2022

KEMENTERIAN PENGAJIAN TINGGI

POLITEKNIK MALAYSIA
UNGKU OMAR

JURNAL KEJURUTERAAN, TEKNOLOGI DAN SAINS SOSIAL

EISSN 2716-6848

VOLUME 8 ISSUE 1
(SPECIAL ISSUE ICRISC2022)

Politeknik Ungku Omar
31400 Ipoh, Perak
05-545 7622/05-545 7656|Faks 05-547 1162
www.puo.edu.my

Hak Cipta/Copyright © Politeknik Ungku Omar

Hak Cipta Terpelihara. Tidak dibenarkan mengeluarkan ulang dalam apa jua bentuk dan dengan apa jua cara, samada elektronik, fotokopi, mekanik, mahupun lain-lain, mana-mana bahagian, ilustrasi atau kandungan jurnal ini sebelum mendapat izin bertulis daripada Politeknik Ungku Omar.

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, whether electronic, mechanical, photocopying, or other, any part, or illustrations of this journal, without prior permission from Polytechnic Ungku Omar.

eISSN 2716-6848

Diterbitkan oleh/Published by:
Politeknik Ungku Omar
Jalan Raja Musa Mahadi
31350, Ipoh
Perak

JURNAL KEJURUTERAAN, TEKNOLOGI DAN SAINS SOSIAL
POLITEKNIK UNGKU OMAR, OCTOBER 2022
VOL. 8 ISSUE 1 (SPECIAL ISSUE-ICRISC2022)
e-ISSN: 2716-6848

International Conference on Research and Innovation in Sustainable Cities (ICRISC 2022)

JKTSS

For further information on the publications, please contact:

Editor JKTSS
Politeknik Ungku Omar
Jalan Raja Musa Mahadi
31400 Ipoh, Perak
Email: editor.jktss@puo.edu.my

JURNAL KEJURUTERAAN, TEKNOLOGI DAN SAINS SOSIAL
POLITEKNIK UNGKU OMAR, OCTOBER 2022
VOL. 8 ISSUE 1 (SPECIAL ISSUE-ICRISC2022)
e-ISSN: 2716-6848

TABLE OF CONTENTS

Paper ID	Title and Authors	Page No.
ID 15	1. **ASSESSMENT OF PRODUCTIVITY RATE IN CONSTRUCTION MANAGEMENT USING IONIC FRAMEWORK** *Famela Tan, Rufaizal Che Mamat, Azuin Ramli*	1 - 29
ID 17	2. **STUDENTS' MATHEMATICS SELF-CONCEPT IN ONLINE LEARNING ENVIRONMENT** *Hashamuddin Yaakob, Noor Farazila Radzi, Md Fauzi Ismail*	30 - 37
ID 20	3. **PERSEPSI PELAJAR DIPLOMA PENGURUSAN LOGISTIK DAN RANTAIAN BEKALAN SEMESTER SATU POLISAS TERHADAP KEBERKESANAN PLATFORM ATAS TALIAN SEMASA AKTIVITI PEMBELAJARAN DAN PENGAJARAN** *Liana A. Samat*	38 - 45
ID 21	4. **PENGGUNAAN GOOGLE SITE SEBAGAI MEDIUM PENGURUSAN DOKUMEN DALAM KALANGAN PELAJAR WBL DI PUO** *Noraziah Hamid, Mazziyatol Farizza Mat, Seri Bunian Mokhtar*	46 - 55
ID 31	5. **KESEDIAAN DAN KEPERLUAN PELAJAR DALAM PEMBANGUNAN M-LEARNING SECARA APLIKASI MUDAH ALIH BAGI KURSUS POWER ELECTRONICS** *Ainul Azniza*	56 - 65

ID 34	**6. MENGKAJI KEBERKESANAN TAKLIMAT KESELAMATAN DAN KESIHATAN DAN LATIHAN PENGUNGSIAN BANGUNAN TERHADAP TAHAP KESEDARAN KESELAMATAN DAN KESIHATAN DI KALANGAN PENGHUNI BLOK V5 DAN V6 KOLEJ KEDIAMAN PELAJAR PSAS.** *Noormala Abdullah, dan Azar Shabudin*	**66 - 78**
ID 35	**7. EXPERIMENTAL STUDY OF NUTRITION FACT OF FREE GLUTEN FLOUR AND CHOCOLATE CUPCAKE DERIVED FROM COCONUT DREG FLOUR THROUGH DEHYDRATION PROCESS** *Hamidah Noor Md Yusoh, Nur Haniza Ewandi Jong, Norshila Md Isa*	**79 - 86**
ID 36	**8. ANTIOXIDANT PROPERTIES OF LIP BALM DERIVED FROM THE PEEL OF RED DRAGON FRUITS (HYLOCEREUS POLYRHIZUS)** *Norshila Md Isa, Nur Haniza Ewandi Jong, Hamidah Noor Md Yusoh*	**87 - 93**
ID 37	**9. ANTIOXIDANT ACTIVITY OF HARD CANDY PRODUCED USING GARCINIA MANGOSTANA PERICARP** *Nur Haniza Ewandi Jong, Hamidah Noor Md Yusoh, Norshila Md Isa*	**94 - 100**
ID 41	**10. ROOFING TILES INNOVATION BASED ON SEASHELLS, COCONUT FIBER AND SODIUM LIGNOSULFONATE** *Mohd Nubli Shahmi Zainal Abidin, and Ibrahim Mohd Zulkifli*	**101 - 108**

ID 42	**11. PENGGUNAAN FACEBOOK PAGE UNTUK MEMPERTINGKATKAN KEMAHIRAN MENULIS DALAM KALANGAN KOMUNITI TVET** *Seri Bunian Mokhtar, Azizah Haron @ Hassan, Kamarudin Yunus*	**109 - 117**
ID 47	**12. MEMBANGUNKAN MESIN PEMPROSESAN JAGUNG UNTUK INDUSTRI KECIL SEDERHANA** *Mohd Hariz Ibrahim, Mohamad Khir Johari Jamaludin, Shahrul Anuar Abd Rahim and Mohd Firdaus Mahayudin*	**118 - 128**
ID 52	**13. SOROTAN TERHADAP PENDEKATAN PEMBELAJARAN PENDIDIKAN ISLAM PELAJAR BERKEPERLUAN KHAS (PBK) PENDENGARAN POLITEKNIK** *Solehah Samsudin, Nur Afifah Saharudin, Hazwani Ubaidillah, Ariyanti Adnan*	**129 - 140**
ID 54	**14. PENERIMAAN PELAJAR TERHADAP PENGGUNAAN TELEFON PINTAR SEBAGAI ALAT PEMBELAJARAN** *Nur Hazwani Nerrahim, Harziah Ahmad*	**141 - 147**
ID 55	**15. A SHARIAH COMPLIANCE INTEGRATED E-COMMERCE TRANSACTION AN ANALYSIS OF SHOPEE.COM: A LITERATURE REVIEW** *Armila Mat Lazim, Sharifah Zuhaira Syed Mizuri*	**148 - 158**
ID 56	**16. CONSUMER INTENTION TO ADOPT ONLINE BANKING IN MALAYSIA : A LITERATURE REVIEW** *Sharifah Zuhaira Syed Mizuri, Armila Binti Mat Lazim*	**159 - 171**

ID 58	**17. BIMAR WEB APPLICATION FOR ISLAND RECLAMATION PROJECT** *Shirley Chai Jia Lin, Samikhah Muhammad@Munir*	**172 - 184**
ID 59	**18. TAHAP PENGUASAAN KEMAHIRAN GENERIK DALAM PROSES PENGAJARAN DAN PEMBELAJARAN DIKALANGAN PELAJAR POLITEKNIK TUANKU SYED SIRAJUDDIN, PERLIS** *Noor Halawati Che Meh dan Mas Guieta Aton*	**185 - 196**
ID 60	**19. KAJIAN KEROSAKAN TURAPAN JALAN DI BANDAR BARU BANGI, SELANGOR** *Muhammad Syamir Hafiy Hussain, Abu Hanifah Yusof, Muhamad Razuhanafi Mat Yazid, Mohd Azizul Ladin*	**197 - 206**
ID 61	**20. TOWARDS AN INTEGRATED ELECTRONIC WORKFORCE INTEGRATION TRACKING SYSTEM** *Muhammad Azmeer A Bakar, Azuin Ramli , Rufaizal Che Mamat, Arman Meohan*	**207 - 213**
ID 64	**21. DEVELOPMENT OF VISUALIZE OFFLINE TEACHING (VIOT) METHOD – TOOL BIT GRINDING TECHNIQUES FOR BEGINNERS** *Muhammad Arieef Hussain, Sazali Md Hasan, Adi Firdaus Hat*	**214 - 226**

ID 66	**22. THE EFFECTIVENESS OF USING GRAPHS AND CHARTS VIDEO PRESENTATION GUIDELINES FOR DUE50032 COMMUNICATIVE ENGLISH 3** *Fazlind Mohd Shuraimi, Nalanie Raja Gobal and Bong Rose Lin*	**227 - 241**
ID 67	**23. A STUDY ON LEARNERS' PERCEPTIVENESS OF TRANSITIONAL SPACES AS INFORMAL ACADEMIC LEARNING SPACE IN UNGKU OMAR POLYTECHNIC** *Ramu A/L Velusamy, Naeemah Yusof, and Awangku Isma Muzafar Pg Bagul*	**242 - 251**
ID 69	**24. APPLYING UTAUT MODEL TOWARDS THE CAPABILITIES OF SME ENTREPRENEURS AND DIGITAL PLATFORMS** *Nor Aziza Abdul Aziz, Supaat Hj Zakaria@Jawahir, Mardiyana Marzuki*	**252 - 262**
ID 70	**25. ANTI-SMELL AND COMPOST POWDER (ASC)** *Babby Freskayani @Izyani Kaliwon, Nor Aziah Fatma Abdul Ayah @ Abdul Aziz, Jevoey Stand Lee Melin, Donathan Donic, Nur Khaleda Lalim, Dimar Abdul*	**263 - 274**
ID 72	**26. COLLABORATION AND INDUSTRY INVOLVEMENT ENHANCES THE EMPLOYABILITY OF BCT PUO GRADUATES** *Samikhah Muhammad@Munir, Mazziyatol Farizza Mat, Noraziah Hamid*	**275 - 285**

ID 75	**27. STUDY ON THE EFFECT OF THE USE OF FREQUENTLY ASKED QUESTION (FAQ) TEMPLATES IN MANAGING AUCTION PROCESS** *Husni Nazra Abu Bakar, Aida Tukiran, Muhammad Nazmi Isa*	**286 - 293**
ID 76	**28. SWIMMING POOL WATER QUALITY: A CASE STUDY FOR CHLORINE ALTERNATIVE SWIMMING POOL** *Joan Wang Yee Juen, Jason William Vitales, Nicole Audrey, Suhanida Ladah, and Mohd Khairul Ikhwan*	**294 - 302**
ID 78	**29. LOW THERMAL CONCRETE** *Abdull Sulaiman Ismil, Mohd Isa Jaffar*	**303 - 313**
ID 79	**30. DETERMINANT OF EMPLOYEE'S RETIREMENT PLANNING: A LITERATURE REVIEW** *Norashikin Rosli*	**314 - 325**
ID 80	**31. INTELLIGENT RAILWAY SAFETY DETECTION DEVICE AT RAILWAY PLATFORM** *Sunitha V. Doraisamy, Izwah Ismail*	**326 - 333**
ID 85	**32. REKABENTUK PENUTUP LONGKANG KONKRIT MESRA ALAM** *Nur Hanani Daud, Saiful Hazman Mokhtar dan Ernie Kulian @ Abd Karim*	**334 - 341**

ID 86	**33. EVALUATION OF PROGRAMME EDUCATIONAL OBJECTIVES FOR CIVIL ENGINEERING TECHNOLOGY PROGRAMME WITH WORK-BASED LEARNING APPROACH** *Yong Rashidah Mat Tuselim, Azuin Ramli, Rufaizal Che Mamat*	**342 - 351**
ID 100	**34. ANALISIS KUALITI AIR MENGGUNAKAN PENAPIS EASY MICRON WATER FILTER** *Ernie Kulian @ Abd Karim, Saiful Hazman Mokhtar and Nasriah Ashikin Mat Nadzir*	**352 - 358**
ID 101	**35. REALITI MAYA INTERAKTIF (VRi) DI LOJI RAWATAN AIR** *Saiful Hazman Mokhtar, Ernie Kulian @ Abd Karim dan Wan Nurul Hasinah Wan Kamarudin*	**359 - 368**
ID 109	**36. KURIKULUM PENGAJIAN ISLAM DAN PENDIDIKAN MORAL DALAM PEMBENTUKAN SAHSIAH BERKUALITI: SATU KAJIAN DI POLTEKNIK MUKAH** *Fatin Faqeriah Hamsah, Termimi Hidayat Mahyan, Farah Hanan Abu Bakar*	**369 - 382**
ID 110	**37. PENGUASAAN KEMAHIRAN BERFIKIR ARAS TINGGI (KBAT) PELAJAR DALAM PEMBELAJARAN BERASASKAN PROJEK** *Farah Hanan Abu Bakar, Fatin Faqeriah Hamsah, Lezawati Seron*	**383 - 393**

ID 113	**38. KAJIAN LITERATUR TAHAP KESEDIAAN PENGAJARAN DAN PEMBELAJARAN DI RUMAH (PDPR) DI KALANGAN PELAJAR, TENAGA PENGAJAR DAN IBUBAPA** *Fadilah Ahmad dan Nor Aqilah Abdul Hamid*	**394 - 403**
ID 115	**39. EXPERIENTIAL LEARNING IN GREEN BUILDING TECHNOLOGY USING AUGMENTED REALITY** *Sharinatol Akmanida Jamaludin*	**404 - 414**
ID 81	**40. RESEARCH OF WASTE DISPOSAL PROBLEM IN PANTAI SIRING RESIDENT AREA** *Hj. Zamali Omar and Nurul Fatiha Ain Azman Putera*	**415 - 424**

ASSESSMENT OF PRODUCTIVITY RATE IN CONSTRUCTION MANAGEMENT USING IONIC FRAMEWORK

Famela Tan[1], Rufaizal Che Mamat[2] and Azuin Ramli[3]

[1,2,3]Department of Civil Engineering,
Politeknik Ungku Omar, Jalan Raja Musa Mahadi,
31400 Ipoh, Perak, Malaysia
[1]famela.jane98@gmail.com

Abstract: Site management is critical in construction, but from the observation made, the issue is about documentation and reporting compilation which is difficult and wastes time to analyze productivity rate. The issues are specified for key in data for manpower and machinery of mast installation for overhead catenary system (OCS) that uses the standard or traditional way such as daily site report in main office Kluang, Johor. This report is to develop an application of daily site report for assessment of productivity rate using Ionic Framework. The outcome of this development was tested in term of functionality to collected data using E-DSR and the respondents show 100% agreement on this product. Finally, this product can be used to produce productivity rate in OCS.

Keywords: *construction management, development, application, productivity rate, ionic framework*

1. Introduction

Civil engineering technicians and technologists assist civil engineers in planning, designing, and constructing infrastructure and development projects. The construction industry is notorious for its resource planning, risk management, and logistic issues, resulting in design flaws, project delays, cost overruns, and contract conflicts (Akinosho, 2017). As a consequence of utilising energy and consuming resources, the construction industry has a significant adverse effect on the environment, manufacturing waste materials and emitting greenhouse gases (Trindade et al., 2020). As a result, all of these have negative environmental consequences for the ecosystem. According to Hossain and Ng (2020), the need of incorporating sustainability in civil construction has been recognised in recent years. Furthermore, industries and organisations understand the value of safeguarding the future while achieving success in the present. Sustainability is most often understood as combining three pillars into design: economics, environmental, and social concerns (Braham, 2017). As the importance of sustainable development grows, more publications on sustainability in the building are being released. Sustainable, creative, and efficient structural design is recognised as is a model for structural health monitoring of high-rise structures, including sustainability in high-rise building design and integrated planning for sustainable construction (Zavadskas et al., 2017).

Site management is critical in construction, but from the observation made, the issue is about documentation and reporting compilation which is difficult and wastes time to analyse productivity rate. When in site, a daily site report is an essential document for the collected data. The data such as time, manpower, machinery and others are vital to measure the productivity rate. These issues can be proved by using the studies that had been made before. Corporate social responsibility (CSR) actions may be effectively communicated via various media, including CSR reports, annual reports, company websites, and social activities, including creating links with non-governmental organisations. However, there is no such systematic content analysis technique (Liao,2017). Key in the data to the datasheet by referencing from other documents is wasting time. This was already proved when most of the studies mentioned these issues in construction management and other management. For example, Oswald (2018) stated that although there is minimal evidence on the usefulness of safety observation reporting (SOR) in reality, many big construction companies employ it as part of their site safety management system. Despite its excellent intentions, the SOR system has issues. These included: significantly increased administration to deliver predictable data; poor data quality; an unwelcome focus on the number of reports rather than their content; their use as a tool to assign individual or organisational blame; and the perception that the SOR forms were being censored before they reached the health and safety team, which eroded trust between the workforce and management. Document management is a difficult task. Contracts, compliance paperwork, drawings and specifications, and other documents all help to guarantee that a project runs well. These papers are crucial in the building process (Chalhoub and Ayer, 2018).

Failure to manage issues, which transmit crucial observations, may result in delays, quality difficulties, or even the total loss of the software project. Various project stakeholders, such as project managers, developers, and even end-users, utilise issue trackers jointly (Mikko, 2021). Internet of thing (IoT) is commonly used in building projects to improve communication between multiple stakeholders throughout the design and construction stages (Svalestuen, 2017). However, IoT implementation in construction project monitoring has been hampered by various challenges such as the unpredictable speed of work, constantly changing site surroundings, and the necessity for frequent synchronisations (Sheikhkhoshkar et al., 2019). IoT is one of the solution that can be made for the issues which is using Ionic and firebase. It is seen that the issues in management not only in construction but also in other businesses, but this study will focus on management in site construction. More specifically, it is about the problem key in data for the mast installation for overhead catenary system (OCS) that uses the standard or traditional way such as daily site report. Thus, the solution for these issues can be solved by using technology which is by creating a platform for building mobile experiences with the web that called Ionic Framework and Firebase as it database. Technology systems or technical systems are defined as machines that apply technology by accepting an input, modifying it according to the system's intended function, and then creating an output. The most fundamental type of technology is the creation and use of simple tools. The innovation using technology can make any documentation for construction be paperless. These will gave lots of advantages to the companies' such reduce money to buy paper (Selbst et al., 2019).

This study was for China Rail Johor Gemas Railways (CRJGR) project. The China Rail Johor Gemas Railways (CRJGR) has five sections which are from Gemas to Johor Bahru. Figure

1 below shows the location of each area for installation mast OCS in five sections but this study focus at main office at Kluang, Johor which is in section three. Site engineer in each section has to do their daily site report for reporting to the office and keep it as data for the planner engineer. This study focuses on making planner engineers work easier on tracking the data from the daily site report. The application that will develop will quickly collect the data and analyse it to measure the productivity rate. The number of output divided by the volume of inputs is frequently referred to as productivity rate (Parc, 2020). In other words, it assesses how effectively a country's production inputs, such as labour and capital, are employed to generate a particular amount of output. Productivity rate is a crucial source of economic development and competitiveness, and it is used as the basis for many international comparisons and evaluations of country performance (Dieppe et al., 2021). Productivity rate, for example, is used to look at the effects of product and labour market laws on economic performance. Productivity rate is an essential factor to consider when calculating an economy's productive potential (Daraio et al., 2018). This application will improve the productivity rate by collecting all the data in the site and the data will accumulate in the database. From the data that already restore in database which is in firebase database. The data will analyse automatically in the application to produce the productivity rate. This application can be used for site engineers, site supervisors and planner engineers. The data of this productivity rate will be focusing on OCS for mast installation. This study will use the observation, engagement which is interview and self - experiences method to create the problem statement and research to study more about the application. As the result, the method that will be used is a questionnaire. The questionnaire will distribute to only 15 selected engineers in construction site.

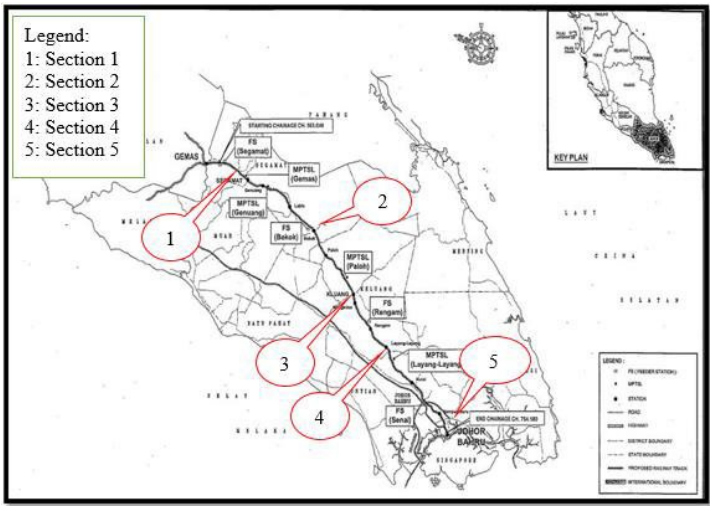


Figure 1. Locations of site project.

The aim of this study is to develop daily site report application for productivity rate assessment that can solve the issue of documentation, reporting compilation and tracking in site management that had been stated in the problem statement which is to identify the issues of data collection for manpower and machinery in mast installation of overhead catenary system (OCS). Besides, to develop a daily site report application that can collect manpower and machinery data for mast installation of overhead catenary system (OCS) using Ionic Framework and to evaluate the effectiveness of daily site report system in term of functionality. This study focuses on mast installation OCS, but the application can be used

for other elements as long as needed for track and productivity rate. In construction, the engineer will always use the productivity rate to plan ahead of the progress of the construction. This application is expected to be used in not only construction companies but also in management. Due to the tracker and productivity rates are used in construction and used in other management companies. This application is not only sustainable, but it also keeps introducing IR 4.0 to companies and let them practice using applications instead of papers.

2. Materials and Methods

The method that been used for findings the targeted person, problem and the details of the problems are using observation, engagement which is through interview and self – experiences. Table 1 below show the description of the method that had been used. While Figure 2 is about the findings after the observation, interview and self – experiences. From the Figure 2, it is known that the aim people for the project are planner engineer, site engineer and site supervisor because they related. For example, site engineer and site supervisor are collecting the data from the site and the data will be given to planner engineer for producing the productivity rate that to compare the actual progress in site and planning progress. The issues that had been identified is regarding the site management documentation.

Table 1. Research Method used address Research Objectives.

Method	Details
Observation	The observation had been made since week 1 during Work Base Learning (WBL) to find the problem in company. The issues that had been identified is regarding site management for documentation part.
Engagement: Interview	From the interview with the planner itself, it is proved that it Quite difficult to track the data for mast installation due to lots of data since CRJGR project has 5 sections.
Self – experiences	As for self – job scope during WBL, supervisor gave a task to track the date of working progress. This task took too much Time due to lots of Daily Site Report (DSR) from each section. The date of construction progress is referencing DSR.

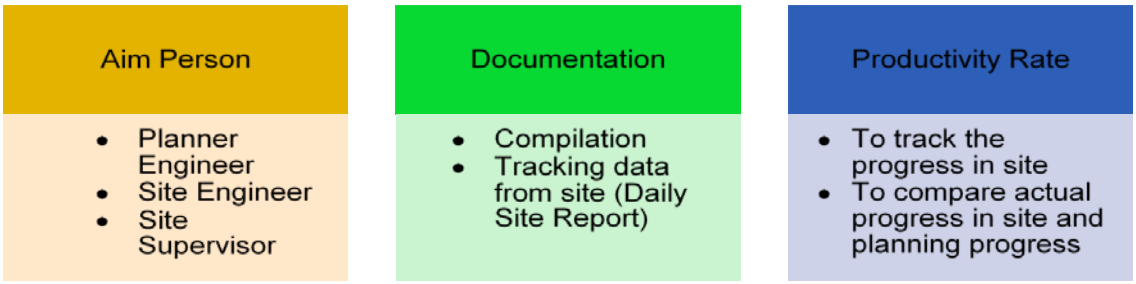


Figure 2. The process of this study.

2.1 Identify Main Problem

It is already defined the problem or issues in the company. It is about documentation, reporting compilation and tracking data which is difficult, wastes time and non-sustainable to measure productivity rate. One the task that had given by mentor industry is key in the data from the daily site report in Aconex sever to produce the productivity rate for mast installation in 5 sections. It is wasting time due to lots of daily site report since 31st October 2019. This documentation not only occur in this company but also in others company. Aconex sever is the software where all the documentation of the company is kept. Figure 3 below shows the Aconex sever while Figure 4 shows the productivity rate template for mast installation. From this problem, the next phase is will introduced the solution.

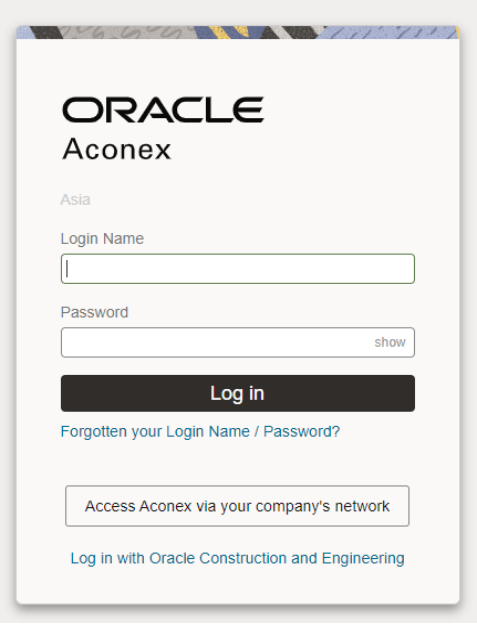
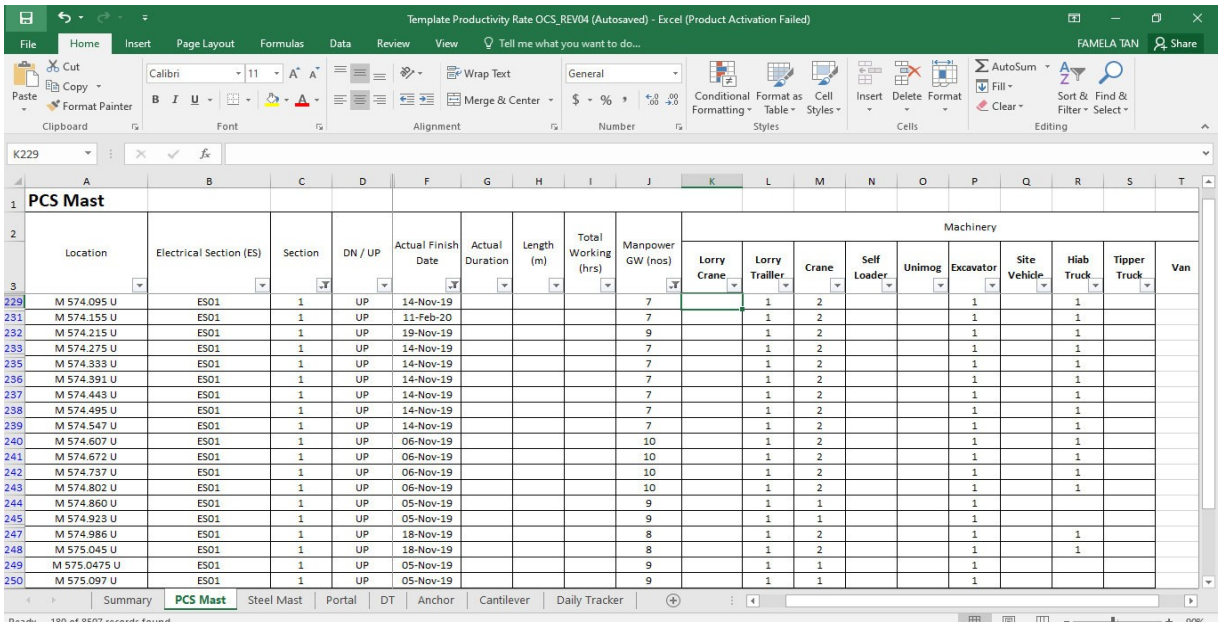


Figure 3. Aconex application



Template Productivity Rate OCS_REV04 (Autosaved) - Excel (Product Activation Failed)

PCS Mast

	Location	Electrical Section (ES)	Section	DN / UP	Actual Finish Date	Actual Duration	Length (m)	Total Working (hrs)	Manpower GW (nos)	Machinery								
										Lorry Crane	Lorry Trailler	Crane	Self Loader	Unimog	Excavator	Site Vehicle	Hiab Truck	Tipper Truck	Van
229	M 574.095 U	ES01	1	UP	14-Nov-19				7		1	2			1		1	
231	M 574.155 U	ES01	1	UP	11-Feb-20				7		1	2			1		1	
232	M 574.215 U	ES01	1	UP	19-Nov-19				9		1	2			1		1	
233	M 574.275 U	ES01	1	UP	14-Nov-19				7		1	2			1		1	
235	M 574.333 U	ES01	1	UP	14-Nov-19				7		1	2			1		1	
236	M 574.391 U	ES01	1	UP	14-Nov-19				7		1	2			1		1	
237	M 574.443 U	ES01	1	UP	14-Nov-19				7		1	2			1		1	
238	M 574.495 U	ES01	1	UP	14-Nov-19				7		1	2			1		1	
239	M 574.547 U	ES01	1	UP	14-Nov-19				7		1	2			1		1	
240	M 574.607 U	ES01	1	UP	06-Nov-19				10		1	2			1		1	
241	M 574.672 U	ES01	1	UP	06-Nov-19				10		1	2			1		1	
242	M 574.737 U	ES01	1	UP	06-Nov-19				10		1	2			1		1	
243	M 574.802 U	ES01	1	UP	06-Nov-19				10		1	2			1		1	
244	M 574.860 U	ES01	1	UP	05-Nov-19				9		1	1			1			
245	M 574.923 U	ES01	1	UP	05-Nov-19				9		1	1			1			
247	M 574.986 U	ES01	1	UP	18-Nov-19				8		1	2			1		1	
248	M 575.045 U	ES01	1	UP	18-Nov-19				8		1	2			1		1	
249	M 575.0475 U	ES01	1	UP	05-Nov-19				9		1	1			1			
250	M 575.097 U	ES01	1	UP	05-Nov-19				9		1	1			1			

Figure 4. Spreadsheet of productivity rate.

2.2 Idea for Problem Solution

As the problem is regarding the documentation and reporting compilation which is wastes time due to many data, non-sustainable and difficult to measure productivity rate. These traditional or usually methods that only using paper for daily site report will develop to modern way which is using application that is sustainable, easy to use, save time and direct analysing data. Sustainability pillar number 2 which is Advanced Design Software (Use software and database for planning, simulation, dimensioning etc). Figure 5 below shows the transformation in this project

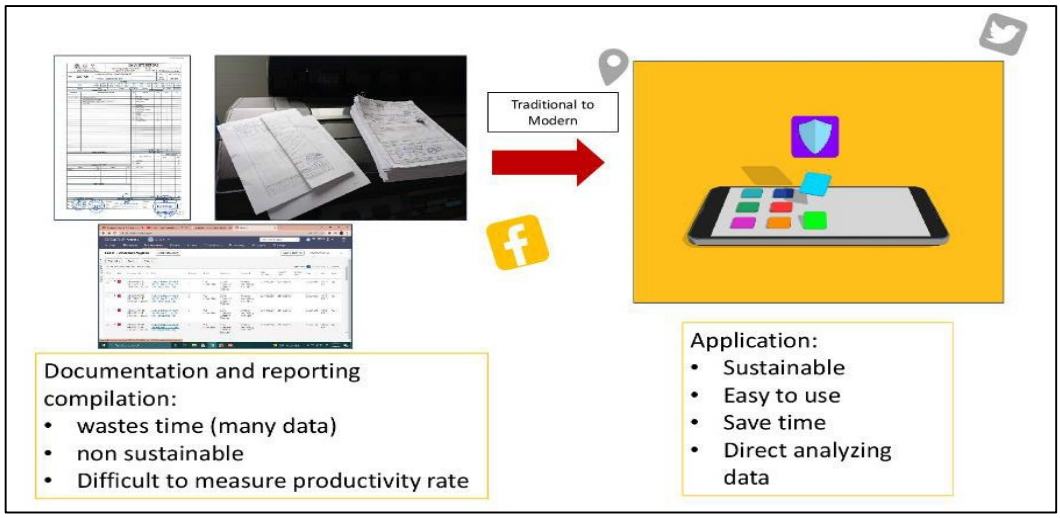


Figure 5. Transformation in the Project.

2.3 Prototype

Prototype create in order to study the issue solutions created in the previous stage. Prototypes may be shared and tested inside the design team, in other departments, or on a small group of individuals who are not part of the design team. This is an experimental phase whose goal is to find the best solution for each of the challenges highlighted in the previous three phases. The answers are implemented in the prototypes one by one, and based on the users' experiences, they are either approved, enhanced, and re-examined, or rejected. By the conclusion of this stage, the design team will have a better understanding of the product's restrictions and issues, as well as a better understanding of how actual users will behave, think, and feel while engaging with the final product. Figure 6 below shows the prototype of this project and Table 2 is regarding how to use it. This prototype is development of daily site report to the application.

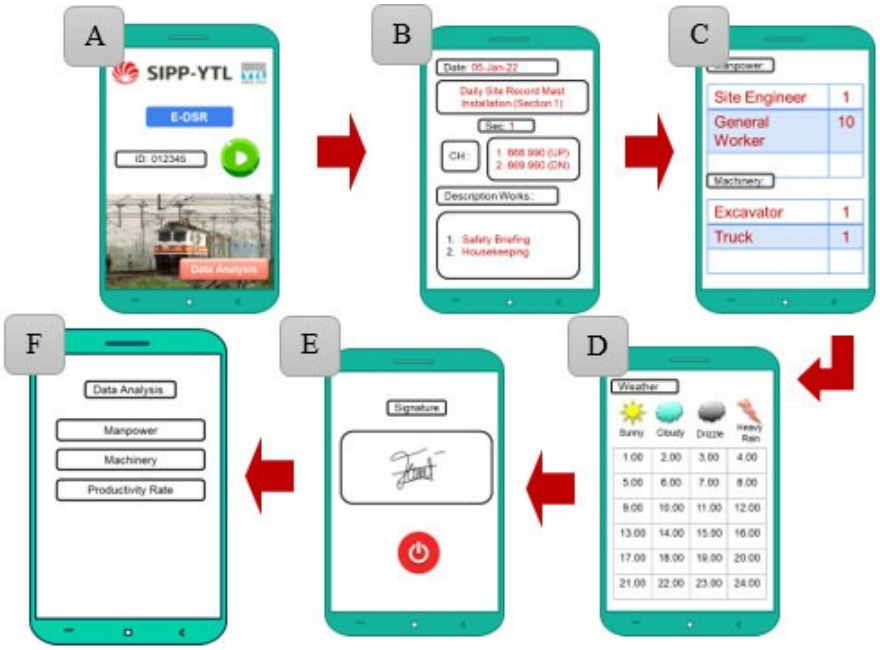


Figure 6. Prototype of E-DSR.

Table 2. Procedure using E – DSR.

Process	Details
A	The user has to enter their staff ID. Then press the "start" button to fill in their details of daily site report.
B	The user has to fill in the details at the site construction as record for daily site report.
C	The user has to fill in the details of manpower and machinery as record for daily site report.
D	This part is for weather details. The user needs to record the weather an hour. First, they need to press the time and the icon will pop up. Then, they will need to choose the weather for that time.
E	They should put their digital or photo of signature. Then press the "end" button finish their daily site report and all the data will store in database for analysis.
F	To see the analysis either by days, weeks or months can be seen by press the "Data Analysis" button. The three items are manpower, machinery and productivity rate. These analyses will produce automatically.

2.4 Application Development

The application develops by using Ionic Framework. This application renamed as E – DSR can function as collecting data, analyse data and measure productivity rate. Figure 7 below show the flowchart how this application function. The details of each items are explaining in Table 3 while figure 8 below shows the flowchart in developing the application.

Figure 7. Flowchart of the study.

Table 3. This is a table Explanation of Application E – DSR.

Function	Details
Data Collection	This application function as data collection. The users such as site engineer use it to key in the data such as manpower and machinery or others element depending on their site. As for this product, it will be focusing on mast installation in railways. This application will be collecting all the data in the site and the data will accumulate in the database which is using Firebase Database.
Analyse Data	The data will automatically generate and analyse in the application. This is because all the data can be seen in the application.
Measure Productivity Rate	The productivity rate will automatically generate and produce in the application.

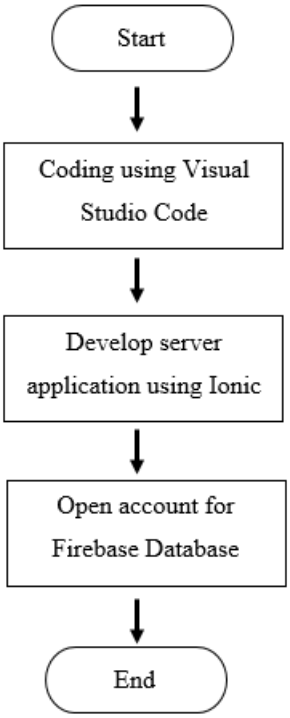


Figure 8. Flowchart of E – DSR development.

Figure 9 below show the coding that using Visual Studio Code. The first step for developing this application is creating coding. Coding means the act of giving anything a code in order to be classified or identified.

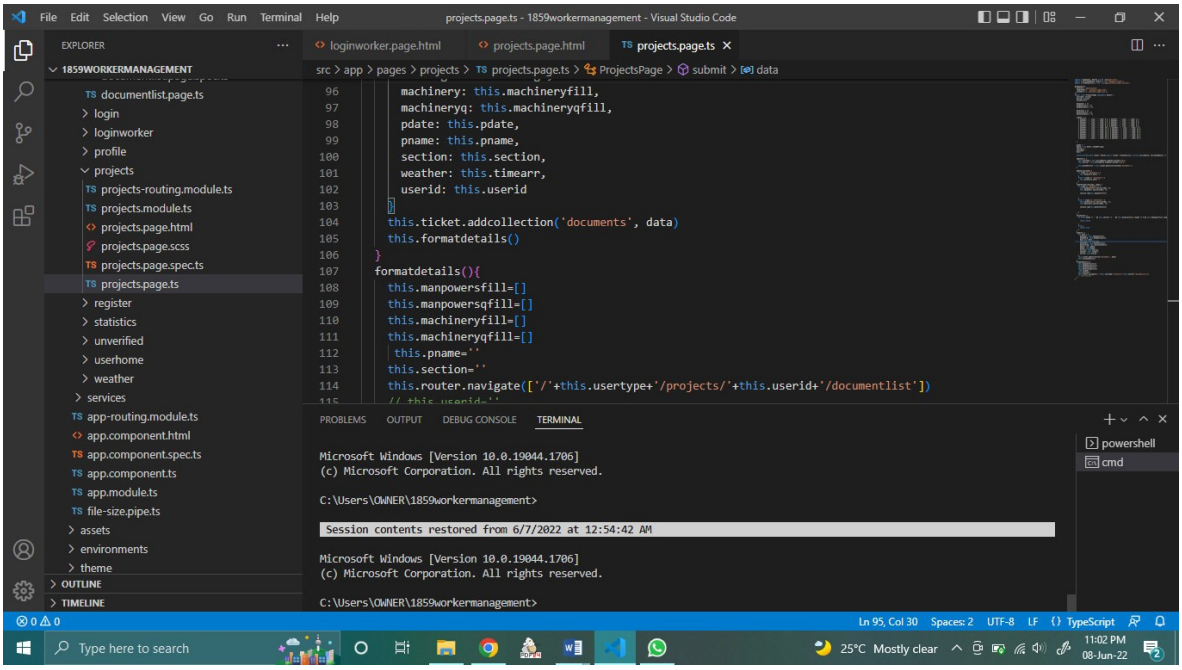


Figure 9. Programming for E – DSR development.

Figure 10 below show the second step which is developing server application using Ionic Framework. While Figure 11 below show the interface of E-DSR that already developed.

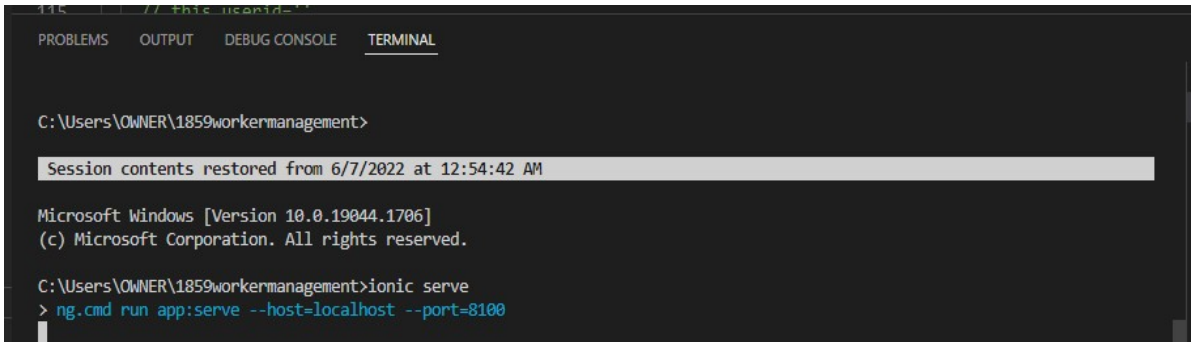


Figure 10. Server of application

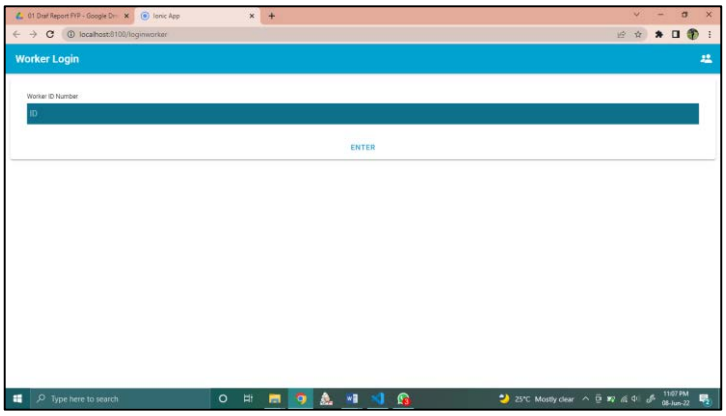


Figure 11. Interface of E – DSR development

Figure 12 below show the account for firebase of database. Firebase of database act as storage for the file to back up.

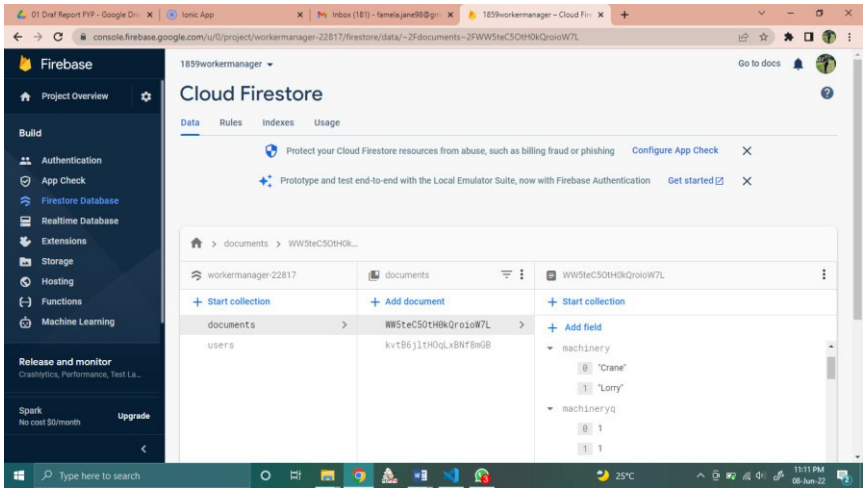


Figure 12. Firebase of database

Figure 13 below show how to operate or run the application and table 4 below is the explanation of the application.

Figure 13. Content of E - DSR.

Table 4. Instructions for using the E – DSR.

Legend	Details
A.	This is for admin view page. The admin will login using the email that had been provided.
B.	The admin can view these 3 items. Admin can manage the user.
C.	Admin can view the documents and the statistic is data of productivity rate.
D.	In this section, the admin can add or remove users. Admin also can change other users to admin
E.	This section is for adding the users.
F.	The productivity rate data that already measured by using data from the documents
G.	Enter ID to login. The key in the data section. This section is for the engineer to fill in their daily site report

2.5 Validate of Application

After the application been developed, it will validate or prove the effectiveness of the function. The method that will used to validate this application is the standard method which is questionnaire method. A questionnaire is a popular data gathering strategy that is an important aspect of any research project. According to Ikart, E. M. (2019), pretesting a questionnaire is a basic way for determining whether a questionnaire may cause problems for respondents or interviewers in advance. As a result, seasoned researchers and survey methodologists have deemed questionnaire pretesting essential. There are a few crucial factors when it comes to survey questionnaire design best practises. Establishing pertinent information, study aims and objectives, data gathering techniques, questionnaire clarity and writing style, question structure, appearance and feel, the flow, and questionnaire pretesting are only a few of them (Ikart, 2018).

The questionnaire will be created using Google Form. Fatria and Listari (2017), mentioned that Google Drive might make teaching and learning more dynamic and inventive, resulting in learning-based learning. Iqbal, M., Rosramadhana, Amal, B.K., and Rumapea, M.E. (2018), the Google Form as a tool for assigning Social Science courses. The assignment may be completed online using the following link. There are many templates in google form that can be used to make a questionnaire. The questionnaire was distributed by WhatsApp on the site. This project distributed the questionnaire 15 selected which is planner, site engineer and site supervisor. The video on how to use the application was also uploaded in the YouTube page (https://www.youtube.com/watch?v=AkS6z-AKccg). Figure 14 below shows the distribution questionnaire on site.

Figure 14. Questionnaire distribution in site

3. Results

The failure management regarding the documentation especially in daily site report in the construction due too much papers to handle. Regarding this issue, application had been developed which is E – DSR. This application is a fantastic approach to gather, assess and compute the productivity rate. The data will be simpler to track as a result. It is anticipated that the programme will be created to make chores or occupations easier for planning engineers, site engineers, and site managers. Additionally, the

company now uses paper for daily site reports, which is not sustainable, especially in a sustainable environment, in an effort to reduce paper waste. This programme not only promotes IR 4.0 to businesses and gives them the opportunity to practise using the Internet of Things (IoT) in place of paper, but it is also sustainable.

This application function as data collection. The users such as site engineer use it to key in the data such as manpower and machinery or others element depending on their site. As for this product, it will be focusing on mast installation in railways. This application will be collecting all the data in the site and the data will accumulate in the database which is using Firebase Database. The data will automatically generate and analyse in the application. This is because all the data can be seen in the application. The productivity rate will automatically generate and produce in the application. The result shows from the questionnaire that has been distributed to selected respondents which consists of Site Engineer, Planner Engineer and Site Supervisor Quantity. These surveys have been conducted to 15 respondents. This survey conducted to know the effectiveness of E – DSR. The results obtained will present a complete of result and analyzes of the study in the form of tables, graphs and figure so that the key information is highlighted.

3.1 Data Analysis

This questionnaire has three sections, Section A, Section B, Section C and Section D. Section A is about the background information. The background and respondent information is shown in Section A. Section B is for data collection with is to identify the issues of data collection for manpower and machinery data in mast installation of overhead catenary system (OCS). While Section C is for development of application and Section D is for to evaluate the effectiveness of daily site report application that can collect manpower and machinery data for mast installation of overhead catenary system (OCS) using Ionic Framework.

3.2 Distribution of mean score (Agreement Level)

In mathematics and statistics, the idea of mean is crucial. The most typical or average value among a group of numbers is called the mean. It is a statistical measure of a probability distribution's central tendency along the median and mode. It also goes by the name "anticipated value". Su A type of psychometric response scale in which responders specify their level of agreement to a statement typically in five points.

Mean Score	Interpretation of Mean Score
1.00–2.00	Low
2.01–3.00	Moderately Low
3.01–4.00	Moderately High
4.01–5.00	High

Figure 15. Mean score for 5 Point Scale (Norasmah & Sabariah, 2007; Norasmah & Salmah, 2011)

Cohen's Kappa always ranges between 0 and 1, with 0 indicating no agreement between the two raters and 1 indicating perfect agreement between the two raters.

Cohen's Kappa	Interpretation
0	No agreement
0.10 - 0.20	Slight agreement
0.21 - 0.40	Fair agreement
0.41 - 0.60	Moderate agreement
0.61 - 0.80	Substantial agreement
0.81 - 0.99	Near perfect agreement
1	Perfect agreement

Figure 16. Mean Score for 2 Point Scale (Ho et al., 2019)

3.3 Respondents (Questionnaire)

As for the questionnaire, the section A is regarding the details of respondent such as gender, age, occupation and work experiences.

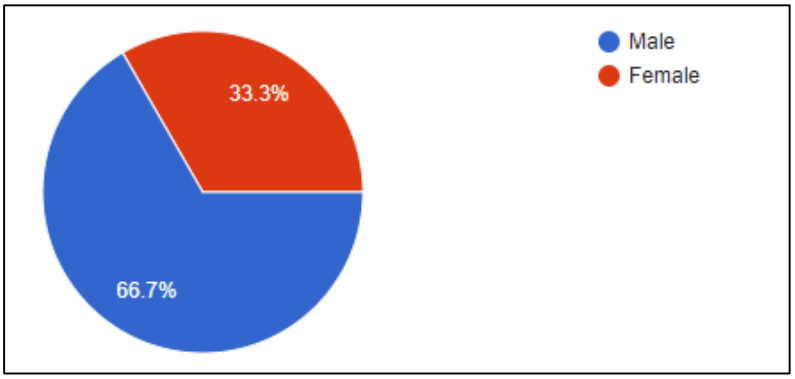


Figure 17. Percentages by the gender

From Figure 17 above it can be seen that the 15 respondents consist of 10 (66.7%) male and 5 (33.3%) female. The difference percentage between male and female is 33.4%. This different expected due to there are more male working in site office than female. It is a logical when employer employed more male staff at site. Table 5 below show the summary of gender respondent.

Table 5. Summary of gender respondent.

Gender	Respondent	Percentages
Female	5	33.3%
Male	10	66.7%

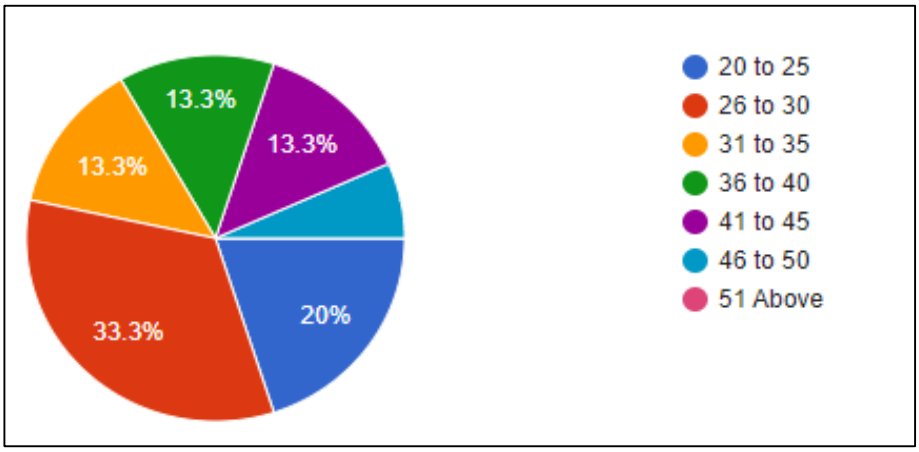


Figure 18. Percentages of ages respondent

From Figure 18 above it can be seen that the 15 respondents consist of 6 category of ages which is 20 to 25 years old, 26 to 30 years old, 31 to 35 years old, 36 to 40 years old, 41 to 45 years old and 46 to 50 years old. The highest age is 26 to 30 years old which is 5 respondents. Table 6 below show the summary of age respondent.

Table 6. Summary of age respondent.

Ages	Respondent	Percentages
20 to 25	3	20.0%
26 to 30	5	33.3%
31 to 35	2	13.3%
36 to 40	2	13.3%
41 to 45	2	13.3%
46 to 50	1	6.67%
51 Above	0	0.00%

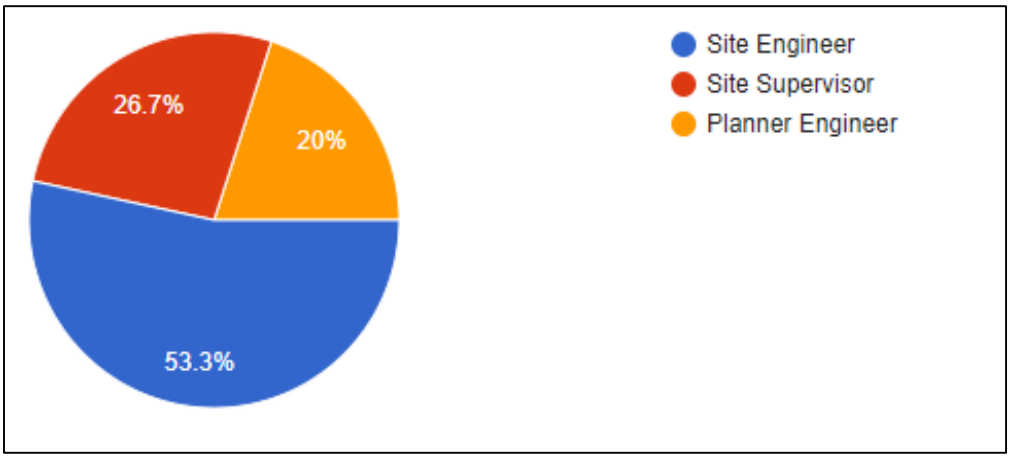


Figure 19. Percentages by the types of occupation.

From Figure 19 above it can be seen that the 15 respondents consist of 3 category of occupation which is Site Engineer, Site Supervisor and Planner Engineer. The highest occupation is Site Engineer which is 8 respondents. Table 7 below show the summary of occupation respondent.

Table 7. Summary occupation respondent.

Occupation	Respondent	Percentages
Site Engineer	8	53.3%
Site Supervisor	4	26.7%
Planner Engineer	3	20.0%

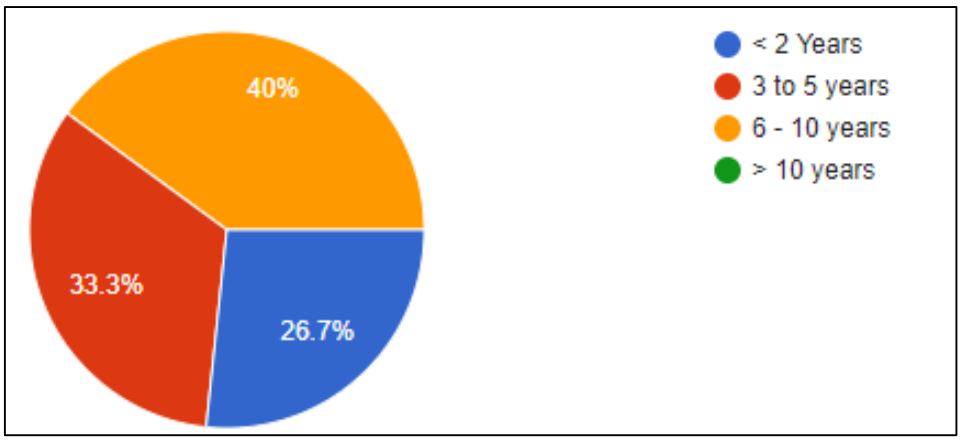


Figure 20. Percentages by the work experiences.

From Figure 20 above it can be seen that the 15 respondents consist of 3 category of work experiences which is below 2 years, 3 to 5 years and 6 to 10 years. The highest occupation is Site Engineer which is 8 respondents. Table 8 below show the summary of work experiences respondent.

Table 8. Work Experiences Respondent.

Work Experiences	Respondent	Percentages
< 2 years	4	26.7%
3 to 5 years	5	40.0%
6 to 10 years	6	33.3%
> 10 years	0	0.00%

3.4 The Effectiveness between Data Collection and Respondent

This part of analysis will analyse between section A and section B from the questionnaire. Figures below shows the analysis that taken from the questionnaire.

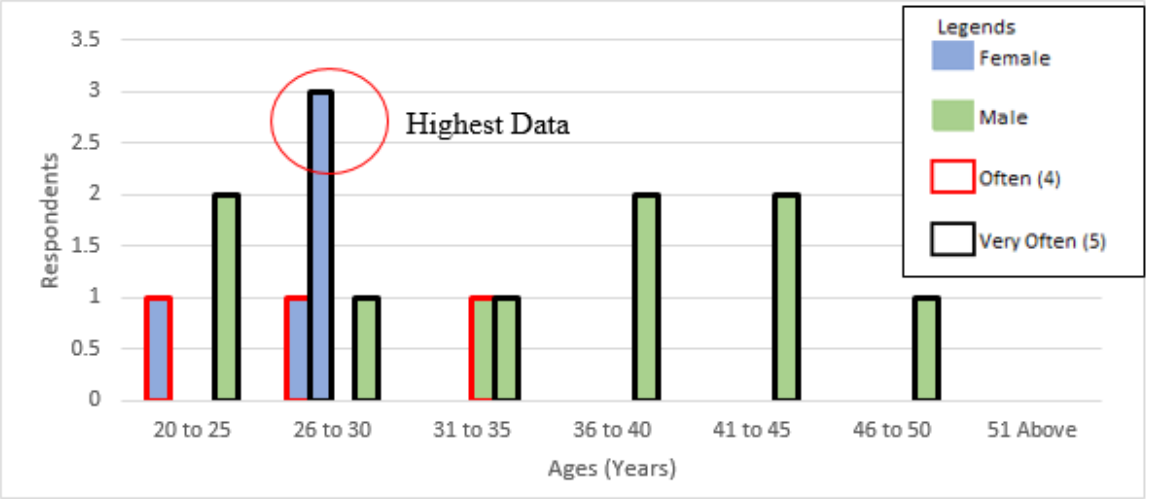


Figure 21. The often respondent using daily site report

From Figure 21 above, it is show bar graph regarding first question in section B about how often the respondent using daily site report (DSR) in site. The 'X' axis of this graph is ages of the respondent and "Y' axis is number of respondents. This question has scale which is 1 to 5 and 1 refer to rarely and 5 refer to very often. Majority of the respondent respond that they very often using DSR in site which is shown in the graph with black bar line while the red bar line is representing scale 4 that is often. The mode of this graph is female in age range 26 to 30 years which is 3 respondents. Percentages differences between the highest and lowest female is 40.0% while male is 20.0%. Mean is 4.87 while standard deviation is 0.339 and variance is
0.116. Besides, majority respondent is at age range 26 to 30 years which is 5 respondents. The result to be expected due to that DSR is used in site. According to Wu et al. (2021), every construction industry is using DSR in their site.

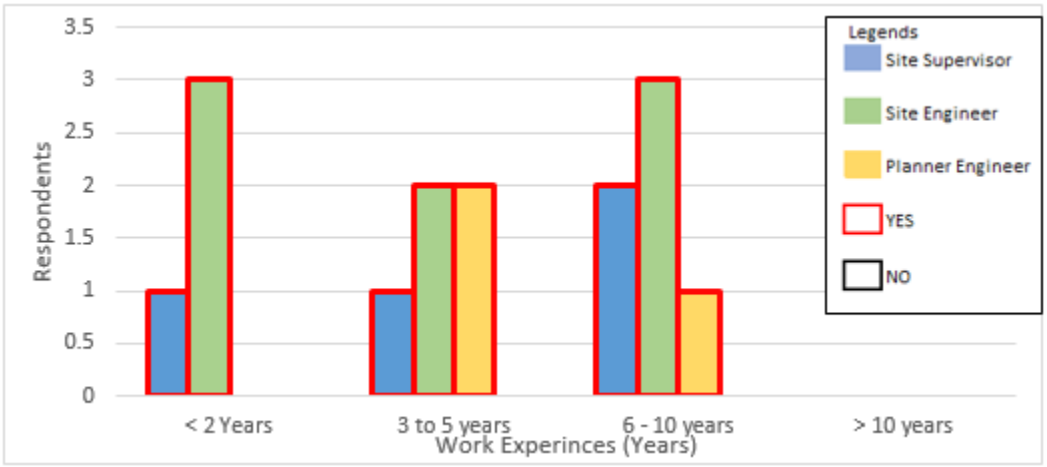


Figure 22. Daily site report for reporting.

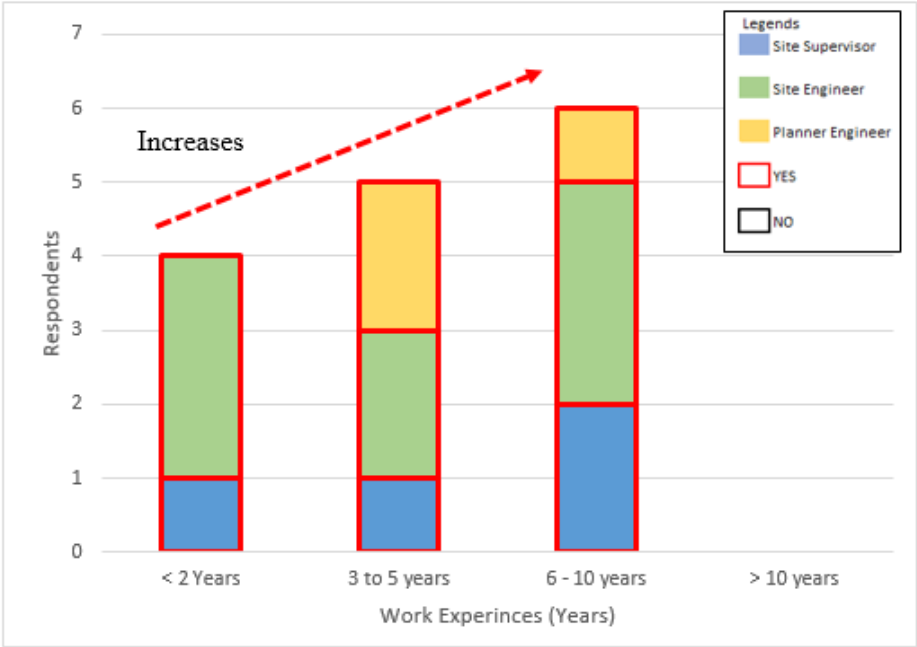


Figure 23. Daily site report for documentation.

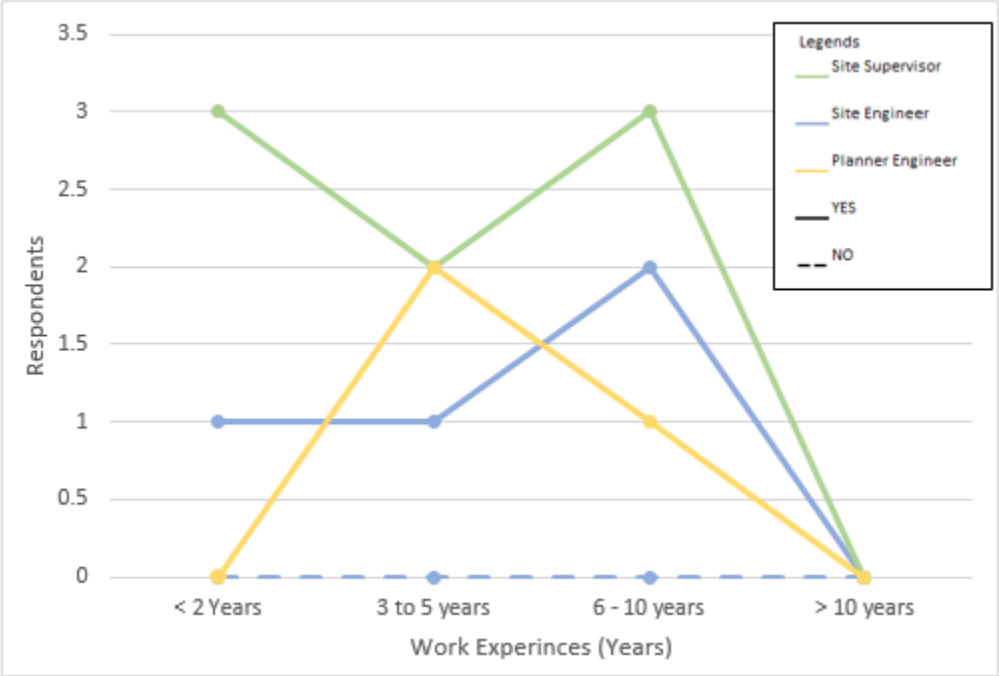


Figure 24. Daily site report for tracking

From Figure 22 above, it is show bar graph regarding second question in section B about used of daily site report for reporting purpose. Meanwhile Figure 23 above, it is show bar graph for documentation purpose and Figure 24 is line graph for tracking purpose. The 'X' axis of this graph is work experiences of the respondent and "Y' axis is number of respondents. This question is "YES" "NO". It is shown that all the respondents are

100.0% agree that they used daily site report for reporting when all the respondent answer "YES". The mode of this graph is respondent with work experiences 6 to 10 years and site engineer is the highest percentages. Percentages differences between the highest and lowest site engineer is 12.5% while site supervisor is 25.0% and planner engineer is 33.3%. Mean is 1.00 while standard deviation is 0.000 and variance is 0.00. The difference percentage between highest and lowest work experiences is 13.3%. The differences between YES and NO answer from the respondent is 100.0%. This result was expected because all the respondent used DSR in site. DSR is used for reporting and documentation to record the data from the site every day. As for tracking, it is used to know the productivity of the activities in certain day and planner can planned ahead the progress of the report.

Figure 25. Histogram of purpose daily site report

Figure 25 above shows the histogram that created from the data. The histogram is representing the purpose of daily site report which is for reporting, documentation and tracking. From the histogram, the mode is at age 26 to 30 years old. There are 3 range age that have the same frequency of respondent which is 2 respondents.

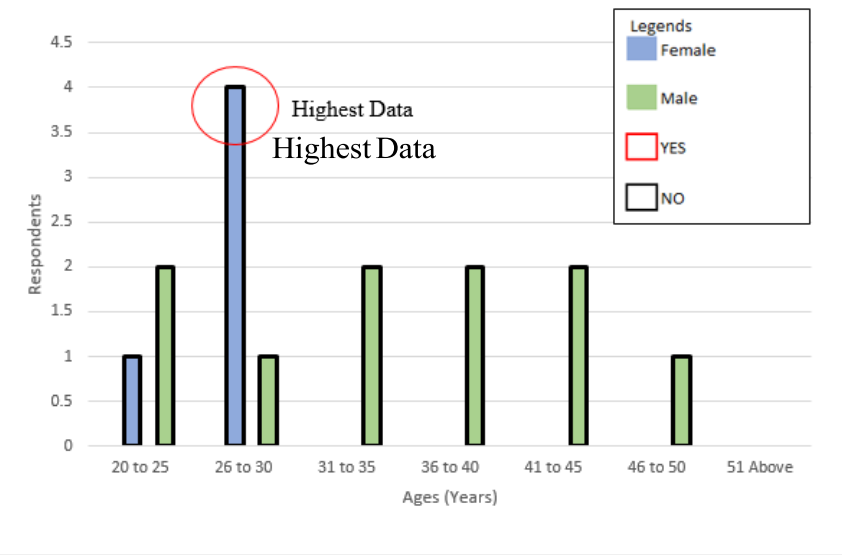


Figure 26. Summarize of data from daily site report

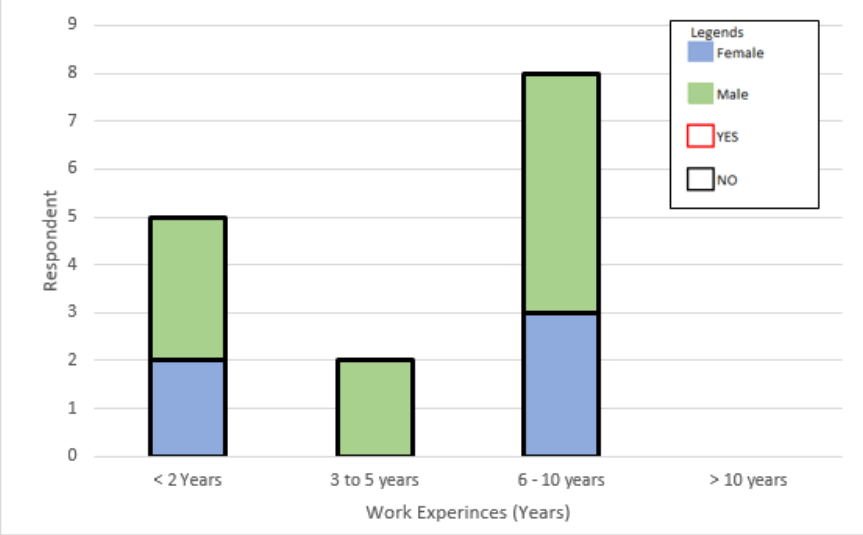


Figure 27. The manageable of many documentations of daily site report

From the Figure 26 above, it is regarding the easy to summarize the data from Daily Site Report while Figure 27 is regarding the manageable of many documentation of Daily Site Report. It is shown that all the respondents are 100.0% agree that they find DSR is quite difficult to summarize and manage when all the respondent answer "NO". The mode of the data is Male due to the highest and most result from the graph which is 8 respondents. The range of the respondent is 4 to 6 for years of experiences. The standard deviation and variance are 0 and 0 for both question. The differences between YES and NO answer from the respondent is 100.0%. This result was expected because too many DSR and it make too difficult to handle. As for this construction project, there are 5 sections and the manageable of DSR is not easy since too many documents. It will make the engineer confuse or error in data.

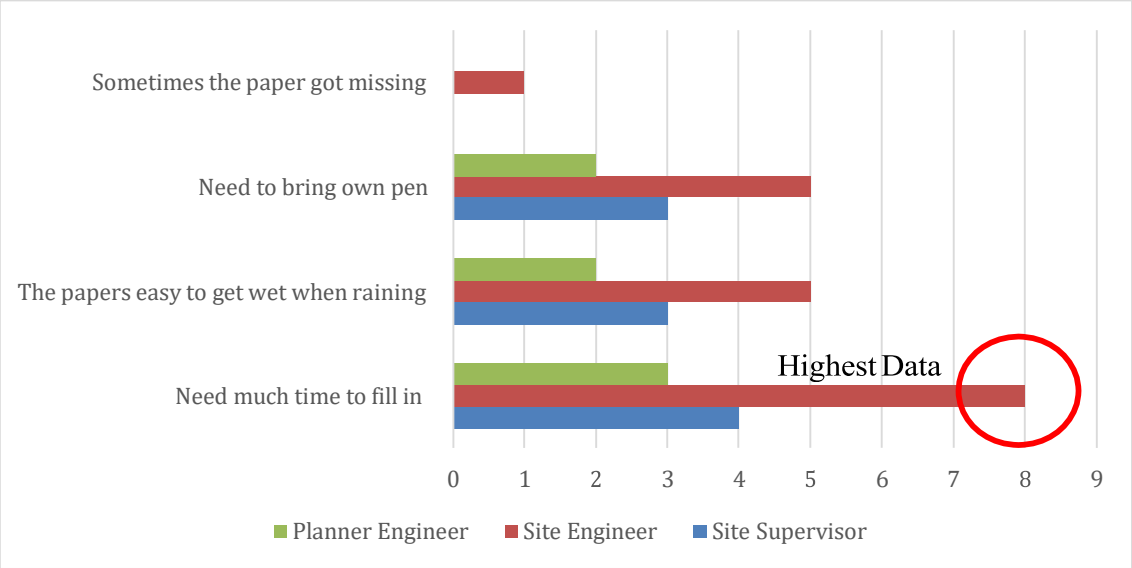


Figure 28. The major problem daily site report

From the 28 above, it can be seen that amount of site engineer is greater than site supervisor and planner engineer which is as for site engineer, it is 8 (53.3%) people while site supervisor is 4 (26.7%) people and planner is 3 (20.0%) people. It also can be seen that amount of male is greater than female which is as for male, it is 10 (66.7%) people while female is 5 (33.3%) people. The mode of the data is male due to the highest and most result from the graph which is 10 respondents. The range of the respondent 3 to 8 people as for occupation. The standard deviation and variance are 0.900 and 0.810. The difference percentage between highest and lowest of type occupation is 33.3%. The mean of the result is 1.912. The major problem for DSR is need much time to fill in followed by the papers will get wet easier. These 2 major problems are expected in the result due to the reason of their experiences in the site.

3.5 The Effectiveness between Development of Application and Respondent

This part of analysis will analyse between section A and section C from the questionnaire. Figures below shows the analysis that taken from the questionnaire.

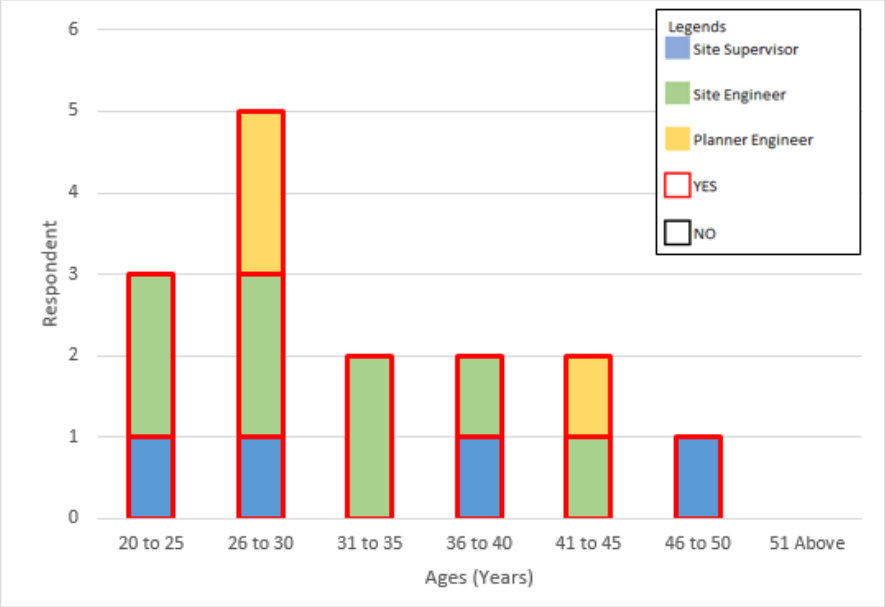


Figure 29. The development of daily site report application

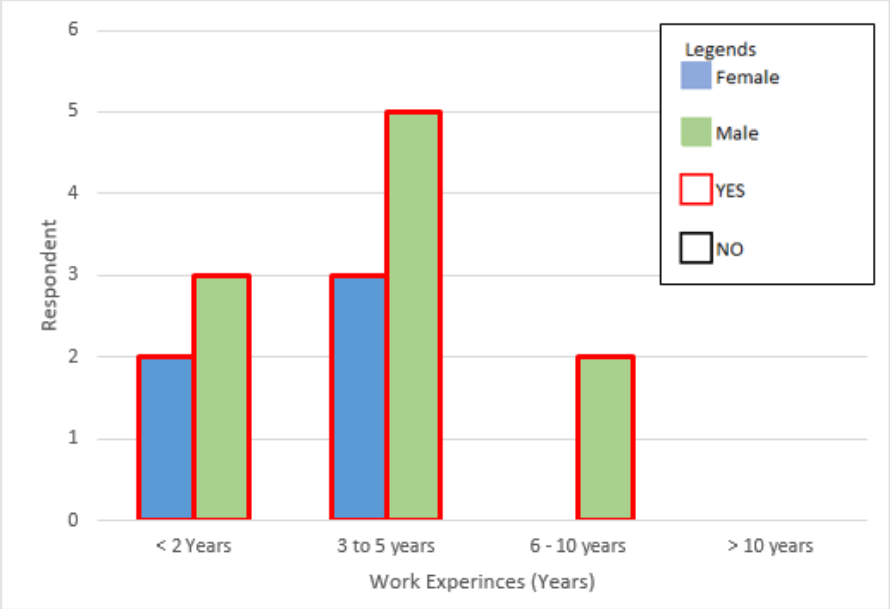


Figure 30. The effectiveness of E – DSR

From Figure 29 and Figure 30 above, it is show bar graph regarding question in section C. As for graph in Figure 29 it is about the relevant for Daily Site Report to develop into application while graph in Figure 30 is regarding saving time and easy to manage. It is shown that all the respondents are agree that E – DSR application is relevant to develop. All of the respondent also agreed that this application can save lot of time and easy to manage. It is shown that all the respondents are 100.0% agree when all the respondent answer "YES". The mode of the data is male due to the highest and most result from the graph which is 10 respondents. The standard deviation and variance is 0.00 the uses of DSR while the mean is 1.00. The differences between YES and NO answer from the respondent is 100.0%.

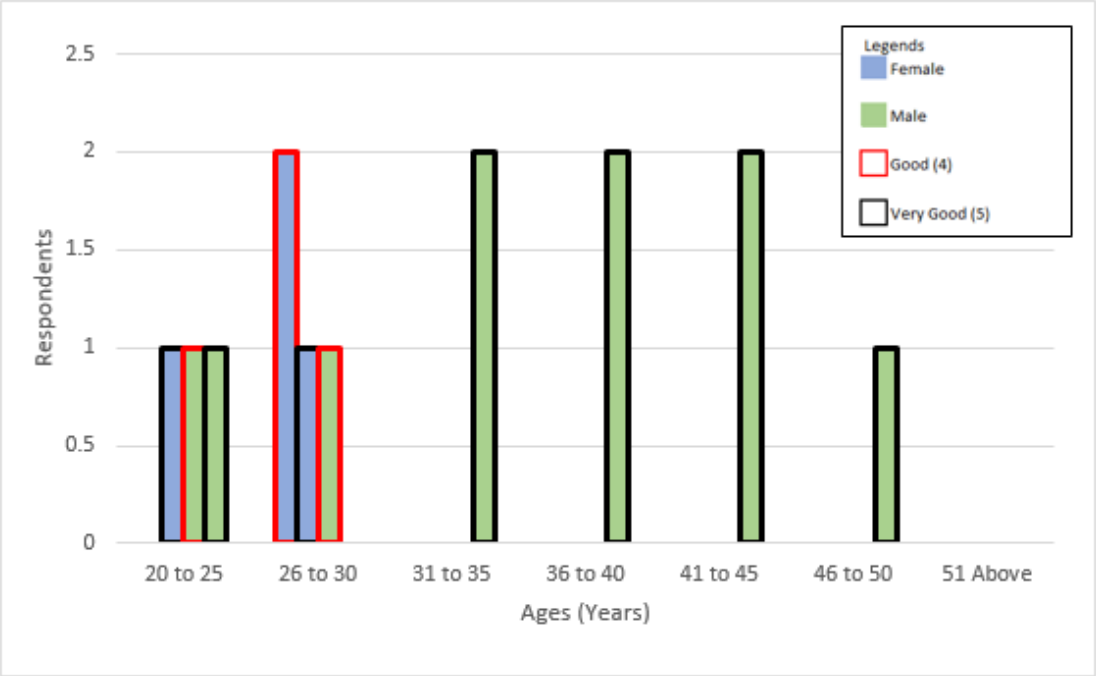


Figure 31. Design satisfaction of E – DSR

From the Figure 31, it is show bar graph regarding question in section C. It can be seen that amount of male is greater than female which is as for male, it is 10 (66.7%) people while female is 5 (33.3%) people. While the highest ages are 26 to 30 years old. It is shown that all the respondents are agree that they satisfy with the design of this application. The mode of the data is 5 dues to the highest result from the graph. The median also 4.73 while the standard deviation and variance is 0.442 and 0.195.

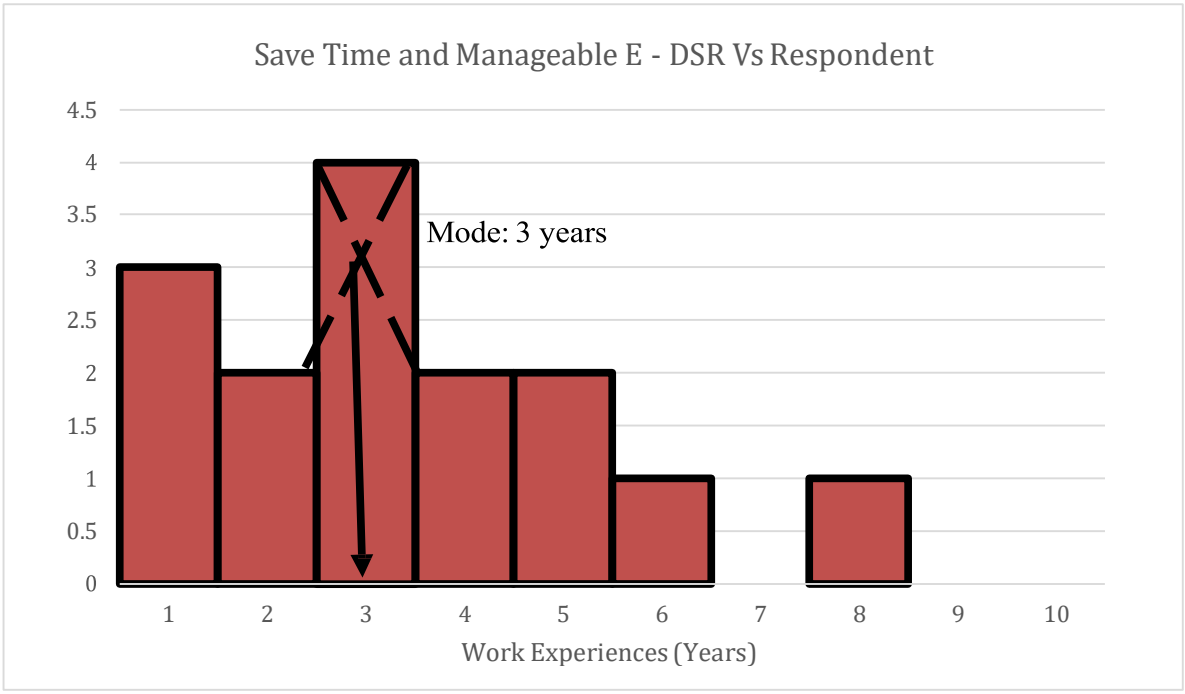


Figure 32. Histogram of Satisfaction of E – DSR

Figure 32 above shows the histogram that created from the data. The histogram is representing the satisfaction of daily site report which is for development, time, manageable and sustainable. From the histogram, the mode is at age 3 years working experiences.

3.6 The Effectiveness between Application and Respondent

This part of analysis will analyse between section A and section D from the questionnaire. Figures below shows the analysis that taken from the questionnaire.

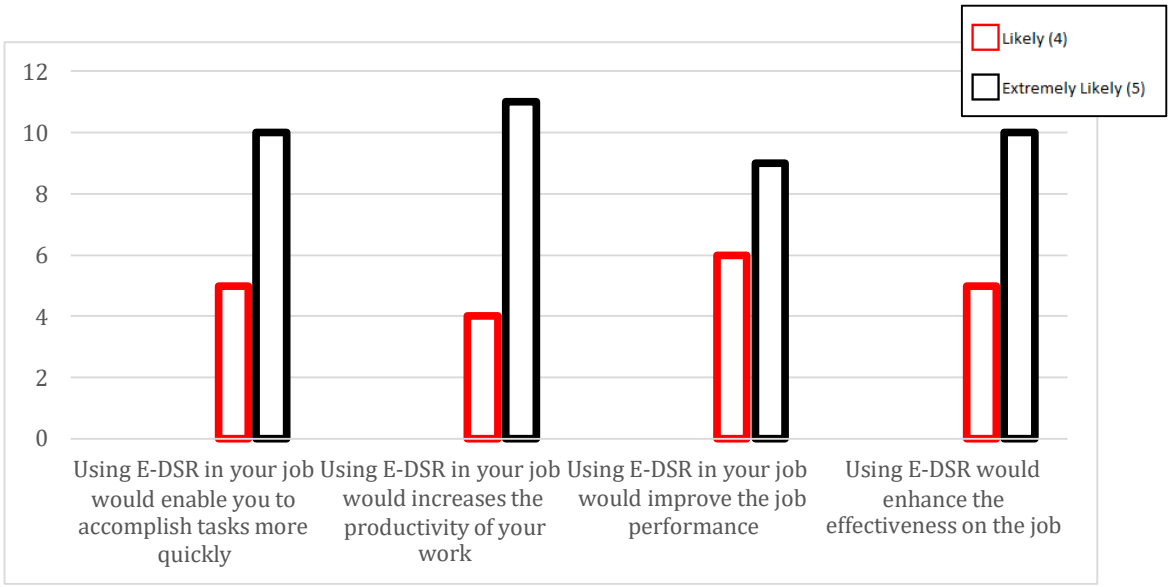


Figure 33. The functional of E – DSR

From Figure 33 above, it shows the respondent feedback regarding the effectiveness using E – DSR application. Majority respondent indicate on scale 4 and above which is the respondent agree that the application was effective. It is proved that all the respondent said that using E –DSR would able to complete the task quickly, will increases productivity, improve performance and enhance the effectiveness on the job. The median also 5 while the range of the result is only between 4 to 5. The standard deviation and variance is 0.488 and 0.238 for effectiveness of the E – DSR while mean is 4.67. Meanwhile, the standard deviation and variance is 0.458 and 0.210 for improve the performance of the E – DSR while mean is 4.73. As for increases the productivity, the standard deviation and variance is 0.488 and 0.238 for improve the performance of the E – DSR while mean is 4.67. As for able to complete the task quickly, the standard deviation and variance is 0.507 and 0.257 for improve the performance of the E – DSR while mean is 4.60.

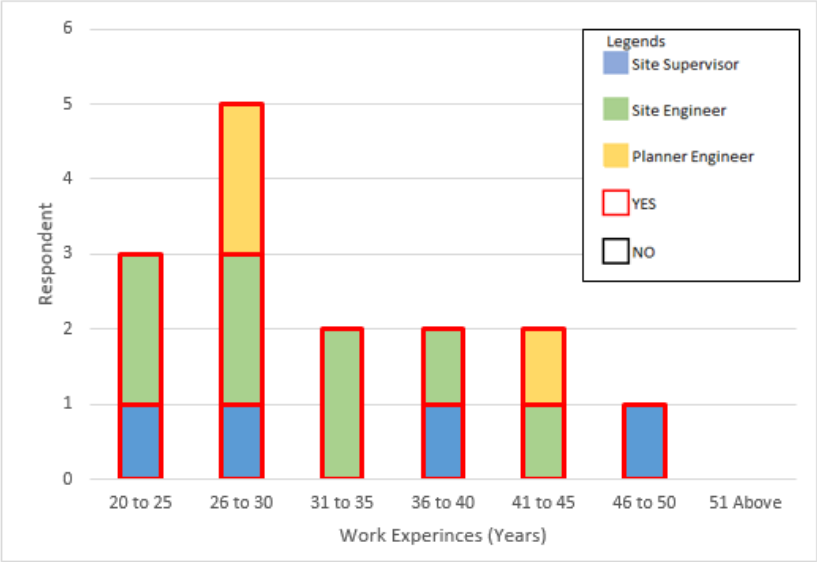


Figure 34. The useful, easy and understandable of E – DSR

From Figure 34 above, it shows the respondent feedback regarding the effectiveness using E – DSR application. Majority respondent indicate on "YES" which is the respondent agree that the application was effective. It is proved that all the respondent said that using E – DSR is useful, easy to use and understandable.

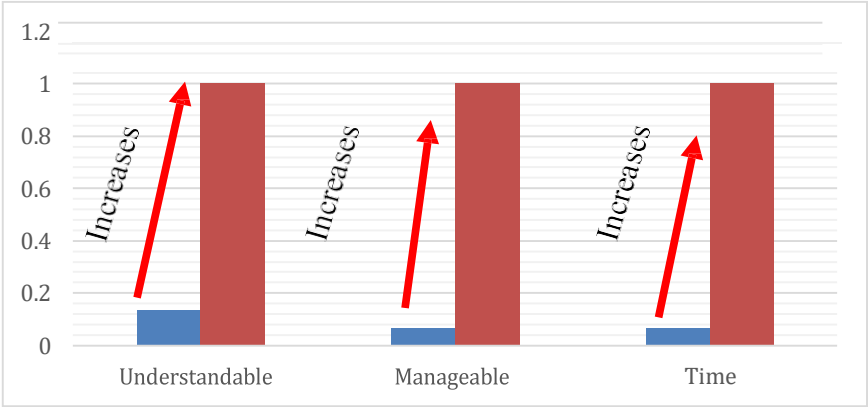


Figure 35. Comparison mean between conventional method vs E – DSR

From Figure 35 above shows the comparison mean between conventional method vs E – DSR application. It is shown that E – DSR is more effective than conventional method which is using paper. It is proof that the application is much understandable, manageable and save time. From the trend of the bar graph, the mean of conventional method is lower than E – DSR. The respondent agreed that using application is much better than papers. It can make work much efficient and productivity increase.

4. Discussion

The results obtained from survey forms have been answered by the respondents. The analysis from the findings of demographic criteria such respondents from the gender, age group, occupation and experience working. As for first objective to identify the issues of data collection for manpower and machinery in mast installation of

overhead catenary system (OCS). The respondents agree for the issues that in the questionnaire and they answered the questionnaire accordingly to their experiences.

The solution to overcome the issue is to develop a daily site report application that can collect manpower and machinery data for mast installation of overhead catenary system (OCS) using Ionic Framework. It is clear that all of the respondents believe that the E – DSR application should be developed. All of the respondents stated that this application may save a significant amount of time and is simple to use and they satisfied with the design of the application. As for the effectiveness of daily site report system in term of functionality. The majority of respondents say that the application was effective on a rating of 4 or above. It was established that all respondents said that utilizing E – DSR would allow them to finish tasks more quickly, boost productivity, improve performance, and increase work effectiveness. Table 9 below shows the comparison between the conventional method and E – DSR application.

Table 9. Comparison between Conventional method vs E – DSR Application.

Conventional method	**E – DSR application**
Used papers which lead to waste papers	Paperless
Need much time to fill in	Save time which is much easy to key in.
Hard to summarize due to lots of papers	Automatically produce the
Hard to manage	Manageable

5. Conclusion

Based on the data analysis in the preceding chapter, this part highlights the findings, conclusions, and recommendations. By evaluating how effectively some of the study's goals were achieved, the effectiveness of utilising the E- DSR programme to monitor productivity rate at YTL main office Kluang was evaluated. In this chapter, the researcher should have the advice to update the system to be much better and function able from the project that will be carried out. It is also one of the steps that researchers thought about after the project has been completed to carefully analyse what suggestion would be generated during the project. E - DSR serves the same purpose as a daily site report but also has the ability to calculate productivity rate. Employees were able to simplify their everyday tasks while still getting work done thanks to E-DSR. Additionally, E – DSR is a system that is easy to use, affordable, and accessible everywhere as long as users have their device. It may also minimise the amount of paper used. This programme demonstrates that it is superior to the current system, which mostly managed the company using paper-based methods, based on the data results and user use. Additionally, E-DSR taught the worker on the construction industry's Innovation Revolution 4.0 (IR 4.0) technologies.

In summary, the aim of this project achieved. The issue is that it takes time and effort to compile documentation and reports in order to analyse productivity rates. The study's three objectives are to identify the issues of data collection for manpower and machinery in mast installation of overhead catenary system (OCS), to develop a daily site report application that can collect manpower and machinery data for mast installation of overhead catenary system (OCS) using Ionic Framework, and to evaluate the

effectiveness of daily site report system in term of functionality. The study's focus is on the placement of each part for the installation of the mast OCS as well as the office building and construction site of the YTL CRJGR Main Office in Kluang.

The inability to manage paperwork, particularly in daily site reports in construction, as a result of having too many documents. E – DSR, an application, had been created in response to these problems. This application is a great tool for gathering, analysing, and computing productivity rate. As a consequence, tracking the data will be easier. The application is expected to be developed to make tasks or jobs for planning engineers, site engineers, and site managers simpler. In an attempt to limit paper waste, the corporation has also started using paper for daily site reports, which is not sustainable, particularly in a sustainable environment. This initiative is not only sustainable but also promotes IR 4.0 to companies and provides them the chance to practice utilizing the Internet of Things (IoT) in lieu of paper.

The respondents have responded to the findings from the survey forms. The study of data from demographic questions about respondents' gender, age group, employment, and work history. As for the first goal, to identify the problems with data collecting for labour and equipment in overhead catenary system mast installation (OCS). The survey respondents agreed with the concerns raised and provided responses based on their own experiences. The answer to address the problem is to design a daily site report application that can gather personnel and machinery data for mast installation of overhead catenary system (OCS) using Ionic Framework. It is apparent that all of the respondents agree that the E – DSR application should be created. All of the respondents mentioned that this application may save a substantial amount of time and is easy to use and were happy with the design of the application. In terms of functionality, it was going well when the majority of responders think the application was successful due to analyse of the data from questionnaire. It was discovered that every responder thought using E
– DSR will help them accomplish projects faster, increase productivity, enhance performance, and improve job effectiveness

Recommendation

As a result of the above findings, some suggestions that suggested to improve the used of E – DSR application. As for scope this E – DSR application to be used for mast installation in CRJGR Project. So, here some suggestions to be improve this application for more user to use. Firstly, the application only has data for the productivity rate but do not have a graph. The graph can be created so that it can be much easy for the users to read the data. Moreover, E – DSR application also can be developing by using other than Ionic Framework that cheaper or affordable. Software can be creating such as Network Solutions, Web.com, SquareSpace, and WordPress.com. User can create the application by using the platform as per mention. All of this software is easy to use and can get free access for all.

Besides, the application only can be used for android. This application can be improved by developing it for Apple version also due to some engineer using IPhone. So that everyone can use it easily. The researcher's conclusion is that technology in the

construction industry is crucial for producing the best quality and product for the project. E-DSR may reduce the expense of utilizing paper, save time, and help the organization become more organized. Consequently, the company's technology may persuade more customers to purchase its services. By using technology in business, Malaysia may be able to compete successfully with other nations across the globe. A country's economy may benefit from technology in the building industry.

References

T.D. Akinosho, L.O. Oyedele, M. Bilal, A.O. Ajayi, M.D. Delgado, O.O. Akinade, A.A. Ahmed, Deep Learning in the Construction Industry: *A Review of Present Status and Future Innovations, Journal of Building Engineering*, **https://doi.org/10.1016/j.jobe.2020.101827**

Trindade, E. L. D., Lima, L. R., Alencar, L. H., & Alencar, M. H. (2020). Identification of Obstacles to Implementing Sustainability in the Civil Construction Industry Using Bow-Tie Tool. *Buildings*, *10*(9), 165. **https://doi.org/10.3390/buildings10090165**

Braham, A. (2017). Fundamentals of Sustainability in Civil Engineering. *Fundamentals of Sustainability in Civil Engineering*. Published. **https://doi.org/10.1201/9781315152073**

Zavadskas, E., Antucheviciene, J., Vilutiene, T., & Adeli, H. (2017). Sustainable Decision- Making in Civil Engineering, Construction and Building Technology. *Sustainability*, *10*(2), 14. **https://doi.org/10.3390/su10010014**

Ikart, E. M. (2019). Survey questionnaire survey pretesting method: An evaluation of survey questionnaire via expert reviews technique. *Asian Journal of Social Science Studies*, 4(2), 1.

Liao, P. C., Xia, N. N., Wu, C. L., Zhang, X. L., & Yeh, J. L. (2017). Communicating the corporate social responsibility (CSR) of international contractors: Content analysis of CSR reporting. *Journal of Cleaner Production*, *156*, 327–336. **https://doi.org/10.1016/j.jclepro.2017.04.027**

Hossain, U.; Ng, S.T. *Strategies for enhancing the accuracy of evaluation and sustainability performance of building. J. Environ. Manag. 2020*, 261, 110230

Oswald, D., Sherratt, F., & Smith, S. (2018). Problems with safety observation reporting: A construction industry case study. *Safety Science*, 107, 35–45. **https://doi.org/10.1016/j.ssci.2018.04.004**

Mikko Raatikainen, Quim Motger, Clara Marie Luders, Xavier Franch, Lalli Myllyaho, Elina Kettunen, ¨ Jordi Marco, Juha Tiihonen, Mikko Halonen, and Tomi

Mannisto (2021). *Improved dependency management for issue trackers in large collaborative projects.* **http://arxiv.org/abs/2102.08485**

Sheikhkhoshkar, M., Pour Rahimian, F., Kaveh, M. H., Hosseini, M. R., & Edwards, D. J. (2019). Automated planning of concrete joint layouts with 4D-BIM. *Automation in Construction*, 107, 102943. **https://doi.org/10.1016/j.autcon.2019.102943**

Parc, C. (2020). Ingo Plag, Word-Formation in English (2. *Lexis*. **https://doi.org/10.4000/lexis.4532**

Dieppe, A., Francis, N., & Kindberg-Hanlon, G. J. (2021). Technology and Demand Drivers of Productivity Dynamics in Developed and Emerging Market Economies. *SSRN Electronic Journal*. **https://doi.org/10.2139/ssrn.3823159**

Daraio, C., Kerstens, K. H., Nepomuceno, T. C. C., & Sickles, R. (2018). PRODUCTIVITY AND EFFICIENCY ANALYSIS SOFTWARE: AN EXPLORATORY BIBLIOGRAPHICAL SURVEY OF THE OPTIONS. *Journal of Economic Surveys*, 33(1), 85–100. **https://doi.org/10.1111/joes.12270**

Selbst, A. D., Boyd, D., Friedler, S. A., Venkatasubramanian, S., & Vertesi, J. (2019, January). Fairness and abstraction in sociotechnical systems. In Proceedings of the conference on fairness, accountability, and transparency (pp. 59-68).

Ho, G. Y., Leonhard, M., Volk, G. F., Foerster, G., Pototschnig, C., Klinge, K., Granitzka, T., Zienau, A. K., & Schneider-Stickler, B. (2019). Inter-rater reliability of seven neurolaryngologists in laryngeal EMG signal interpretation. *European Archives of Oto- Rhino-Laryngology*, 276(10), 2849–2856. **https://doi.org/10.1007/s00405-019-05553- y**

STUDENTS' MATHEMATICS SELF-CONCEPT: THE CASE OF KOLEJ KOMUNITI BAGAN DATUK

Noor Farazila Radzi[1], Hashamuddin Ya'akob[2] and Md. Fauzi Ismail[3]

[1,2,3]Politeknik Ungku Omar, Malaysia
[1]farazilanoor@gmail.com
[2]hashamudin@puo.edu.my
[3]fauzimail@puo.edu.my

Abstract: The COVID-19 pandemic has causes changes in various sector including education. Teaching and learning were shifted to online mode. Previous study stated that students prefer face to face class (Shauqi et al., 2020; Rini, 2022). Therefore, the objective of this is to determine students' Mathematics self-concept during online learning. In addition, it is perceived as one of the most difficult subjects. Online questionnaire was distributed to students that have taken SSM1022 Mathematics course for Session 1 2021/2022 at Kolej Komuniti Bagan Datuk. The data processed using the Statistical Package for the Social Sciences (SPSS). Descriptive analysis was employed. The findings of this study stated that the students have positive self-concept in terms of ability. The respondents have moderate or unsure outlook in terms interest. Overall, the students have positive mathematics self-concept during online learning. The findings of this study can be used to improved teaching and learning strategy.

***Keywords**: self-concept, mathematics, online learning*

1. Introduction

The Coronavirus disease (COVID-19) caused a serious threat to the education sector. Students are not allowed to physically enter their learning institution. It has changed the way education is conducted. It led the education systems to shift to full online learning method. It is either conducted using synchronous or asynchronous methods (Selvanathan et al., 2020). Online learning become compulsory teaching method during the outbreak of the pandemic COVID-19 (Selvanathan et al., 2020).

In general, the changes from physical classroom environment to online learning environment raises challenges for students. It could be distraction such as noise during the online learning (Baticulon et al., 2021; Bringula et al., 2021). In addition, students have to learn on their own during asynchronous session. This is applied for some parts of the syllabus. These could lead to ineffective online learning.

One of the subjects offered by education sector is Mathematics. Mathematics plays an important role in every aspect of life. Through the perspective of education globally, mathematics is perceived as one of the most difficult subjects to learn due to its complexity and abstract nature (Azizah & Suhendra, 2020; Haase et al., 2019). Furthermore, the learning process that is interconnected and requires mastery comprehension from the previous topics

causes students to struggle throughout mathematics lessons. Students tend to be scared, worried and feel less interested to learn mathematics in depth (Nachiappan et al., 2016; Yahya & Amir, 2018).

In online mathematics learning, the display of the mathematical concepts, problems and process steps of the solutions and effective realization of the student-teacher interaction are two factors that affect learning outcomes (Karal et al., 2013). Karal et al. (2013) stated that prior research found that it is difficult for mathematics instructors to explain the concept in blended and online learning.

Online learning is different from face-to-face learning. Moreover, mathematics learning requires teacher feedback after working on practice questions but there is limited time for reflection (Petty & Farinde, 2013). Even worse, if the teacher only gives assignments and materials without any explanation. Based on the previous study, it is a challenge for both lecturers and students to apply e-learning especially in mathematics learning which contains a lot of abstract computational material (Ramadhani et al., 2021).

Most of the subjects need to be assessed by doing activities such as discussions, presentation and elaboration. In mathematics the teacher needs to communicate with students by writing words and symbolic language on the blackboard in addition to the discussion. This is not easy in online learning (Cassibba et al., 2020).

According to Shauqi et al. (2020), students stated that online learning has not provided better experience and productivity in mastering competencies. Students also hesitant to use it in the future. Majority of students prefer offline learning in face-to-face classes compared to online learning (Rini, 2022). In addition, the mathematics self-concept in the context of online learning is not yet investigated (Bringula, et al. 2021).

Mathematics self-concept is defined as a student's self-ranking of their skills, ability, enjoyment, and interest in mathematics (Erdogan & Sengul, 2014). Delima & Cahyawati (2021) stated that mathematics self-concept is students' perceptions of themselves regarding their mathematical abilities and skills, pleasure, and interest in carrying out mathematical activities. Self-concept is important in education since it is related to academic achievement (Ayodele, 2011; Lee & Kung, 2018).

The self-concept is needed to foster the students' views, self-confidence and positive attitudes when solving mathematics problems. Self-concept of students in learning consists of positive and negative self-concept (Sultra et al., 2018).

Therefore, this study aimed to determine students' perceptions towards mathematics learning. Students' perceptions are described through the self-concept of mathematics learning in Kolej Komuniti Bagan Datuk.

2. Materials and Methods

The purpose of this study was to determine the students' mathematics self-concept on online learning. This study was conducted at Kolej Komuniti Bagan Datuk. The population of this study consists of 14 students that have taken SSM1022 Matematik for Session 1 2021/2022 through online learning. The sample size was determined using Krejcie & Morgan (1970) table. The response rate was 100%.

The data was collected using questionnaires that were distributed using google form. The questionnaire items were adapted and modified from Bringula et al. (2021). The questionnaire consisted of two parts. The first part is about the students' profile. The second part is about students' mathematics self-concept.

Descriptive statistical analysis of frequency, percentage and mean scores were employed. The mean scores were categorized as follows: a mean score of 4.21–5 points were classified as very positive (VP), between 3.41–4.20 as positive (P), 2.61–3.40 as moderate (M), 1.81–2.60 as negative (N) and 1.00-1.80 as very negative. Scores under 2 were considered high negative (HN) (Jenkins, 2007; Suwannasri, 2016). Based on these researchers, the categorizes were adopted.

3. Results

Table 1 shows demographic profile of participants. The respondents of this study are male. 93% (13) respondent are 18-21 years old and 7% (1) only above 22 years old. It is found that 50% (7) of the online learners have their own personal space and 50% (7) of them do not have personal space during online mathematics class.

Table 1: Demographic profile of participants

Item	Frequency	Percentage
Gender		
Male	14	100
Female	-	-
Age		
18-21	13	93
22 and above	1	7
Personal space for online learning:		
Yes	7	50
No	7	50

Table 2 shows learners related factor. 7% (1) respondent reported that the internet connection is slow, 79% (11) stated that the internet connection is sometimes fast, sometimes slow, and only 14% (2) stated that their internet connection is fast. Most of the respondents, 43% (6) of them stated that mathematics online learning is harder than face-to-face. The rest of the respondent which is 29% (4) stated that it is easier than face-to-face and another 21% (3) of them stated that it is about the same level of difficulty with face-to-face. Only 7% (1) respondent stated that online learning is about the same level of ease with face to face. 64% (9) of the respondents rely on teachers or friends for further explanations. 14% (2) of them can understand the lesson by themselves. 21% (3) of them rely entirely on lecturer and classmate to understand the topics.

Table 2: Learners related factor

Item	Frequency	Percentage
Internet connection:		
Slow	1	7
Sometimes fast, sometimes slow	11	79
Fast	2	14
Perceptions of mathematics online learning:		
Harder than face-to-face	6	43
Easier than face-to-face	4	29
About the same level of difficulty with face-to-face	3	21
About the same level of ease with face to face	1	7
Mathematics learning autonomy:		
Most of the time, I can understand the lesson by myself. I seldom consult my teachers or my classmates	2	14
Sometimes I understand the lesson; sometimes I do not understand it. I consult my teachers or my friends for further explanations	9	64
I entirely rely on my teachers' lectures or from the help of my classmates and friends	3	21

Table 3 shows the result of Mathematics self-concepts in online learning environment. Generally, the students have positive perceptions on mathematics distance learning as indicated by the overall mean score (M= 3.51). Respondents have positive self-concept regarding obtaining good grades, lesson understanding, problem solving, doing well, attending the online class, doing the assignment in online mode, ability to finish the course, passing the course and more interest in learning.

The respondents have moderate or unsure outlook in terms of helping their classmate in completing the assignments, easily recall the lessons, better performance than classmates and enjoy the online class more than face to face.

Table 3: Mathematics self-concepts

Item	Mean
I can get good grades in the course	3.50
I can understand the lessons easily	3.57
I can solve problems easily	3.50
I can do well overall in the course	3.64
I can attend the class easily.	4.00
I can do the assignments easily	3.86
I can help my classmates with our assignments.	3.29
I can easily recall what I have learned	3.29
I can finish the course online rather than face-to-face.	3.57
I can perform better than my classmates.	3.21
I can pass the course	3.50
I will be more interested to learn.	3.50
I will enjoy the lecture more online than face-to-face.	3.21
Average scale	3.51

4. Discussion

The objective of this study have been achieved; to determine students' perceptions towards mathematics learning. The finding of this study stated that half of the respondent do not have personal learning space for online learning. According to Ismail et al., (2020), non-conducive environment is one of the challenges in online learning. Students with low-income group family background usually live in low-cost housing areas with small rooms that they share with other siblings. Therefore, they are not comfortable for online learning.

Poor internet access or lack of devices in a household is a major challenge for online learning in Malaysia (Zainol et al., 2021). This is in accordance with the finding of this study where most of the respondent stated that their internet connection is sometimes fast, sometimes slow.

For mathematics learning autonomy, the findings of this study stated that most of the students sometimes understand and sometimes do not understand the lesson and consult their lecturer or friends for further explanations. According to Kumi-Yeboah et al. (2017), the lack of social presence is one of the constrain in online learning experiences and academic self-concept of the students. Therefore, the lack of social presence may affect student understanding in online learning environment.

Based on the indicated findings, generally, students have positive self-concept. These findings suggest that students' have a positive self-ranking of their skills, ability, and interest in mathematics. It affects many critical behaviours of the students such as effort to learn, determination when confronted by a problem and participation in the lectures (Erdogan & Sengul, 2014). They believe that their abilities can still meet the demands of the course (Bringula et al., 2021). They are confident that they can still perform well despite the challenges and uncertainties they are facing. This also could be due to the current generation being close to technology, so it is easier to adapt to online learning (Hastini et al., 2020). Besides that, e-learning has the ability to enhance student understanding and positive impact on motivation, autonomy, participation, mathematical concepts, results and grades as stated by Freiman et al., (2017) and Moreno-Guerrero et al. (2020).

The finding of this study also stated that students have unsure outlook in terms of helping their classmate in completing the assignments, easily recall the lessons, better performance than classmates, enjoy the online class more than face to face and student perceived mathematics online learning is harder than face-to-face. These are undesirable effects of mathematics self-concept during online learning.

This might due to limited ICT usage in developing countries. Therefore, the investments in technology such as obtaining hardware and software for online learning become one of the constraints (Bhuasiri et al., 2012, Ismail et al., 2020). In addition, students' commitment and discipline also another issue in successful online learning.

The finding s of this study can be used by the management and instructor of the institution to take necessary measures to avoid left out students. At the same time, course learning outcome can be achieved. Future research is highly needed with larger sample size from another institution.

Acknowledgments

The authors would like to thank the cooperation given by the respondents during the data collection process. The author also would like to thank to all authors in the positive support in this study.

References

Ayodele, O.J. (2011). Self-concept and Performance of Secondary School Students in Mathematics. Journal of Educational and Developmental Psychology, 1(1), 176-183.

Azizah, S. N., & Suhendra. (2020). Mathematics anxiety of senior high school students based on extrovert and introvert personality types. Journal of Physics Conference Series, 1521(3).

Baticulon, R. E., Sy, J. J., Alberto, N. R. I., Baron, M. B. C., Mabulay, R. E. C., Rizada, L. G.T., Tiu, C. J. S., Clarion, C. A., & Reyes, J. C. B. (2021). Barriers to online learning in the time of COVID-19: A national survey of medical students in the Philippines. Medical Science Educator, 31, 615–626.

Bhuasiri, W., Xaymoungkhoun, O. & Zo, H. (2012). Critical success factors for e-learning in developing countries: a comparative analysis between ICT experts and faculty. Computers and Education 58(1), 843–855.

Bringula, R. P., Batalla, M. Y. C., & Borebor, M. T. F. (2021). *Modeling computing students' perceived academic performance in an online learning environment* [Paper presentation]. ACM-SIGITE'21, SnowBird, UT, USA. https://doi.org/10.1145/3450329.3476856.

Cassibba, R., Ferrarello, D., Mammana, M. F., Musso, P., Pennisi, M., & Taranto, E. (2020). Teaching mathematics at distance: A challenge for universities. Education Sciences, 11(1), 1-20. http://doi.org/10.3390/educsci11010001

Delima, N. & Cahyawati, D. (2021). Students' mathematics self-concept, mathematics anxiety, mathematics self-regulated learning during the Covid-19 pandemic. Jurnal Pendidikan Matematika, 15(2), 103- 114.

Erdogan, F. & Sengul S. (2014). A study on the elementary school students' mathematics self-concept. Procedia - Social and Behavioral Sciences 152 (2014) 596 – 601

Freiman, V., Polotskaia, E., & Savard, A. (2017). Using a computer-based learning task to promote work on mathematical relationships in the context of word problems in early grades. ZDM, 49(6), 835-849.

Haase, V. G., Guimarães, A.P.L. & Wood, G. (2019). Mathematics and emotions: the case of math anxiety. In. International Handbook of Mathematical Learning Difficulties (pp. 469–503). Springer: Cham.

Hastini, L. Y., Fahmi, R., & Lukito, H. (2020). Can learning using technology improve human literacy in generation Z in Indonesia? [in Bahasa]. Jurnal Manajemen Informatika (JAMIKA), 10(1), 12–28. https://doi.org/10.34010/jamika.v10i1.2678

Ismail, N.S., Abu Bakar, N.M. & Syed Saadun Tarek Wafa, S.W.W. (2020). Online Learning Challenges during Pandemic COVID-19 in Malaysian Higher Learning Institution. Universal Journal of Educational Research, 8(12), 7151 - 7159. DOI: 10.13189/ujer.2020.081282

Jenkins, J. (2007). English as a lingua franca: Attitude and identity. Oxford: Oxford University Press.

Karal, H., Kokoc, M., Colak, C., & Yalcin, Y. (2013). Using pen-based technology in online mathematics course: An evaluation study. European Journal of Open, Distance and e-Learning, 16(2), 152.

Krejcie, R.V. & Morgan D.W. (1970). Determining Sample Size for Research Activities. Educational and Psychological Measurement

Kumi–Yeboah, A., James Dogbey & Guangji Yuan (2017): Exploring Factors That Promote Online Learning Experiences and Academic Self-Concept of Minority High School Students, Journal of Research on Technology in Education, DOI: 10.1080/15391523.2017.1365669

Lee, C.-Y., & Kung, H.-Y. (2018). Math self-concept and mathematics achievement: Examining gender variation and reciprocal relations among junior high school students in Taiwan. EURASIA Journal of Mathematics, Science and Technology Education, 14(4), 1239–1252. https://doi.org/10.29333/ejmste/82535

Moreno-Guerrero, A., Aznar-Díaz, I., Cáceres-Reche, P., Alonso-García, S. (2020). E-Learning in the Teaching of Mathematics: An Educational Experience in Adult High School. Mathematics 2020, 8, 840; doi:10.3390/math8050840

Nachiappan, S., Rengasamy, K., Maniam, V., Ganaprakasam, C., & Zulkafaly, M. F. (2016). Analisis pengajaran guru dalam mata pelajaran matematik ke arah aplikasi kognisi dalam kurikulum standard sekolah rendah melalui kaedah hermeneutik. EDUCATUM–Journal of Social Science, 2(1), 31–41.

Petty, T., & Farinde, A. a. (2013). Investigating student engagement in an online mathematics course through Windows into Teaching and Learning. MERLOT Journal of Online Learning and Teaching, 9(2), 261–270.

Ramadhani, R., Sihotang, S.F., Bina, N.S., Rusmini, Harahap, F.S.W., Fitri, Y. (2021). Undergraduate Students' Difficulties in Following Distance Learning in Mathematics Based on E-Learning During the Covid-19 Pandemic. TEM Journal. Volume 10, Issue 3, Pages 1239-1247, ISSN 2217-8309, DOI: 10.18421/TEM103-30, August 2021.

Rini, A.P. (2022). Students Perceptions of Mathematics Education on Online Learning at STKIP Tunas Palapa Central Lampung. Bulletin of Science Education. Vol. 2, No. 2, May 2022. https://attractivejournal.com/index.php/bse/index

Selvanathan, M., Mohamed Hussin, N.A. & Nor Azazi, N.A. (2020). Students learning experiences during COVID-19: Work from home period in Malaysian Higher Learning Institutions. Teaching Public Administration 1-10.

Shauqi, K., Munadi, S. & Triyono, M.B. (2020). Students' perceptions toward vocational education on online learning during the COVID-19 pandemic. International Journal of Evaluation and Research in Education (IJERE) Vol. 9, No. 4, December 2020, pp. 881~886 ISSN: 2252-8822, DOI: 10.11591/ijere. v9i4.20766

Sultra, W.S.R.Y., Usodo, B. & Pramudra, I. (2018). Self-Concept of Junior High School Student in Learning Mathematics. The International Conference on Mathematical Analysis, Its Applications and Learning 2018.

Suwannasri, C. (2016). An investigate into awareness and attitudes of vocational students in tourism towards varieties of spoken English as a lingua franca in ASEAN (Unpublished Master's thesis). Research Institute for Languages and Cultures of Asia: Mahidol University.

Yahya, S. Z., & Amir, R. (2018). Kebimbangan matematik dan pencapaian matematik tambahan. Journal of Nusantara Studies (JONUS), 3(2), 124–133.

Zainol, S., Mohd Hussin, S., Othman, M., & Mohd Zahari, N. (2021). The Challenges of Online Learning Faced by The B40 Income Parents in Malaysia. International Journal of Education and Pedagogy, 3(2), 45-52.

PERSEPSI PELAJAR TERHADAP PENGGUNAAN PLATFORM SEMASA PDPT& MASALAH KEMUDAHAN INTERNET: KAJIAN DI KALANGAN PELAJAR DIPLOMA LOGISTIK POLISAS

Liana Abdul Samat

Jabatan Pengajian Am
Politeknik Sultan Hj Ahmad Shah,Kuantan Pahang,
Malaysialyana@polisas.edu.my

Abstrak: Pandemik *Covid-19* telah memberi impak yang besar kepada struktur pendidikan seluruh dunia yang menyebabkan peralihan dari pendekatan pendidikan konvensional kepada pendidikan digital. Pengajian secara atas talian, digital atau virtual ditawarkan oleh Kementerian Pengajian Tinggi sebagai langkah menangani pandemik ini.Penggunaan platform atas talian memerlukan akses jalur lebar yang tinggi dan ini mengundang masalah dalam pembelajaran dan pengajaran .Konferen video atas talian bersifat synchronous manakala rakaman video adalah asynchronous memerlukan kadar penggunaan data yang tinggi dan membebankan pelajar dari segi kos.Kajian yang dijalankan adalah berbentuk kuantitatif dan instrumen kajian yang digunakan adalah borang soal selidik melalui perantaraan *Google Forms*.Responden kajian ini seramai 36 pelajar Diploma Logistik semester satu Polisas.Hasil kajian mendapati pelajar mempunyai komputer riba dan telefon pintar,manakala jenis platform atas talian yang paling mudah digunakan *Microsoft Teams* serta *Telegram.* Dapatan kajian mendapati bahawa pelajar bersetuju menggunakan platform *Microsoft Teams* serta *Telegram* dan ianya sesuai serta berkesan bagi sesi perkuliahan atas talian. Walaubagaimanapun pelajar menghadapi masalah mendapatkan kemudahan talian akses internet. Pensyarah perlu memilih platform yang sesuai dan mengetahui kestabilan internet semasa aktiviti pengajaran dan pembelajaran atas talian.Semua pihak terutamanya pihak Kementerian Pengajian Tinggi mendapat manfaat dari kajian ini supaya cabaran ini dapat ditangani dengan segera bagi membina pelan kontigensi selaras dengan proses adaptasi pembelajaran atas talian.

***Kata kunci**: persepsi; platform atas talian; digital ; virtual*

1.Pengenalan

Proses pengajaran dan pembelajaran di Malaysia yang sebelum ini lebih tertumpu kepada kaedah bersemuka telah beralih arah kepada pembelajaran secara atas talian semenjak pandemik *Covid 19* melanda dunia .Segala aktiviti pembelajaran dan pengajaran atas talian menggunakan sepenuhnya penggunaan teknologi.Melalui pembelajaran dan pengajaran atas talian ini pelajar dapat mempraktiskan penjarakan fizikal seperti yang disarankan Kementerian Kesihatan Malaysia.

Pembelajaran dan pengajaran secara atas talian menjadi satu keperluan yang sangat relevan.Pelbagai cabaran dihadapi oleh warga pendidik dalam pelaksanaan aktiviti pembelajaran dan pengajaran secara atas talian ini.Penggunaan platform atas talian memerlukan akses jalur lebar yang tinggi dan ini mengundang masalah dalam pembelajaran dan pengajaran.Konferen video atas talian bersifat *synchronous* manakala rakaman video adalah *asynchronous* memerlukan kadar penggunaan data yang tinggi dan membebankan pelajar dari segi kewangan.Selain itu,pensyarah perlu memilih platform yang sesuai dan mengetahui kestabilan internet semasa aktiviti pengajaran dan pembelajaran atas talian.

Selain itu,sesetengah pelajar yang tinggal di kawasan pedalaman mempunyai masalah untuk memperoleh kemudahan capaian internet. Ramai pelajar yang berasa terbeban apabila mereka terpaksa membeli data internet bagi membolehkan mereka menghadiri kuliah dalam talian, peperiksaan dalam talian dan juga untuk menghantar tugasan. Bagi membolehkan pelajar mengikuti pembelajaran atas talian, ianya memerlukan talian internet yang laju, cepat dan tiada gangguan dan untuk mendapatkannya perlu membayar kos yang agak tinggi. Kajian berkenaan sistem penyampaian pendidikan yang dijalankan oleh Yahaya dan rakan – rakan mendapati kebanyakan pelajar terkesan dengan masalah kewangan bagi membeli alat pembelajaran di rumah.

Selain itu satu kajian lain juga menyatakan kos perbelanjaan pendidikan seperti talian internet menjadi beban kepada pelajar yang tergolong dalam keluarga yang berpendapatan rendah ,miskin dan tergolong dalam kalangan B40.Kebanyakan ibu bapa tidak mampu menanggung perbelanjaan kemudahan talian internet tersebut. Ini selari dengan kajian Wan Sofiah yang menyatakan kekangan utama dalam pendidikan anak-anak adalah masalah kewangan.

Satu kajian telah dijalankan ke atas para pelajar Diploma Logistik semester satu Polisas.Kajian ini bertujuan mengkaji berkaitan kemudahan gajet yang dimiliki pelajar seperti telefon pintar dan komputer riba,kemudahan talian akses internet,jenis platform atas talian yang paling mudah digunakan dan keberkesanan platform atas talian bagi kuliah semasa sesi pembelajaran dan pengajaran.

2.Metodologi Kajian

Metodologi ialah analisis teori dan sistematik kaedah yang digunakan untuk bidang pengkajian. Ia terdiri daripada analisis teori mengenai kaedah dan prinsip berkenaan dengan pelbagai cabang pengetahuan. Metodologi menawarkan asas teori untuk memahami kaedah, set kaedah, atau amalan terbaik yang boleh digunakan untuk kes tertentu.Ia juga telah ditakrifkan sebagai perihalan kaedah.

Kaedah kuantitatif digunakan dalam kajian ini kerana instrumen-instrumen yang dilaksanakan menggunakan set soal selidik.Selain itu,kaedah ini dapat membuktikan kesahihan yang kukuh dengan menggunakan angka hasil daripada analisis ini.Instrumen kajian yang digunakan ialah borang soal selidik menggunakan aplikasi *Google Forms.*Terdapat empat skop soalan kajian diberi kepada responden.Bahagian pertama berkenaan kemudahan gajet dalam aktiviti pembelajaran dan pengajaran atas talian.Seterusnya bahagian kedua berkaitan kemudahan talian akses internet.Bahagian ketiga berkaitan jenis platform atas talian yang paling mudah digunakan.Manakala bahagian keempat pula berkenaan keberkesanan platform atas talian bagi sesi kuliah.

Antara faktor yang mempengaruhi pemilihan kaedah aplikasi *Google Forms* ini adalah kerana ia memerlukan tempoh yang singkat untuk menjawab dan penyeliaannya pula adalah senang. Data yang diperolehi daripada aplikasi ini secara automatik menunjukkan frekuensi dan peratus dalam *Responses Google Forms.* Oleh itu, kaedah ini sangat bertepatan sekali kerana ia dapat menjimatkan masa berbanding dengan kaedah-kaedah lain.

Jadual 1 Kemudahan Gajet dalam Aktiviti Pembelajaran dan Pengajaran atas Talian.

	Frekuensi dan peratus			
	STS	*TS*	*S*	*SS*
Telefon pintar sahaja	1(2.8%)	5(13.9%)	11(30.6%)	19(52.8%)
Komputer riba / Komputer	1(2.8%)	7(19.4%)	12(33.3%)	16(44.4%)
Telefon pintar & Komputer riba / komputer	1(2.8%)	2(5.6%)	10(27.8%)	23(63.9%)

[1]Nota:STS- Sangat Tidak Setuju, TS – Tidak Setuju, S- Setuju, SS- Sangat Setuju

Jadual 1 melihat kepada aspek kemudahan yang dimiliki oleh pelajar politeknik semestersatu Diploma Pengurusan Logistik seperti kemudahan gajet bagi pembelajaran dan pengajaran atas talian.Dapatan kajian menunjukkan majoriti responden iaitu seramai 23 orang atau 63.9 peratus mempunyai kemudahan gajet seperti telefon pintar dan komputer riba. Seramai 16 orang pelajar atau 44.4 peratus mempunyai komputer riba sahaja, manakala 19 orang yang lain iaitu 52.8 peratus mempunyai telefon pintar.

Jadual 2 Kemudahan Talian Akses Internet bagi Aktiviti Pembelajaran dan Pengajaran atas Talian

	Frekuensi dan peratus			
	STS	*TS*	*S*	*SS*
Akses internet menggunakan *prepaid/pospaid*	1(2.8%)	5(13.9%)	14(38.9%)	16(44.4%)
Akses internet menggunakan modem	0(0%)	7(19.4%)	15(41.7%)	14(38.9%)
Tiada akses internet	10(27.8%)	9(25%)	9(25%)	8(22.2%)

[1]Nota: STS- Sangat Tidak Setuju, TS – Tidak Setuju, S- Setuju, SS- Sangat Setuju

Jadual 2 menunjukkan kemudahan talian akses internet bagi aktiviti pembelajaran dan pengajaran atas talian bagi pelajar Diploma Pengurusan Logistik semester satu,Polisas.Seramai 16 orang atau 44.4 peratus mengatakan mereka sangat setuju menggunakan *prepaid* atau *postpaid* bagi akses internet, manakala 15 orang atau 41.7 peratus setuju mengatakan mereka menggunakan modem bagi akses internet. Selain itu, seramai 8 orang atau 22.2 peratus responden mengatakan yang mereka tidak mempunyai akses talian internet langsung bagi pembelajaran atas talian.

Jadual 3 Jenis Platform Atas Talian Paling Mudah Digunakan

	Frekuensi dan peratus			
	STS	*TS*	*S*	*SS*
Jenis platform Atas Talian Paling Mudah Menggunakan *Microsoft Teams*	1(2.8%)	8(8.3%)	4(11.1)	28(77.8)
Jenis Platform Atas Talian Paling Mudah Menggunakan *Google Meet*	7(19.4%)	3(8.3%)	9(25%)	17(47.2)
Jenis Platform Atas Talian Paling Mudah Menggunakan *Zoom*	4(11.1%)	7(19.4%)	7(19.4)	18(50%)
Jenis platform Atas Talian Paling Mudah Menggunakan *Telegram*	0(0%)	1(2.8%)	4(11.1)	31(86.1)

[1]Nota : STS- Sangat Tidak Setuju, TS – Tidak Setuju , S- Setuju , SS- Sangat Setuju

Jadual 3 berkenaan jenis platform atas talian yang paling mudah digunakan dalam aktiviti pembelajaran dan pengajaran. Seramai 28 orang responden atau 77.8 peratus mengatakan bahawa platform *Microsoft Teams* adalah platform yang mudah digunakan. Selain itu,platform *Telegram* pula menjadi platform atas talian yang paling mudah digunakan dengan persetujuan seramai 31 orang responden iaitu 86.1 peratus. Manakala 18 orang responden atau sebanyak 50 peratus memilih platform *Zoom* antara yang termudah digunakan.

Jadual 4 Keberkesanan Platform Atas Talian bagi Kuliah

	Frekuensi dan peratus			
	STS	*TS*	*S*	*SS*
Keberkesanan Platform Atas Talian bagi Kuliah Menggunakan *Microsoft Teams*	0(0%)	2(5.6%)	8(22.2%)	26(72.2%)
Keberkesanan Platform Atas Talian bagi Kuliah Menggunakan *Google Meet*	6(16.7%)	8(22.2%)	8(22.2%)	14(38.9%)
Keberkesanan Platform atas Talian bagi Kuliah Menggunakan *Zoom*	5(13.9%)	8(22.2%)	5(13.9%)	18(50%)
Keberkesanan Platform atas Talian bagi Kuliah Menggunakan *Telegram*	1(2.8%)	3(8.3%)	6(16.7%)	26(72.2%)

[1]Nota : STS- Sangat Tidak Setuju, TS – Tidak Setuju , S- Setuju , SS- Sangat Setuju

Jadual 4 berkenaan persepsi pelajar terhadap keberkesanan platform atas talian bagi sesi kuliah dalam aktiviti pembelajaran dan pengajaran secara atas talian. Seramai 26 orang responden atau 72.2 peratus mengatakan bahawa menggunakan platform *Microsoft Teams* dan *Telegram* adalah paling berkesan digunakan bagi sesi kuliah dalam pembelajaran dan pengajaran atas talian. Manakala 18 orang responden yang lain atau 50 peratus mengatakan *Zoom* berkesan bagi sesi kuliah secara atas talian.

3. Perbincangan Dapatan Kajian

Dapatan kajian jelas menunjukkan 52.8 peratus responden mempunyai telefon pintar dan digunakan dalam pembelajaran atas talian.Seramai 44 peratus responden mempunyai komputer riba atau komputer peribadi.Seramai 63.9 peratus responden mempunyai telefon pintar dan komputer riba.

Selain itu, 44.4 peratus responden menggunakan prepaid atau postpaid untuk mendapatkan capaian liputan internet.Manakala 38.9 peratus responden menggunakan modem untuk liputan internet.Namun begitu, 22 peratus responden yang tidak mempunyai akses internet juga perlu diberi perhatian bagi memastikan setiap pelajar politeknik dapat mengikuti pembelajaran atas talian dan mendapat hak asasi yang sama dalam sistem pendidikan.

Selain itu, dapatan kajian berkaitan penggunaan platform atas talian yang lebih mudah digunakan semasa aktiviti pembelajaran dan pengajaran iaitu 86.1 peratus pelajar mengatakan mereka menggunakan aplikasi *Telegram,* seterusnya 77.8 peratus menggunakan aplikasi *Microsoft Teams* dalam sesi pembelajaran dan pengajaran atas talian.

Selain itu,pensyarah perlu memilih platform yang sesuai dan mengetahui kestabilan internet semasa aktiviti pengajaran dan pembelajaran atas talian.Ini selaras dengan kajian yang dilakukan oleh Ngadi (2020).Platform *Telegram* juga sangat senang digunakan dalam semua keadaan menghadapi cabaran capaian internet.

Pendapat di atas selari dengan kajian Pusat e-Pembelajaran dan Sumber Pengajaran, Universiti Malaysia Pahang, sekiranya capaian internet rendah, platform seperti *WhatsApp*, *Telegram* dan *Instagram* sesuai dijadikan platform pengajaran dan pembelajaran pelajar.Manakala bagi capaian internet yang tinggi, platform bersemuka seperti *Zoom*, *Microsoft Teams,* dan *Google Meet* sesuai digunakan.

Selain itu,platform *Telegram* antara yang paling sesuai diaplikasikan dalam aktiviti pengajaran dan pembelajaran mengikut kajian Hairia'an (2020).Oleh itu pensyarah perlu membimbing untuk menghasilkan interaksi yang baik seterusnya mengekalkan prestasi akademik serta menjaga emosi pelajar.Hal ini selaras dengan kajian yang dilakukan oleh Bouhnik & Deshen,2014.

Di samping itu, menurut Siti Azura (2021) dalam kajiannya beliau setuju pelaksanaan pembelajaran dan pengajaran dengan pelbagai jenis platform atas talian adalah berkesan untuk melaksanakan proses pembelajaran dan pengajaran.Kaedah ini menyediakan peluang kepada pelajar dengan aktiviti komunikasi dua hala yang lebih baik tanpa mengira faktor masa dan tempat.

4.Kesimpulan

Hasil kajian mendapati pelajar mempunyai kemudahan gajet seperti telefon pintar serta komputer riba atau komputer peribadi.Manakala responden memilih jenis platform atas talian yang paling mudah digunakan seperti *Microsoft Teams* serta *Telegram*. Dapatan kajian juga mendapati bahawa pelajar bersetuju menggunakan platform *Microsoft Teams* serta *Telegram* dan ianya sesuai serta berkesan bagi sesi perkuliahan atas talian.
Seterusnya institusi dan tenaga pengajar juga perlu memberi perhatian dan ruang kepada pelajar yang tiada akses internet, dengan mempelbagaikan platform atas talian seperti *Telegram* atau *Microsoft Teams* bagi memastikan pendidikan berterusan dapat diberikan kepada setiap individu pelajar.

Di samping itu,bagi sesetengah pelajar politeknik yang menghadapi masalah untuk mendapatkan capaian liputan internet,pihak kerajaan dan institusi pengajian tinggi mengambil inisiatif dengan memberikan *Bantuan Prihatin* sebanyak RM200 secara one-off kepada semua pelajar IPTA termasuk pelajar politeknik. Dengan bantuan yang diberikan pelajar dapat menggunakannya untuk membeli data internet yang mana harganya menelan kos yang agak tinggi.Selain itu,Menteri Pengajian Tinggi YB Dato' Dr Noraini Ahmad mengumumkan pada 30 Oktober 2021 bahawa komputer riba dan bantuan internet percuma akan diberikan kepada pelajar B40 termasuk pelajar politeknik dan kolej komuniti.

Rujukan

Baskerville, R. (1991). "Risk Analysis as a Source of Professional Knowledge". Computers & Security. 10 (8): 749–764.

Ehwan, N. (2020). Universiti Sains Islam Malaysia, 2020, Covid19: Implikasi Pengajaran dan Pembelajaran Atas Talian.Retrived from https://www.usim.edu.my/news/in-our-words/covid19-implikasi-pengajaran-dan-pembelajaran-at as-talian/.

Finn, J. D. (1960). Technology and The Instructional Process, Audiovisual Communication Review. Vol. 8 (1), New York: Springer. Galbraith, J. (1967). The New Industrial State. Boston:Houghton Mifflin.

Ida Faridah, Febi Ratna Sari, Tri Wahyuningsih,Fitri Putri Oganda & Untung Rahardja(2020). Effect Digital Learning On Student Motivation During Covid 19. The 8th International Conference on Cyber and IT Service,Management

Irma Mahad, Ugartini Magesvaran, & Intan Nur Syuhada Hamzah. (2021). Sikap Dan Motivasi Murid Sekolah Rendah Terhadap Pembelajaran Bahasa Melayu Dalam Talian Sepanjang Perintah Kawalan Pergerakan. Jurnal Pendidikan Bahasa Melayu.Vol.11, Bil. 1, 16-2

Irny, S.I. and Rose, A.A. (2005) "Designing a Strategic Information Systems Planning Methodology for Malaysian Institutes of Higher Learning (isp- ipta), Issues in Information System, Volume VI, No. 1, 2005.

Juwairiah Mustapah & Roslinda Rosli. (2021). Tahap Kepuasan Pembelajaran MatematikAtas Talian Semasa Pandemik COVID-19. Malaysian Journal of Social Sciences and Humanities,Volume 6, Issue 4.1-20.

Nur Hazirah Hairia'an & Masayu Dzainudin. (2020). Pengajaran Dan Pemudahcaraan Dalam Talian Semasa Perintah Kawalan Pergerakan. Jurnal Pendidikan Awal Kanak-kanak Kebangsaan(Special Issue),Vol. 9, 2020, 18-28.

Norfarahi Zulkifli, Mohd Isa Hamzah, & Khadijah Abdul Razak. (2020). Isu dan cabaran penggunaan MOOC dalam proses pengajaran dan pembelajaran. Journal of Research,Policy & Practice of Teachers &Teacher Education, 1(1), 77-9

Nor Hidayati Mokhtar. (2020). Pembelajaran dalam Talian untuk Pembelajaran SepanjangHayat. Retrived from https://news.utm.my/ms/2020/04/pembelajaran-atas-talian-untukpembelajaran- sepanjang-hayat/

Siti Azura Abu Hassan, Suzana Zainol Abidin & Zulkurnain Hassan. (2021). Keberkesanan Pembelajaran dan Pengajaran Dalam Talian (E-Pembelajaran) Terhadap Pembelajaran Pelajar Kolej Komuniti Hulu Langat, International Journal of Humanities Technology and Civilization(IJHTC), Volume 2 March 2021, Issue 10, 1-13

Ump News, 2020, Kesan Covid-19 Kepada Pelajar UMP: Satu Kajian Ringkas.Retrived from http://news.ump.edu.my/experts/kesan-covid-19-kepada-pelajar-ump-satu-kajian-ringkas

Wan Sofiah, M.O. (2007). Penglibatan Ibu Bapa Dalam Pendidikan Anak-anak Kaum Penan: Kajian Kes Di Hilir Tinjar, Baram, Sarawak. Working paper 14. Faculty of Social Sciences, University Malaysia Sarawak.

Yahaya, M., Azman, A., Mohamad Yusof, M., Kamarul Bahrin, F., & Md Akhir, N. (2020). Halangan masyarakat dalam sistem penyampaian program pendidikan: satu kajian kes di baling, Kedah. KHIDMAT SOSIAL, Journal of Social Work and Social Service. Volume 1 Nomor 2, 60-75.

Zalika, A., Faridah, K., & Mohamad Johari, S. (2009). Memperkasakan pendidikan luar bandar, 3–5. Prosiding "Persidangan Kebangsaan Pendidikan Luar Bandar 2009", 3 – 5 Februari2009, Hotel Baverly, Kota Kinabalu. Sabah. Anjuran: Sekolah Pembangunan Dan Pendidikan Sosial, University Malaysia Sabah. Diperoleh dari http://irep.iium.edu.my/11670/1/Procedng_ Memperkasakan_Pend_Luar_Bandar.pdf.

PENGGUNAAN GOOGLE SITE SEBAGAI MEDIUM PENGURUSAN DOKUMEN DALAM KALANGAN PELAJAR WBL DI PUO

Noraziah Hamid[1], Mazziyatol Farizza Mat[1], Seri Bunian Mokhtar[1]

[1]Politeknik Ungku Omar, Ipoh, Perak
aziahhamid1965@gmail.com
mazziyatol@puo.edu.my
mseribunian@gmail.com

Abstrak: Pandemik COVID 19 telah mengubah sistem pendidikan serta perlaksanaannya secara menyeluruh dan aplikasi teknologi telah digunapakai secara meluas dalam memudahcara urusan pengajaran dan pembelajaran. Justeru, kajian deskriptif ini bertujuan untuk melihat tahap penggunaan Google Sites sebagai medium pengurusan dokumen dalam kalangan pelajar WBL di PUO. Tahap penggunaan ini dilihat dari empat aspek iaitu Persepsi Kemudahan Penggunaan *(Perceived Ease of Use*), Persepsi kegunaan *(Perceived Usefulness*), Sikap Menggunakan Teknologi *(Attitude Towards Using Technology*) dan Niat Perilaku Untuk Menggunakan *(Behavioral Intention to Use*) terhadap penggunaan *Google Sites* dalam pengurusan dokumen yang disediakan kepada pelajar. Instrumen kajian adalah set soal selidik yang mengandungi 20 item berskala Likert. Responden terdiri daripada 30 pelajar semester 8 program Ijazah sarjana Muda Teknologi Kejuruteraan Awam, PUO. Data dianalisis menggunakan perisian *Statistical Package for The Social Science* (SPSS) versi 21 untuk mendapatkan peratus dan skor min. Hasil analisis menunjukkan tahap penggunaan *Google Sites* sebagai medium pengurusan dokumen oleh pelajar memperolehi min keseluruhan yang tinggi. Pembelajaran berasaskan *Google Sites* yang dibangunkan memudahkan urusan penghantar dokumen sepanjang pelajar berada di industri. Jelas, *Google site* boleh digunakan sebagai satu medium perantaraan antara pelajar dan industri sepanjang tempoh pandemic.

***Katakunci**: Penggunaan; Google Sites; Pembelajaran, E-learning.*

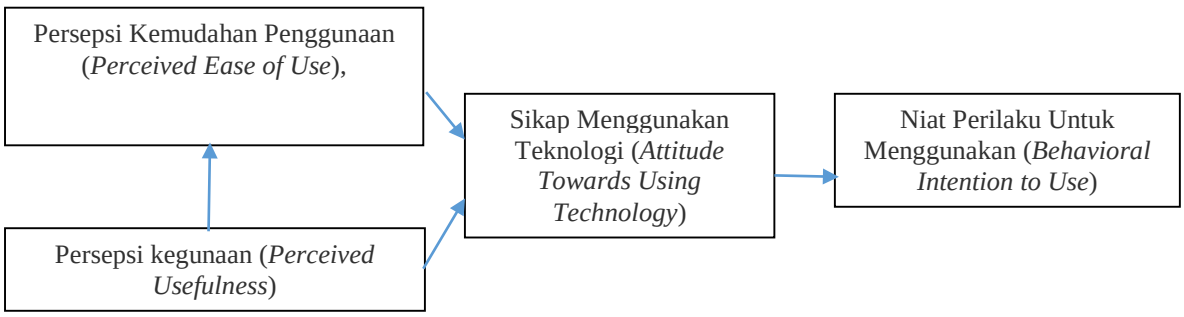
1. Pengenalan

Pandemik COVID 19 telah melanda dunia hampir 3 tahun. Walaupun kes COVID 19 kelihatan makin berkurang namun beberapa mutasi baharu COVID 19 masih wujud dan langkah-langkah berjaga-jaga masih harus diteruskan. Justeru, kerajaan cuba sedaya upaya dalam untuk mengekalkan atau pun menurunkan kadar ini . Kehadiran virus ini ditemui untuk kali pertama di Wuhan, China, dan telah merebak ke hampir setiap negara di dunia dan Malaysia menjadi salah sebuah daripada negara yang terkesan. Fenomena COVID-19 di seluruh dunia telah membawa pada satu era digital yang baharu dalam bidang pendidikan tanah air. Peralihan sistem pembelajaran secara bersemuka kepada kaedah dalam talian dilihat dapat membantu kelangsungan sistem pendidikan negara. Pelaksanaan pembelajaran maya atau dalam talian merupakan salah satu model pembelajaran yang dijalankan semasa pandemik, ini didorong oleh prinsip dasar pendidikan semasa pandemik Covid-19 ialah mengutamakan kesihatan dan

keselamatan pelajar, pendidik, kakitangan pendidikan, keluarga, dan masyarakat di umum, dalam konteks memenuhi pendidikan perkhidmatan semasa pandemik (Jusriati et, al. 2021).

Kesan daripada pandemik ini maka satu tindakan drastic perlu dilakukan oleh pihak Kementerian Pengajian Tinggi (KPTM) bagi menjamin kelangsungan system penyampaian maklumat kepada pelajar. Satu Prosedur Operasi Standard (SOP) telah dijana untuk mengendalikan urusan pemantauan pelajar terutama pelajar yang berada di industri. Justeru satu Garis Panduan Pengurusan Operasi Politeknik Dan Kolej Komuniti Semasa Dan Pasca Perintah Kawalan Pergerakan Akibat Pandemik Covid-19 pada 30 Jun 2020 telah dihasilkan dan digunapakai untuk menguruskan operasi pemantauan dan perlaksanaan pengajaran dan pembelajaran semasa Perintah Kawalan Pergerakan (PKP) berkuatkuasa. Mengikut SOP yang telah berkuatkuasa pelajar yang sedang menjalani *Work Based Learning* (WBL) dan sedang mengikuti latihan di industri boleh dipantau secara atas talian mengikut kesuaian kursus yang ditawarkan begi memudahkan interaksi antara institusi dan pelajar. Oleh yang demikian, keterbatasan interaksi antara pelajar diindustri dan diinstitusi telah wujud dan satu medium perantaraan perlu diujudkan untuk memudahkan pengurusan dokumen pelajar yang terlibat.

Model Penerimaan Teknologi (TAM) merupakan satu model yang sangat popular dalam menentukan penerimaan sebarang teknologi dalam kalangan pengguna. Idea model TAM ini awalnya ditemui oleh Davis (1989) dalam kajiannya untuk menerangkan perihal penerimaan teknologi computer berdasarkan satu teori yang jelas. Model asal dibangunkan oleh Ajzen & Fishbein (1980) dan seterusnya dikembangkan lagi oleh pengkaji lepas (Lu et al., 2003; Davis, 1989; Venkatesh et al., 2003). Rajah 1 menunjukkan kaitan antara pembolehubah yang diukur dalam TAM.



Rajah 1: Model Penerimaan Teknologi (TAM)

Terdapat banyak kajian yang lepas mengkaji tentang penggunaan teknologi dalam pembelajaran maya antaranya Model Intruksional *E learning* Magdalena, et, al.,2020), Laman Web (Website) Menggunakan Google Sites (Kirin et, al.,2021), Media Pembelajaran Interaktif Berbasis Android (Nurfadhillah et, al.,2021) dan Media Audio Visual (Nurfadhillah et, al.,2021). Penggunaan platfom maya dilihat sebagai satu alternatif penyelesaian masalah ini. Banyak platfom maya yang boleh digunapakai bagi tujuan pembelajaran maya. Antara platfom yang sering digunakan adalah applikasi *Zoom, Weber, Microsoft Team, google classroom* dan lain-lain. Manakala *Google Sites* ialah platform di Google yang membenarkan pengguna untuk membuat laman web dengan mudah. Pengguna boleh memanfaatkan Google Sites kerana ia

mudah dicipta dan diurus oleh pengguna biasa. Kemudahan menggunakan google sites yang diolah oleh google ini dapat membolehkan sesiapa sahaja untuk menggunakan atau mencipta *Google Sites*, terutamanya untuk kegunaan dalam pengajaran dan pembelajaran semasa pandemik Covid-19. Justeru, kajian ini bertujuan untuk membangunkan *google site* bagi pengurusan dokumen pelajar WBL serta menentukan tahap penggunaannya dalam kalangan pelajar WBL.

2. Metodologi

Penyelidikan ini dijalankan berdasarkan bedasarkan pada dua fasa. Fasa pertama adalah fasa pembangunan laman web mengunakan google site. Manakala fasa kedua menentukan tahap penggunaan laman web yang dibangunkan dalam kalangan pelajar. Tahap penggunaan ini dilihat dari empat aspek dalam model Penerimaan Teknologi yang diasaskan oleh Davis (1989) iaitu Persepsi Kemudahan Penggunaan (*Perceived Ease of Use*), Persepsi kegunaan (*Perceived Usefulness*), Sikap Menggunakan Teknologi (*Attitude Towards Using Technology*) dan Niat Perilaku Untuk Menggunakan (*Behavioral Intention to Use*) terhadap penggunaan *Google Sites* dalam pengurusan dokumen yang disediakan kepada pelajar. Instrumen kajian adalah set soal selidik yang mengandungi 20 item berskala Likert yang diadaptasi daripada Davis (1989). Responden terdiri daripada 30 pelajar semester 8 program Ijazah Sarjana Muda Teknologi Kejuruteraan Awam, PUO. Data diperolehi dianalisis menggunakan perisian *Statistical Package for The Social Science* (SPSS) versi 21 untuk mendapatkan peratus dan skor min.

Fasa Pertama: Pembangunan Laman Web

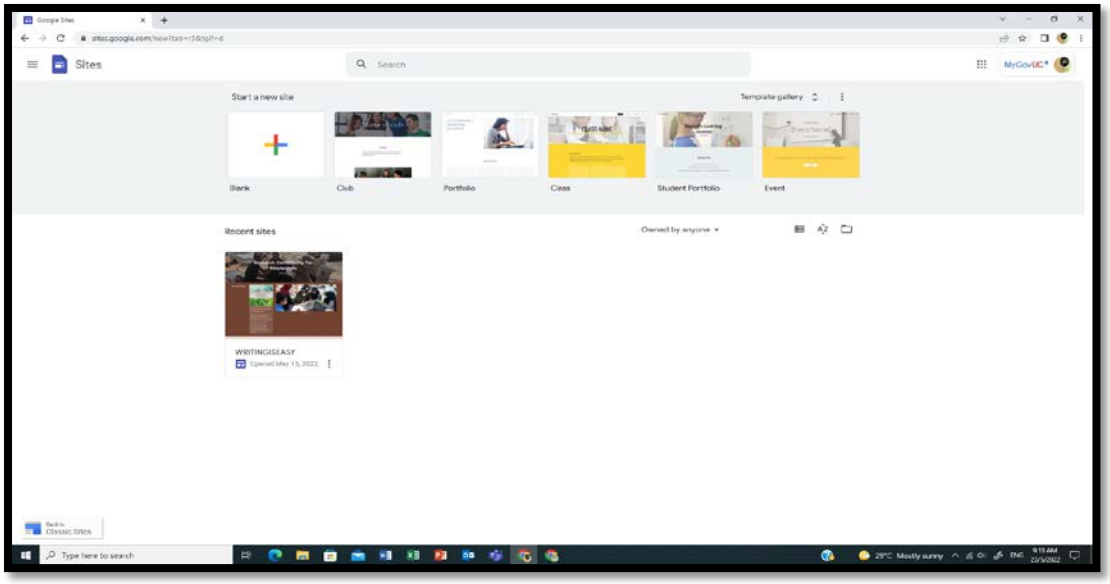
Google Sites adalah laman *website* peribadi ataupun profesional yang berfungsi sebagai saluran infomasi yang dibangunkan dibawah Google. Aplikasi ini mudah digunakan dan setiap individu yang mempunyai akaun google mail boleh menggunakannya. Berikut merupakan langkah-langkah pembangunan laman web WBL.

a. Buat akaun Google
Buat akaun atau guna akaun yang sedia ada.

b. Buka Google Sites
Langkah selanjutnya, layari https://sites.google.com/new atau melalui:

- menu “Google apps” yang ada di pojok kanan atas *browser*
- Google Drive → (+) New → More → Google Sites

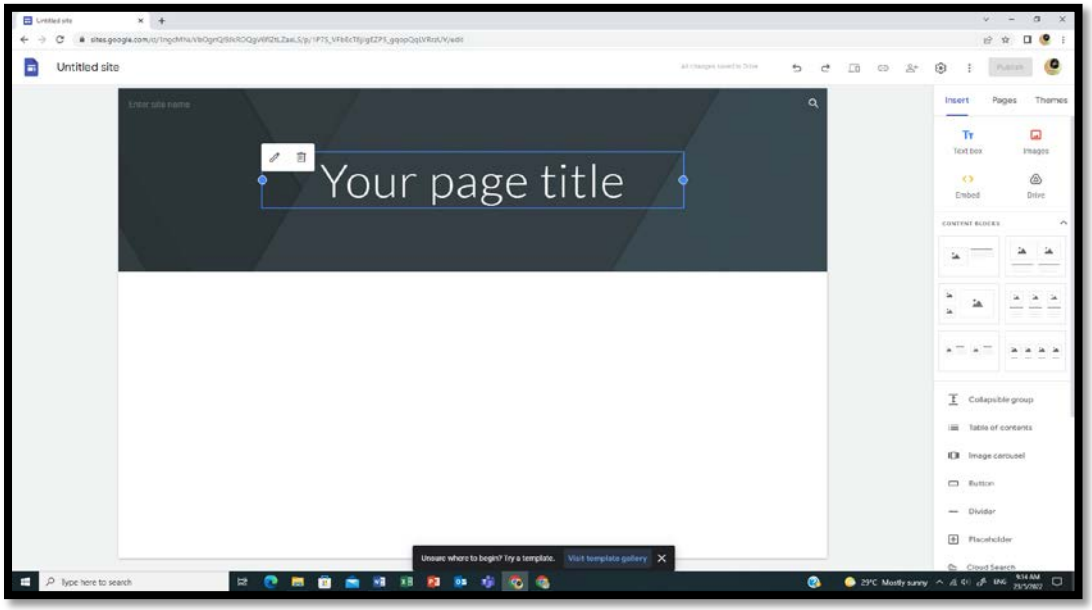
Setelah itu, paparan seperti Rajah 2 di bawah ini akan tertera.



Rajah 2: Paparan Gsite

c. Klik (+) atau *template* yang ada

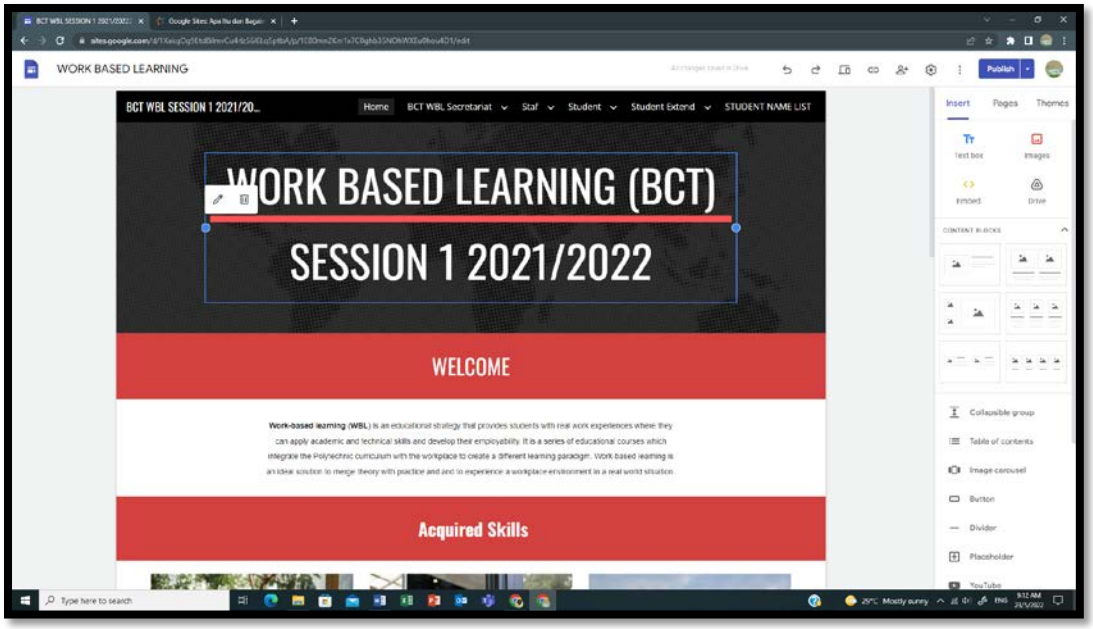
Klik menu **(+)** atau buka ***Template gallery*** dan pilih *template* yang ada seperti Rajah 3 di bawah.



Rajah 3: Paparan template

d. Mulai buat *website* WBL

Setelah itu, masukkan semua maklumat yang berkaitan dan ingin dipaparkan dalam laman web tersebut seperti Rajah 4 berikut.



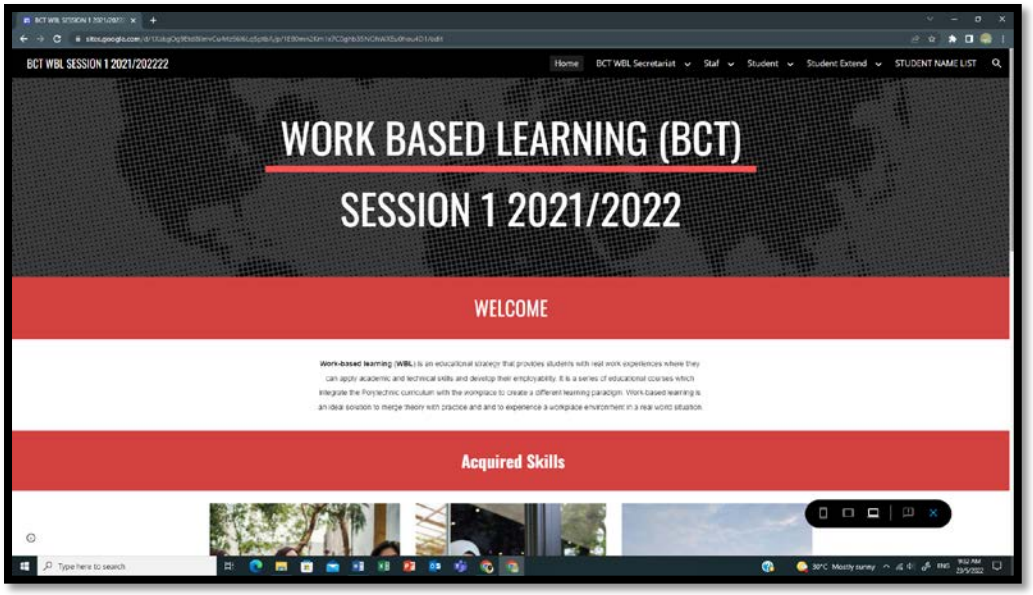
Rajah 4: Paparan maklumat

Fasa kedua: Tahap Penggunaan

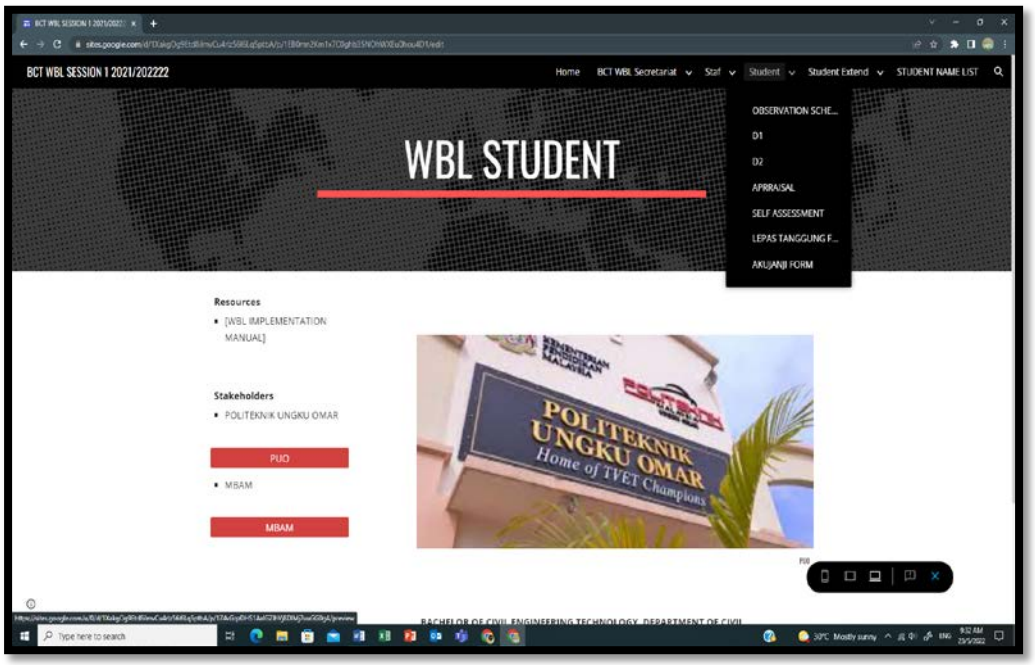
Setelah laman web tersebut berjaya dihasilkan maka ianya diterbitkan atas talian dan diberikan link web kepada pelajar yang sedang menjalani WBL untuk menggunakan laman tersebut bagi perhantaran semua dokumen yang berkaitan. Pelajar diberikan tempoh satu semester untuk melengkapkan semua dokumen serta memuatnaik kedalam *website* WBL tersebut. Seramai 31 orang pelajar WBL terlibat dalam penggunaan website tersebut dan kesemua pelajar ini telah diberikan soal selidik secara dalam talian untuk menentukan tahap pengguaan website yang dibangunkan. Berdasarkan faktor-faktor yang dikenal pasti berkaitan dengan penerimaan teknologi, empat aspek iaitu Persepsi Kemudahan Penggunaan (*Perceived Ease of Use*), Persepsi kegunaan (*Perceived Usefulness*), Sikap Menggunakan Teknologi (*Attitude Towards Using Technology*) dan Niat Perilaku Untuk Menggunakan (*Behavioral Intention to Use*) terhadap penggunaan *Google Sites* dalam pengurusan dokumen. Bagi semua pembolehubah yang dinyatakan di atas, ia diperoleh daripada kajian lepas(Davis, 1989).

3. Dapatan

Hasil pembangunan website boleh dilihat dalam Rajah 5 dan Rajah 6 berikut. Semua maklumat yang perlu dimuatnaik oleh pelajar boleh dilayari melalui *pages* yang disediakan dalam *website* tersebut. Pelajar hanya perlu mengimbas dokumen dan memuatnaik dokumen tersebut dalam kategori yang telah ditetapkan dalam Gsite tersebut.



Rajah 5: Website Work Based Learning (WBL)



Rajah 6: Hasil akhir Gsite

Jadual 1 menunjukkan dapatan persepsi pelajar WBL terhadap Gsite WBL. Majoriti pelajar menyatakan setuju (> 80%) dengan penggunaan Gsite dalam pengurusan dokumen. Manakala Jadual 2 menunjukkan tahap penggunaan *Google Sites* sebagai medium pengurusan dokumen oleh pelajar memperolehi min keseluruhan yang tinggi. Selain itu, pelajar juga merasakan pembelajaran berasaskan *Google Sites* adalah senang dan mudah untuk digunakan dan ini memberi manfaat kepada pelajar. Ini menunjukkan pelajar mempunyai kesediaan yang tinggi

terhadap penggunaan *Google Sites* sebagai medium pengurusan dan bersedia dengan sistem pembelajaran berasaskan *e-learning*.

Jadual 1: Persepsi pelajar terhadap Gsite WBL.

Penyataan	Sangat Tidak Bersetuju	Tidak Bersetuju	Kurang Setuju	Setuju	Sangat Setuju
Persepsi Kemudahan Penggunaan (*Perceived Ease of Use*)					
Menggunakan gsite meningkatkan kecekapan saya dalam mengurus dokumen	0(0%)	0(0%)	2(6.5%)	3(9.7%)	26(83.9%)
Menggunakan gsite meningkatkan prestasi saya dalam mengurus dokumen	0(0%)	0(0%)	2(6.5%)	6(19.4%)	23(74.2%)
Menggunakan gsite meningkatkan produktiviti tugasan saya	0(0%)	0(0%)	1(6.5%)	6(19.4%)	24(77.4%)
Saya dapati Gsite WBL sangat berguna	0(0%)	0(0%)	2(6.5%)	5(16.1%)	24(77.4%)
Persepsi kegunaan (*Perceived Usefulness*)					
Saya dapati mengunakan Gsite WBL sangat mudah	0(0%)	0(0%)	2(6.5%)	5(16.1%)	24(77.4%)
Saya dapati belajar mengunakan Gsite WBL sangat mudah	0(0%)	0(0%)	1(6.5%)	4(13.3%)	25(83.3%)
Saya dapati interaksi dengan Gsite WBL jelas dan difahami	0(0%)	0(0%)	2(6.5%)	8(25.8%)	21(67.7%)
Saya dapati mudah menguruskan dokumen dengan Gsite WBL	0(0%)	0(0%)	3(9.7%)	4(13.3%)	24(77.4%)
Sikap Menggunakan Teknologi (*Attitude Towards Using Technology*)					
Saya berhasrat untuk menguruskan dokumen dengan Gsite WBL	0(0%)	0(0%)	4(13.3%)	3(9.7%)	24(77.4%)
Saya akan selalu menguruskan dokumen dengan Gsite WBL	0(0%)	0(0%)	4(13.3%)	3(9.7%)	24(77.4%)
Saya akan kerap menggunakan Gsite WBL	0(0%)	0(0%)	6(19.4%)	2(6.5%)	23(74.2%)
Niat Perilaku Untuk Menggunakan (*Behavioral Intention to Use*)					
Gsite WBL menjadikan urusan penghantaran dokumen WBL lebih menarik	0(0%)	0(0%)	2(6.5%)	6(19.4%)	23(74.2%)
Gsite WBL menjadikan urusan penghantaran dokumen WBL lebih ceria	0(0%)	0(0%)	4(13.3%)	3(9.7%)	24(77.4%)
Saya suka menggunakan Gsite WBL	0(0%)	0(0%)	4(13.3%)	4(13.3%)	23(74.2%)
Saya sentiasa mengambil peluang untuk menguruskan dokumen menggunakan Gsite WBL	0(0%)	0(0%)	4(13.3%)	3(9.7%)	24(77.4%)

Jadual 2: Tahap Penggunaan Gsite WBL

Penggunaan	Min	Interpretasi
Persepsi Kemudahan Penggunaan (*Perceived Ease of Use*)	4.73	Tinggi
Persepsi kegunaan (*Perceived Usefulness*),	4.70	Tinggi
Sikap Menggunakan Teknologi (*Attitude Towards Using Technology*)	4.61	Tinggi
Niat Perilaku Untuk Menggunakan (*Behavioral Intention to Use*)	4.64	Tinggi

4. Perbincangan

Dapatan persepsi pelajar WBL terhadap Gsite WBL hasil dari soalselidik kepada pelajar sebagai respondent seramai 31 orang semester 8 yang menggunakan google site ini menunjukkan majoriti pelajar menyatakan setuju (> 80%) dengan penggunaan Gsite dalam pengurusan dokumen yang melibatkan empat persepsi pelajar di mana pelajar bersetuju melebihi 80%, dalam persepsi Kemudahan Penggunaan (*Perceived Ease of Use),* Persepsi kegunaan (*Perceived Usefulness),* Sikap Menggunakan Teknologi (*Attitude Towards Using Technology*) dan juga Niat Perilaku Untuk Menggunakan (*Behavioral Intention to Use*).Bagi persepsi pertama iaitu Persepsi Kemudahan Penggunaan (*Perceived Ease of Use),* majoriti pelajar menyatakan setuju (> 80%) dalam perkara meningkatkan kecekapan dan prestasi dalam mengurus dokumen, mampu meningkatkan produktiviti tugasan dan sangat berguna sebagai satu kemudahan penggunaan dikalangan pelajar dalam satu platform. Persepsi kedua iaitu Persepsi kegunaan (*Perceived Usefulness*), majoriti pelajar menyatakan setuju (> 80%) dalam perkara Gsite WBL sangat mudah digunakan dan juga platform yang mudah untuk berinteraksi,jelas dan senang difahami disamping mudah dan jelas dalam menguruskan dokumen dikalangan pelajar.Persepsi ketiga iaitu, Sikap Menggunakan Teknologi (*Attitude Towards Using Technology*), menunjukkan majoriti pelajar berhasrat untuk menguruskan dokumen dengan Gsite WBL, akan selalu menguruskan dokumen dengan Gsite WBL, kerap menggunakan dan mengurus dokumen dengan Gsite WBL.Persepsi ke empat iaitu Niat Perilaku Untuk Menggunakan (*Behavioral Intention to Use*), menyatakan setuju (> 80%) dalam perkara Gsite WBL menjadikan urusan penghantaran dokumen WBL lebih menarik, lebih ceria serta suka dan sentiasa mengambil peluang untuk menguruskan dokumen menggunakan Gsite WBL dan akan kerap menggunakan Gsite WBL.Dapatan untuk tahap penggunaan *Google Sites* sebagai medium pengurusan dokumen oleh pelajar memperolehi min keseluruhan yang tinggi dalam Persepsi Kemudahan Penggunaan (*Perceived Ease of Use*), Persepsi kegunaan (*Perceived Usefulness*),Sikap Menggunakan Teknologi (*Attitude Towards Using Technology*) dan Niat Perilaku Untuk Menggunakan (*Behavioral Intention to Use*) dalam Gsite WBL.

Penggunaan *Google Site* sebagai medium pengurusan dokumen dalam kalangan pelajar WBL di PUO memberi faedah yang sangat berguna kerana ianya adalah satu medium perantaraan untuk memudahkan pengurusan dokumen pelajar menjadi lebih mudah digunakan, teratur dan jelas dan mudah difahami. Semua pelajar lebih jelas berinteraski dengan platform ini dan tidak mudah terlepas pandang dokumen yang sepatutnya di kumpul, *upload* ataupun *download* mengikut keperluan dalam masa yang ditetapkan kerana masa menjalani WBL di industri adalah 40 minggu setiap semester selama dua semester yang membawa beberapa

kursus bersama sudah pasti perlu menyelesaikan banyak dokumen sepanjang waktu tersebut. Penggunaan *Google Site* Sebagai medium Pengurusan Dokumen Dalam Kalangan Pelajar WBL di PUO memberi impak yang baik kepada pelajar WBL di mana mereka merasa lebih teruja dan menarik,suka,ceria dan sentiasa akan menggunakan Giste WBL dalam pengurusan dokumen kerana ianya lebih teratur, mudah dan jelas selaras dengan dapatan yang majoriti pelajar bersetuju Gsite ini adalah medium pengurusan dokumen yang berkesan serta dapat meningkatkan kecekapan dan prestasi dalam mengurus dokumen, mampu meningkatkan produktiviti tugasan serta ianya sangat berguna sebagai satu kemudahan penggunaan dikalangan pelajar dalam satu platform.

5. Rumusan

Rumusan yang boleh dibuat dalam Penggunaan *Google Site* Sebagai medium Pengurusan Dokumen Dalam Kalangan Pelajar WBL di PUO ialah dimana para pelajar mempunyai kesediaan yang tinggi terhadap penggunaan *Google Sites* sebagai medium pengurusan dokumen dan bersedia dengan sistem pembelajaran berasaskan *e-learning*. Ini jelas dari persepsi sikap menggunakan teknologi menunjukkan majoriti pelajar berhasrat, selalu dan kerap untuk menggunakan dan mengurus dokumen dengan Gsite WBL(BCT). Keterbatasan interaksi antara pelajar yang menjalani WBL di industri dan di institusi iaitu PUO semasa Pandemik *Covid 19* telah membuka ruang mewujudkan satu medium perantaraan untuk memudahkan pengurusan dokumen pelajar yang terlibat melalui *google site* yang di bangunkan sebagai platfom maya yang boleh digunapakai bagi tujuan pembelajaran maya. Ianya amat berkesan sebagai satu kaedah baharu dalam *e-learning.* Selain itu, pelajar juga merasakan pembelajaran berasaskan *Google Sites* adalah mudah untuk digunakan, mudah belajar, mudah mengurus dokumen kerana interaksi adalah jelas dan mudah difahami. Seterusnya pelajar juga mempunyai niat perilaku yang tinggi untuk menggunakan Gsite WBL BCT yang dapat memberi manfaat kepada pelajar terutama dalam menguruskan dokumen yang pelbagai semasa 80 minggu dalam dua semester menjalani WBL di industri kerana majoriti pelajar bersetuju bahawa berinteraksi dengan menggunakan platform Gsite WBL BCT ini adalah jelas dan mudah difahami. Selain dari itu pelajar tidak mudah terlepas pandang dokumen yang sepatutnya di kumpul, dimuatnaik ataupun dimuat turun mengikut keperluan dalam masa yang ditetapkan. Secara keseluruhannya; tahap penerimaan kemudahan penggunaan, kegunaan, menggunakan teknologi dan perilaku menggunakan Gsite WBL amat tinggi dikalangan para pelajar WBL untuk program Sarjana Muda Teknologi Kejuruteraan (BCT) di PUO.

Rujukan

Magdalena, I., Firdaus, C. C., Roshalia, D. R., & Habibah, S. U. (2020). Pelaksanaan Model Instruksional E-Learning pada Era Covid-19 di SD Negeri Bugel 1. *PENSA*, *2*(3), 440-450. https://doi.org/10.36088/pensa.v2i3.1019

Kirin, A., Sutimin, H., Pong, T., Poh, L., & Marpuah, S. (2021). Membina Laman Web (Website) Menggunakan Google Sites Untuk Kelestarian Ekonomi. *JPPM Kepri: Jurnal Pengabdian Dan Pemberdayaan Masyarakat Kepulauan Riau*, *1*(1), 24-34. https://doi.org/10.35961/jppmkepri.v1i1.187

Nurfadhillah, S., Rachmadani, A., Salsabila, C. S., Yoranda, D. O., Savira, D., & Oktaviani, S. N. (2021). Pengembangan Media Pembelajaran Interaktif Berbasis Android melalui Aplikasi Quiziz pada Pelajaran Matematika VI SDN Karang Tengah 06. *PENSA*, *3*(2), 280-296. https://doi.org/10.36088/pensa.v3i2.1359

Nurfadhillah, S., Hidayati, N., Effendi, H., Sabila, R., & Umroh, S. (2021). Pengembangan Media Audio Visual Pembelajaran Matematika di Era Pandemi Covid-19 di SDN Pangakalan 4. *PENSA*, *3*(1), 166-175. https://doi.org/10.36088/pensa.v3i1.1275

Jusriati., Nasriandi., Kurniadi, W., Ratna. (2021). The implementation of Google site as e-learning platform for teaching EFL during covid-19 pandemic. English Review: Journal of English Education, 10(1), 129-138. doi: https://doi.org/10.25134/erjee.v10i1.5363.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, *13*(3), 319–340. https://doi.org/10.2307/249008

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: toward a unified view. MIS Quarterly, 27(3), 425-478.

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice Hall.

Lu, J., Yu, C., Liu, C., & Yao, J. E. (2003). Technology acceptance model for wireless Internet. Internet Research: Electronic Networking Applications and Policy, 13, 206-222.

KESEDIAAN DAN KEPERLUAN PELAJAR TERHADAP PEMBANGUNAN M-*LEARNING* MENGGUNAKAN APLIKASI MUDAH ALIH BAGI KURSUS *POWER ELECTRONICS*

Ainul Azniza

Politeknik Merlimau Melaka, Malaysia

ainul@pmm.edu.my

Abstrak: Perkembangan teknologi telah merubah gaya hidup manusia masa kini dalam usaha menambahbaik sistem pembelajaran secara teknologi mudah alih. Kajian ini bertujuan untuk mengenal pasti tahap kesediaan dan keperluan pelajar terhadap pembangunan aplikasi mudah alih secara M- *Learning* bagi kursus Power Electronics. Seramai 60 pelajar dari semester 4, Diploma Kejuruteraan Mekatronik yang terlibat sebagai responden dalam kajian ini. Borang soal selidik digunakan sebagai instrumen dalam kajian ini yang telah diubahsuai dan dirujuk daripada *Technology Acceptance Model* (TAM) bagi menentukan tahap kesediaan dan keperluan terhadap penggunaan *mobile learning* di kalangan pelajar. Instrumen kajian yang digunakan adalah terdiri daripada satu set soal selidik yang mengandungi 48 item soalan dan menggunakan skala Likert yang menggunakan skala 5. Data kajian dianalisa melalui statistik deskriptif dan analisis kualitatif yang menggunakan SPSS versi 28.0. Dapatan kajian menunjukkan bahawa tahap kesediaan pelajar terhadap pembelajaran secara atas talian, strategi pembelajaran pelajar, keperluan rekabentuk aplikasi mudah alih dan bagi keperluan rekabentuk interaksi dalam aplikasi mudah alih skor min adalah 3.94 - 4.43. Berdasarkan kepada dapatan yang diperolehi, skor min yang diperolehi pada tahap tinggi. Oleh itu, penyelidik akan meneruskan penyelidikan dengan lebih lanjut serta dapat digunakan dalam elemen pembangunan *M-Learning* aplikasi mudah alih bagi kursus Power Electronics yang lebih mudah, sistematik dan menarik.

***Kata Kunci**: M-Learning, Aplikasi Mudah Alih, Power Electronics*

1.0 Pengenalan

Dalam era teknologi yang terkini, pembelajaran mudah alih adalah satu medium pengajaran dan pembelajaran yang banyak digunakan sebagai pengantar digital. M- Learning merupakan pendekatan pembelajaran yang dapat menentukan penguasaan terhadap kemahiran dan pengetahuan melalui aplikasi teknologi mudah alih. Pembelajaran yang berasaskan aplikasi mudah alih atau lebih dikenali sebagai pembelajaran mudah alih atau m-pembelajaran dilihat semakin popular kini dan pembelajaran berasaskan *web* ini mampu menggantikan teknik pembelajaran di masa hadapan (Alif Nawi et al, 2014). Pembelajaran mudah alih banyak menggunakan alat peranti pintar seperti telefon pintar, *tablet* dan sebagainya. Ini kerana peranti ini mempunyai pelbagai aplikasi yang boleh digunakan untuk pelbagai aktiviti (Göksu, Atici 2013). Selain itu juga pembelajaran secara mudah alih telah membawa perubahan yang amat ketara kepada sistem pendidikan. Iaitu dengan memberi peluang serta ruang kepada pelajar untuk aktif didalam aktiviti pembelajaran secara fizikal

atau mental. Kesan daripada aktiviti ini ia dapat menggalakkan pelajar untuk belajar secara kendiri memenuhi keperluan ruang bagi dalam penerimaan mental dan fizikal pelajar.

Menurut Yong & Shengnan (2010), mobile pembelajaran atau pembelajaran secara mudah alih adalah satu kaedah pembelajaran yang menggunakan peranti atau peralatan mudah alih dalam pengajaran dan pembelajaran. Oleh itu, dengan adanya perkembangan teknologi 3G dan 4G LTE dan yang terkini rangkaian 5G telah mencetuskan pembangunan inovasi kepada sektor pendidikan dimana teknologi ini boleh dimanfaatkan untuk pembelajaraan secara atas talian. Kemajuan teknologi telefon pintar yang berteraskan pengoperasian aplikasi Android, iOS, Windows Phone dan Blackberry ia menjadikan alat komunikasi ini satu keperluan kepada pelajar di pusat pengajian tinggi. Dengan adanya pembangunan aplikasi mudah alih ini, ia dilihat dapat meningkatkan taraf penggunaan yang amat pesat dalam bidang pendidikan.

Selain daripada itu, penularan pendemik Covid-19 telah menjadikan pengajaran dan secara atas talian menjadi satu keperluan di institusi pendidikan. Kini, medium pengajaran dan pembelajaran secara mudah alih dan atas talian dapat mencegah penularan wabak Covid-19 dalam kalangan pelajar. (Muhammad Izzat et al., 2020). Pelajar-pelajar perlu menyesuaikan dengan pengajaran dan pembelajaran mudah alih bagi membolehkan mereka untuk membina keyakinan terhadap kemahiran dengan pembelajaran kendiri secara optimum.

2.0 Fokus Kajian

Kajian kuantitatif yang dijalankan secara kajian tinjauan melibatkan responden yang terlibat iaitu pelajar Semester 4 yang sedang mengikuti pengajian dalam program Diploma Kejuruteraan Mekatronik, Politeknik Merlimau Melaka bagi mendapatkan maklumat tentang kesediaan dan keperluan pelajar dalam membangunkan aplikasi mudah alih bagi kursus Power Electronics.

3.0 Objektif Kajian

Objektif kajian adalah:

1. Untuk membangun aplikasi mudah alih bagi kursus Power Electronics berasaskan strategi pembelajaran yang sistematik di Politeknik Merlimau Melaka.
2. Kajian ini juga akan mengenalpasti tahap kesediaan dan keperluan pelajar Semester 4 yang sedang mengikuti pengajian dalam program Diploma Kejuruteraan Mekatronik dalam pembangunkan aplikasi mudah alih.

4.0 Persoalan Kajian

Bagi mencapai dan memastikan objektif kajian tercapai, maka persoalan kajian dibangunkan iaitu:

i. Apakah kesediaan pelajar dalam pembangunan aplikasi mudah alih dalam kursus Power Electronics

ii. Apakah komponen yang diperlukan oleh pelajar untuk membangunkan aplikasi mudah alih dalam kursus *Power Electronics.*

5.0 Metodologi Kajian

Menurut Chua (2020), hasil kajian ditentukan oleh kaedah dan reka bentuk kajian yang dibangunkan bagi melaksanakan kajian yang melibatkan strategi penyelidikan dan kaedah kajian. Dalam metodologi beberapa perkara yang dibincangkan ialah termasuk populasi dan sampel kajian, instrumen kajian, kajian rintis, kesahan dan kebolehpercayaan dan analisis data.

5.1 Populasi dan Sampel Kajian

Populasi kajian adalah terdiri daripada 54 orang pelajar yang sedang mengikuti kursus Power Electronics bagi Sesi 2-2021-2022 program Diploma Kejuruteraan Mekatronik. Seramai 54 orang yang terdiri daripada 47 orang pelajar lelaki dan 7 orang pelajar perempuan. (20 orang pelajar sebagai sampel untuk kajian rintis) telah mengikut prosedur persampelan rawak.

5.2 Instrumen Kajian

Instrumen yang digunakan dalam kajian ini merupakan soal selidik yang direka bentuk bagi memenuhi objektif keseluruhan kajian. Pembinaan item dalam kajian ini adalah hasil daripada item soal selidik dalam kajian oleh Tamil Selvan (2014) dan Norhapizah (2016). Dalam kajian ini, soal selidik terdiri daripada dua bahagian iaitu bahagian A mengandungi maklumat demografi responden manakala bahagian B mengandungi 40 item mengenai keperluan komponen dalam pembangunan aplikasi mudah alih.

5.3 Kesahan Kajian

Menurut (Chua, 2020) kajian rintis adalah kajian yang dilakukan sebelum kajian sebenar dilaksanakan manakala nilai 0.80 keatas mempunyai kebolehpercayaan yang tinggi. Kajian rintis bertujuan untuk mendapatkan maklumat awal berhubung kesahan dan keboleh percayaan instrumen yang dibina. Sampel yang terlibat dalam ujian ini terdiri daripada 20 orang responden. Analisis kebolehpercayaan instrumen kajian ini menunjukkan nilai Cronbach Alpha 0.91.

6.0 Analisis Data

Data kajian dianalisis menggunakan statistik deskriptif bagi menjawab setiap item-item kajian. Data daripada borang soal selidik akan dianalisis menggunakan program SPSS versi 28 untuk mendapatkan kekerapan (frekuensi) dan peratusan bagi setiap soalan kajian. Data kajian diwakilkan dalam bentuk jadual. Manakala analisis data dibuat dengan membandingkan peratusan tertinggi dan terendah serta nilai skor min dan menilai tahap interpretasi Skor Min bagi setiap soalan kajian. Interpretasi Skor Min berdasarkan Pallant (2020) boleh dirujuk berdasarkan Jadual 1.

Jadual 1. Interpretasi Skor Min

Skor Min	Interpretasi (Tahap)
1.00 hingga 1.66	Rendah
1.67 hingga 3.33	Sederhana
3.34 hingga 5.00	Tinggi

6.1 Analisis Demografi Responden

Laporan analisis demografi responden ditunjukkan seperti dalam Jadual 2 hingga 5 bagi menjawab persoalan pada bahagian A iaitu apakah kesediaan pelajar dalam pembangunan aplikasi mudah alih dalam kursus Power Electronics. Bilangan kekerapan (dalam nilai peratus) digunakan untuk membuat analisis demografi responden.

Jadual 2: Responden mengikut jantina

Jantina	Frekuensi	Peratusan
Lelaki	47	87
Perempuan	7	13

Jadual 2 menunjukkan bilangan responden lelaki (87%, n=47) adalah lebih besar daripada bilangan responden perempuan (13%, n=7). Ini disebabkan oleh kebanyakan bilangan yang mengambil kursus kejuruteraan mekanikal terdiri daripada pelajae lelaki lebih ramai.

Jadual 3: Responden mengikut pencapaian akademik

HPNM	Frekuensi	Peratusan
2.00-3.00	14	25.9
3.00-3.49	25	46.3
>3.5	15	27.8

Jadual 3 menunjukkan bilangan responden HPNM 3.00-3.49 (46.3%, n=25) adalah lebih besar daripada bilangan responden HPNM 2.00-3.00 (25.9%, n=14). Ini menunjukkan tahap pencapaian akademik pelajar adalah tinggi.

Jadual 4: Aplikasi telefon pintar responden

Sistem aplikasi	Frekuensi	Peratusan
Android	40	74.1
Windows phone	14	25.9

Jadual 4 menunjukkan, sistem aplikasi yang paling banyak digunakan oleh responden adalah penggunaan sistem Android iaitu kekerapan 74.1% (n=40). Manakala sistem pengoperasian yang paling sedikit digunakan oleh responden ialah Windows Phone dengan kekerapan 25.9% (n=14). Oleh itu, daripada data kajian ini dapat mengenalpasti jenis sistem pengoperasian telefon mudah alih yang di minati oleh responden.

Jadual 5: Jenis Aplikasi Dalam Telefon Yang Selalu Dimuat Turun Oleh Responden

Jenis	Frekuensi	Peratusan
Permainan	11	20.4
Pendidikan	10	18.5
Komunikasi	13	24.1
Hiburan	11	20.4
Penyimpanan Fail	4	7.4
Lain-lain	5	9.3

Berdasarkan dapatan kajian dalam Jadual 5, aplikasi mudah alih yang selalu dimuat turun oleh responden ialah aplikasi komunikasi dengan kekerapan 24.1% (n=13). Manakala aplikasi permainan dan hiburan 20.4% (n=11), aplikasi pendidikan 18.5% (n=10), dan aplikasi penyimpanan fail 7.4% (n=4) aplikasi yang paling sedikit.

Jadual 6 hingga 9 digunakan bagi menjawab persoalan pada bahagian B iaitu apakah ciri-ciri komponen yang diperlukan oleh pelajar untuk membangunkan M-pembelajaran dalam kursus Power Electronics.

Jadual 6: Kesediaan Pelajar Terhadap Pembelajaran Secara Atas Talian

Kod	Item	Skor Min	Tahap
B1	Saya sentiasa bersedia menggunakan kaedah pembelajaran atas talian	4.15	Tinggi
B2	Saya mempunyai kemahiran menggunakan kaedah pembelajaran atas talian	4.13	Tinggi
B3	*M- Learning* membolehkan saya mempelajari pelajaran dalam bentuk yang disesuaikan oleh gaya pembelajaran saya	4.11	Tinggi

B4	Institusi memberi peluang kepada saya untuk menggunakan *M-Learning*	4.15	Tinggi
B5	Saya sentiasa cuba untuk mendapatkan bahan pembelajaran secara atas talian	4.33	Tinggi
B6	Menggunakan *M- Learning* mengurangkan beban saya dalam pencarian maklumat.	4.28	Tinggi
B7	Saya sangat selesa dengan kaedah pembelajaran atas talian	4.17	Tinggi
B8	Saya tidak menghadapi sebarang halangan untuk menggunakan pembelajaran atas talian	3.94	Tinggi
B9	Menggunakan *M-Learning* meningkatkan kecekapan saya sebagai seorang pelajar	4.04	Tinggi
B10	Saya boleh belajar mengikut kemampuan saya sendiri menggunakan *M-Learning*	4.17	Tinggi

Jadual 6 menunjukkan nilai skor min bagi kesediaan pelajar terhadap pembelajaran secara atas talian adalah tinggi berdasarkan daripada rujukan Jadual 1 Interpretasi Skor Min. Persoalan daripada item B1 hingga B10 adalah menunjukkan tahap kesediaan responden adalah tinggi. Walaubagaimanapun, skor min pada item B8 adalah dibawah skor 4, iaitu 3.94. Persoalan item bagi B8 adalah berkaitan dengan terdapat sedikit sahaja responden menghadapi halangan untuk menggunakan pembelajaran atas talian. Oleh itu, pembangunan aplikasi mudah alih ini perlu mengambil kira tahap kesediaan pelajar supaya bahan yang dibangunkan dapat digunakan oleh pelajar secara optimum.

Jadual 7: Strategi Pembelajaran Pelajar

Kod	Item	Skor Min	Tahap
C1	Pensyarah menyediakan pembelajaran yang aktif.	4.15	Tinggi
C2	Pensyarah memberi peluang pelajar membuat perbincangan bersama rakan sekelas.	4.30	Tinggi
C3	Pensyarah menyediakan aktiviti yang melibatkan kerja berkumpulan.	4.22	Tinggi
C4	Pensyarah menyediakan aktiviti pdp yang mencabar minda	4.17	Tinggi
C5	Pensyarah menyediakan platform yang sesuai untuk menyampaikan maklumat.	4.22	Tinggi

C6	Pensyarah menyediakan aktiviti pembelajaran membantu memahami topik kursus.	4.24	Tinggi
C7	Pensyarah menyediakan aktiviti yang menyerupai situasi sebenar.	4.19	Tinggi
C8	Pensyarah memberi kebebasan dalam memilih kaedah pembelajaran sendiri	4.15	Tinggi
C9	Pensyarah menyediakan kemudahan tambahan (butang search atau glosari) bagi mencari maklumat tambahan	4.22	Tinggi
C10	Pensyarah memberi peluang membuat penilaian/ latihan dari semasa ke semasa	4.35	Tinggi

Jadual 7 menunjukkan nilai skor min tahap penerimaan responden terhadap strategi pembelajaran secara aplikasi mudah alih. Secara keseluruhannya responen telah menyatakan tahap persetujuan tinggi dengan nilai skor min keseluruhan ialah 4.22. Secara keseluruhan, semua item C1 hingga menunjukkan skor min pada tahap yang tinggi. Nilai skor min yang paling tinggi aspek reka bentuk strategi pembelajaran ialah memberi peluang membuat penilaian/ latihan dari semasa ke semasa (skor min 4.35).

Jadual 8: Keperluan Rekabentuk Aplikasi Mudah Alih

Kod	Item	Skor Min	Tahap
D1	Mengaplikasikan reka bentuk yang ringkas	4.20	Tinggi
D2	Menggunakan imej yang sebenar bagi penerangan sesuatu konsep	4.24	Tinggi
D3	Kandungan audio yang jelas	4.22	Tinggi
D4	Menggunakan kandungan video bagi penyampaian sesuatu topik	4.19	Tinggi
D5	Tulisan yang mudah dibaca dan kemas	4.43	Tinggi
D6	Menyediakan menu-menu atau butang yang mesra bagi memudahkan pelajar meneroka isi kandungan	4.31	Tinggi
D7	Menyediakan sistem navigasi yang mudah supaya pelajar dapat meneroka isi kandungan dalam sesuatu topik	4.24	Tinggi
D8	Menggunakan animasi yang menarik dan ringkas	4.11	Tinggi
D9	Infografik yang digunakan menarik	4.17	Tinggi
D10	Warna latar belakang yang terang	4.02	Tinggi

Berdasarkan Jadual 8 menunjukkan nilai skor min tahap persetujuan pelajar terhadap aspek reka bentuk antara muka adalah tinggi dengan nilai skor min keseluruhan ialah 4.15. Didapati setiap item yang diukur mencatatkan tahap pencapaian yang tinggi. Nilai skor min yang tinggi menunjukkan pelajar bersetuju dengan elemen seperti audio, video, grafik, navigasi, animasi dan menu perlu disertakan dalam pembangunan aplikasi mudah alih.

Jadual 9: Keperluan Rekabentuk Interaksi Dalam Aplikasi Mudah Alih

Kod	Item	Skor Min	Tahap
E1	Menyediakan ruangan forum atas talian	4.19	Tinggi
E2	Menyediakan kemudahan pelajar berinteraksi dengan pensyarah	4.04	Tinggi
E3	Memudahkan pencapaian maklumat	4.43	Tinggi
E4	Menyediakan soalan-soalan penilaian disetiap topik bagi menilai pemahaman pelajar	4.31	Tinggi
E5	Pengguna boleh memberi maklumbalas	4.31	Tinggi
E6	Maklumbalas dalam pelbagai bentuk (menaip jawapan, pilihan jawapan dan sebagainya)	4.17	Tinggi
E7	Menyediakan kemudahan memuat turun(download) bahan yang disediakan	4.35	Tinggi
E8	Menyediakan manual panduan untuk pengguna menggunakan aplikasi *M-Learning*	3.96	Tinggi
E9	Menyediakan lebih dari satu bentuk capaian maklumat	4.33	Tinggi
E10	Menyediakan pautan (link) ke laman web yang berkaitan	4.04	Tinggi

Berdasarkan Jadual 9 menunjukkan nilai skor min tahap ukuran responden terhadap aspek reka bentuk interaksi adalah tinggi dengan nilai skor min keseluruhan ialah 4.21. Didapati kebanyakan soalan yang diukur mencatatkan tahap persetujuan yang tinggi kecuali item E8 yang mana mempunyai skor min kurang daripada 3.96. Nilai skor min yang tinggi menunjukkan pelajar bersetuju supaya elemen reka bentuk interaksi seperti kemudahan memberi maklum balas, capaian maklumat, panduan pengguna dan kemudahan memuat turun bahan disertakan dalam pembangunan aplikasi ini.

7.0 Dapatan dan Perbincangan

Hasil dapatan kajian ini diperbincangkan berdasarkan dua objektif kajian seperti yang dinyatakan sebelum ini iaitu i) untuk membangun aplikasi mudah alih bagi kursus Power Electronics berasaskan strategi pembelajaran yang sistematik di Politeknik Merlimau Melaka.; dan ii) mengenalpasti tahap kesediaan dan keperluan pelajar Semester 4 yang sedang mengikuti pengajian dalam program Diploma Kejuruteraan Mekatronik dalam pembangunkan aplikasi mudah alih. Kesediaan pelajar terhadap pembelajaran mudah alih menunjukkan tahap kesediaan yang tinggi. Berdasarkan dapatan, semua pelajar memiliki peranti pintar sebagai alat capaian pembelajaran mudah alih. Selain daripada itu juga pelajar mempunyai pengalaman dan kemahiran memuat turun aplikasi mudah alih ke dalam peranti pintar mereka berdasarkan hasil dapatan kajian. Koole (2009) menyatakan untuk mewujudkan persekitaran pembelajaran mudah alih yang efektif peranti mudah alih merupakan salah satu daripada tiga aspek iaitu peranti, kendiri, dan sosial. Manakala dari aspek kesediaan pelajar terhadap pembelajaran menggunakan aplikasi mudah alih kursus Power Electronics pula mendapati daripada soal selidik item menunjukkan 100 peratus pelajar memiliki telefon dan tablet pintar. Manakala tahap kesediaan pelajar terhadap aplikasi mudah alih juga tinggi dengan skor min 4.22.

Aplikasi mudah alih ini diharapkan dapat memberi manfaat dalam pengajaran dan pembelajaran kursus Power Electronics dan membantu meningkatkan kemahiran pelajar menguasai sesuatu topik dalam subjek tersebut. Selain daripada untuk kegunaan pelajar, aplikasi ini boleh digunakan sebagai bahan bantu mengajar pensyarah bagi aktiviti pengajaran bagi kursus Power Electronics. Maka cadangan untuk membina aplikasi mudah alih ini dapat menerapkan teori pembelajaran dan strategi pembelajaran kendiri dan sistematik supaya bahan pembelajaran ini bermakna kepada para pelajar secara optimum.

8.0 Kesimpulan

Berdasarkan kepada dapatan kajian, diharapkan dapat membantu meningkatkan kesedaran tentang kelebihan aplikasi mudah alih kepada pelajar kursus Power Electronics bagi program Diploma Kejuruteraan Mekatronik dan ia dapat menjadi sebagai salah satu alternatif pendidikan. Kebanyakan pelajar mempunyai telefon pintar yang boleh digunakan untuk capaian pembelajaran secara mudah alih dan ini tidak mustahil jika aplikasi mudah alih pendidikan dapat membantu sistem pendidkan ke arah pembelajaran abad ke-21. Hasil kajian akan menjadi input kepada fasa seterusnya bagi projek mereka bentuk, membangunkan, menilai dan memodelkan faktor reka bentuk dan pembangunan aplikasi mudah alih bagi kursus Power Electronics yang yang lebih mudah, sistematik dan menarik.

Rujukan

Aliff Nawi, Ahmad Fkhrudin Mohamed Yusoff, Hafit Hidayah Ajmain & Mohamad Raffe Ghalil Abbas. (2014). Engaging student through ICT: strategies and challenges for using website in teaching and learning. International Letters of Social and Humanistic Sciences, 16(1): 49-56.

Chua, Y.P. (2020). Kaedah dan statistik penyelidikan: kaedah penyelidikan. Mcgraw-Hill Education. Kuala Lumpur.

Göksu, I., & Atici, B. (2013). Need for mobile learning: technologies and opportunities. Procedia-Social and Behavioral Sciences, 103, 685-694.

Koole, M. L. (2009). A Model for Framing Mobile Learning. In Mobile Learning: Transforming the Delivery of Education and Training. 25-47.

Muhammad Izzat Mailis, Zuraini Hanim & Nur Hafizaliyana. (2020). Persepsi pelajar Kolej Universiti Islam Melaka terhadap pelaksanaan pembelajaran secara atas talian dalam era pandemik COVID-19. Jurnal Kesidang, 5, 88-99.

Norhapizah Mohd Burhan (2016). Pembangunan dan Penilaian Modul Kursus Tamadun Islam dan Tamadun Asia (e-CITAC) Berasaskan Strategi Blended Learning. Tesis Dr. Fal, Fakulti Pendidikan UKM

Pallant, J., & Manual, S. S. (2020). A step by step guide to data analysis using IBM SPSS. In SPSS Survival Manual. 7th edition, Routledge.

Tamil Selvan a/l Subramaniam (2014). Pembangunan dan Penilaian Perisian e-PBL Rec Untuk Pelajar Kejuruteraan Bagi Kursus Electrical Circuits. Tesis Dr. Fal, Fakulti Pendidikan UKM Waddill D.D (2004). Action e-learning: The impact of action learning on the effectiveness of a management level web instruction course. Dissertation Abstracts Intenational .65 (03) (UMI No. 3126204)

Yong, L. & Shengnan, H. (2010). Understanding the factors driving m-learning adoption: A literature review. Campus-Wide Information Systems. 27 (4).

MENGKAJI KEBERKESANAN TAKLIMAT KESELAMATAN DAN KESIHATAN DAN LATIHAN PENGUNGSIAN BANGUNAN TERHADAP TAHAP KESEDARAN KESELAMATAN DAN KESIHATAN DI KALANGAN PENGHUNI BLOK V5 DAN V6 KOLEJ KEDIAMAN PELAJAR PSAS

Noormala Abdullah[1] dan Azar Shabudin[2]

[1,2]Politeknik Sultan Azlan Shah, Malaysia
[1]noormala@psas.edu.my
[2]azar@psas.edu.my

Abstrak: Isu keselamatan dan kesihatan sentiasa menjadi tumpuan utama pihak pengurusan Politeknik Sultan Azlan Shah (PSAS), terutamanya di kawasan Kolej Kediaman Pelajar PSAS yang menempatkan 1424 orang pelajarnya. Untuk meningkatkan tahap kesedaran pelajar berkenaan keselamatan dan kesihatan, taklimat keselamatan dan kesihatan dan latihan pengungsian bangunan dilaksanakan di Kolej Kediaman Pelajar 2 kali setahun. Kajian ini dilakukan bagi mengukur tahap keberkesanan kedua-dua program keselamatan ini dalam meningkatkan kesedaran pelajar berkenaan keselamatan dan kesihatan. Kajian ini melibatkan 238 orang pelajar yang menghuni blok V5 dan V6. Satu soalselidik telah diedarkan kepada semua penghuni blok V5 dan V6 7 hari selepas program keselamatan tersebut dilaksanakan. Hasil kajian mendapati tahap kesedaran pelajar mengenai keselamatan dan kesihatan meningkat selepas program dilaksanakan dan para pelajar mendapati kolej kediaman pelajar PSAS adalah selamat dan kondusif. Hasil kajian juga mendapati penglibatan pelajar dalam pasukan sukarelawan juga dapat meningkatkan tahap kesedaran dan pengetahuan berkenaan tindakan awal kecemasan.

***Kata kunci**: latihan keselamatan dan kesihatan; pengungsian bangunan; kesedaran terhadap keselamatan dan kesihatan.*

1. Pengenalan

Keselamatan dan kesihatan adalah berkait rapat dengan kehidupan seharian kita terutamanya apabila melibatkan komuniti dan organisasi. Kemalangan di tempat kerja berlaku disebabkan oleh aktiviti dan persekitaran pekerjaan yang tidak selamat dan tidak sihat yang mana kedua-dua perkara ini boleh dikawal oleh pihak pengurusan (Holt dan Allen, 2015). Adalah menjadi tanggungjawab pihak pengurusan untuk menyediakan dan memastikan persekitaran tempat kerja selamat dan bebas dari penyakit. Antara langkah-langkah yang boleh diambil oleh pihak pengurusan bagi mengelak kemalangan di tempat kerja ialah dengan memberi maklumat

lengkap mengenai keselamatan dan kesihatan pekerjaan kepada semua pekerja, dan meningkatkan kemahiran bekerja mengikut sistem bekerja yang betul dan selamat melalui program-program latihan (Mohamed, R., Juhari, M.A.F., Baker, R., dan Yasid, A.F.M., 2018).

Keselamatan merupakan cara hidup yang sama penting sama ada dalam dan luar masa bekerja (Wells, 2003). Di Politeknik Sultan Azlan Shah (PSAS), aspek keselamatan warga kampus menjadi keutamaan institusi ini dalam pengoperasiannya. Kolej kediaman, sebagai contoh, menggariskan prosedur kawalan keselamatan dan sistem pengurusan pelajar yang teratur bagi memastikan persekitaran kondusif dapat dikekalkan. Selain dari menyediakan persekitaran yang selesa dan selamat, kesedaran yang tinggi di kalangan penghuninya berkenaan keselamatan dan kesihatan juga amat penting. Menurut Holt dan Allen (2015), meningkatkan tahap kesedaran pekerja mengenai keselamatan dan kesihatan pekerjaan juga adalah langkah penting bagi mengelak berlakunya kemalangan di tempat kerja.

Antara usaha yang telah diambil oleh pengurusan kolej kediaman bagi meningkatkan kesedaran berkenaan keselamatan dan kesihatan di kalangan pelajar ialah dengan mewujudkan Program Keselamatan dan Kesihatan dengan kerjasama Unit Keselamatan dan Kesihatan Pekerjaan (UKKP) PSAS. UKKP PSAS ditubuhkan untuk memantau dan memastikan persekitaran di PSAS adalah selamat dan bebas dari bahaya yang boleh menjejaskan keselamatan dan kesihatan warga PSAS. Selain itu, UKKP PSAS juga bertanggungjawab menjalankan kursus-kursus dan latihan berkaitan dengan keselamatan dan kesihatan bagi memastikan warga PSAS mempunyai kesedaran dan pengetahuan yang cukup berkenaan keselamatan dan kesihatan. Antara program latihan yang sering dilaksanakan setiap semester ialah latihan pencegahan kebakaran dan pengungsian bangunan.

1.1 Latar belakang responden

Kolej Kediaman Pelajar PSAS merangkumi 6 blok yang boleh menampung 1424 orang penghuni dalam satu masa. Setiap blok mempunyai 4 aras dengan setiap aras mempunyai 2 buah tandas, 2 buah bilik basuh baju dan 2 pantri. Kemudahan-kemudahan lain yang terdapat di Kolej Kediaman Pelajar PSAS ialah kafeteria, kedai koperasi, klinik pelajar dan gelanggang-gelanggan sukan. Ini menjadikan kawasan kolej kediaman pelajar sebagai tempat tumpuan para pelajar ketika minggu perkuliahan.

Blok V2, V3 dan V4 dikhaskan untuk pelajar lelaki manakala blok V1, V5 dan V6 dikhaskan untuk pelajar perempuan. Kebanyakan penghuni-penghuni kolej kediaman pelajar ini terdiri daripada pelajar-pelajar semester 1 dan sebahagian kecil lagi terdiri daripada ahli jawatankuasa Majlis Perwakilan Pelajar PSAS (MPP), Jawatankuasa Pelajar Kolej Kediaman (JPKK) dan pelajar-pelajar senior yang berkeperluan khas.

Kajian ini membabitkan penghuni-penghuni blok V5 dan V6 sahaja dengan dengan jumlah penghuni seramai 238 orang. Ketika kajian ini dilakukan, blok V1 dan V2 telah dijadikan sebagai blok isolasi sebagai persediaan mengasingkan pelajar yang dijangkiti COVID-19. Kesemua penghuni blok V5 dan V6 terlebih dahulu telah menjalani program Latihan Pengungsian Bangunan dan Taklimat Keselamatan dan Kesihatan pada 13 September 2020. Seramai 238 orang penghuni telah terlibat dengan program ini yang telah diselia oleh UKKP

PSAS, Unit Pengurusan Asrama dan warden-warden. Disebabkan oleh pandemik COVID-19 yang sedang melanda dunia pada ketika itu, program ini terpaksa dilaksanakan secara dalaman tanpa melibatkan pihak Jabatan Bomba dan Penyelamat Malaysia. Satu soalselidik telah diedarkan kepada semua penghuni tersebut 7 hari selepas program dilaksanakan bagi mengukur tahap keberkesanan program terhadap tahap kesedaran keselamatan dan kesihatan di kalangan penghuni Blok V5 Dan V6 Kolej Kediaman Pelajar PSAS.

1.2 Keperluan latihan keselamatan

Dengan bilangan penghuni yang ramai, tambahan pula menjadi tempat tumpuan para pelajar pada waktu puncak ketika minggu perkuliahan, risiko berlakunya kemalangan dan kecemasan di kolej kediaman pelajar adalah tinggi. Sehubungan itu, kesedaran berkenaan keselamatan di kalangan penghuni kolej kediaman pelajar perlu ditingkatkan. Bagi meningkatkan kesedaran berkenaan keselamatan dan kesihatan di kalangan penghuni kolej kediaman, program-program latihan berkenaan keselamatan dan kesihatan perlu kerap dilaksanakan. Menurut Mohamed, R. et al. (2018), wujud hubungan yang signifikan positif antara sikap pekerja dan latihan keselamatan dan kesihatan dengan tahap kesedaran keselamatan dan kesihatan pekerja-pekerja. Kenyataan ini juga disokong oleh M, Mansur., dan Peng, S.H. (2009) yang menyatakan bahawa latihan keselamatan dan kesihatan yang ditawarkan bukan sekadar meningkatkan ilmu pengetahuan di kalangan para pekerja terhadap keselamatan dan kesihatan pekerjaan sahaja tetapi juga meningkatkan kesedaran para pekerja supaya semasa bekerja senantiasa mementingkan keselamatan sendiri dan juga rakan sekerjanya tanpa bertindak dengan bahaya. Sahid, F.M., Hin, K.F., dan Ahmad, A.L. (2013) juga berpendapat mempertingkatkan program latihan bagi meningkatkan kesedaran terhadap keselamatan dan kesihatan dan memastikan prosedur kerja dipatuhi sepertimana yang ditetapkan. Selain itu, program latihan juga dapat mempertingkatkan kualiti kerja dan mewujudkan kesedaran mengenai keselamatan dan kesihatan. Menjalankan lebih banyak program-program latihan untuk meningkatkan kesedaran penghuni tentang keselamatan kebakaran (Tharmarajan, P., 2007).

Sebagai sebuah organisasi kerajaan, adalah menjadi tanggungjawab pihak pengurusan PSAS untuk mengadakan latihan-latihan sebegini sepertimana yang telah dinyatakan di dalam Buku Arahan Perkhidmatan Awam. Berdasarkan kepada Buku Arahan Perkhidmatan, bab 8 perkara 2(a), jabatan-jabatan hendaklah mengadakan latihan dari semasa ke semasa bagi kakitangan-kakitangan mereka tentang cara-cara mencegah kebakaran seperti penggunaan pemadam-pemadam api dan tindakan-tindakan menyelamatkan diri apabila berlaku kebakaran di pejabat-pejabat, terutama di bangunan-bangunan tinggi. Latihan-latihan ini patut diadakan setahun sekali. Jabatan bomba akan sedia memberi nasihat dan membantu di dalam latihan-latihan yang diaturkan oleh jabatan-jabatan. Dengan melaksanakan latihan keselamatan dan kesihatan yang lebih kerap, ia menunjukkan kesan terhadap komitmen sesebuah organisasi tentang keselamatan dan kesihatan (Azlan, S.N., Wahab, S.R.A., 2018). PSAS melalui UKKP melaksanakan latihan kebakaran dan pengungsian bangunan sebanyak 2 kali setahun, selain latihan, seminar dan taklimat keselamatan dan kesihatan yang lain seperti pengenalan kepada HIRARC, kursus pengurusan sisa berjadual, prosedur kerja selamat dan banyak lagi. Ini menunjukkan komitmen dan kesungguhan yang tinggi pengurusan PSAS terhadap isu keselamatan warganya.

Latihan keselamatan mempunyai kepentingan kepada firma dan masyarakat dan berupaya menyelamatkan nyawa, mengelakkan kemalangan, kecederaan dan kesakitan. Ini menunjukkan betapa pentingnya membekalkan secukupnya latihan keselamatan bagi memastikan tanggungjawab majikan telah dilaksanakan iaitu membekalkan latihan kepada semua lapisan pekerja binaan termasuk kakitangan pengurusan (Misnan, M.S., Mohammed, A.H., Yusof, Z.M., Hamid, R.A., Othman, N., dan Mahmood, W.Y.W., 2015). Kekerapan latihan dan jenis latihan yang sesuai dengan keadaan persekitaran kerja sangat penting bagi menyediakan organisasi dan pekerjanya dengan ilmu dan kemahiran yang cukup untuk menghadapi keadaan kecemasan. Semakin kerap latihan keselamatan dilaksanakan, semakin cekap dan pantas tindakan organisasi dan pekerjanya ketika menghadapi situasi kecemasan. Penyelidikan empirikal telah membuktikan bahawa latihan keselamatan sebagai peramal kepada tingkah laku keselamatan (Faiz, Z., 2017). Selain daripada dapat meningkatkan ilmu pengetahuan dan kemahiran, latihan, kursus, taklimat dan seminar keselamatan juga dapat meningkatkan motivasi pekerja. Ini kerana, selepas menghadiri seminar, motivasi pekerja akan meningkat kerana memperoleh idea-idea baru ketika sesi perbincangan atau aktiviti dalam kumpulan (Reese, C.D., 2016).

Selain daripada meningkatkan kekerapan melaksanakan latihan, kualiti latihan yang diberikan itu juga sangat penting. Namian, M., Albert, A. dan Behm, Michael. (2016) mendedahkan, latihan yang melibatkan penglibatan peserta yang tinggi akan memberikan kesan lebih baik terhadap tahap pengecaman bahaya dan persepsi risiko keselamatan. Mohamed, R. et al. (2018) juga mencadangkan agar pihak pengurusan menjalankan analisis keperluan latihan dan menilai semula program-program latihan keselamatan dan kesihatan yang telah dijalankan. Ini kerana, hasil dari kajian mereka mendapati bahawa tahap kesedaran keselamatan pekerja-pekerja di sebuah pusat perubatan berada pada tahap sederhana kerana ceramah dan latihan yang diberikan kurang memberi kesan. Faiz, Z. (2017) pula menyatakan pengurus harus memastikan jenis latihan keselamatan yang sesuai dengan organisasi supaya latihan yang diberikan itu memberi kesan positif kepada organisasinya.

Kesimpulannya di sini, kajian terhadap keberkesanan taklimat keselamatan dan kesihatan dan latihan pengungsian bangunan yang telah dilaksanakan kepada penghuni blok V5 dan V6 Kolej Kediaman Pelajar PSAS perlu dilaksanakan bagi mengetahui tahap keberkesanannya terhadap kesedaran keselamatan dan kesihatan di kalangan penghuni blok V5 dan V6 Kolej Kediaman Pelajar PSAS.

2. Metodologi Kajian

Merujuk kepada kajian yang dijalankan, penyelidik menyerta dan menekankan kepada beberapa perkara yang meliputi persampelan, analisis data, instrumen kajian serta reka bentuk kajian. Ia turut dikenali sebagai tatacara kajian ini dijalankan (Mohamad Najib, 1999). Kajian ini dilaksanakan secara keseluruhannya melalui kaedah edaran borang soal selidik dan diakhiri dengan pemprosesan data melalui kaedah peratusan berdasarkan terimaan data sedia ada.

2.1 Reka Bentuk Kajian

Reka bentuk kajian yang dilaksanakan oleh penyelidik adalah berdasarkan kepada borang soal selidik yang diberikan pautan kepada para responden utk menjawabnya. Ia secara keseluruhannya berupaya mendapatkan data-data yang diperlukan bagi memenuhi kriteria analisis dan objektif yang telah ditetapkan oleh penyelidik. Kaedah taburan borang soal selidik menjurus kepada dapatan kajian bercorakkan kuantitatif. Ia berupaya membantu penyelidik mengupas segala data yang diperolehi serta dalam masa yang sama mencapai matlamat untuk mewujudkan keselesaan dan keprihatian terhadap ruang tempat tinggal, faktor persekitaran, dan pengetahuan sedia ada berkenaan keselamatan dan kesihatan pekerjaan di dalam sistem Pendidikan Politeknik Malaysia.

2.2 Kerangka Kajian

Rajah 1: Kerangka Kajian

Rajah 1 menunjukkan Kerangka Kajian yang dibuat bagi mencapai objektif kajian. Penyelidik memulakan dengan aktiviti pemilihan tajuk, pemilihan responden, pernyataan masalah dan

diselesaikan melalui analisis, huraian, dapatan dan cadangan kajian.

2.3 Persampelan Bertujuan

Kajian ini dijalankan dengan merujuk kepada kaedah persampelan bertujuan. Merujuk kepada Sabitha Marican (2005) ia tidak menunjukkan pendapatan penyelidik semata-mata. Justeru itu, ia adalah menjurus kepada data sebenar melalui teknik persampelan yang dijalankan. Penyelidik juga telah menetapkan individu yang akan dirujuk sebagai sampel kajian. Ia telah dipertimbangkan terlebih dahulu oleh penyelidik sebelum kajian dijalankan (Mohd Majid, 2004). Umumnya, pemilihan individu yang terlibat akan melambangkan kualiti kajian yang dijalankan berdasarkan kesesuaian, situasi dan keperluan (Sabitha Marican, 2005). Ia disusuli dengan kajian berkaitan berkenaan keadaan tempat tinggal. Oleh yang demikian, pemilihan responden dibuat dengan melibatkan para pelajar Kolej Kediaman Politeknik Sultan Azlan Shah sendiri.

2.4 Instrumen Kajian

Maklumat-maklumat kajian yang dilaksanakan oleh penyelidik untuk mendapatkan data adalah melalui borang soal selidik yang diedarkan kepada para responden. Justeru itu, ia secara tidak langsung telah membantu penyelidik mencerap setiap data-data yang diperlukan.

2.5 Pengumpulan Data

Penyelidik melalui Mohd Majid (2004) menyatakan bahawa proses perancangan dan pelaksanaan kajian adalah salah satu daripada elemen pengumpulan data. Oleh yang demikian, kaedah yang digunakan bagi mendapatkan data adalah melalui borang soal selidik yang terlebih dahulu diedarkan kepada para responden melalui pautan yang diberikan kepada responden melalui kumpulan aplikasi Whatsapp.

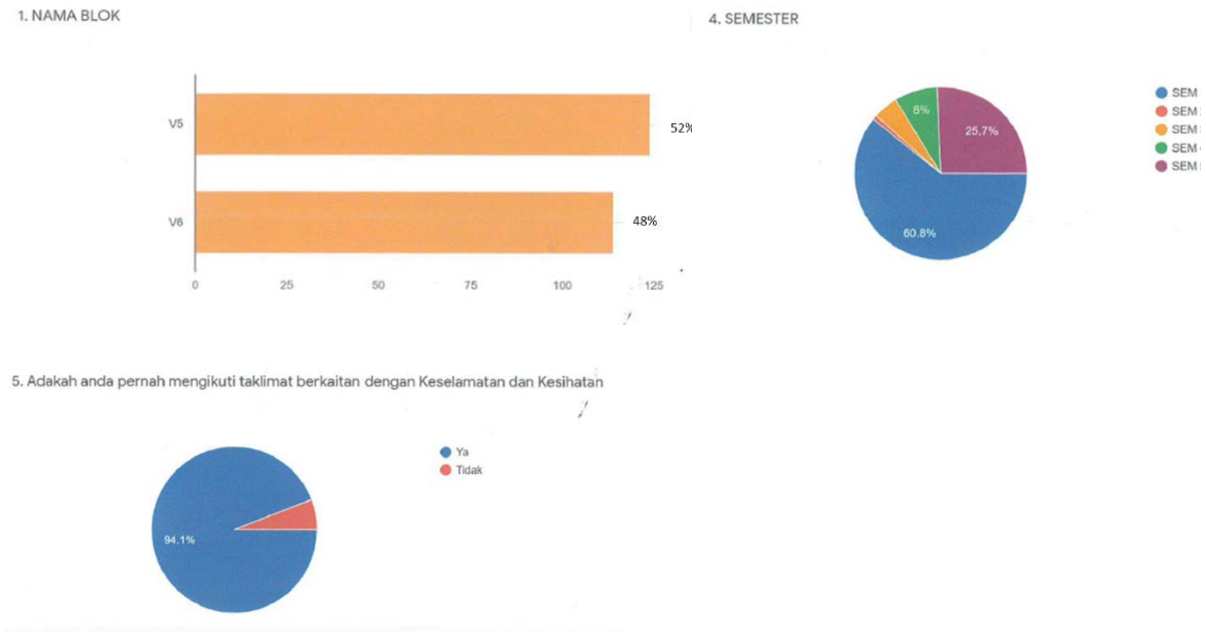
2.6 Kaedah Analisis Data

Data deskriptif melalui dapatan kajian telah menjelaskan kaitan responden atau populasi dengan yang dilaksanakan oleh penyelidik. Ia diterjemahkan melalui gambaran carta, purata, peratusan yang diperolehi (Sabitha Marican, 2005). Oleh yang demikian, ia telah memaparkan fenomena populasi yang dinilai berdasarkan ketetapan penyelidik dengan menjurus kepada objektif asal kajian.

3. Dapatan Kajian

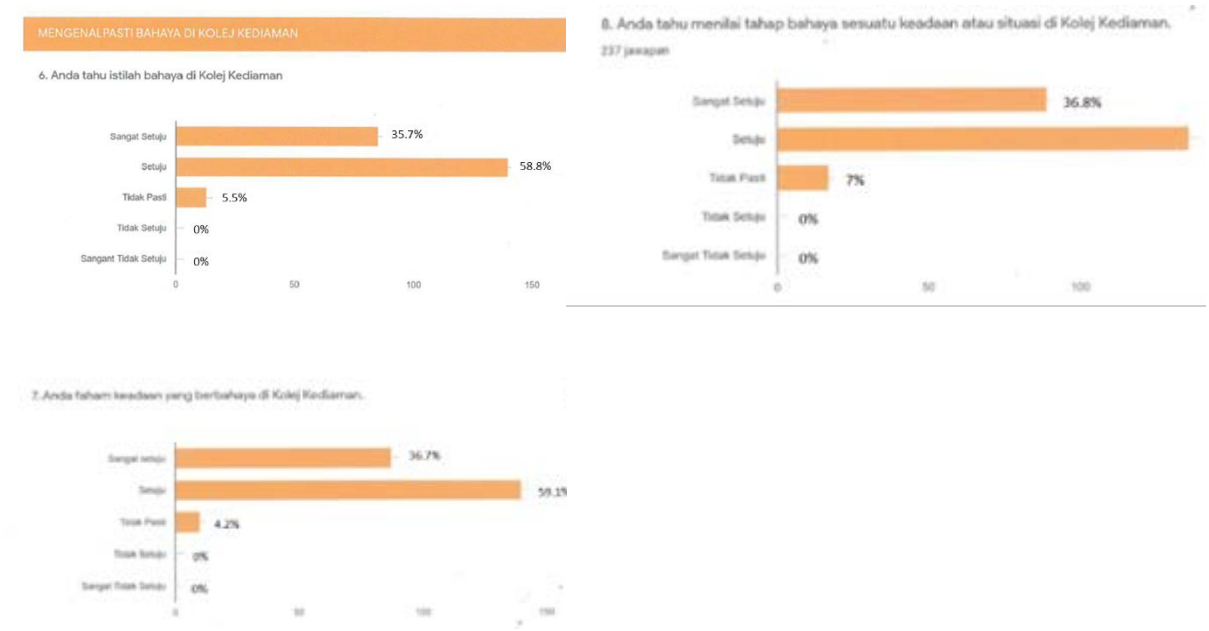
Kajian ini meliputi responden dari penghuni-penghuni blok kamsis V5 dan V6 yang telah mengikuti Latihan Pengungsian Bangunan Blok V5 dan V6 Kolej Kediaman PSAS yang telah dilaksanakan pada 13 September 2020. Borang soal selidik ini diedarkan kepada responden pada 20 September 2020 iaitu kira-kira seminggu selepas tamat latihan tersebut. Seramai 238 orang responden telah terlibat di mana 52% adalah responden dari blok V5 manakala 48% lagi dari blok V6 sepertimana yang ditunjukkan pada Rajah 1. 60.8% dari responden merupakan pelajar semester 1 manakala selebihnya adalah dari pelajar-pelajar semester 2 hingga 5. Ini

menunjukkan bahawa majoriti responden adalah penghuni baru Kolej Kediaman PSAS dan pertama kali menyertai Latihan Pengungsian Bangunan Blok Kolej Kediaman PSAS. Sebanyak 94.1% responden menjawab pernah mengikuti taklimat berkaitan dengan keselamatan dan kesihatan dan selebihnya menjawab tidak pernah. Ini menunjukkan majoriti penghuni blok V5 dan V6 mengikuti Latihan Pengungsian Bangunan Blok V5 dan V6 Kolej Kediaman PSAS yang telah dilaksanakan pada 13 September 2020.



Rajah 1: Latarbelakang Responden

Sebanyak 94.5% responden menyatakan mereka tahu istilah bahaya di Kolej Kediaman manakala 5.5% lagi menjawab tidak pasti. Dari segi kefahaman berkaitan keadaan yang berbahaya di Kolej Kediaman, sebanyak 95.8% responden menjawab mereka faham akan keadaan tersebut manakala 4.2% lagi menjawab tidak pasti di mana sebanyak 93% responden tahu menilai tahap bahaya sesuatu keadaan atau situasi di Kolej Kediaman dan cuma 7% sahaja yang tidak pasti. Ini menunjukkan bahawa majoriti penghuni Blok V5 dan V6 Kolej Kediaman PSAS tahu mengenalpasti bahaya di Kolej Kediaman. Data-data ini dapat dilihat pada Rajah 2.

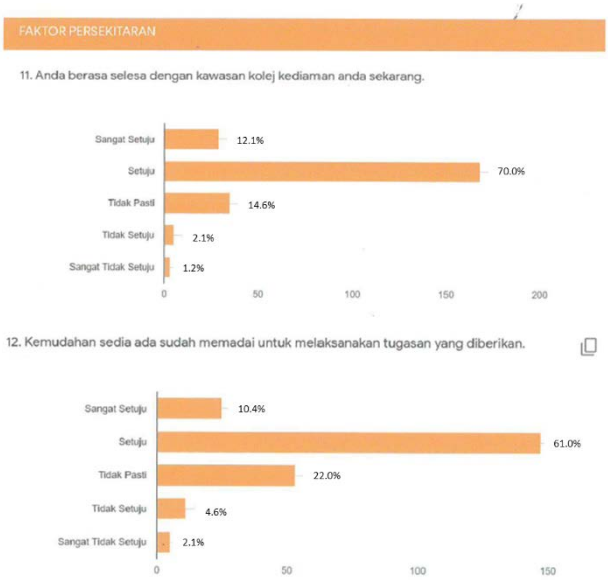


Rajah 2: Mengenalpasti Bahaya di Kolej Kediaman

Menurut 69.9% responden, kawasan Kolej Kediaman adalah selamat dan 25.5% lagi tidak pasti, manakala 4.6% responden tidak berasa selamat di Kolej Kediaman sepertimana yang ditunjukkan pada Rajah 3. Walaupun Kolej Kediaman adalah kawasan yang selamat, tapi risiko berlaku kemalangan tetap ada. Sebanyak 32.4% responden bersetuju bahawa Kolej Kediaman merupakan kawasan yang berisiko dan 24% lagi tidak bersetuju. 43.6% lagi responden menjawab tidak pasti. Ini menunjukkan bahawa penghuni Blok V5 dan V6 yakin akan keselamatan mereka ketika berada di Kolej Kediaman tetapi tetap sedar akan risiko kemalangan yang boleh berlaku pada bila-bila masa.

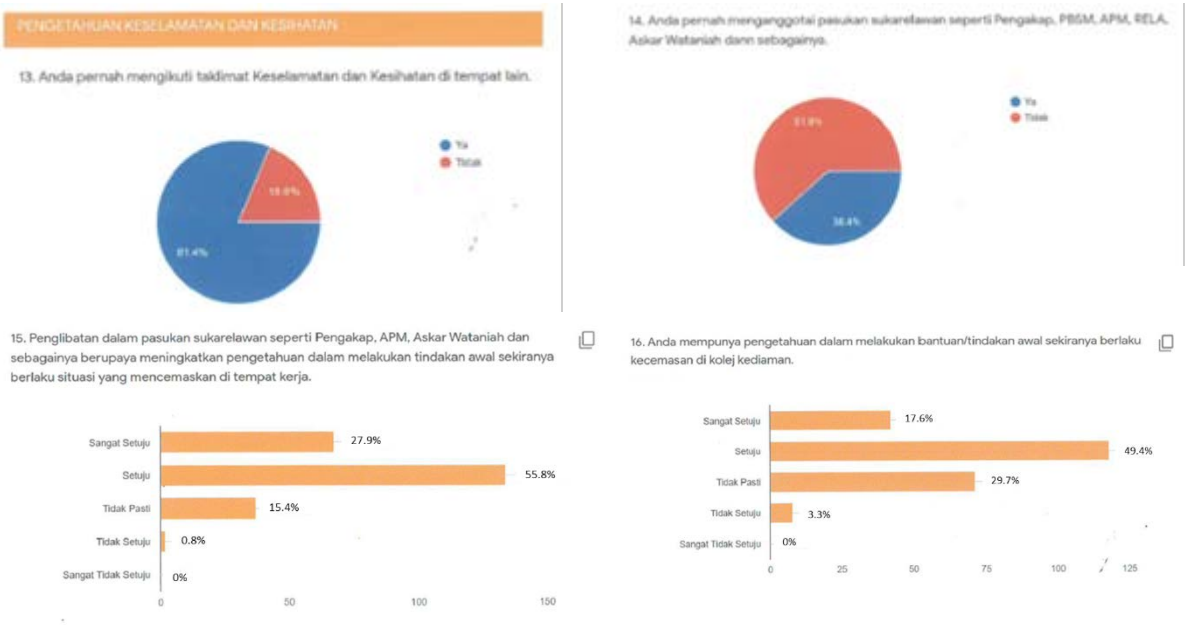
Rajah 3: Keprihatinan Kawasan Kolej Kediaman

Sebanyak 82.1% responden berasa selesa di Kolej Kediaman dan hanya 3.3% sahaja yang berasa tidak selesa. Selebihnya 14.6% menjawab tidak pasti. Kemudahan yang disediakan di Kolej Kediaman cukup memadai untuk melaksanakan tugasan kuliah yang diberikan. Ini dapat dibuktikan dengan 71.4% responden bersetuju dengan pernyataan ini dan cuma 6% sahaja responden yang tidak bersetuju manakala 22% lagi responden menjawab tidak pasti. Data-data ini ditunjukkan pada Rajah 4.



Rajah 4: Faktor Persekitaran

Bagi memupuk kesedaran berkaitan dengan keselamatan dan kesihatan dikalangan penghuni Blok V5 dan V6, pengetahuan sedia ada berkenaan keselamatan dan kesihatan juga penting. Merujuk Rajah 5, sebanyak 81.4% responden menyatakan mereka pernah mengikuti taklimat keselamatan dan kesihatan di tempat lain iaitu selain dari PSAS manakala hanya 18.6% sahaja yang tidak pernah mengikuti taklimat berkenaan sebelum ini. 61.6% responden pernah atau sedang mengganggotai pasukan sukarelawan dan 38.4% tidak pernah. Sebanyak 83.8% responden mengakui bahawa penglibatan dalam pasukan sukarelawan berupaya meningkatkan pengetahuan dalam melakukan tindakan awal sekiranya berlaku situasi yang mencemaskan di kawasan Kolej Kediaman manakala 15.4% lagi responden menjawab tidak pasti dan 0.8% lagi tidak bersetuju. Ini membuktikan penglibatan pelajar dalam pasukan sukarelawan dapat memupuk kesedaran berkaitan keselamatan dan kesihatan disamping memberi pengetahuan am berkenaan tindakan kecemasan. Ini dapat dibuktikan lagi apabila 70% dari responden menyatakan mereka mempunyai pengetahuan dalam melakukan bantuan atau tindakan awal sekiranya berlaku kecemasan di Kolej Kediaman manakala sebanyak 29.7% menyatakan mereka tidak pasti dan hanya 3.3% sahaja responden yang tidak bersetuju.

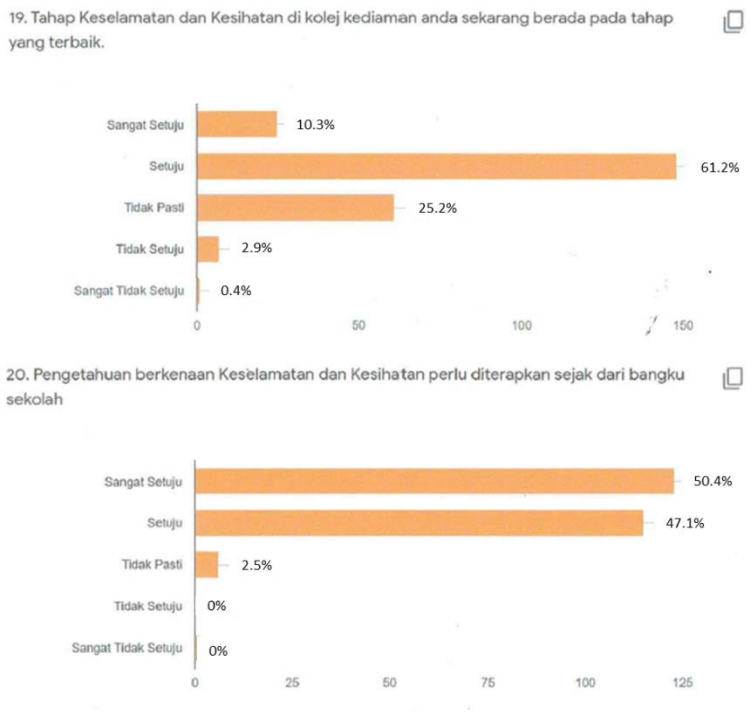


Rajah 5: Pengetahuan Sedia Ada Responden

Rajah 6 menunjukkan sebanyak 78.8% responden bersetuju bahawa adalah menjadi tanggungjawab Jawatankuasa Keselamatan dan Kesihatan Pekerjaan untuk melaporkan jika berlaku kejadian yang tidak diingini seperti kemalangan kepada pihak tertentu manakala 15.5% responden menyatakan tidak pasti dan 5.7% lagi tidak bersetuju. 88.4% responden bersetuju bahawa mereka dan rakan-rakan mereka yang lain perlu mengikuti sebarang taklimat berkenaan keselamatan dan kesihatan manakala selebihnya iaitu 10.8% responden menjawab tidak pasti dan 0.8% lagi tidak bersetuju.

Rajah 6: Kesedaran Tanggungjawab JKKP Dan Kepentingan Taklimat Keselamatan Dan Kesihatan Di Kalangan Responden

Tahap keselamatan dan kesihatan di Kolej Kediaman tertutamanya di blok V5 dan V6 berada pada tahap yang terbaik. Ini dibuktikan melalui Rajah 7 apabila sebanyak 71.5% responden bersetuju dengan pernyataan ini dan hanya 3.3% responden sahaja yang tidak bersetuju. 25.2% responden lagi jawab tidak pasti. Majoriti responden atau 97.5% bersetuju bahawa pengetahuan berkenaan keselamatan dan kesihatan perlu diterapkan sejak dari bangku sekolah lagi manakala cuma 2.5% sahaja yang tidak bersetuju. Ini menunjukkan kesedaran yang amat tinggi dikalangan penghuni blok V5 dan V6 berkenaan dengan isu keselamatan dan kesihatan.



Rajah 7: Tahap Keyakinan Responden Terhadap Tahap Keselamatan Di Kolej Kediaman

4. Kesimpulan dan Cadangan

Merujuk kepada kajian yang telah dijalankan, ia menunjukkan terdapat peningkatan pengetahuan dan kesedaran yang signifikan berkaitan dengan keselamatan dan kesihatan bagi penghuni-penghuni blok V5 dan V6 Kolej Kediaman PSAS setelah Taklimat Keselamatan dan Kesiahatan dan Latihan Pengungsian Bangunan Blok V5 dan V6 Kolej Kediaman PSAS dilaksanakan. Ini dapat dilihat daripada data kajian iaitu lebih dari 90% responden memahami dan mampu menilai situasi bahaya di Kolej Kediaman. Oleh itu latihan ini dan taklimat keselamatan dan kesihatan perlu diteruskan dan diperhebatkan pada masa akan datang.

Selain itu, kawasan Kolej Kediaman PSAS terutamanya di blok V5 dan V6 adalah sangat selamat dan kondusif untuk para penghuninya namun begitu perlu kerap membuat penilaian risiko kerana hampir separuh dari penghuninya tidak pasti berkenaan dengan tahap risiko di Kolej Kediaman PSAS.

Bagi meningkatkan kesedaran dan pengetahuan berkenaan tindakan awal kecemasan, pihak Kolej Kediaman atau pihak Pengurusan PSAS perlu mempertingkatkan usaha menggalakkan para pelajarnya menyertai pasukan sukarelawan seperti Pengakap, Angkatan Pertahanan Awam, Askar Wataniah dan sebagainya kerana kemahiran-kemahiran berkenaan tindakan awal kecemasan ada diterapkan di dalam pasukan sukarelawan berkenaan. Pihak Pengurusan Asrama PSAS juga digalakkan untuk bekerjasama dengan Unit Keselamatan dan Kesihatan Pekerjaan PSAS untuk merancang dan melaksanakan lebih banyak lagi program atau latihan berkenaan keselamatan dan kesihatan.

Rujukan

Holt, A.S.J., & Allen, J. (2015). Principles of Health and Safety at Work. London: Routledge

Mohamed, R., Juhari, M.A.F., Baker, R., & Yasid, A.F.M.(2018). Hubungan antara Sikap dan Latihan dengan Tahap Kesedaran Keselamatan dan Kesihatan Pekerjaan di Pusat Perubatan Swasta Malaysia. *Proceeding of the 5th International Conference on Management and Muamalah 2018 (ICoMM 2018), 5*(19),207-219. http://conference.kuis.edu.my/icomm/5th/images/e-proceeding/IC-019.pdf

Faiz, Z. (2017). *Amalan Pengurusan Keselamatan Dan Tingkah Laku Keselamatan Dalam Kalangan Pekerja Di Dalam Industri Automotif di Malaysia* [master's thesis, Universiti Utara Malaysia]. UUM Electronic Theses and Dissertation [eTheses]. http://etd.uum.edu.my/7631/1/s821256_01.pdf

M, Mansur., Peng, S.H. (2009). Keberkesanan Latihan Keselamatan Dan Kesihatan Dalam Mengurangkan Kemalangan Di Tempat Kerja. *Prosiding PERKEM IV, Jilid 2* (2009), 293-324. https://www.ukm.my/fep/perkem/pdf/perkemIV/PERKEM2009-2-25.pdf

Azlan, S.N., Wahab, S.R.A. (2018). Kesan Amalan Latihan Keselamatan Kepada Komitmen Organisasi Di Sebuah Organisasi Perkilangan di Johor Bahru. *Journal Of Human Capital Development (JHCD), vol.11*(1), 12-22. https://journal.utem.edu.my/index.php/jhcd/article/view/4234/3118

Namian, M., Albert, A. & Behm, Michael. (2016). Role of Safety Training: Impact on Hazard Recognition and Safety Risk Perception. *Journal of Construction Engineering and Management. Volume 142 Issue 12*. DOI: 10.1061/(ASCE)CO.1943-7862.0001198.

Misnan, M.S., Mohammed, A.H., Yusof, Z.M., Hamid, R.A., Othman, N., & Mahmood, W.Y.W. (2015). Isu-Isu Semasa Pengurusan Keselamatan Dan Kesihatan Pekerjaan Dalam Industri Pembinaan Malaysia. 6 Feb. 2015. https://www.researchgate.net/publication/265315355

Reese, C.D. (2016). *Occupational Health and Safety Managemeny: A Practical Approach.* 3rd Ed. CRC Press, Boca Raton Florida.

Tharmarajan, P. (2007). *The Essential Aspects of Fire Safety Management In High-Rise Buildings*. [master's thesis, Universiti Teknologi Malaysia]. Universiti Teknologi Malaysia Institutional Repository. http://eprints.utm.my/id/eprint/6131/1/PrashantTharmarajanMFKA2007.pdf

Sahid, F.M., Hin, K.F., & Ahmad, A.L. (2013). Tahap Kesedaran Tentang Keselamatan Dan Kesihatan Di Tempat Kerja Bagi Staf JKM Politeknik Tuanku Sultanah Bahiyah. *Persidangan Pendidikan (Penyelidikan dan Inovasi) Dalam Pendidikan Dan Latihan Teknikal Dan Vokasional (CiE-TVET 2013).* No Prosiding 06. 219-227.

Wells, J. W. (2003). How Effective is your safety culture? *Occupational Health and Safety*, 72 (9), 26.

Wan Sabri Bin Wan Ismail. (2012). *Kesedaran Keselamatan Dalam Kalangan Pelajar Kolej Kemahiran Tinggi Mara Di Lembah Kelang*. Universiti Tun Hussein Onn Malaysia: Tesis Sarjana Muda.

Mohamad Najib Abdul Ghaffar (1999). *Penyelidikan Pendidikan*, Cetakan Pertama, Skudai, Johor. Universiti Teknologi Malaysia. 37 - 44.

Mohd. Majid Konting (2004). *Kaedah Penyelidikan Pendidikan*, Cetakan Keenam, Ampang, Selangor. Dewan Bahasa Dan Pustaka. 57 – 150.

Sabitha Marican (2005). *Kaedah Penyelidikan Sains Sosial*, Cetakan Pertama, Petaling Jaya, Selangor. Prentice Hall. 91 – 118.

EXPERIMENTAL STUDY OF NUTRITION FACT ON FREE GLUTEN FLOUR AND CHOCOLATE CUPCAKE DERIVED FROM COCONUT DREG FLOUR THROUGH DEHYDRATION PROCESS

Hamidah Noor Md Yusoh[1], Nur Haniza Ewandi Jong[2] and Norshila Md Isa[3]

[1]Politeknik Merlimau Melaka, Malaysia
mckin81@gmail.com

Abstract: Malaysia has foods based from coconut and white flour. However, coconut dregs discarded from coconut milk factory while common white flour contains gluten causing intolerance to some people. Nevertheless, coconut dregs can be utilized to produce nutritious and high fiber flour. Therefore, a research was conducted to create new formulation of chocolate cake premix (CCP) from free gluten coconut dreg flour. Objectives are to determine gluten value of coconut dreg flour (CDF) and examine nutrition facts of CDF and CCP formulated. Immunochemical analysis used to determine gluten markers in CDF while Gas Chromatography- Mass Spectrometry (GC-MS) to determine nutrition value of CDF and CCP. Result indicated in 100g CDF no gluten presence and protein 9.1g/100g, carbohydrate 67.2g/100g, fat 17.8g/100g and total energy 465kcal/100g. While in 100g CCP, protein 8.81g/100g, carbohydrate 21.3g/100g and total energy 417kcal/100g. In conclusion, CDF contains nutrients, free gluten and suitable as wheat flour replacement in CCP.

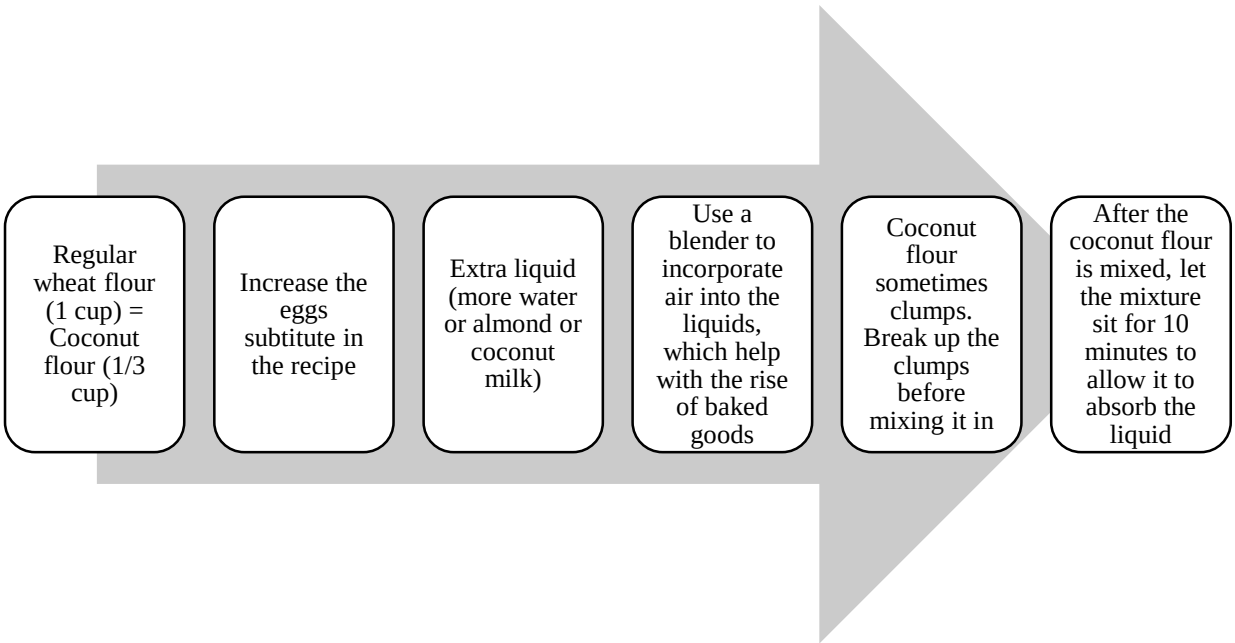
***Keywords**: coconut dreg, gluten free, flour, nutrients*

1. Introduction

Coconuts are incredibly nourishing, full of critical vitamins and minerals, antioxidants, fibre, and other healthy nutrients. It is renowned for their flexibility, with applications in everything from foods to cosmetics (Mohamad, 2020). There is a substantial amount of unutilized agro-industrial residue produced in connection with the large-scale production (Gomes et al., 2021). According to de Arajo Neto et al. (2016), the coconut structure contains about 85% trash that the agro-industrial chain does not utilise for the production of new products. Due to the strong demand for coconut-based products, the coconut sector is expanding quickly, and this causes some agricultural waste and byproducts to be produced during the food production process. These materials are typically offered as livestock feed and are extremely non-valuable (Eadmusk, 2022). The extraction of coconut milk produces roughly 30% coconut residue, according to Raghavendra et al. (2004). Sadly, little has been done with this residue. Typically, it is utilised as cheap animal feed or is allowed to decompose. A small number of researchers have looked at the use of coconut residue in food production, despite the fact that it can reduce costs and add value to coconut by-products (Raghavendra et al., 2004). According to the method of extraction, coconut residue contains 4–25 percent protein recently (Rodsamran and Sothornvit, 2018). Coconut residue can be employed as food-grade dietary fibre (Zheng et al., 2021) moreover, in baking goods (Trinidad et al., 2006).

The coconut waste is turned into flour and is thought to provide nutritional fibre. It has been demonstrated that dietary fibre provides significant health benefits in lowering the chance of developing chronic diseases like cancer, cardiovascular disease, and diabetes mellitus (Trinidad et al. 2006). Hewett (2016) claimed that lauric acid, a type of lipid present in human breast milk, is present in coconut oil. The benefit of lauric acid for heart health is that it raises HDL cholesterol. According to Wadl and As' (2006) study, over 92 percent of the fats in coconuts are saturated fats. Due to this, many people now think that coconut fats are "dangerous for health," especially when it comes to ischemic heart disease. The majority of the saturated fats in coconut, however, are medium chain fatty acids, which have distinct physiological characteristics from those of animal origin. The body uses medium chain fatty acids directly to make energy since they do not go through processes of decomposition and re-esterification. Compared to saturated fats, they are not as "dangerous for health."

McGruther (2016) noted that the high protein and fibre content of coconut flour makes it a fantastic thickener. The processes for utilising coconut flour in cooking are shown in Figure 1. Only a third as much coconut flour as conventional flour is required, and twice as much egg substitute. Additionally, coconut flour absorbs liquid significantly more than other gluten-free flours. For it to function properly, the amount of liquid specified in the recipe must be doubled. Sift the coconut flour before using it in baking to ensure that it mixes well with the other ingredients. Additionally, coconut flour works nicely in a range of other coconut-based recipes, including cupcakes.



(McGruther, 2016)

Figure 1. Steps of using coconut flour in cooking

Gluten-free products have recently gained popularity, driving up demand as they appeal to consumers looking for a gluten-free diet as well as those with medical needs. It's critical to consider the nutritional value of their diets as they mature (Pellegrini and Agostoni, 2015).

QonitahAzzahra (2016) claims that bread dregs from coconuts can be developed as a preventative measure for coronary heart disease since they contain high levels of dietary fibre and may lessen the availability of cholesterol. Additionally, it has the ability to bind to bile acids and prevent their reabsorption in the liver, which reduces the formation of cholesterol. Additionally, coconut flour works nicely in a range of other coconut-based recipes, including cupcakes (Hamidah et. al., 2018).

2. Materials and Methods

This study was conducted using quantitative analysis. There are four steps in achieving the research objectives. The first step is the CDF production. The second step is the analysis of nutrition and gluten content of CDF. The third step is determining suitable formulation of CCP and nutritional analysis of CCP. Finally, the Hedonic scale was used to determine the respondents' acceptance level, and SPSS version 25 was used to analyse the mean score. Table 1 displays the level and meaning of the mean score.

Table 1. Mean score interpretation

Mean Score	Interpretation	Level
1.00 until 2.33	Low	Weak
2.34 until 3.66	Medium	Medium
3.67 until 5.00	High	Good

(Mohd Najib, 2003)

2.1 Sample collection and coconut dreg flour (CDF) production

Referring to Figure 2, the coconut dreg was collected aseptically from NSL Delima Niaga; a Small Medium Industry (SME) producing fresh coconut milk that had sign a collaborative agreement with Politeknik Merlimau. Then, the coconut dreg sample (CDS) was thinly spread inside a food dehydrator. The dehydration process was done at 65^{o}C for 12 hours. Next, the coconut dreg was milled at Malaysian Flour Mill to produce fine CDF.

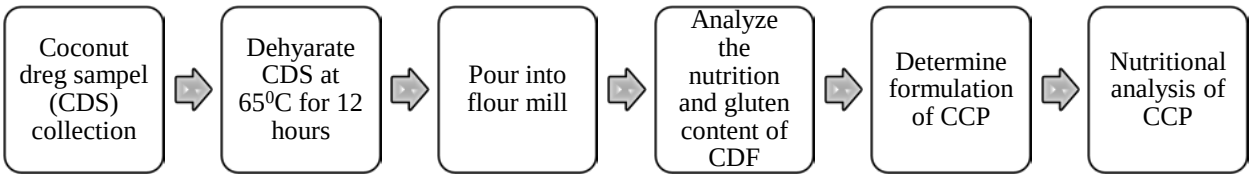


Figure 2. Production and analysis flow of Chocolate Cake Premix (CCP).

2.2 Formulation of Chocolate Cake Premix (CCP)

The standard formulation of CCP is as in Table 2, where the formulation comprises of 100g CDF, 80g coco powder, 100g fine sugar, 10g baking powder and 10g soda bicarbonate.

Table 2. Standard formulation of Chocolate Cake Premix (CCP)

Metric	Ingredient
100 gram	Coconut dreg flour
80 gram	Coco powder
100 gram	Fine sugar
10 gram	Baking powder
10 gram	Soda bicarbonate

2.3 Gluten test and nutritional analysis of coconut dreg flour (CDF) and comparison of nutrition content between CDF and wheat flour

For nutrition content analysis, sampel of CDF was sent to Melaka Institute of Biotechnology. 100g of CDF sampel was analyzed using Gas Chromatography- Mass Spectrometry (GC-MS) to determine the nutrition values. The test parameter are moisture, crude ash, total fat content, crude protein content, total carbohydrate and energy content.

The immunochemical analysis used to determine gluten markers in CDF. 250g of CDF sample was sent to SGS (Malaysia) Sdn Bhd to identify the gluten value in the sample. Finally comparison of nutrition content between CDF and wheat flour was made.

3. Results

Findings were based on three analysis made on CDF and CCP. Result also covers comparison of nutrition content between CDF and wheat flour.

3.1 Gluten analysis of Coconut Dreg Flour (CDF) and comparison of nutrition content between CDF and wheat flour

Referring to Table 3, the nutrition analysis result signifies that the in 100g sampel of CDF contains 9.1g protein, 67.2g carbohydrate, 17.8g fat, 0g gluten and 465kcal energy

Table 3. Comparison of nutrition content between Coconut Dreg Flour (CDF) and wheat flour

Test Parameter	Coconut Dreg Flour(CDF)	Wheat flour
Protein	9.1 g/100g	15.8 g/100g
Carbohydrate	67.2 g/100g	84.21 g/100g
Fat	17.8 g/100g	1.67 g/100g
Gluten	0 g/100g	2.21 g/100g
Energy	465kcal/100g	368kcal/100g

3.2 Nutrition content of Chocolate Cake Premix (CCP)

Table 4 shows the nutrition analysis in 100g of CCP signifies that the sampel of CDF contains 3.3g moisture, 5.0g crude ash, 15.9g total fat content, 9.63g crude protein content, 66.2g carbohydrate and 446kcal energy

Table 4. Nutrition content of Chocolate Cake Premix (CCP)

Test Parameter	Unit	Result
Moisture	g/100g	3.3
Crude Ash	g/100g	5.0
Total Fat Content	g/100g	15.9
Crude Protein Content	g/100g	9.63
Total Carbohydrate	g/100g	66.2
Gluten	g/100g	0
Energy Content	kcal/100g	446

3.3 Respondent acceptance towards Chocolate Cake Premix (CCP)

Table 5 indicated respondents' response towards CCP are high and at good level. Attributes evaluated are about texture, odour and taste of the sampel. The mean score are 3.47, 3.52 and 4.12 for texture, odour and taste respectively.

Table 5. Respondent acceptance towards Coconut Cake Premix (CCP)

Item	Mean	Interpretation	Level
Texture	3.47	High	Good
Odour	3.52	High	Good
Taste	4.12	High	Good

4. Discussion

Referring to Table 3, the nutrition analysis result signifies that the CDF contains protein, carbohydrate, fat and energy comparable to the wheat flour. This in relevant with research by Pellegrini and Agostoni, (2015) and Qonitah Azzahra (2016) stating that the coconut flour contains various nutrients and beneficial in promoting good health as a utilize prevention of coronary heart disease. The results also showed that CDF had more fat than wheat flour, although according to Wadl and As' (2006) study, about 92 percent of coconut fats are saturated fats. This has given rise to the myth that coconut fats are unhealthy. The majority of the saturated fats in coconut, however, are medium chain fatty acids, which have distinct physiological characteristics from those of animal origin. The body uses medium chain fatty acids directly to make energy since they do not go through processes of decomposition and re-esterification. Compared to saturated fats, they are not as "dangerous for health."

Previous research have revealed that coconut flour is likewise gluten-free and that its nutritional composition is very similar to that of wheat flour (Paucean et. al., 2016).It is also proven in Table 3 this gluten analysis test using In-house based on R-Biopharm ELISA Test Kit (R7001) done by SGS (Malaysia) Sdn Bhd indicated that there is no gluten detected in CDF sample. This finding also relevant with Queiroz et. al., (2017), proving by the nutritional qualities of

the gluten-free food were improved by adding coconut flour to the formulations, which increased the fat and protein contents while lowering the carbohydrate level.

After successfully developing the standard formulation, further nutritional study of CCP indicated that sample contains protein, carbohydrates, fat and providing 446kcal energy. This is a positive result considering the main ingredient of CCP in from coconut dreg that normally treated as waste. On top of this, the cake produced from CCP was highly accepted by respondents in term of its organoleptic characteristic and some of respondent even wanted to buy the cake if it is commercialized.

5. Conclusion

In conclusion, the CDF is free gluten. The CCP and CDF contain protein, carbohydrate, fat and energy . CDF also suitable in producing new and nutritious formulation of CCP and it is highly accepted by respondents.

Acknowledgments

Greatest appreciation to the Almighty, Allah S.W.T because of His blessing. The biggest appreciation to everyone who was directly or indirectly involved in this research. I sincerely appreciate it.

References

Eadmusik, S., Phungamngoen, C., Panphut, W. and Budsabun, T. (2022). Partially substitution of wheat flour by coconut residues in bakery products and their physical and sensorial properties. *Food Research 6* (1) : 99 – 105. https://www.myfoodresearch.com/uploads/8/4/8/5/84855864/_12__fr-2021-140_eadmusik.pdf

Gomes, M.A., dos Santos Rocha, M.S.R., Barbosa, K.L., de Abreu, Í.B.S., de Oliveira Pimentel, W.R., De Farias Silva, C.E., Almeida, R.M.R.G., de Magalhães Cabral Albruquerque, E.C. and Vieira, R.C. (2021). Agricultural coconut cultivation wastes as feedstock for lignocellulosic ethanol production by Kluyveromyces marxianus. *Waste and Biomass Valorization*, 12, 4943-4951. https://doi.org/10.1007/s12649-021-01345-w

Hamidah Noor Md Yusoh., Wan Nor Hafiza Wan Sulaiman, Ruhana Wati Iran., (2018). Consumer Acceptance Towards Double Cocoa Cupcake from Coconut Dreg Flour and Optimization Study on Nutrition Facts. Proceedings 8th National Conference in Education - (CiE-TVET) 2018, 805 – 813

Hewett. (2016). Are the benefits of coconut oil all a myth?. Health diet. News.com.au. https://www.news.com.au/lifestyle/health/diet/are-the-benefits-of-coconut-oil-all-amyth/news-story/b7d7d8b9bc47ad4ef53e21ea25c56d7b

Mohammad Nor, Nor Amna A'liah and Engku Ariff, Engku Elini and Nik Omar, Nik Rahimah and Zainol Abidin, Ahmad Zairy and Muhammad, Rasmuna Mazwan and Rahim, Hairazi and Nazmi, Mohd Syauqi and Sulaiman, Nurul Huda. (2020). Total productivity and technical efficiency of coconuts in Malaysia. *Economic and Technology Management Review, Vol. 15(2020):* 11 – 22. http://myagric.upm.edu.my/id/eprint/17608/1/02_Nor%20Amna.pdf

McGruther, J. (2016). How to Bake with Coconut Flour: Tips & Tricks for Using this Gluten-free Flour. http://nourishedkitchen.com/baking-with-coconut-flour/

Mohd Najib Abd Ghafar (2003). *Penyelidikan Pendidikan*. Johor Darul Takzim, Universiti Teknologi Malaysia. 129-139

Paucean A., Man S., Muste S., Pop A. (2016). Development of Gluten Free Cookies from Rice and Coconut Flour Blends. Bulletin UASVM Food Science and Technology 73(2)/2016 ISSN-L 2344-2344; Print ISSN 2344-2344; Electronic ISSN 2344-5300

Pellegrini N, Agostoni C. (2015). Nutritional aspects of gluten-free products. Journal of the Science of Food and AgricultureVolume 95, Issue 1. https://doi.org/10.1002/jsfa.7101

Qonitah Azzahra, Alfu Nikmatul Laily, Asiyah Mutmainnah. (2016). Bread Dregs Coconut: Utilization of Coconut Dregs as Prevention of Coronary Heart Disease. International Journal of Advances in Science Engineering and Technology, ISSN: 2321-9009

Queiroz A. M., Rocha R. F. J., Garruti D. S., Silva A. P. V., Araujo I. M. (2017). Preparation and characterization of gluten-free cookies enriched with coconut flour: an alternative for celiacs. Braz. J. Food Technol. vol.20 Campinas 2017. http://dx.doi.org/10.1590/1981-6723.9716

Raghavendra, S.N., Rastogi, N.K., Raghavarao, K.S.M.S. and Tharanathan, R.N. (2004). Dietary fiber from coconut residue: Effects of different treatments and particle size on the hydration properties. *European Food Research and Technology, 218*(6), 563-567. https://doi.org/10.1007/s00217-004-0889-2

Rodsamran, P. and Sothornvit, R. (2018). Physicochemical and functional properties of protein concentrate from by-product of coconut processing. *Food Chemistry, 241,* 364-371. https://doi.org/10.1016/j.foodchem.2017.08.116.

Trinidad, T.P., Mallillin, A.C., Valdez, D.H., Loyola, A.S., Askali-Mercado, F.C., Castillo, J.C., Encabo, R.R., Masa, D.B., Maglaya, A.S. and Chua, M.T. (2006). Dietary fiber from coconut flour: A functional food. Innovative Food Science and Emerging Technologies, 7(4), 309-317. https://doi.org/10.1016/j.ifset.2004.04.003

Wadl, A. & As, D. (2006). Coconut fats. The Ceylon Medical Journal, 51 (2), 47-51

Zheng, Y., Tian, H., Li, Y., Wang, X. and Shi, P. (2021). Effects of carboxymethylation, hydroxypropylation and dual enzyme hydrolysis combination with heating on physicochemical and functional properties and antioxidant activity of coconut cake dietary fibre. *Food Chemistry*, 336, 127688. https://doi.org/10.1016/j.foodchem.2020.127688

ANTIOXIDANT PROPERTIES OF LIP BALM DERIVED FROM THE PEEL OF RED DRAGON FRUITS (HYLOCEREUS POLYRHIZUS)

Norshila Md Isa[1], Nur Haniza Ewandi Jong[2], Hamidah Noor Md Yusoh[3]

[1,2,3]Department of Tourism and Hospitality, Politeknik Merlimau, Malaysia
[1]mysaila2905@gmail.com
[2]hanyss89@gmail.com
[3]mckin81@gmail.com

Abstract: Recently, the need for herbal merchandise is increasing especially within side the cosmetics industry. Lip balm is one of the extensively used beauty merchandise that functioned as a shade of protection to the lip and may contain subdue numerous poisonous results of lead and technology of oxidative pressure. Red Dragon Fruit (Hylocereus polyrhizus) contains an effective antioxidant amaranth colorant referred to as betacyanin pigment. Looking at this benefit, this research aims to analyze the antioxidant activities of betacyanin pigment in lip balm from the peel of Red Dragon Fruits. The finding indicated antioxidant properties contained in lip balm from the peel of Red Dragon fruit result changed into 2.0% using in house method based on International Food Research Journal. In conclusion, the application of natural color derived from the peel of Red Dragon fruit is safe and can act as a natural dye that has antioxidant properties which do not affect the color and texture of the lip balm.

Keywords*: antioxidant properties, lip balm, Red Dragon fruit*

1. Introduction

Currently, cosmetics product grows to be intensively used by guys and ladies to enhance their appearance and beautify themselves. Many new beauty merchandises is produced and advanced each day as compared to the previous. Besides, people are aware of environmental consequences related to the use of abundant chemicals in everyday products (Hapiz et al., 2021) and turning withinside the path of green to adopt a more natural way of life (Kadu et al., 2014). Moreover, customers are attempting to find herbal-primarily totally based cosmetics to keep away from allergic reactions, any facet results, and for the protection of their health. Since the lip has no oil glands, in order that they need greater moisture and safety at some point of the day (Christopulos A, 2011). Lip balm is one of the beauty products that soothe dryness and chapping and assist sore lips to experience better. Lip balm is a kind of cream or an ointment this is used to preserve the lip's smooth which is available in a stick or small tub. A good lip balm must have persuading traits and be multifunctional in a way to is appropriate to consumers, inclusive of having an appropriate texture and antioxidant properties. Antioxidants are compounds that can stop, or delay cell deterioration brought on by free radicals, unstable molecules that the body creates in response to its environment. (Ware, 2018).

Hylocereus polyrhizus, a member of the Cactaceae family, is becoming more and more popular in nations with climates suitable for cultivating various kinds of tropical and subtropical fruits in general. Due to the commercial interest in it, it is now grown all over the world, especially in countries of Asia including Malaysia, Vietnam, and the Philippines. (Kamairudin et al., 2014) and over 20 tropical and subtropical countries (Mercado-Silva, 2018). It was first cultivated in Johor, Perak, Negeri Sembilan, Pahang, Pulau Pinang, and Sabah in the 1990s after being introduced to Malaysian agriculture. (Department of Agriculture Sarawak, 2013). The red dragon fruit is distinguished by its brilliant pink skin and green scales. The reddish-violet meat is encrusted with numerous tiny black seeds that are high in vital fatty acids. (Ariffin et al., 2009). A ripe dragon fruit includes a significant amount of total soluble solids, which are rich in organic acids, according to prior study. (Stintzing et al., 2003), protein (Le Bellec et al., 2006). Vaillant et al., (2015) reported that the presence of other phenolic components enhanced the high antiradical properties of dragon fruit. Furthermore, Cai et al., (2003) demonstrate that different betacyanins and betaxanthins have structure-activity relationships that show free radical scavenging properties, which helps to increase interest in Hylocereus polyryhizus as an antioxidant source.

Recently, there has been research about many natural dyes as a colorant. This Red Dragorn fruit (Hylocereus polyrhizus) is recognised to have various benefits for health, including as strong antioxidant content and antibacterial characteristics (Anjarsari et al., 2020). Abhijeet (2012) stated that super red dragon fruit could be added to food, medication, and cosmetic products. There are not many people that use this fruit for lipstick, though. Due to the presence of antioxidant qualities, which neutralize the free radicals produced in lips due to the free radicals produced on lips because of external influences and prevent aging on the lip, the start of the unsightly wrinkled chapped lip can be reduced. (Kamairudin et al., 2014). The main objective of this research work is to determine the antioxidant properties of the production of lip balm made from the peel of red dragon fruit (*Hylocereus polyrhizus*) that act as a natural dye in natural lip balm formulation.

2. Materials and Methods

2.1 Plant material

Red dragon fruit peel (Hylocereus polyrhizus), which was purchased from the neighbourhood market area in Merlimau, Malacca, Malaysia, served as the study's primary source of the material. The red dragon fruit peel was extracted by using the slow extraction method.

2.2 Formulation of lip balm

To remove impurities like dirt, grit, and dust, red dragon fruits were thoroughly washed in water. To maximize the surface area and the extraction effectiveness, the dragon fruits were first peeled, followed by the weighting and chopping of around 200 g of the skins. These small pieces of peels of dragon fruits were boiled with water (150ml) at a temperature of 70^{o}C for 10 minutes. Figure 1 illustrates how lip balm was made by combining honey, corn starch, and petroleum jelly with red dragon fruit peel extract. The mixture is then double-boiled to melt all the ingredients until mixed thoroughly. After melting completely, a mixture was poured into a

container and it was let to dry at room temperature as shown in figure 2. Next, it was put into the refrigerator for solidifying for further evaluation. The materials were weighed using an analytical balance. The formulation of lip balm is given in Table 1.

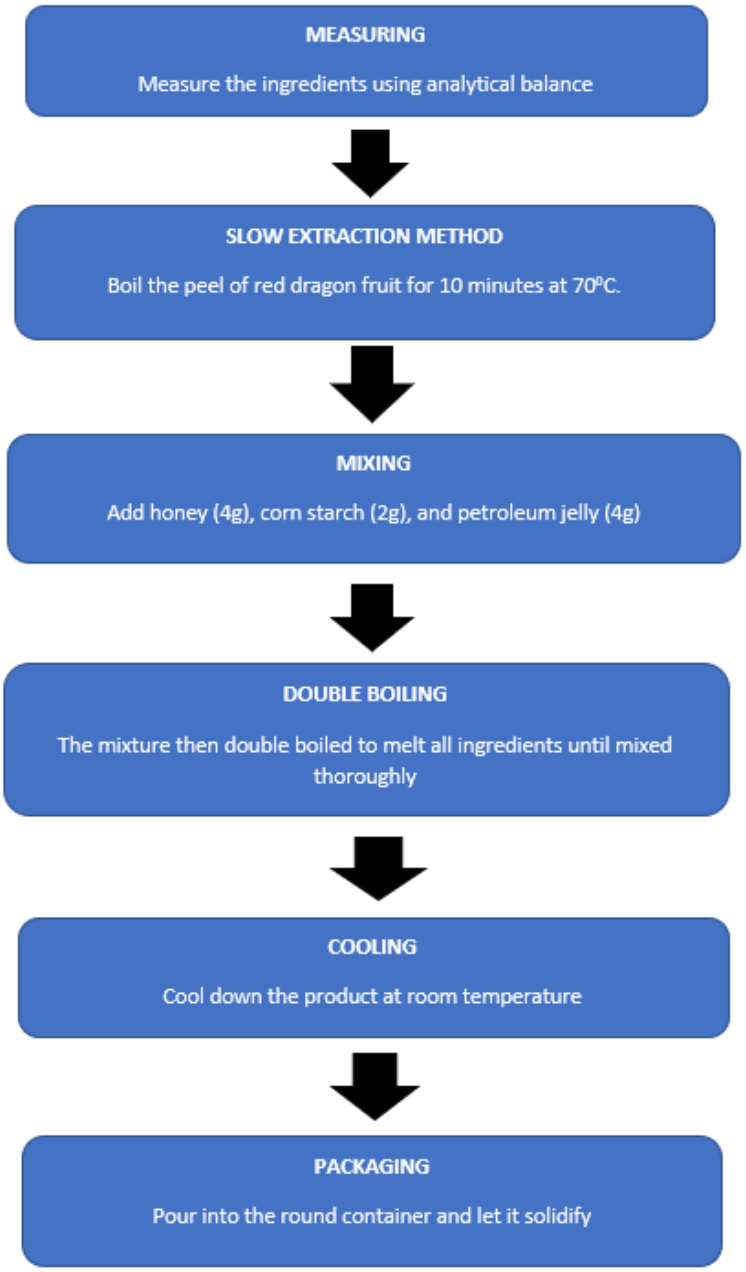


Figure 1: Process flowchart

Figure 2: Lip balm

Table 1: Formulation of lip balm

Ingredients	Quantity (gram)
Peel of red dragon fruit extract	95
Honey	4
corn starch	2
Petroleum jelly	4
Total (g)	105

2.3 Evaluation of lip balm

Antioxidant properties were determined through an in-house method based on International Food Research Journal. This analysis was carried out by a chemist at the Melaka Institute of Biotechnology. In addition, a test for lip sensitivity involved applying lip balm for 30 minutes to the lips.

3. Results

Antioxidant properties of the lip balm that was made from the peel of red dragon fruit (Hylocereus polyrhizus) were determined through an in-house method based on International Food Research Journal. This method refers to the determination of antioxidant activity in foods and beverages by reaction with 2,2’ – diphenyl-1-picrylhydrazyl (DPPH): collaborative study first action 2012.04 (Plank et al., 2012). As stated in table 2, the results showed that lip balm contains 2.0% antioxidant activity.

Table 2: Result of antioxidant activity

Test Parameter	Unit	Test Method	Result	Limit
Antioxidant activity (DPPH Radical Scavenging Activity)	%	In-house method based on International Food Research Journal	2.0	N/A

4. Discussion

Antioxidant activities are frequently assessed using the DPPH radical scavenging activity assay, which examines a sample's capacity to donate hydrogen (H) to DPPH radicals. (Choo and Yong, 2011). According to Norashikin and M.Azlan (2016), Plant antioxidants called flavonoids and polyphenols, which are polar and easily soluble in water can quench DPPH free radicals. Besides, the amaranth pigment betacyanin, a potent antioxidant, is present in red dragon fruit. It can stop the oxidative damage brought on by low lead levels (Lwin et al., 2020). In this study, betacyanin colorant from the red dragon fruit peel was extracted by slow extraction method, and the sample's results revealed that there was 2.0% of antioxidant activity per 100g sample. Previous studies stated that the effective concentration (EC50) for red dragon fruit was 2.9±0.4 mM vitamin C (Rebecca et al., 2010). And lip balms do not cause skin irritation or itchiness when left on for 30 minutes. This is because all ingredients that are used in making the lip balm are safe. Honey is the second main ingredient in this lip balm formulation. Kishore et al (2011) stated that the antioxidant property of honey is increased by the phenolic compound and has several preventive qualities against a wide range of medical illnesses, including cancer, inflammatory disorders, coronary artery diseases, neurological deterioration, and aging. Petroleum jelly gave a favorable texture and works nicely to keep skin moist. Furthermore, it also preserves the lip’s smoothness. The color of the lip balm gave a bright red-purple. To impart elegance to lips as well as to enhance the aesthetic appeal of the cosmetic formulation selection of coloring agents is of utmost importance (Pawar et al., 2021). Because the marketing of cosmetic items heavily relies on color. The current research work aims to prepare lip balms containing antioxidant properties. As we can see, the use of antioxidants in cosmetics can benefit both the lips and formulations by preventing the consequences of oxidative damage.

5. Conclusion

In conclusion, the combination of ingredients such as honey, petroleum jelly, and corn starch produce a great consistency of product. This lip balm has no skin irritation, and the formulation would increase customer acceptance since the additional properties of antioxidants added extra market value to the product as a cosmetic product. It is because consumers involved with the surroundings are inclined to spend extra on "environmentally friendly" products, favoring the increase of the marketplace for natural cosmetics.

Acknowledgments

Greatest appreciation to the Almighty, Allah S.W.T because of His blessing. Million appreciations to our family and entire friends for their support and help. Special thanks to everyone who had been involved in this project.

References

Abhijeet A. A., Shripad, M. B., Preeti, T. K., Swapnil, S. D.and Pradeep, K. N. 2012. Formulation and Evaluation of Herbal Lipstick from Colour Pigment of Bixa Orellana (Bixaceae) Seeds. International Journal of Pharmacy and Pharmaceutical Sciences. 4(5): 357–359.

Anjarsari L.D, Aditiyarini D, and Guntoro (2020). Potency of Super Red Dragon Fruit Flesh Extract (Hylocereus costaricencis) in Herbal Lipstick as Colorant, Antioxidant and Antibacterial. Scistatio Vol. 1, No.1:23-33

Cai Y.Z, Sun M, Corke H (2003). Antioxidant activity of betalains from plants of the Amaranthaceae. Journal Agricultural Food Chemistry. 51: 2288-2294

Christopulos A (2011). Mouth Anatomy. https://emedicine.medscape.com/article/1899122-overview June 11 2022

Choo, W.S., and Yong, W.K. (2011). Antioxidant properties of two species of Hylocereus fruits. Advances in Applied Science Research 2, no. 3 418-425.

Hapiz A.I.A, Japakumar J. Jayagobi J, Jamaluddin M.A and Aramugam S. (2021). Production of Lip Balm from Natural Dyes. Science and Technology publication Lda. ISBN: 978-989-758-496-1

Kadu M, Vishwasrao S, and Singh S. (2014). Review on Natural Lip Balm. International Journal of Research in Cosmetic Science. ISSN 2277-7172.

Kamairudin N., Gani S. S., Masaomi H.R. and Hashim P. (2014). Optimization of natural lipstick formulation based on pitaya (*Hylocereus polyrhizus*) seed oil using D-optimal mixture experimental design. *Molecules*, 19: 16672-16683

Kishore R.K, Halim A.S, Syazana M.S.N, Sirajudeen K.N.S.(2011). Tualang honey has higher phenolic content and greater radical scavenging activity compared with other honey sources Nutr. Res., 31 (4)

Le Bellec F, Vaillant F, Imbert E (2006). Pitahaya (*Hylocereus spp.*): A new fruit crop, a market with a future. Fruits, 61: 237-250.

Lwin T, Myint C.Y, Win H.H, Oo W.W and Chit K (2020). Formulation and Evaluation of Lipstick with Betacyanin Pigment of *Hylocereus polyrhizus* (Red Dragon Fruit). Journal of Cosmetics, Dermatological Sciences and Applications. 212-224.

Mercado-Silva E. M. (2018): Pitaya - Hylocereus undatus (Haw). In: Rodrigues S., de Oliveira Silva E., de Brito E.S. (eds): Exotic Fruits Reference Guide. 1st Ed. Academic Press: 339-349

Norashikin, M.Z., and Muhammad Azlan, N. (2016) Antioxidant and mineral content of pitaya peel extract obtained using microwave-assisted extraction (MAE). Australian Journal of Basic and Applied Science 10, no. 17: 63-8.

Pawar J.C., Kandekar U.Y., Vichare V.S and Ghavane P.N. (2021). Production and Analysis of Lip Balm using Herbal Resources. Journal of Pharmaceutical Research International. ISSN: 2456-9119

Plank D.W., Szpylka J., Sapirstein H., Woollard D., Zapf C.M., Lee V., Chen C-Y.O., Liu R.H., Tsao R., Dusterloh A and Baugh S. (2012). Journal of AOAC International, Volume 98, Isuue 6, Pages 1562-1569.

Rebecca O.P.S, Boyce A.N and Chandran S. (2010). Pigment Identification and Antioxidant Properties of Red Dragon Fruit (*Hylocereus Polyrhizus*). African Journal of Biotechnology Vol. 9(10), pp. 1450-1454.

Stintzing F.C, Schieber A, Carle R (2003). Evaluation of color properties and chemical quality parameters of cactus juices. Europe Food Research Technology. 216: 303-311.

Vaillant F, Perez A, Davila I, Dornier M, Reynes M (2005). Colorant and antioxidant properties of red pitahaya (Hylocereus sp.). Fruits, 60: 1-7

Ware M. (2018). How can antioxidants benefit our health? http://medicalnewstoday.com/articles/301506 overview June 13 2022.

ANTIOXIDANT ACTIVITY OF HARD CANDY PRODUCED USING GARCINIA MANGOSTANA PERICARP

Nur Haniza Ewandi Jong[1], Norshila Md Isa[2], Hamidah Noor Md Yusoh[3]

[1,2,3]Department of Tourism and Hospitality, Politeknik Merlimau, Malaysia
[1]hanyss89@gmail.com
[2]mysaila2905@gmail.com
[3]mckin81@gmail.com

Abstract: Most hard candy are empty-calories with nearly 100% sugar by weight. Consumed too much of it can be bad for health. One of the fruits that rich in antioxidant is *Garcinia mangostana*. Looking to its health potential, a study was conducted to produce a nutritive hard candy by using waste of *Garcinia mangostana* pericarp and honey to replace the function of sugar in making hard candy. The objective of this study is to determine the antioxidant activity in hard candy made of *Garcinia mangostana* pericarp using DPPH Radical Scavenging Activity following International Food Research Journal test method. Result indicated presence of antioxidant activity value at 14.31% in one solid sample of the hard candy. In conclusion, hard candy made from *Garcinia Mangostana* pericarp contains antioxidant and can be a nutritive snacking choice for consumer.

Keywords: *antioxidant activity, empty-calorie, nutritive*

1. Introduction

The majority of hard candies contain over 100 percent sugar. Syrups of sucrose, glucose, fructose, or other sugars may be used in recipes for hard candy (Advameg, 2007). So researchers came up with the notion to make a healthier, more nutritional hard candy. By combining it with the hard candy, we fully utilize the nutrients included in the pericarp of *Garcinia mangostana*. Lollipops were selected by researchers as the hard candy category because they are among the most well-liked by consumers. Southeast Asia is the home of the *Garcinia mangostana*, also referred to as mangosteen. *Garcinia mangostana* has been produced in numerous nations since the dawn of time because of its juiciness, delicate texture, and somewhat sweet and sour flavour (Ho Dinh Hai, 2016). While the durian has been referred to as the "King of Fruits," *Garcinia mangostana* is not merely an ordinary fruit. When rumours circulated in the 1890s that Queen Victoria would knight anyone who brought her fruits, the phrase "Queen of fruits" was coined (Stone, 2016). The *Garcinia mangostana* fruit is highly prized for its strong antioxidant contents, in addition to its royal heritage. *Garcinia mangostana* juice is quite popular, and the fruit's much-touted health advantages are due to the type of antioxidant present, particularly in the pericarp. These anti-oxidants are classified as biologically active and abundant xanthones (Chester, 2018).

According to phytochemical studies, the pericarp of the mangosteen has the most potent amounts of xanthones, flavonoids, saponins, and tannin. Pharmacological actions of xanthones, such as antibacterial, antifungal, and anti-inflammatory ones, have been identified. Mice have been shown to be unaffected by xanthones from the mangosteen pericarp when given 100 mg/kg of body weight orally every day for seven days. However, Kaomongkolgit also discovered throughout his investigation that alpha-mangostin was not harmful to human gingival fibroblasts for 480 minutes at certain concentrations (Puteri et. al., 2019). Foods that are abundant in calories but lacking in nutrients are considered junk food (Merriam, 2015). If ingested in excess, it can lead to a variety of diseases. For instance, eating foods devoid of fibre and nutrients required to effectively digest carbohydrates, such as white flour and processed sugars found in soft drinks, will raise your insulin levels (Roizman, 2015). Typically, junk food vendors focus mostly on children. Children's food preferences, purchasing behaviour, and general dietary behaviour have all been found to be influenced by food advertising and other forms of marketing (WHO, 2014). Because of this, researchers developed this hard candy with healthy natural ingredients.

As is common knowledge, eating foods high in antioxidants is beneficial to our health. *Garcinia mangostana* is one of the fruits that is high in antioxidants. Most of the time, people merely consume the fruit and discard the pericarps. Fruit peels are the primary production waste in the food business when using fruits as a raw material for products such fruit juices, concentrated jams, and dried fruits (Ibrahim, 2017). Not only do we waste food, but we also waste natural sources of nutrients like antioxidants that are good for our health. In order to fully utilize the nutrition in the *Garcinia mangostana* pericarp, researchers decided to produce hard candy utilizing the pericarp. Additionally, researchers intend to create nutritive hard candy as an alternative for kids or adults who ate unhealthy food with good nutritional value.

2. Materials and Methods

2.1 Plant material

The main material used in this study was the pericarp of *Garcinia mangostana* which was obtained from the local market area in Merlimau, Malacca Malaysia. The pericarp was extracted by using slow extraction method.

2.2 Formulation of lip balm

The mangosteen fruit needs to be removed and washed first. A slow extraction procedure was used to obtain the extract of the mangosteen pericarp. The lollipop mould was made of silicone. Stevia, pure honey, and water were mixed in a saucepan according to the recipe in Table 1. Butter vanilla was then added after all ingredients had been thoroughly combined. The mixture was brought to a double boiled for 5–7 minutes until the thermometer read 375°F/200°C (hard-crack stage). Turn off the heat when the mixture reaches the hard crack stage and the mangosteen pericarp extract was added. The liquid mixture was poured immediately into the silicone lollipop mould. The lollipop sticks was inserted right away. The lollipops were let to cool completely and firm before carefully removing them from the mould. Figure 1 showed

processing steps in making the hard candy while Figure 2 showed the final product of hard candy made from *Garcinia mangostana* pericarp.

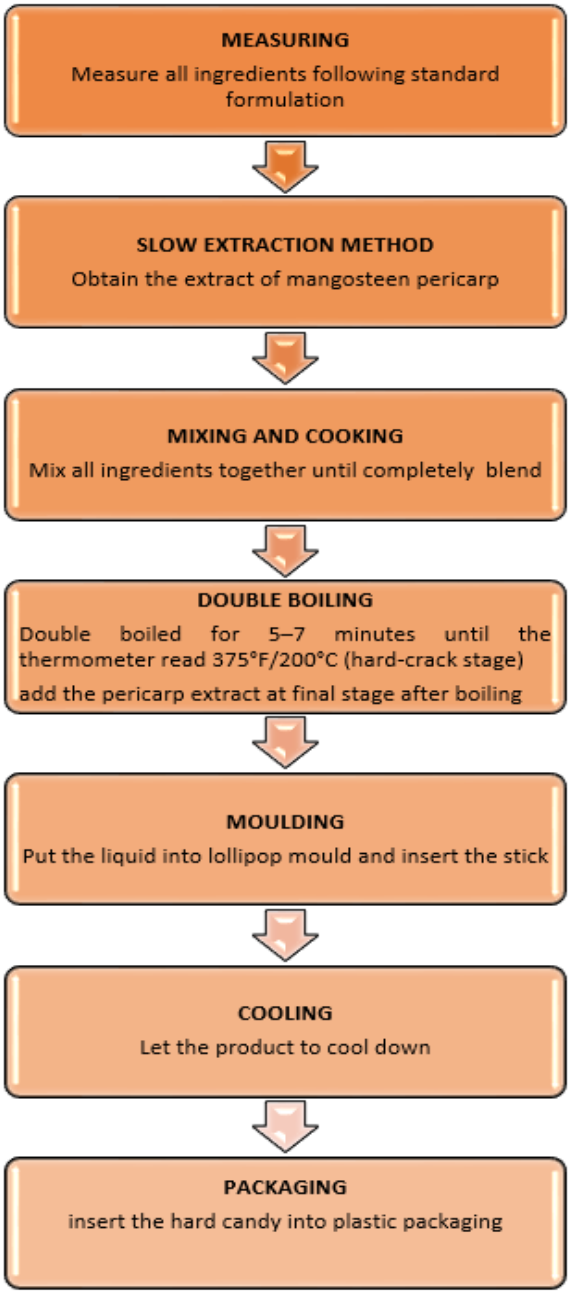


Figure 1: Process flowchart for making hard candy made of *Garcinia mangostana*

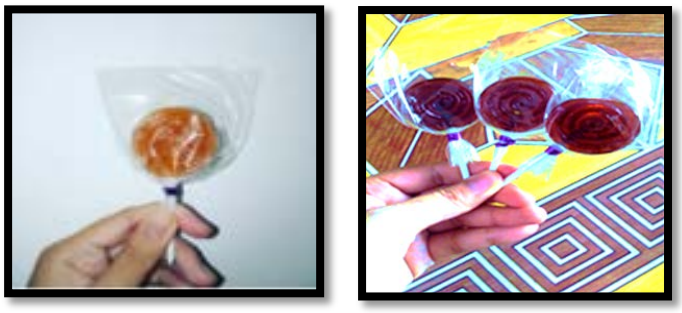


Figure 2: Final look of hard candy made of *Garcinia mangostana*

Table 1: Standard formulation of hard candy made of *Garcinia mangostana*

Ingredients	Quantity (gram)
Mangosteen pericarp extract	10 g
Stevia	31 g
Water	57 g
Pure honey	100 g
Butter vanilla	2 g
Total (g)	200 g

2.3 Evaluation of hard candy

Antioxidant properties were determined through an in-house method based on International Food Research Journal.

3. Results

Antioxidant properties of the hard candy made of *Garcinia mangostan* were determined through an in-house method based on International Food Research Journal. This method refers to the determination of antioxidant activity in foods and beverages by reaction with 2,2' – diphenyl-1-picrylhydrazyl (DPPH Radical Scavenging Activity): collaborative study first action 2012.04 (Plank et al., 2012). Result indicated presence of antioxidant activity value at 14.31% in one solid sample of the hard candy.

Table 2: Result of antioxidant activity

Test Parameter	Unit	Test Method	Result	Limit
Antioxidant activity (DPPH Radical Scavenging Activity)	%	International Food Research Journal	14.31	N/A

4. Discussion

The special antioxidant profile of mangosteen is arguably one of its most important qualities. Compounds known as antioxidants can counteract the negative effects of potentially dangerous molecules known as free radicals, which are associated with a number of chronic disorders (Pham-Huy et al., 2008). Vitamin C and folate are two minerals found in mangosteen that have antioxidant properties. Though their clinical anticancer potential has not yet been tested, mangosteen products seem safe and have been well tolerated in human clinical trials where they exhibit antioxidant activity (Nauman et al., 2022). Therefore, researchers think that this hard candy made from *Garcinia mangostana* pericarp has a great potential to be marketed as nutritive hard candy because the test results for the sample showed presence of antioxidant activity of 14.31 percent. Other than that, the pleasant aroma of butter vanilla and distinctive flavour of the *Garcinia mangostana* pericarp extract, together with the goal of appealing to the kid's market, make this lollipop primarily appropriate for those who prefer hard candy that is not overly sweet. Moreover, it has been found that *Garcinia mangostana* pericarp extract, either alone or in combination with other leave extract, have the potential to be utilized as antibacterial and antifungal agents (Pasaribu et al., 2021). An antibacterial agent is a substance that has the ability to either kill or inhibit the growth of bacteria (Parham et al.,2020). As a result, using the pericarp of mangosteen as the major ingredient can serve as a natural preservative for the hard candy. This innovation will also assist to prevent environmental pollution, thereby fully using the antioxidant compound existence, given that these residues of mangosteen pericarp are one of the ideal sources of antioxidants and dietary fiber.

5. Conclusion

A remarkable consistency of product is produced by combining ingredients like pure honey, stevia, and butter vanilla. Due to the enhanced antioxidant capabilities from the mangosteen pericarp, this formulation would increase consumer acceptance because it would give the candy improved characteristics in term of nutrient.

Acknowledgments

Greatest appreciation to the Almighty, Allah S.W.T because of His blessing. Million appreciations to our family and entire friends for their support and help. Special thanks to everyone who had been involved in this project.

References

Abhijeet A. A., Shripad, M. B., Preeti, T. K., Swapnil, S. D.and Pradeep, K. N. 2012. Formulation and Evaluation of Herbal Lipstick from Colour Pigment of Bixa Orellana (Bixaceae) Seeds. International Journal of Pharmacy and Pharmaceutical Sciences. 4(5): 357–359.

Chester, K. Y. (2018). What Are The Skin & Health Benefits Of Mangosteen? https://eminenceorganics.com/ca/blog/2018/03/29/what-are-skin-health-benefits-mangosteen. Retrieved by: 15 April 2022

Hai, H. D. (2016). Garcinia mangostana - Mangosteen. https://www.worldwidefruits.com/garcinia-mangostana---mangosteen.html Retrieved by: 6 May 2022

Juyun Lim, (2011). Abstract. Published by Elsevier Ltd, Food Quality and Preference 22 (733-747). Retrieved by: https://www.journals.elsevier.com/food-quality-and-preference (Sun 19 August 2018 / 2:33:10)

Josedé Praza-Chaverri, Noemí Cárdenas-Rodríguez, Marisol Orozco-Ibarra and Jazmin M. Pérez-Rojas (2008). Medicinal properties of mangosteen (Garcinia mangostana). Journal of food and toxicology Elsevier 3:24-27.

Nauman, M. C., & Johnson, J. J. (2022). The purple mangosteen (Garcinia mangostana): Defining the anticancer potential of selected xanthones. Pharmacological research, 175, 106032. https://doi.org/10.1016/j.phrs.2021.106032

Parham, S., Kharazi, A. Z., Bakhsheshi-Rad, H. R., Nur, H., Ismail, A. F., Sharif, S., RamaKrishna, S., & Berto, F. (2020). Antioxidant, Antimicrobial and Antiviral Properties of Herbal Materials. Antioxidants (Basel, Switzerland), 9(12), 1309. https://doi.org/10.3390/antiox9121309

Pasaribu, T., Sinurat, A. P., Wina, E., & Cahyaningsih, T. (2021). Evaluation of the phytochemical content, antimicrobial and antioxidant activity of Cocos nucifera liquid smoke, Garcinia mangostana pericarp, Syzygium aromaticum leaf, and Phyllanthus niruri L. extracts. Veterinary world, 14(11), 3048–3055. https://doi.org/10.14202/vetworld.2021.3048-3055

Pathak, P. D., Mandavgane, S. A., & Kulkarni, B. D. (2017). Fruit Peel Waste: Characterization and its Potential Uses. Current Science,113(03), 444. doi:10.18520/cs/v113/i03/444-454

Pham-Huy, L. A., He, H., & Pham-Huy, C. (2008). Free radicals, antioxidants in disease and health. International journal of biomedical science: IJBS, 4(2), 89–96.

Puteri, F. H., Widjaja, J., Cahyani, F., Mooduto, L., & Wahjuningrum, D. A. (2019). The Comparative Toxicity of Xanthones and Tannins in Mangosteen (Garcinia mangostana Linn.) Pericarp Extract against BHK-21 Fibroblast Cell Culture. Contemporary clinical dentistry, 10(2), 319–323. https://doi.org/10.4103/ccd.ccd_579_18

Roizman, T. (2018). Reasons Eating Junk Food Is Not Good. https://healthyeating.sfgate.com/reasons-eating-junk-food-not-good-3364.html Retrieved by: 20 Jun 2022

Shibata, M.-A., Iinuma, M., Morimoto, J., Kurose, H., Akamatsu, K., Okuno, Y., Akao, Y., Otsuki, Y. (2011). α-Mangostin extracted from the pericarp of the mangosteen (Garcinia mangostanaLinn) reduces tumor growth and lymph node metastasis in an immunocompetent xenograft model of metastatic mammary cancer carrying a p53 mutation. BMC Medicine 9, 69-77.

Stone, D. (2016, May 26). Meet the Mangosteen. https://www.nationalgeographic.com/people-and-culture/food/the-plate/2016/05/meet-the-mangosteen/ Retrieved by: 16 May 2022

U K Ibrahim, N Kamarrudin, M U H Suzihaque and S Abd Hashib (2017). Local Fruit Wastes as a Potential Source of Natural Antioxidant: An Overview. IOP Conf. Ser.: Mater. Sci. Eng 206 012040

World Health Organization (2014). Protecting children from the harmful effects of food and drink marketing. http://www.who.int/features/2014/uk-food-drink-marketing/en/ Retrieved by: 23 May 2022

ROOFING TILES INNOVATION BASED ON SEASHELLS, COCONUT FIBER AND SODIUM LIGNOSULFONATE

Mohd Nubli Shahmi Zainal Abidin[1] and Ibrahim Mohd Zulkifli[2]

Politeknik Sultan Idris Shah, Malaysia
[1]nublishahmi@gmail.com
[2]ibrahim@psis.edu.my

Abstract: Seashells and Coconut Fiber has many uses other than it's discarded and become waste. The sodium lignosulfonate also can be use as an mixture in the concrete mix in the present and future of construction. In this study, the seashells, coconut fiber and sodium lignosulfonate is presented as improved strength, water reducer and heat resistance additional mixture in innovation of roofing tiles. This product of roofing tiles divided into three sample (30%,60% and 80%) with different ratio of additional mixture. With different ratio of additional mixture it divided again in 3 sample. This study conducted with the aim to produce concrete improvements on the roof tiles by adding new additional materials such as shell powder, coconut fiber and sodium lignosulfonate. The test that been conducted are compression strength test, water absorption test and thermal conductivity test which is the compression strength test sample 1 with 30% additive materials with 10.00 N/mm² is the highest than sample 60% and 80% but this test are not suitable for roofing tiles strength testing. The water absorption result sample 1 with 30% additive materials absorb less water than other sample with 4.2% and standard sample 4.4% which is fulfilled the Malaysian Standard (MS797).For thermal conductivity testing, sample 1 with 30% additive materials has the lowest temperature reading than existing roof tiles nowadays. The overall of the testing shows that the sample 1 with 30% additive materials are the almost succeeded since the water absorption test and thermal conductivity test shows the best reading compared to the existing roof tiles. This study also shows that the additive materials should not be mixed together into one ratio because it will effect the reading result of the testing.

***Keywords**:* additional mixture; compression strength; thermal conductivity test; additive materials

1. Introduction

Nowadays, the construction industry has grown and developed, however, the problems damage in conctruction remains valid, especially on the roofing part. There were several problems or damage on the roof which is mossy and fragile. This study conducted with the aim to produce concrete improvements on the roof tiles by adding new additional materials such as shell powder, coconut fibber and sodium lignosulfonate.

Tiled roof is a roof that is often used in construction. Tiled roof always been characterized as a rugged and durable. As is known, roof tiles commonly used and easily available in the market is a tiled roof made of concrete. This is because the roof of this made long lasting and the cost of produce cheaper from the other roof. Material that researcher will use such as shell powder, coconut fibers and lignosulphonates. Cockle is a living water shelled in the coastal muddy. This habitat can be found near beach around Sabak Bernam. Shells contain calcium carbonate, which can replace cement. Crushed and graded seashells used in concrete displayed a lower porosity/permeability than plain concrete. (Alan E. Richardson, 2013).

Advantages of natural fibers is that it can reduce costs as it is widely available, low density, the strength that can be adopted, a good heat insulator, and can be renewed for recycling without affecting the environment. Coconut fiber offers many advantages such as reducing costs as easy to find, low density, strength can prevail, good thermal insulation, the cause of which can be updated and can for recycling without compromising the environment. (M.Mizanur, 2007).

2. Materials and Methods

In this study, additional materials that will be used in the concrete mix is seashells, coconut fiber and sodium lignosulfonates will be added in a mixture with the corresponding ratio in the manufacture of concrete roof tiles. 9 samples will be generated for each percentage. Each sample will be added additives with different percentages to compare the strength of each sample. For sample A which is consist with 3 sample. Research will use 30% of additive (Cockle shells 15%, Coconut fibers 10%, Sodium lignosulfonates 5%). For sample B, research use 60% of additive (Cockle shells 22%, Coconut fibers 19%, Sodium lignosulfonates 19%) and for sample C, research use 80% of additive (Cockle shells 30%, Coconut fibers 25%, Sodium lignosulfonates 25%).

The test that will be used to test the strength of the roof tiles such as Water absorption test, Compression strength test and Thermal test. At the end of the producing or testing all the sample, research will compare the strongest durability sample with the normal mixture of the concrete roof tiles.

3.0 Results

The test that conducted is Compression Strength Test, Water Absorption Test and Thermal Conductivity Test which is to know the strongest strength, the percentage of water absorption test and also to know the measure of the heat that flow through the roof tiles. The data analysis is very important in bringing off a test, it is possible to compare and identify the results obtained. The data and results obtained will be presented through tables, graphs and diagrams detailing.

3.1 Compression Strength Test

All 9 sample for each of the prototypes with different ratio will be mixed by conventional and is immersed for 7 days before conducted the compression strength test.

- The roof tile with different ratio of the additional is immersed for 7 days.
- After 7 days, the sample will remove from the curing tub with specified curing time and will be weighed before the test.
- Placed the specimen into the machine in such a manner.
- The roof tiles are tested by using the compression strength test machine and the data is recorded.

3.1.1 Comparison of the average value of each sample A (30%), B (60%) and C (80%)

Comparison of the strength test (Compression Strength Test) for each sample A (30%), B (60%) and C (80%). Table 1 and Figure 1 below shows the compression strength test value for comparison of the average value of each sample.

Table 1. Comparative data for each sample of strength test

Sample	Average Strength (N/mm²)	Standard (N/mm²)
Sample A (30%)	8.52	18.44
Sample B (60%)	3.85	
Sample C (80%)	4.66	

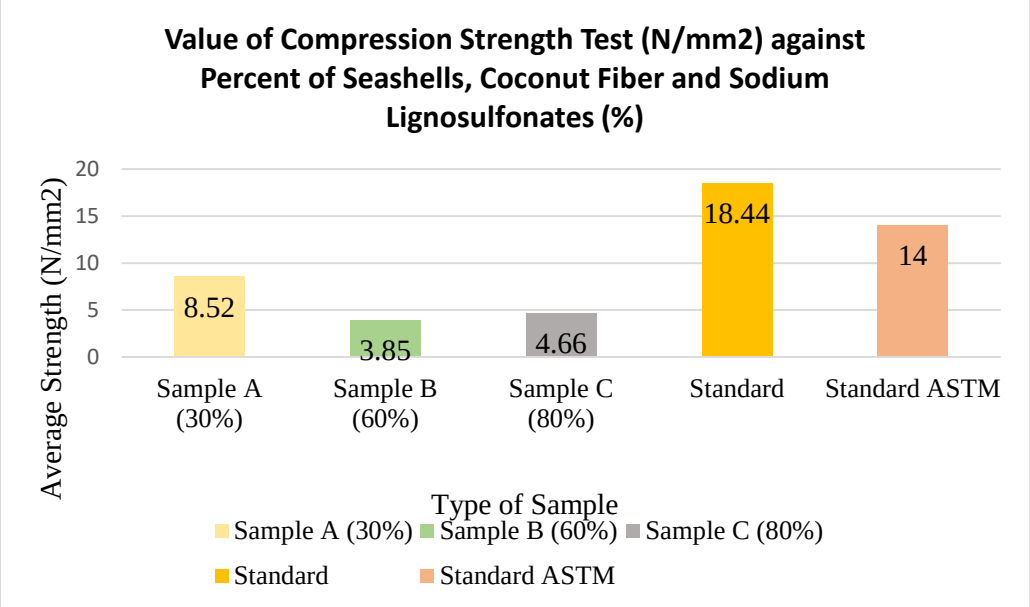


Figure 1. Bar chart comparing the average of sample A (30%), B (60%) and C (80%) for the compression strength test value.

3.1.2 Analysis data of compression strength test

Based on the in the figure 4.4, data shows the value of each sample A (30%), B (60%), C (80%) and standard for compression strength testing. Compression strength test refers to sample of standard cubes and standard strength test for concrete cubes that is 14 N/mm². Line graph in figure 4.1 on sample A for 30% showed the highest value are sample 1 (10.00 N/mm²) and the lowest value are sample 3 (7.56 N/mm²). For sample B with 60% figure 4.2 the compression strength value were highest in sample 1 (4.67 N/mm²), while for the lowest value in the sample 2 (3.33 N/mm²). While for the sample C with 80% based on figure 4.3, the highest compression strength test value in the sample 1 (5.11 N/mm²) and the other sample 2 and sample 3 (4.44 N/mm²) has the same value that make it the lowest value in strength test. Next, the strength test value for standard sample has the highest value with 18.44 N/mm².

The average ratio as in the graph bar chart in figure 4.4 shows the sample 1 with 30% additive materials is the highest than sample 60% and 80%. But the value of the standard sample has a higher value than the other samples 60% and 80% as well as the standard value 14 N/mm² as shown in figure 4.10 with reference JKR Standard.

3.2 Water Absorption Test

The test for water absorption is conducted to get the percentage of the water in the prototype.

- The samples are weighed before immersed into water.
- The roof tiles with different ratio of the mixture (seashells, coconut fiber and sodium lignosulfonate) are immersed for 24 hours.
- After 24 hours, the sample is weighed for each which got 9 sample and 1 for the standard roof tiles to record the data of the sample after immersed into water for 24 hours.
- After weighed the sample, each samples will comparison with the standard roof tiles.

3.2.1 Comparison of the average value of each sample A (30%), B (60%), C (80%) and standard.

Comparison of the Water Absorption Test for each sample A (30%), B (60%), C (80%) and standard. Table 2 and Figure 2 below shows the water absorption test value for comparison of the average value of each sample.

Table 2. Comparative Data of Water Absorption Test

Sample	Average of Water Absorption (%)
A (30%)	4.20
B (60%)	7.10
C (80%)	6.24
Standard	4.40

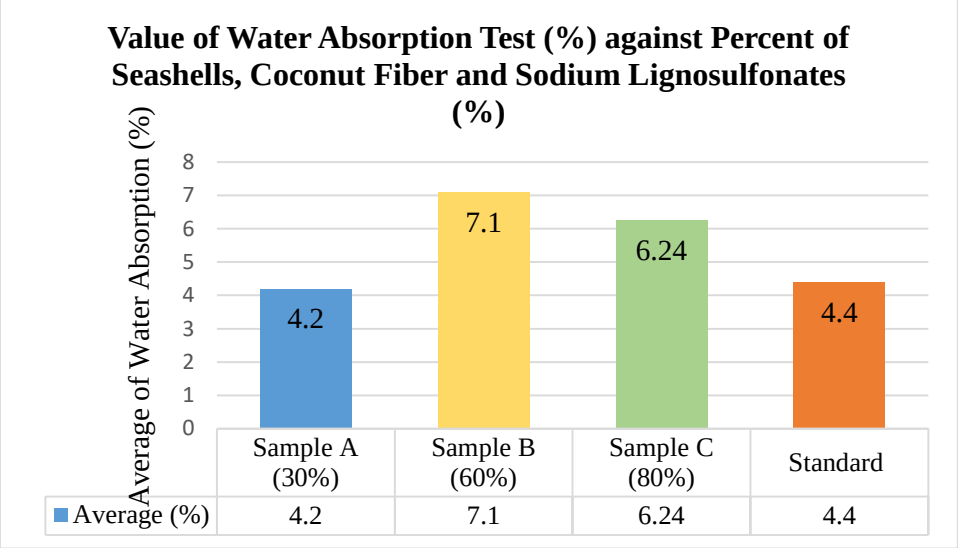


Figure 2. Bar chart comparing the average of sample A (30%), B (60%) and C (80%) for the water absorption test value.

3.2.2 Analysis data of water absorption test

The percentage of water absorption should not be exceeded than 10% for the water absorption test. Data shows the value of each sample A, B, C and standard for water absorption testing. Line graph figure 4.5 shown that the percentage of water absorption on all the sample for sample A (30%) with the value of testing for sample 1 (1.21%), sample 2 (2.38%) and sample 3 (9%) which mean this sample did not be exceeded than 10%. For sample B with 60% of additive materials shown that the percentage value does not be exceeded 10% because the value for sample 1 (9%), sample 2 (6.90%) and sample 3 (5.88). While for sample C with 80% additives also does not exceeded than 10% because the value of sample 1 (6.34%), sample 2 (5.66%) and sample 3 (6.73). The percentage value of water absorption testing for all the sample A (30%), B (60%) and C (80%) is fulfilled the Malaysian Standard (MS 797) for roof tile because the value of all the sample did not exceeded 10% of the percentage of water for 24 hours' test.

The average ratio on the graph bar chart in figure 4.8 shows the sample A (30%) is decreased than the standard sample which means sample A (30%) absorb less water other than standard sample and sample B (60%) and C (80%). In conclusion, the increase the content of sodium lignosulfonate in roof tile the higher the decrease the water absorption of the roof tile.

3.3 Thermal Conductivity Test

Thermal Conductivity Test, is used to measured or map surfaced temperatures based on the infrared radiation given off by an object as heat flows through, to or from that object.

- Put the sample of roof tiles that have been completed under the sunlight.
- After that, the shoot readings using the Infrared Laser as temperature measuring devices during peak hours of the sunny day for about 60 minutes.
- Lastly, it be recorded the readings on the front surfaced and the back surfaced of the roof tiles every 15 minutes in 1 hours.

3.3.1 Comparison of the average value of each sample A (30%), B (60%), C (80%) and standard 1 hour's duration.

Comparison of Thermal Conductivity Test for each sample A (30%), B (60%), C (80%) and standard. this data is an average for 1 hour taken involving 4 readings every 15 minutes. Table 3 below shows the thermal conductivity test values for a comparison of the values of each sample.

Table 3. Comparative Data of Thermal Conductivity Test on the Sample A (30%), Sample B(60%) and Sample C(80%) with Standard

Class Sample	**Sample (1 Hour) Average**			
	Sample1 (Front)	**Sample1 (Back)**	**Standard (Front)**	**Standard (Back)**
Sample A(30%)	35.55^{o}	34.99^{o}	50.18^{o}	50.53^{o}
Sample B(60%)	37.46^{o}	35.84^{o}		
Sample C(80%)	38.75^{o}	39.38^{o}		

4.0 Discussion

There are a few recommendations that can be made to improve the roof tile innovation.

- The additives materials suitable to mix with the mixture of concrete roof tiles but in separately method because it contents different function that can generate chemical reactions that can reduce the work ability of the roof tiles innovation.
- Other than that, recommended that the industries of supplying the coconut fiber should be widely to supplied the fiber coconut to the roof tiles factory because the coconut fiber content many advantages to improve the existing concrete roof tiles in category heat insulator.
- The study on the use of seashells, coconut fiber and sodium lignosulfonate should be continued and developed to a higher level in order to achieve progress in terms of industry and construction.
- This product can be used not only for house and building roofing but it also can be use as gazebo roof, covered walkways.

5.0 Conclusion

The conclusion that can be made after the test shows that there are some differences between standard roof tiles and roof tiles mixed with additives. The study found that roof tiles with a mixture of 30% additives achieved satisfactory results in three tests that had been carried out. For the water absorption test results, roof tiles with 30% additive ratio succeeded when the water absorption rate decreased from standard roof tiles, refer to Table 4. Sodium lignosulfonate is used as a water reduction agent in roof tiles. In conclusion, the increase of sodium lignosulfonate, the content of water absorption in the roof membrane decreases, refer to Table 4.

As for the thermal conductivity test results, the heat absorption rate was lower than the existing roof tile absorption rate which was higher during the test. Coconut coir is used as an additive because it is one of the best heat insulating composites. In conclusion, increasing the quantity of coconut coir will cause the rate of heat absorption into the roof tiles to decrease. It makes the roof tiles less hot when exposed to the heat radiation of sunlight refer to Table 5.

For the compressive strength test results, it was found that the strength of roof tiles containing 30% additives is weak according to standard requirements refer to Table 4. All materials are suitable to be mixed as additives to produce concrete roof tiles but the mixing ratio. methods need to be varied because they can produce chemical reactions that can reduce the workability of each material in a concrete roof tile mix and separate methods are appropriate to achieve optimal or best results for each mix.

Table 4. Comparative Data of Water Absorption Test and Compressive Strength Test N/mm^2

Test	Sample	Result	Standard
Water Absorption (%)	A (30%)	4.2	4.4
	B (60%)	7.1	
	C (80%)	6.24	
Compressive Strength Test N/mm^2	A (30%)	8.52	18.44
	B (60%)	3.85	
	C (80%)	4.66	

Table 5. Comparative Data of Thermal Conductivity Test on the Sample

Class Sample	Sample (1 Hour) Average			
	Sample1 (Front)	Sample1 (Back)	Standard (Front)	Standard (Back)
Sample A(30%)	35.55^o	34.99^o	50.18^o	50.53^o
Sample B(60%)	37.46^o	35.84^o		
Sample C(80%)	38.75^o	39.38^o		

References

ACI Committee 212. (1991). *Chemical Admixtures for Concrete.* Fermington Hill, Michigen: American Concrete Institute.

ACI Committee 212. (1998). *Guide for the Use of High-ERange Water-Reducing Admixtures (Superplasticizers) in Concrete.* Fartmington Hill, Michigen: American Concrete Institute.

ASTM C1492-03. (2009). *Standard specification for concrete Roof Tile.* West Conshohocken, PA: ASTM International. Retrieved from www.astm.org

ASTM C33/C33M-13. (2013). *Standard Specification for Concrete Aggregates.* West Conshohocken, PA: ASTM International. Retrieved from www.astm.org

Haster, W. t. (1979). *Superplasticizers in Ready Mixed Concrete (A Practical Treatment for Everyday Operations).* Silver spring, Maryland: National Ready Mixed Concrete Association.

Nmai, C. K. (April, 1998). *A History of Mid-Range Water-Reducing Admixtures,"Concrete International.* Farmington Hills, Michigan: American Concrete Institute.

Parry, J. M. (1985). *Production of Fiber Concrete Roofing.* Gradley health: Parry and Associates. Retrieved from Assessed at www.parryassociates.org

Ramachandran, V. S. (1995). *Concrete Admixtures Handbook.* Park Ridge, New Jersey: Noyes Publications.

Rixom, M. R. (1986). *Chemical Admixtures for Concrete.* Spon, New York: E. & F.N. .

Tagnit-Hamou, A. a. (August, 1993). *"Cement and Superplasticizer Compatibility," World Cement.* Farnham, Surrey, England: Palladian Publications Limited.

Tersoo, A. (March, 2005). *A Project Work Submitted To Department of Civil Engineering, Production Of Concrete Roofing Tiles Using Rice Husk Ash (RHA) in Partial Replacement of Cement.* Makurdi: University of Agriculture.

Whiting, D. A. (1981). *Evaluation of Super-Water Reducers for Highway Applications,.* Research and Development Bulletin RD078: Portland Cement Association. Retrieved from http://www.portcement.org/pdf_files/RD078.pdf

Whiting, D. a. (1992). *Effects of Conventional and High-Range Water Reducers on Concrete Properties.* Bulletin RD107, Portland Cement Association: Research and Development. Retrieved from http://www.portcement.org/pdf_files/RD107.pdf

PENGGUNAAN *FACEBOOK PAGE* UNTUK MEMPERTINGKATKAN KEMAHIRAN MENULIS DALAM KALANGAN KOMUNITI TVET

Seri Bunian Mokhtar[1], Azizah Haron @ Hassan[2], Kamarudin Yunus[3]

[1,2,3]Politeknik Ungku Omar, Malaysia
[1]mseribunian@yahoo.com
[2]zzharun13@gmail.com
[3]dodinyunus@gmail.com

Abstrak: Projek tahun akhir (FYP) adalah satu kursus yang memerlukan maklumat terkini, isu terkini dan interaksi terpantas secara kolobaratif. Facebook merupakan platform popular yang boleh memudahkan aktiviti pembelajaran atas talian. Satu Facebook Page (FB Page) telah dibangunkan untuk kursus projek tahun akhir dan digunakan untuk menyampaikan maklumat yang berkaitan dengan kursus dan memberi peluang untuk meningkatkan kemahiran menulis kajian dalam kalangan pelajar. Justeru, kajian ini bertujuan untuk menilai persepsi pengguna terhadap penggunaan FB Page yang dibangunkan sebagai sumber pembelajaran. Untuk mengkaji persepsi pengguna terhadap kursus FYP di halaman Facebook, data telah dikumpulkan melalui soal selidik dan melalui cerapan aktiviti FB Page yang diperolehi dari statistik harian yang dikeluarkan oleh FB. Cerapan aktiviti pada FB Page telah diambil pada Jun 2020 sehingga Jun 2022, kira-kira lebih 1 tahun pengunaan FB Page tersebut. Soal selidik telah disediakan kepada 12 pelajar yang mengambil FYP semester 5 Sesi Jun dan Disember 2019, yang mana mereka diminta untuk melengkapkannya dan menyerahkannya kepada penyelia FYP. Soal selidik terdiri daripada 5 konstruk iaitu Sikap terhadap pembelajaran kemahiran menulis kajian melalui FB, Persepsi peningkatan kemahiran menulis kajian melalui FB, Pembelajaran kolaboratif, Niat Menggunakan Media Sosial dan Kepuasan Pengguna. Semua analisis telah dijalankan menggunakan pakej perisian statistik IBM SPSS versi 21. Dapatan kajian menunjukkan FB Page ini berpotensi untuk menggalakkan pembelajaran kolaboratif dan meningkatkan kemahiran menulis penyelidikan dalam kalangan pelajar.

Kata kunci: *Pembelajaran kolaboratif, Pembelajaran teradun, Media Sosial*

1. Pengenalan

Institusi pengajian tinggi perlu merancang pendekatan pembelajaran yang merangkumi semua keadaan dan mampu menyampaikan ilmu kepada pelajar tanpa mengira jarak atau halangan sempadan. Untuk mengekalkan dan membina kemampanan dalam pendidikan semua jenis sumber pembelajaran perlu diterapkan dan digunakan dalam sistem pendidikan kita. Persaingan antara

institusi pendidikan dikira sebagai penggerak kepada bentuk pendidikan masa hadapan. Oleh itu institusi pengajian tinggi khususnya Pendidikan Teknik dan Vokasional (TVET) mesti bersaing antara satu sama lain untuk menarik lebih ramai pelajar yang ingin belajar di peringkat pendidikan tinggi. Kualiti pendidikan tinggi merupakan faktor penting bagi pembangunan sesebuah negara, kerana institusi pendidikan tinggi merupakan tempat di mana golongan profesional dilatih. Walaupun terdapat persaingan dalam hasil seperti penyelidikan dan inovasi, pendidikan tinggi juga dijangka memberikan kualiti perkhidmatan yang lebih baik. Keterangkuman semua medium pembelajaran mesti diutamakan untuk menangani kesan normal baharu semasa dan selepas pandemik. Ini akan membawa kepada tonggak pembangunan mampan iaitu menstabilkan impak sosial dalam kalangan generasi muda.

Perkembangan pesat teknologi dan integrasi teknologi moden ke dalam proses pengajaran dan pembelajaran membawa kepada penilaian dan penambahbaikan pendidikan (Ataie, Shah, & Mior Nazir, 2015). Pembaharuan pendidikan perlu memupuk kebolehan pembelajaran kolaboratif dalam kalangan komunitinya (Ataie, Shah, & Mior Nazir, 2015; Han, & Ellis, 2021). Komuniti terdiri daripada pengajar dan pelajar boleh bekerjasama, berkomunikasi, berkongsi pengetahuan, dan membantu antara satu sama lain untuk mendapatkan pemahaman yang lebih baik tentang subjek dengan menggunakan alatan dalam talian (Ataie, Shah, & Mior Nazir, 2015). Pembelajaran kolaboratif berasaskan web boleh membantu meningkatkan kebolehan kendiri pelajar, pembelajaran sepanjang hayat, dan meningkatkan kesedaran dan pemikiran kritis, moral dan etika profesional mereka (Ataie, Shah, & Mior Nazir, 2015). Kajian yang dijalankan oleh Jamal Abdul & Nawab (2020) mendedahkan bahawa media sosial dalam talian yang digunakan untuk pembelajaran kolaboratif mempunyai kesan yang signifikan terhadap interaktiviti dengan rakan sebaya, guru dan tingkah laku perkongsian pengetahuan dalam talian. Oleh itu, penyedia pendidikan TVET tanahair mesti membawa perubahan untuk mengoptimumkan kecekapan dan keberkesanan untuk menyediakan pendidikan berkualiti kepada masyarakat.

Pembelajaran teradun pula dilihat mampu mengintegrasikan pelbagai media untuk menyampaikan bahan pengajaran kepada pelajar dan penggunaan semakin berleluasa dalam pendidikan (Zheng, et al, 2021; Bayyat, 2020). Facebook ialah tapak web yang membolehkan pengguna berinteraksi dan bekerjasama dalam komuniti maya. Selalunya dipanggil laman rangkaian sosial, Facebook ialah alat komunikasi dalam talian yang membolehkan pengguna membina profil awam atau peribadi untuk berhubung dan berinteraksi dengan orang yang merupakan sebahagian daripada rangkaian sosial mereka. Aldahdouh, Nokelainen & Korhonen (2020) juga menekankan tentang kelebihan media sosial di mana mereka bersetuju bahawa laman media sosial mewakili inovasi terkini yang bertujuan untuk memupuk komunikasi dan kerjasama secara besar-besaran. Algomaizy, Hamad & Sharadgah, Talha (2020) berpendapat bahawa media sosial seperti Facebook popular di kalangan orang ramai, pelajar pengajian tinggi dan pendidik serta mempunyai beberapa ciri pedagogi dan sosial, yang memberikan kelebihan yang hampir sama dengan Sistem Pengurusan Pembelajaran (SPP).

Sebahagian besar kajian menunjukkan bahawa pelajar menggunakan Facebook untuk menyokong kedua-dua matlamat akademik dan sosial mereka (Giannikas, 2020; Mark & William, 2021). Sejak diperkenalkan pada 2004, Facebook telah menjadi laman rangkaian sosial paling popular di dunia

dengan pantas dan statistik menunjukkan 2.93 bilion pengguna aktif bulanan setakat suku pertama 2022 dan ini bermakna Facebook ialah rangkaian sosial terbesar di seluruh dunia. Walaupun dikenali terutamanya untuk aktiviti rangkaian sosial, Facebook dengan cepat diiktiraf sebagai platform e-pembelajaran yang dikenali. Kajian terdahulu juga melaporkan tentang kesan positif penyepaduan media sosial ke dalam sumber teknologi pembelajaran (Al-Daihani, et al, 2018; Algomaizy et al, 2020).

Pendidikan pengajian tinggi perlu memberi tumpuan kepada teknologi yang disepadukan ke dalam persekitaran pembelajaran yang boleh membawa ke arah meningkatkan kemahiran. Projek tahun akhir (FYP) adalah satu kursus yang memerlukan maklumat terkini, isu terkini dan interaksi terpantas secara kolobaratif. Penyeliaan FYP akan lebih mudah dijalankan apabila terdapat pelbagai sumber yang memudahkan pencarian maklumat berkaitan dengan FYP. Contoh dan keadah penulisan yang mudah difahami dapat membantu pelajar dalam menjanakan idea baru serta mudah dicapai secara atas talian. Penggabungan *Facebook* (FB) ke dalam sumber pembelajaran kursus FYP boleh memberi kesan kepada kepuasan pengguna terhadap penyampaian kursus, kerana mereka dapat menyepadukan keperluan akademik dengan platform rangkaian sosial yang lazim digunakan. Memandangkan tiada FB flatform yang dibangun sebelum ini untuk memudahkan komuniti penyelidikan TVET, maka satu laman *FB page* telah dibangun untuk meningkatkan kemahiran menulis dalam kalangan komuniti TVET. Oleh itu, tujuan kajian ini adalah untuk menilai persepsi pengguna menggunakan laman Facebook yang ditetapkan sebagai sumber pembelajaran dalam meningkatkan kemahiran menulis kajian dalam kalangan komuniti TVET.

2. Metodologi

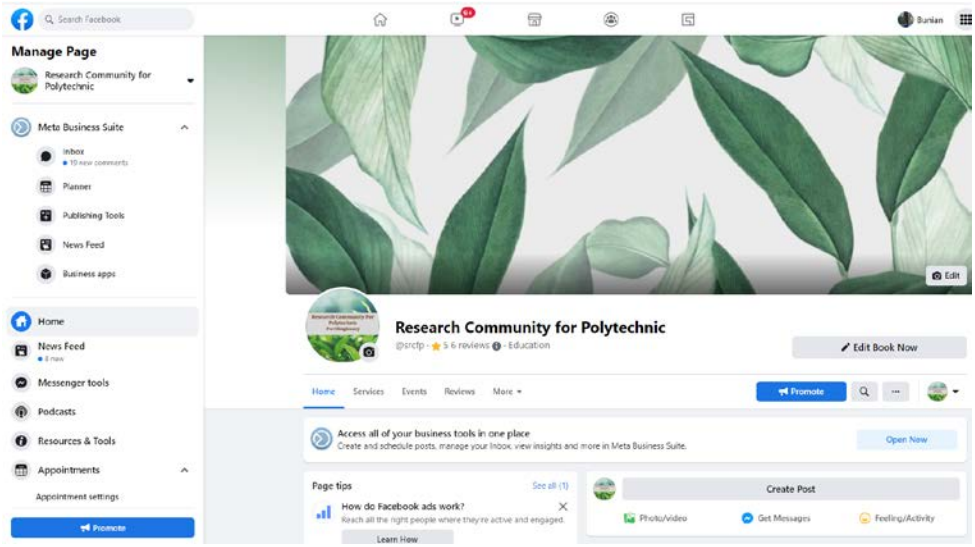
Terdapat 2 fasa dalam membangunkan kajian ini. Fasa pertama adalah fasa pembangunan laman FB mengunakan *FB Page*. Manakala fasa kedua menentukan tahap persepsi penggunaan laman web yang dibangunkan dalam kalangan pelajar.

Fasa 1: Pembangunan *FB page*

i. Mula dengan ‘Create A Page’. Pastikan log masuk ke dalam akaun *facebook* peribadi dahulu. Kemudian klik pada pilihan ‘Create’ yang tertera pada bar menu atas dan pilih ‘Page’.

ii. Lengkapkan *‘Page Info’*

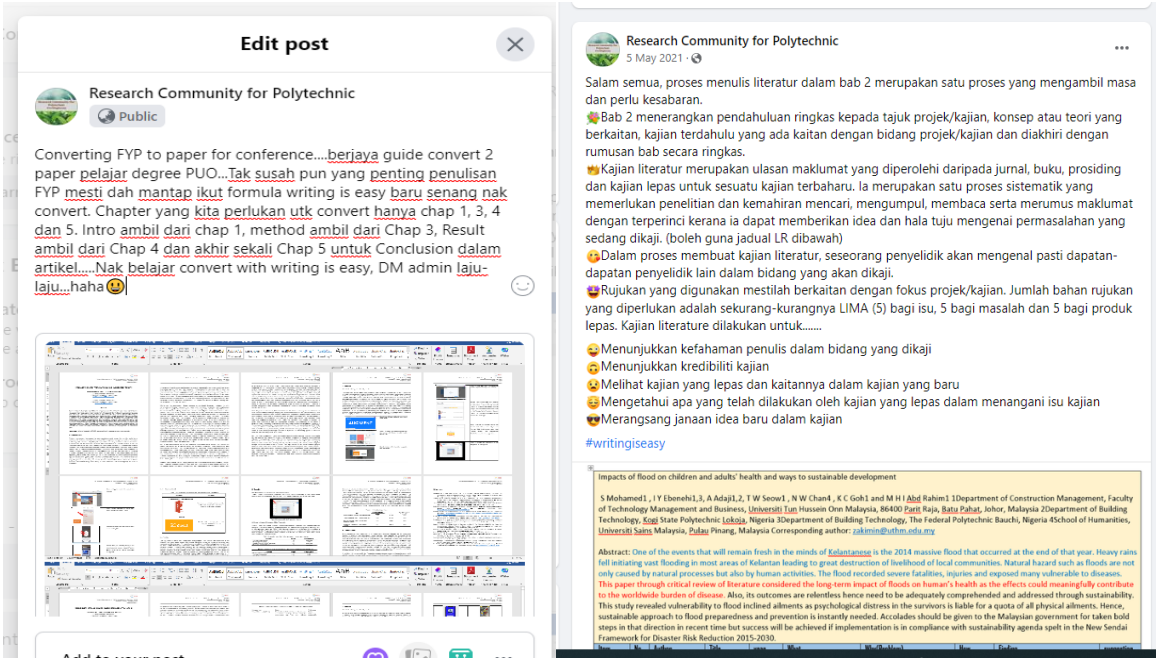
FB page kini sudah tersedia dan berjaya diwujudkan. Namun begitu, pengguna *facebook* yang berkunjung ke *page* anda akan memerlukan beberapa maklumat tambahan penting yang berkaitan dengan *FB page* tersebut seperti *URL website*, nombor telefon untuk dihubungi, dan sebagainya. Semua maklumat tersebut boleh diperbaharui melalui *‘edit page info’*.



Rajah 1. Profil *FB Page*

iii. Muatnaik *Post*

Setelah FB *Page* ini diujudkan maka *Post* berkaitan dengan penulisan bolehlah dimuatnaik dan dimaklumkan kepada pelajar untuk mengikuti post tersebut. *Post* yang dimuatnaik berbentuk video, penerangan ringkas tentang penulisan, contoh tajuk kajian, format penulisan, kaedah kajian dan sebagainya seperti Rajah 2.



Rajah 2. Post dalam FB Page

Fasa 2: Menentukan persepsi penggunaan

Untuk mengkaji persepsi pengguna terhadap kursus FYP di halaman Facebook, data telah dikumpulkan melalui soal selidik dan melalui cerapan aktiviti FB Page yang diperolehi dari statistik harian yang dikeluarkan oleh FB. Cerapan aktiviti pada FB Page telah diambil pada Jun 2020 sehingga Jun 2022, kira-kira lebih 1 tahun pengunaan FB Page tersebut. Soal selidik telah disediakan kepada 12 pelajar yang mengambil FYP semester 5 Sesi Jun dan Disember 2019, yang mana mereka diminta untuk melengkapkannya dan menyerahkannya kepada penyelia FYP. Soal selidik terdiri daripada 5 konstruk dan tertumpu kepada Sikap terhadap pembelajaran kemahiran menulis penyelidikan melalui FB (Abu Sa'aleek, 2015), Persepsi peningkatan kemahiran menulis penyelidikan melalui FB (Abu Sa'aleek, 2015), Pembelajaran kolaboratif (So & Brush , 2008), Niat Menggunakan Media Sosial (Kim, 2011), Kepuasan Pengguna (Kim, 2011). Semua analisis telah dijalankan menggunakan pakej perisian statistik IBM SPSS versi 21. Taburan kekerapan dikira untuk setiap item daripada soal selidik.

3. Dapatan

3.1 Statistik Aktiviti FB Page

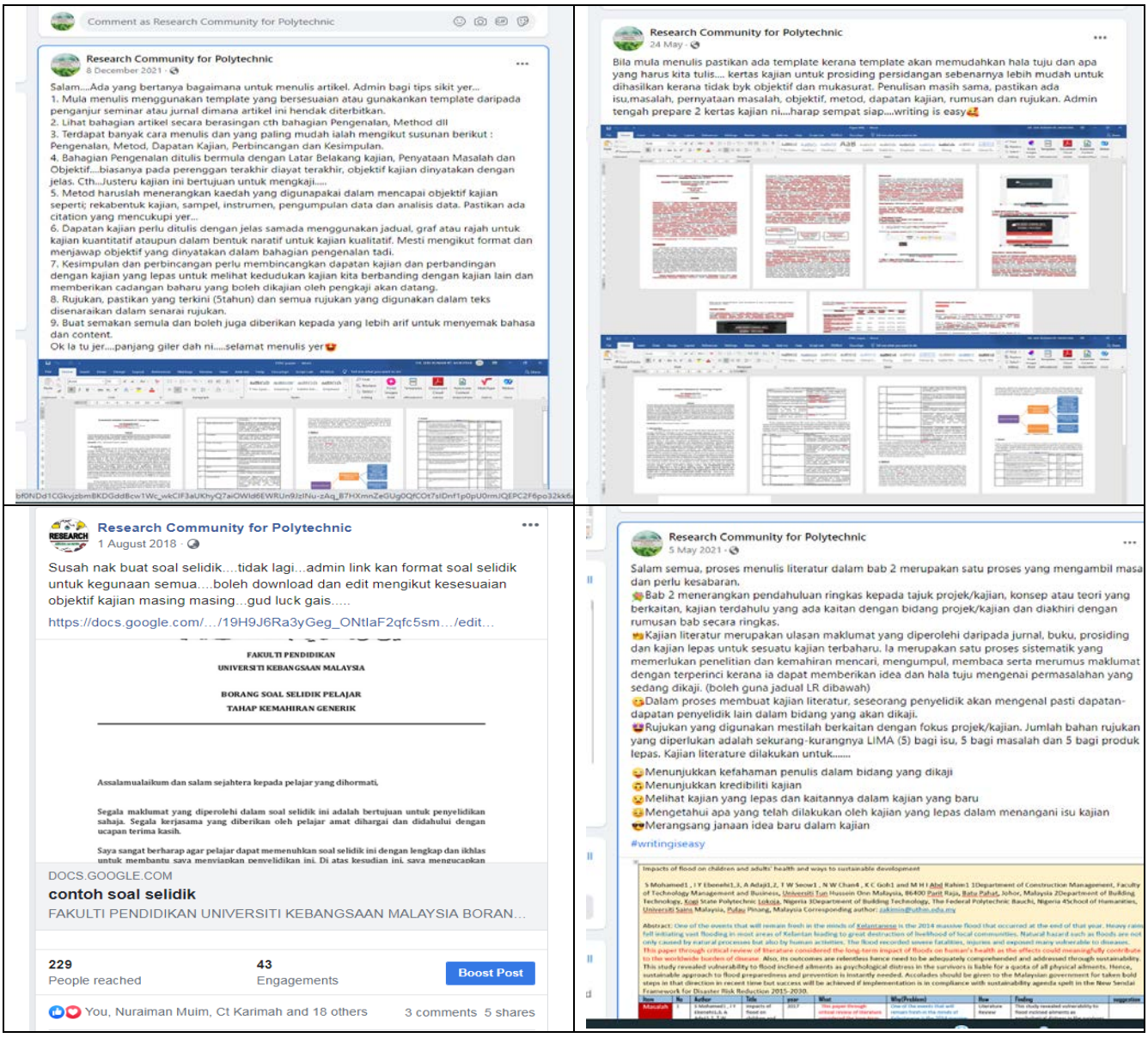
Statistik penggunaan FB Page ini seperti dalam Jadual 1 yang menunjukkan statistik untuk jumlah *Like* dan juga *Follower*. Jadual 2 pula menunjukkan jumlah capaian post FB oleh pengguna manakala Rajah 3 menunjukan contoh post tentang penulisan kajian kepada pengguna.

Jadual 1. Statistik untuk jumlah *Like* dan juga *Follower*

Jumlah *followers*	765
Jumlah *likes*	668

Jadual 2. Jumlah capaian dari Jun 2020 hingga Jun 2022

Jenis	Purata capaian
Capaian	2847
Page visit	1932



Rajah 3. Contoh *Post*

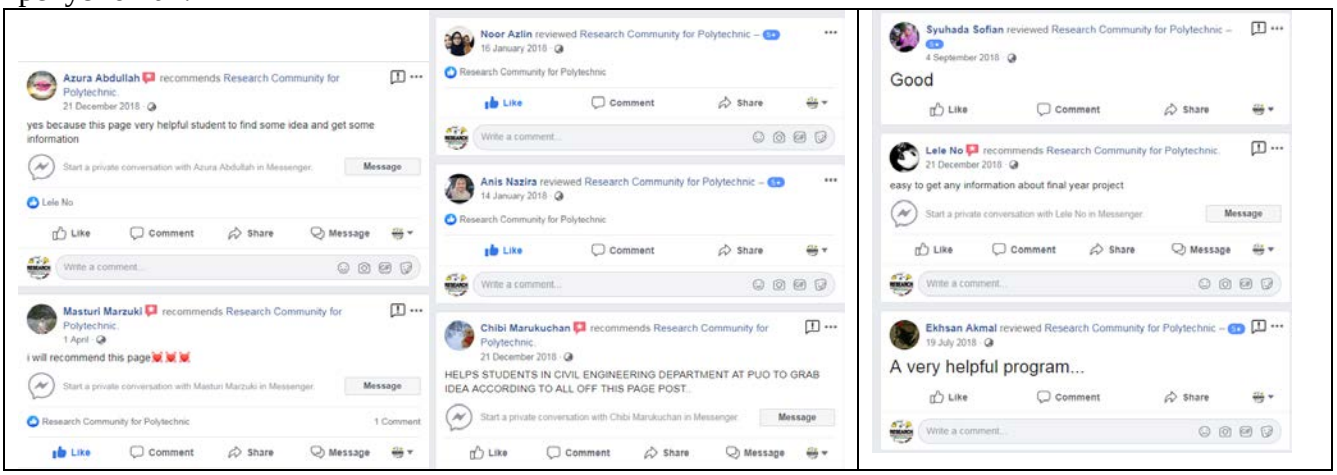
3.2 Persepsi Pengguna terhadap *FB page*

Jadual 3 menunjukkan persepsi pengguna terhadap *FB page* yang dibangunkan. Analisis menunjukkan purata semua 5 pembolehubah lebih tinggi daripada 4.00.

Jadual 3. Persepsi Pengguna terhadap *FB page*

Pembolehubah	Min	Sisihan Piawai	Interpretasi
Sikap terhadap pembelajaran kemahiran menulis penyelidikan melalui *FB page*	4.35	0.22	Tinggi
Persepsi peningkatan kemahiran menulis penyelidikan melalui *FB page*	4.25	0.35	Tinggi
Pembelajaran kolaboratif	4.08	0.38	Tinggi
Niat Menggunakan Media Sosial	4.25	0.43	Tinggi
Kepuasan Pengguna	4.12	0.53	Tinggi

Manakala Rajah 4 menunjukkan ulasan yang diberikan oleh pengguna FB page yang dibangunkan. Rata-rata ulasan yang diberikan sangat positif dan hampir semua ulasan yang diperolehi mengakui bahawa FB page yang dibangunkan untuk FYP dapat menbantu mereka dalam penulisan cadangan penyelidikan.



Rajah 4. Ulasan dari pengguna *FB Page*

4. Perbincangan dan Kesimpulan

Dapatan menunjukkan pelajar yang mengambil kursus FYP bersetuju dengan semua pembolehubah dalam soal selidik. Purata min melebihi 4.00 menunjukkan pengguna bersetuju bahawa halaman itu membantu mereka untuk mempunyai sikap yang lebih baik terhadap pembelajaran kemahiran menulis penyelidikan, meningkatkan kemahiran menulis penyelidikan mereka, bekerjasama dalam pembelajaran kolaboratif dan mempunyai niat untuk menggunakan media sosial sebagai platform pembelajaran. Dimensi kepuasan pengguna yang diuji dalam soal selidik juga menunjukkan majoriti bersetuju bahawa platform membantu proses pembelajaran dan memudahkan. Namun kajian ini masih perlu diuji pada responden yang lebih besar dan ramai. Dari segi generalisasi, kajian ini menepati keperluan responden yang terlibat sahaja dan tidak mewakili keseluruhan populasi pengguna FB Page tersebut. Kajian yang lebih komprehensif perlu dilakukan dimasa akan datang.

Ini jelas menunjukkan bahawa penggunaan *FB page* atau media sosial boleh membantu pelajar untuk berinteraksi dan mencipta pengalaman belajar tersendiri. Media sosial terutamanya dalam kes ini *FB page* yang dibangunkan mengandungi data terkini mengenai pelbagai aspek dan maklumat terkini dalam meningkatkan kemahiran menulis. Pelajar berpeluang meninjau dan melihat perkara baharu secara dalam talian dan dalam ruang peribadi mereka. Dari perspektif pedagogi, *FB page* adalah cara yang berkesan untuk pelajar bermotivasi untuk mendapatkan bahan berkaitan kandungan kursus mereka sendiri, berkongsi kandungan dan idea mereka mengenainya dalam forum awam, serta berinteraksi dan melibatkan diri secara tidak formal di luar bilik darjah. Platform media sosial seperti *FB page* kini tersedia sebagai alat pengajaran yang akan mempromosikan pembelajaran hibrid. Penggunaan media sosial mengubah corak pembelajaran dalam masyarakat dan trend ke laluan yang lebih cekap dan pantas. Medium ini menjadi penting sebagai alat komunikasi dan pengumpulan maklumat dalam sistem pedagogi, terutamanya dalam bidang penyelidikan. Oleh itu kajian ini mengesyorkan:

i. Penggunaan *FB Page* sebagai medium penganjaran dan pembelajaran dalam kalangan komuniti TVET kerana ianya murah dan menjimatkan masa sebagai medium komunikasi untuk berkongsi idea dan dokumen projek,
ii. Penyediaan platform rangkaian sosial berasaskan TVET bertujuan untuk menyediakan maklumat yang boleh disahkan untuk pelajar TVET,
iii. Penggunaan medium dalam talian untuk pelajar TVET untuk menggalakkan pendigitalan penyelidikan dan prosedurnya.

Rujukan

AbuSa'aleek, A.O. (2015).Students' Perceptions of English Language Learning in the Facebook Context. *Teaching English with Technology*, 15(4), 60-75, http://www.tewtjournal.org

Aldahdouh TZ, Nokelainen P, & Korhonen V. (2020). Technology and Social Media Usage in Higher Education: The Influence of Individual Innovativeness. *SAGE Open*. doi:10.1177/2158244019899441

Al-Daihani, S. M., Al-Qallaf, J. S., AlSaheeb, S. A. (2018). Use of social media by social science academics for scholarly communication. Global Knowledge, Memory and Communication, 67(6/7), 412–424. https://doi.org/10.1108/GKMC-11-2017-0091

Algomaizy, Hamad & Sharadgah, Talha. (2020). Social Networking Sites as an Educational Tool: The Facebook Group Feature as an Alternative to Learning Management Systems in Teaching and Learning. International Journal of Educational Sciences. 30. 59-70.

Ataie,F., Shah,A.,& Mior Nazir, M.N. (2015).Collaborative learning, using Facebook's page and Groups. International Journal of Computer System, 02(02), 47-52.

Jamal Abdul N, A & Nawab Ali Khan (2020). Exploring the role of social media in collaborative learning the new domain of learning. *Smart Learning Environments* 7(9), 1-16 https://doi.org/10.1186/s40561-020-00118-7

Kim, B. (2011). Understanding antecedents of continuance intention in social-networking services. Cyberpsychology, Behavior and Social Networking, 14(4),199-205.

So, J., & Brush, T. (2008). Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors. Computers & Education, 51(1), 318–336

Zheng, W., Ma, Y.-Y., & Lin, H.-L. (2021). Research on Blended Learning in Physical Education During the COVID-19 Pandemic: A Case Study of Chinese Students. *SAGE Open*. https://doi.org/10.1177/21582440211058196

Bayyat, M. (2020). Blended learning: A new approach to teach ballet technique for undergraduate students. Turkish Online Journal of Distance Education, 21(2), 69–86.

Giannikas, C. (2020). Facebook in tertiary education: The impact of social media in e-Learning. Journal of University Teaching & Learning Practice, 17(1). https://ro.uow.edu.au/jutlp/vol17/iss1/3

Han, F. & Ellis, R.A. (2021) Patterns of student collaborative learning in blended course designs based on their learning orientations: a student approaches to learning perspective. *Int J Educ Technol High Educ* **18,** 66. https://doi.org/10.1186/s41239-021-00303-9

Mark B. U, & William F. P, (2021). Facebook as an integrated online learning support application during the COVID19 pandemic: Thai university students' experiences and perspectives,*Heliyon,* 7(11), https://doi.org/10.1016/j.heliyon.2021.e08317

MEMBANGUNKAN MESIN PEMPROSESAN JAGUNG UNTUK INDUSTRI KECIL SEDERHANA

Mohd Hariz Ibrahim[1], Mohamad Khir Johari Jamaludin[1], Shahrul Anuar Abd Rahim[2] and Mohd Firdaus Mahayudin[2]

[1] Kolej Komuniti Kuantan, Malaysia,
harizpolisas@gmail.com
[2]Kolej Komuniti Paya Besar, Malaysia

Abstrak: Penghasilan mesin pemprosesas jagung ini adalah hasil inovasi yang dihasilkan melalui geran PPRN (*Public Private Research Network*) Kementerian Pendidikan Malaysia untuk pengusaha industri kecil sederhana makanan berasaskan jagung. Mesin ini terdiri daripada dua bahagian yang beransingan iaitu untuk pengupas kulit jagung dan meleraikan isi jagung. Mesin pengupas kulit jagung dibangunkan mengunakan 2 *"roller"* yang besar diperbuat daripada bahan *stainless steel* bergred makanan dan dibantu oleh 2 *"roller"* yang kecil diperbuat daripada bahan getah. Mesin pelerai isi jagung dibangunkan untuk bertindak memisahkan isi jagung daripada empulur jagung dengan binaan satu set pisau berserta "*roller teflon"* yang boleh laras ikut size jagung dan dibantu oleh *"air compressor"* untuk mengasingkan isi jagung dengan empulur serta mayang halus jagung. Keupayaan mesin pengupas kulit jagung yang dihasilkan mampu mengupas 6000 jagung dalam masa 1 jam dengan seorang pekerja berbanding pengupasan secara manual hanya mampu mengupas 30 jagung dalam masa sejam dengan tenaga seorang pekerja. Keupayaan mesin pelerai isi jagung pula, mesin ini dapat menghasilkan 300 kg dalam masa 1 jam berbanding secara manual hanya 1 kg dengan seorang tenaga pekerja. Inovasi ini telah menjimatkan masa dan kos tenaga kerja, dari aspek kualiti, jagung dan isi jagung yang dikupas menggunakan mesin ini lebih bersih dan mempunyai bentuk yang sekata berbanding pengupasan secara manual. Secara keseluruhannya, produktiviti dan pengeluaran produk dapat ditingkatkan seiring dengan permintaan produk yang berasaskan jagung.

Kata Kunci: Mesin kupas, Pemprosesan, Perusahaan kecil dan sederhana, Rekabentuk mesin

1. Pengenalan

Di Malaysia, permintaan terhadap jagung terbahagi kepada dua iaitu jagung manis dan jagung bijian. Jagung manis digunakan di dalam bentuk tongkol atau bijian untuk digunakan pada produk makanan yang berasaskan jagung. Manakala jagung bijian pula adalah untuk kegunaan produk makanan serta untuk makanan ternakan, (Jabatan Pertanian, 2020). Malaysia merupakan pengimport jagung bijian dengan import terbesar (93%) daripada Argentina serta Brazil dan selebihnya (7%) adalah daripada USA, Thailand, Myanmar dan Indonesia (Nazmi et al., 2020). Jumlah import jagung bijian Malaysia pada 2018 adalah sebanyak 4 juta tan, peningkatan sebanyak 42% berbanding dengan tahun 2010 iaitu sebanyak 2.8 juta tan (Nazmi et al., 2020) . Manakala menurut Pertubuhan Makanan dan Pertanian Antarabangsa (FAO), pengambilan jagung rata-rata 12 kilogram setiap tahun. Jumlahnya bertambah pada tahun 2009,

ketika FAO melaporkan penggunaan jagung oleh rakyat Malaysia meningkat dua kilogram menjadi 14 kilogram setahun kerana penggunaannya di hampir semua jenis menu makanan. Dalam penyediaan bahan mentah, pengelupasan kulit jagung adalah salah satu tahap penting yang akan mempengaruhi kualiti dan harga produk akhir. Dalam Industri Makanan, kaedah konvensional untuk mengupas jagung secara manual masih diterapkan. Walaubagaimanapun, kerana kekurangan produktiviti dan kecekapan, kaedah gabungan iaitu kaedah secara manual dan kaedah mesin pemprosesan diciptakan (FAO 2015).

Menurut SME Corp Malaysia, 98.5% penubuhan perniagaan di Malaysia adalah merupakan Perusahaan Kecil dan Sederhana (PKS). Penubuhan perniagaan ini sangat memberangsangkan dan rekabentuk dan pembangunan mesin amat diperlukan sejajar dengan peningkatan penubuhan IKS di Malaysia. Selain itu, Kementerian Pendidikan Malaysia (KPM) menyokong industri PKS melalui beberapa geran seperti *Public Private Research Network Grant* (PPRN). Oleh itu, kajian ini dilakukan untuk mengembangkan mesin pemprosesan jagung yang akan membantu pengembangan industri PKS terutama di sektor perkhidmatan 89.2% (PKS) yang menyumbang peratusan tertinggi untuk Keluaran Dalam Negara Kasar (KDNK), eksport dan pekerjaan berbanding sektor lain (PKS 2016).

Pada peringkat pertama, rekabentuk konsep mesin dilukis dan dibangunkan protaip untuk diuji kemampuan rekabentuk mesin pengupas kulit jagung. Untuk menghilangkan kulit jagung secara besar-besaran, kaedah lelasan mekanik dipilih dengan menggunakan "*roller rotating*". Kombinasi lelasan dari pengupas "*roller*" dengan putaran mendatar diuji dan dibantu dengan udara termampat yang akan menghilangkan kulit jagung. Ujian awal dilakukan untuk menguji kecekapan pengupas "*roller*" dan kecekapan pengelupasan. Sepanjang Penyelidikan dan Pembangunan (R&D) yang berterusan dengan peningkatan berterusan, kaedah mekanikal gabungan ini dapat memanjangkan jangka hayat jagung dan menghasilkan produk jagung yang berkualiti tinggi. Mesin mengupas jagung ini dapat dikendalikan oleh satu pengendali dalam masa yang singkat.

Untuk peringkat kedua pula, mesin pelerai isi jagung dilukis konsep mesin dan dibangunkan, mesin ini menggunakan pembuatan keluli tahan karat yang berkualiti tinggi. Bahagian yang paling utama untuk mesin ini adalah pembangunan set pisau boleh laras yang boleh meleraikan isi jagung walaupun size jagung berbeza dengan diameter maksimum jagung 700 mm. Motor elektrik yang digunakan berkuasa 2.2 kw berupaya lebih tahan hentaman, diperbuat daripada pemacu motor khas, kawalan kelajuan frekuansi penyongsang yang boleh dikawal. Mesin ini juga dilengkapkan peniup udara disebelah corong untuk menjadikan hasil keluaran akhir jagung lebih bersih. Pembinaan mesin pelerai ini sesuai untuk kilang yang mempunyai pengeluaran yang berskala besar dan juga untuk PKS yang menjalankan pemprosesan makanan berasaskan jagung. Pengoperasian yang mudah, sesuai untuk pelbagai jagung segar, manis dan jagung beku.

Matlamat projek ini akan menumpukan pada reka bentuk, penemuan dan fabrikasi berdasarkan teknologi yang boleh mengurangkan masa operasi, meningkatkan kemampuan dan keberkesanan mesin pemprosesan untuk menjalankan tugasnya. Selain itu, proses pengelupasan jagung berkualiti tinggi dan kebersihan dengan keselamatan tahap pertama diutamakan. Oleh itu, penyediaan asas teknologi yang mudah, fleksibel dan boleh dipercayai untuk masa depan.

2. Kajian Literatur

Hari ini jagung adalah salah satu makanan sejagat yang digunakan di kebanyakan negara. Mengupas jagung dan meleraikan isinya adalah langkah penting dalam menghasilkan banyak produk jagung seperti tepung jagung, perasa jagung dan makan yang berasaskan jagung. Menurut William (2016), dari rakaman wawancara pengguna, waktu untuk mengupas jagung dengan tangan rata-rata sekitar 15 saat setiap orang (4 jagung / minit) dan itu bergantung pada orang tersebut dan dapat mengupas jagung hingga 22 kg berterusan pada satu masa. Menurut Bagher Emadi (2005), kaedah pengelupasan dapat dibahagikan kepada tiga kategori: pengelupasan mekanikal, termal dan kimia. Kaedah teknik pengelupasan yang berbeza bergantung pada variasi dan spesifikasi produk. Jenis pengelupasan yang paling biasa adalah pengelupasan mekanikal. Terdapat beberapa jenis alat pengelupasan mekanikal seperti pemotong penggilingan, alat pelelas yang dilekatkan atau dilapisi pada dram, penggelek, pisau dan bilah. Peranti tersebut dijelaskan secara ringkas menggunakan karya yang berkaitan seperti berikut:

i. Pemotong Pengilangan

Pemotong Pengilangan Mengupas dengan menggunakan pemotong penggilingan menghadapi masalah penyumbatan. Oleh itu kaedah ini telah dihalang untuk digunakan secara komersial dalam Industri Makanan.

ii. Peralatan Pelelas

Alat pelelas biasanya dilapisi pada permukaan gendang. Ini adalah kaedah biasa untuk sebilangan kecil kentang mengupas yang menghasilkan output yang tinggi, tetapi sisa yang dihasilkan rendah (Somsen, et al. 2004). Kaedah ini masih relevan untuk sayur-sayuran akar walaupun produk berkualiti rendah berbanding pengelupasan tangan.

iii. Gendang

Menurut Singh (1995), kulit kentang dikupas semasa putaran gendang dengan disokong dengan kaedah lelasan. Hasil terbaik diperoleh semasa memuatkan 20 kg kentang menggunakan kelajuan 30 putaran / minit dalam 8 minit.

iv. Pisau dan bilah

Srivastava, et al., (1997), dalam laporan kajian mereka bahawa pengembangan mesin pelerai jagung terdiri dari empat bilah dan mesin itu dibantu dengan jet udara termampat. Hasilnya menunjukkan 17% lapisan luar isi jagung dikeluarkan. Bagher Emadi (2005) menyebutkan bahawa terdapat beberapa kaedah pengelupasan termal seperti pengelupasan api (panas kering), pengelupasan wap (panas basah), pengelupasan letupan termal, pembekuan pembekuan panas, dan letupan wap (pengelupasan vakum). Dalam kaedah pengelupasan kimia, kulit akan dilembutkan dengan merendam sayur-sayuran dalam larutan alkali panas. Kuantiti larutan dan jangka masa berbeza berbeza dengan jumlah sayur-sayuran. Contoh kaedah pengelupasan kimia adalah pengelupasan kaustik dan pengelupasan enzim. Walau bagaimanapun, pengelupasan jenis ini terutamanya pengelupasan lye, dan kaedah pengelupasan api adalah keras dan tidak sesuai untuk banyak produk jagung. (Wang, 1993, Srivastava et al., 1997 dan Naik, et al., 2007).

3. Penyataan Masalah

Masalah utama yang dihadapi oleh syarikat adalah proses pengelupasan jagung yang dijalankan secara manual. Syarikat telah menghantar pengeluaran jagung ke 6 kios di sekitar Kuantan Maran, Jengka, dan Jerantut. Setiap kios yang melibatkan 1-2 orang harus mengupas jagung secara manual untuk jumlah 20 bakul dan setiap bakul mempunyai kapasiti maksimum dalam memegang 8 kg jagung yang dikupas. Proses penyediaan setiap kiub jagung adalah 15 minit dan pekerja harus membersihkan 1,000 kek jagung sehari. Pembuatan secara manual menyebabkan jagung terdedah kepada pencemaran dan mempengaruhi jangka hayat produk. Proses ini nampaknya tidak begitu berkesan dan juga memakan masa. Selanjutnya, proses manual tidak dapat menjamin konsistensi dan kualiti jagung yang dikupas. Faktor utama jagung yang dipilih kerana masalah mengenai masa mengupas lebih lama, kos tenaga kerja lebih tinggi dan tidak memenuhi produk berkualiti yang diinginkan.

4. Metodologi

Kajian ini dimulakan dengan kajian ilmiah untuk mendapatkan maklumat awal mengenai permasalahan kajian seperti kajian ilmiah berkaitan pembinaan mesin pengupas kulit jagung dan mesin pemisah isi jagung. Kajian lapangan juga dijalankan bersama dengan PKS Ceria Mama Nurrizqi Sdn Bhd. Gabungan kajian ilmiah dan kajian lapangan, seterusnya perbincangan bersama ahli kumpulan untuk menghasilkan draf awal Konsep rekabentuk dimulakan dengan beberapa rekabentuk industri dan dibantu dengan prototaip. Perisian "*computer aided design*" (*AutoCAD* 2016) telah digunakan bagi melaksanakan rekabentuk produk dengan lebih baik dan melaksanakan analisa produk melalui perisian ini. Setelah proses rekabentuk selesai, ia dimulakan dengan pemasangan produk, seterusnya proses pengesahan keberkesanan produk dari pengguna dilaksanakan bagi mengukuhkan lagi konsep rekabentuk mesin ini bagi memastikan ia menepati kehendak pengguna dan pasaran.

5. Ciri-ciri inovasi dan rekabentuk

Masalah reka bentuk berkenaan dalam membuat dan mengira ukuran dan bentuk pelbagai bahagian sistem untuk memenuhi keperluan prestasi. Berdasarkan kajian lapangan kami, pengupas jagung komersial murah dan hanya efektif pada proses pengelupasan jagung kering (jagung bijian untuk ternakan) tetapi tidak untuk proses pengelupasan jagung manis (untuk makanan manusia). Oleh itu, kapasiti pengeluaran mesin pengupas kulit jagung yang lebih produktif dan mesin pelerai isi jagung perlu dirancang, dicipta, dibuat dan diuji untuk memenuhi kehendak pelanggan yang semakin meningkat. Dari pernyataan masalah tersebut, pengkaji telah mengeluarkan reka bentuk konsep mesin pengupas kulit jagung dan mesin pemisah kernel untuk menyelesaikan masalah Ceria Mama Nurrizqi Sdn Bhd.

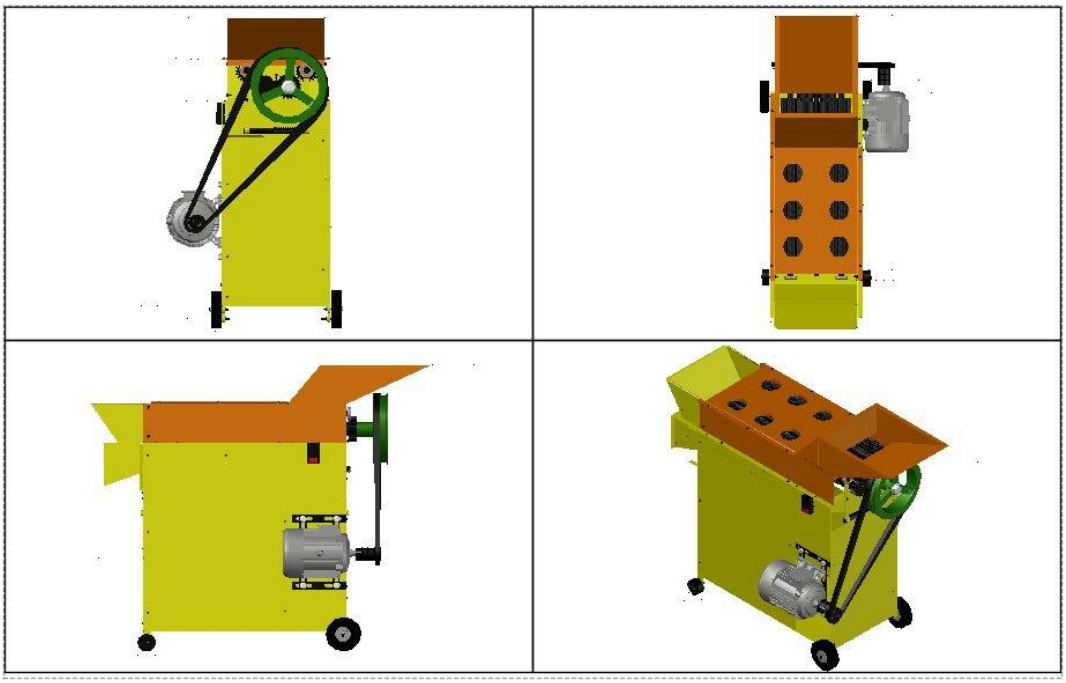
Bagi memenuhi permintaan pengguna dalam industri pemakanan berasaskan jagung, reka bentuk dan produk pengupas kulit dan pelerai isi jagung telah dihasilkan. Proses penghasilan mesin pengupas kulit dan pelerai isi jagung dimulakan dengan perbincangan bersama ahli kumpulan untuk mendapatkan idea mengenai draf rekabentuk mesin, konsep serta rekabentuk yang di kehendaki. Penghasilan idea adalah proses pemikiran dan lakaran berdasarkan penyelidikan dan maklumat yang diperolehi (Nigel, 2020) melalui proses kajian di lapangan

bersama pengusaha makanan yang berasakan jagung. Di peringkat ini, lakaran cepat, garis besar dan bentuk kasar adalah pilihan utama pereka produk kerana ia mudah untuk diubahsuai apabila diperlukan. Lakaran rekabentuk yang dibuat dapat memudahkan proses penghasilan projek kerana ia merangkumi segala proses dalam menyiapkannya dengan teratur. Lakaran rekabentuk dibuat untuk mendapatkan ukuran yang sesuai untuk setiap komponen serta mengenalpasti sistem mekanikal dan sistem elektrikal yang akan digunakan. Hasil dari lakaran dan ukuran keatas bahan mentah serta saiz mesin telah dikenalpasti. Seterusnya lukisan kejuruteraan dihasilkan bagi mengenalpasti saiz setiap komponen dan kaedah yang bersesuaian untuk proses penghasilan dan pemasangan setiap komponen.

5.1 Mesin pengupas kulit jagung

Mesin ini terdiri daripada mekanisma pelucutan, pemancar tekanan dan alat pengedaran telinga dan sebagainya. Bahagian utama mesin mengelupas adalah *"roller"* pengupas, peranannya adalah untuk membuang daun campuran dan mengupas kulit jagung. Prinsipnya adalah sepasang penggelek yang agak berputar untuk menangkap dan mengupas kulit telinga yang bergerak di atasnya, sambil menarik kulit dan campuran daun-batang di bawah gulungan dan menanggalkan kulit jagung. Melepaskan jurang *"roller"* dengan udara pemampatan untuk memastikan kulit jagung terkupas dengan cantik.

Pemancar tekanan sangat penting untuk meningkatkan kualiti pengelupasan dan meningkatkan produktiviti alat pengelupasan. Ia menaikkan telinga ke permukaan *"roller"* pengelupasan, sehingga meningkatkan geseran *"roller"* pengelupasan ke telinga dan mempromosikan kulit yang gebu dan menjadikan gulungan pelucutan lebih baik dan kemudian secara berkala melonggarkan pasak pada *"roller"* pengelupasan sehingga kinerjanya berputar sumbu sehingga paku itu bersentuhan dengan gulungan pelucutan ke kulit sekitarnya, menyebabkan telinga terangkat pada saat mengelupas, yang memudahkan Elakkan jatuh di hujung telinga. Kerana mesin mengadopsi keseluruhan *"roller"* pengelupas getah, permukaan *"roller"* mempunyai tulang rusuk spiral, penggelek kiri dan kanan saling bergantungan, digunakan secara berpasangan, kerana pekali geseran getah besar, jadi tidak perlu menambahkan penekan. Rajah 1 menunjukkan rekabentuk mesin pengupas kulit jagung secara pandangan sisi atas, sisi tepi depan, sisi belakang dan pandangan isometri.



Rajah 1: Rekabentuk mesin pengupas kulit jagung

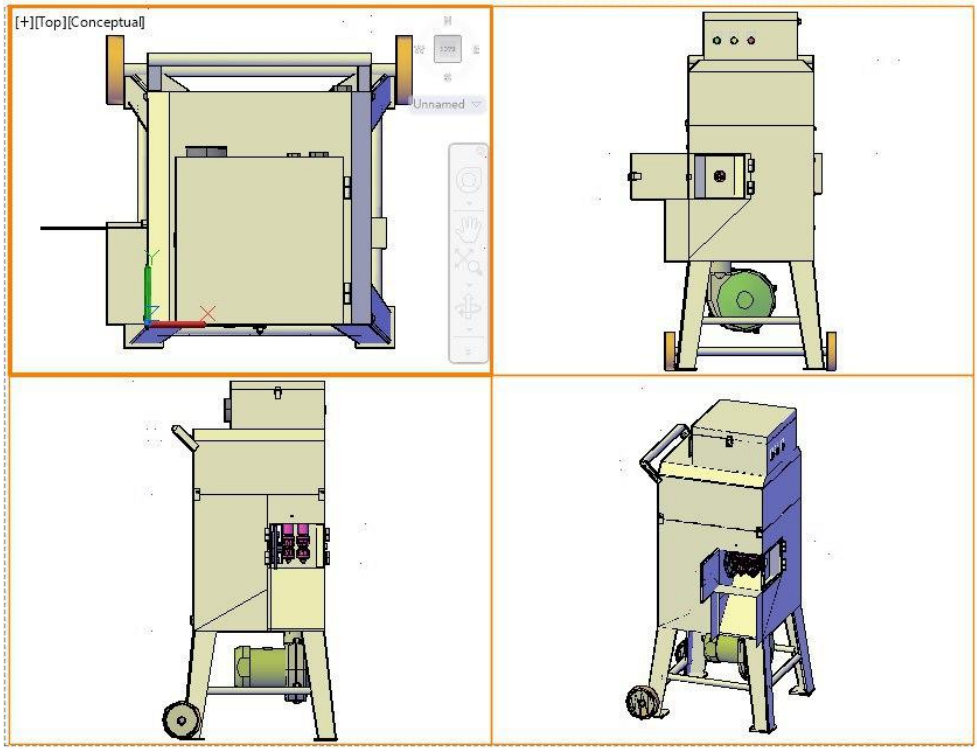
Rajah 2 menunjukkan perbandingan lukisan rekabentuk padangan isometri dengan gambar sebenar mesin yang telah dihasilkan.

Rajah 2: Rekabentuk dan Mesin pengupas kulit jagung

5.2 Mesin pelerai isi jagung

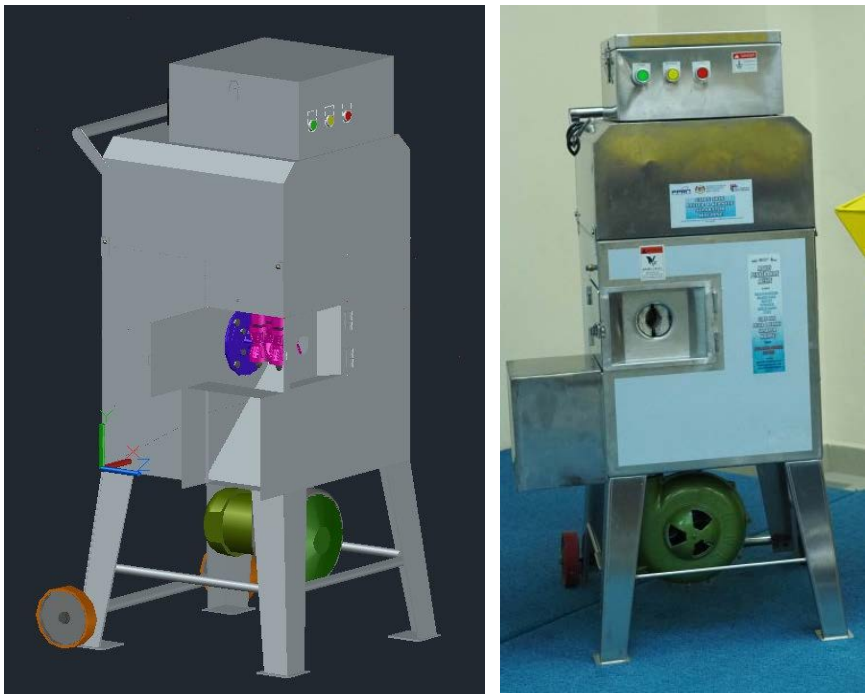
Mesin ini menggunakan pembuatan keluli tahan karat, pergerakan mudah dengan kastor. Pengoperasian yang mudah, sesuai untuk pelbagai jagung segar, manis, lilin, jagung beku, dicairkan selepas pengirikan. Lebih tahan hentaman, diperbuat daripada pemacu motor khas, kawalan kelajuan penyongsang. Mesin ini dicipta sesuai untuk kilang pengeluaran berskala besar dengan barisan, juga menyesuaikan diri dengan pemprosesan bengkel. Dengan kemampuan kapisiti penggunaan yang tinggi dan disesuai dengan oparasi secara automatik mengikut ukuran jagung pada tongkol, sesuai untuk pelbagai ukuran pengintian jagung dengan diameter lubang masuk terbesar 70 mm. Kedalaman pengirikan boleh dikupas, kadar pengelupasan jagung manis hingga 100%. Peraturan kelajuan penukar frekuensi, operasi mudah dan *fleksibel*.

Terdapat peniup di port pembuangan untuk menjadikan biji jagung lebih bersih dan dapat disesuaikan secara automatik dengan ukuran tongkol jagung, sesuai untuk diameter berbagai jagung, kedalaman pengirikan dapat disesuaikan, kadar penyingkirannya baik, dan kecekapan pengeluarannya tinggi. Pisau diperbuat daripada keluli tahan karat khas, melalui rawatan haba khas. Ia tidak memerlukan penajaman jangka panjang dan tahan lama. Biji jagung setelah degranulasi keseluruhan, tidak ada kerosakan, dan tidak ada kehilangan nutrien. Kaedah pemotongan empar khas, ukuran jagung boleh dipotong. Rajah 3 menunjukkan mesin pelerai isi jagung secara pandangan sisi atas, sisi tepi depan, sisi belakang dan pandangan isometri.



Rajah 3: Rekabentuk mesin pelarai isi jagung

Rajah 4 menunjukkan perbandingan lukisan rekabentuk padangan isometri dengan gambar sebenar mesin pelerai isi jagung yang telah dihasilkan.



Rajah 4: Rekabentuk penuh dan gambar mesin pelerai isi jagung

6. KEPUTUSAN HASIL PENYELIDIKAN

Berikut hasil penyelidikan bagi kedua-dua buah mesin, Jadual 1 menunjukkan hasil output akhir bagi mesin pengupas kulit jagung dengan membandingkan dengan kaedah manual sebelum menggunakan mesin. Perbandingan ini dilakukan dengan kapasiti bilangan pekerja yang sama iaitu seorang pekerja dalam masa operasi selama 1 jam. Didapati mesin pengupas kulit jagung berjaya mengupas kulit jagung sehingga 8000 ketul jagung berbanding hanya 30 ketul hanya jika menggunakan kaedal manual. Ini menunjukan hasil penyelidikan berjaya diselesaikan oleh mesin pengupas kulit jagung sebanyak 300%.

Jadual 1: Hasil penyelidikan menggunakan mesin pengupas kulit jagung

Kaedah kupasan	Kaedah Manual	Mesin Pengupas kulit jagung
Bilangan Pekerja	**1 Orang**	**1 Orang**
Kapasiti	**30 ketul**	**6000-8000 ketul**
Durasi (jam)	**1 Jam**	**1 Jam**

Merujuk kepada jadual 2 pula adalah perbandingan kaedah manual dengan mesin pelerai isi jagung dengan kapasiti bilangan pekerja yang sama iaitu seorang pekerja dan durasi masa yang sama iaitu selama 1 jam. Didapati bahawa mesin pelerai isi jagung berjaya meleraikan isi jagung daripada tongkolnya seberat sehingga 400 kg isi jagung berbanding kaedah manual hanya mampu 1 kg isi jagung sahaja. Ini menunjukan hasil penyelidikan berjaya diselesaikan oleh mesin pelerai isi jagung melebihi 300% kejayaan produk akhir.

Jadual 2: Hasil penyelidikan menggunakan mesin pelerai isi jagung

Kaedah kupasan	Kaedah Manual	Mesin Pelerai Isi Jagung
Bilangan Pekerja	**1 Orang**	**1 Orang**
Kapasiti	**1 Kg**	**300-400 Kg**
Durasi (jam)	**1 Jam**	**1 Jam**

7. Gambarajah Inovasi

Mesin yang dihasilkan adalah untuk syarikat PKS yang mengusahakan produk berasaskan jagung. Rajah 5 di bawah menunjukkan mesin pengupas kulit jagung dan pelerai isi jagung yang telah dihasilkan.

Rajah 5: Mesin pengupas kulit jagung dan pelerai isi jagung

Dengan rekabentuk yang mudah dan mesra pengguna, ia lebih selamat untuk dikendalikan disamping penjimatan kos yang banyak dapat dikurangkan.. Disamping menjimatkan masa dan

kos tenaga kerja, dari aspek kualiti, jagung dan isi jagung yang dikupas menggunakan mesin ini lebih bersih dan mempunyai bentuk yang sekata berbanding pengupasan secara manual. Secara keseluruhannya, produktiviti dan pengeluaran produk dapat ditingkatkan seiring dengan permintaan produk yang berasaskan jagung. Mesin ini telah dipertandingkan di "*NATIONAL INVENTION & INNOVATION, COMPETITION, EXHIBITION AND ROBOT-SUMO 2020*" (*NICERS'20*) peringkat Kebangsaan dan telah dianugerahkan Best Award bagi kategori C: Mesin, Peralatan & Proses Pengilangan serta menangi anugerah pingat emas.

8. Kesimpulan

Secara keseluruhan Projek Geran Penyelidikan PPRN ini, telah membuktikan keupayaan pensyarah Kolej Komuniti dan pelajar menyelesaikan masalah reka bentuk serta fabrikasi dengan mengira ukuran, bentuk pelbagai bahagian sistem dan mekanikal untuk memenuhi keperluan prestasi mesin. Oleh itu, kapasiti pengeluaran yang lebih cekap dan lebih tinggi dari mesin pengupas kulit jagung dan mesin pelerai isi jagung telah berjaya mengurangkan masa operasi syarikat dengan bilangan pekerja yang sedikit. Oleh itu, pihak syarikat mampu menghasilkan lebih banyak produk jagung untuk dipasarkan disamping mementingkan aspek kebersihan dan keselamatan makanan. Di akhir kajian, penyelidik berjaya mencipta mesin pengupas kulit jagung dan mesin pelerai isi jagung untuk menyelesaikan masalah Ceria Mama Nurrizqi Sdn Bhd dan telah berjaya membantu meningkatkan hasil pengeluaran dan pelbagai tambahan produk yang berasaskan jagung.

Penghargaan

Penulis ingin mengucapkan terima kasih kepada Kementerian Pendidikan Malaysia dibawah *Demand-Driven Innovation Project Under Public Private Research Network* (PPRN) atas kelulusan geran projek ini.

Rujukan

Pertanian, J. (2020). Pakej Teknologi Jagung Bijian.

Nazmi, M. S., Rahimah, N., Omar, N., Zairy, A., Abidin, Z., & Hifzan, M. (2020). Potensi industri jagung bijian di Malaysia. 18, 83–90.

FOA (2015). Statistical Year Book of the Food and Agricultural Organization Retrieved from http://www.fao.org/docrep/018/i3107e/i3107e03.pdf.

PKS (2016) SME Statistics. Retrieved from http://www.smecorp.gov.my/index.php/en /policies /2015-12-21-09-09-49/sme-statistics.

William R. Luer, Matthew O. Clohisy, Craig A. Claire and Dylan L. Newcomb (2016). Automatic Maize Peeler. MEMS 411 Design Report. Washington University in St. Louis. School of Engineering & Applied Science.

Bagher Imadi, Vladis Kosse, Prasad Yarlagadda (2005). Experimental Investigation of Abrasive Peeling of Pumpkin. Journal of Food Engineering.

Somsen, D, Capelle, A and Trampler J. (2004).Manufacturing of Par-Fried French Fries. Part 2: Modelling yield efficiency of peeling. Journal of Food Engineering, 61, 199-207.

S.S.Singh and B.D.Shukla (1995). Abrassive peeling of potatoes. Journal of Food Engineering,26,431-442.

Srivastava A, Vanee G, Ledebuhr R, Welch D, and Wang L (1996). Design and Development of an Corn-Peeling Machine. Transaction of ASAE, 13(2), pp 167-173.

Wang, L. (1993). Performance Testing of an Maize Peeling Machine Using Response Surface Methodology. M.Sc Thesis, Michigan State University.

Naik R, S. J. K. Annamali and D. C. P. Ambrose (2007). Development of Batch Type Multiplier Corn Peeler. Proceedings of the International Agriculture Engineering Conference. Bangkok Thailand.

Nigel, Cross (2021). Engineering Design Methods, Third Edition. Jojn Willey & Sons, LTD https://www.smecorp.gov.my/index.php/my/

SOROTAN TERHADAP PENDEKATAN PEMBELAJARAN PENDIDIKAN ISLAM PELAJAR BERKEPERLUAN KHAS (PBK) PENDENGARAN POLITEKNIK

Solehah Samsudin[1], Nur Afifah Saharudin[2], Hazwani Ubaidillah[3], dan Ariyanti Adnan[4]

[1,2,3,4] Politeknik Ungku Omar,
Jalan Raja Musa Mahadi, 31400 Ipoh,
Perak, Malaysia

[1]solehah@puo.edu.my
[2]nurafifah@polycc.edu.my
[3]hazwani@puo.edu.my
[4]ariyanti@puo.edu.my

Abstrak: Kurikulum Pendidikan Islam di politeknik Malaysia menunjukkan bahawa ketidakupayaan Pelajar Berkeperluan Khas (PBK) pendengaran memerlukan kaedah, teknik dan pendekatan pembelajaran yang sesuai daripada pelajar normal. Oleh itu, artikel ini bertujuan memahami pendekatan pembelajaran dalam PBK (Pendengaran) dalam memahami istilah Pendidikan Islam dan kehidupan beragama. Selain itu, pendekatan pembelajaran ini juga adalah untuk meneliti kaedah pengajaran yang bertepatan terhadap pelaksanaan Pendidikan Islam PBK. Kajian kepustakaan yang bersumberkan artikel menunjukkan terdapat tiga pendekatan yang boleh diaplikasikan kepada PBK (pendengaran) iaitu melalui kompetensi kemahiran komunikasi bahasa isyarat guru terutamanya istilah agama, bahan bantu pembelajaran yang dibangunkan khas untuk PBK dan boleh diadaptasikan dalam talian atau bersemuka serta amali yang mengukuhkan kefahaman topik pembelajaran secara konsisten. Oleh itu, implikasi daripada pendekatan ini ialah pensyarah perlu diberikan kursus kompetensi berbahasa isyarat untuk mengukuhkan istilah dalam Pendidikan Islam. Malah, pembangunan bahan bantu serta latihan amali menggunakan elemen 3V iaitu video, visual dan *virtual simulation* turut dicadangkan untuk meningkatkan kefahaman pelajar secara menyeluruh.

***Kata kunci**: Pelajar berkeperluan khas, OKU pendengaran, pengajaran dan pembelajaran pendidikan Islam, pembelajaran dalam talian, fardhu ain.*

1. Pengenalan

Kurikulum pendidikan kebangsaaan menunjukkan bahawa ia digubal mengikut kesesuaian situasi samada pelajar yang normal mahupun berkeperluan khas. Namun, perbezaan kurikulum sangat penting dalam memastikan keberkesanan pembelajaran bagi pelajar OKU terutamanya pendengaran. Hashim et al., (2019) menjelaskan bahawa penggunaan istilah melalui bahasa lisan turut menjadi isu dengan situasi pelajar dalam pelaksanaan kurikulum yang sukar difahami jika berlakunya salah faham dalam pertuturan terutamanya istilah agama. Malah, Kurikulum Pendidikan Islam haruslah didedahkan dengan istilah yang menjadi kebiasaan

kepada golongan OKU ini berdasarkan situasi pelajar dengan menerapkan kaedah yang asas bermula dari bawah sehingga kepada tahap penguasaan yang baik bagi situasi mereka (Ab Rahman et al., 2021). Hal ini disokong oleh Omar et al., (2021) yang menyatakan bahawa golongan ini tidak boleh ketinggalan dalam proses mendapatkan ilmu agama dan dakwah.

Pencapaian golongan Pelajar Berkeperluan Khas (pendengaran) di politeknik amat memberangsangkan seperti yang pernah dilaporkan di akhbar Utusan Malaysia yang bertarikh 8 Disember 2021. Ketidakupayaan mereka menunjukkan bahawa mereka boleh mengatasi cabaran dalam menuntut ilmu samada fardu ain dan fardhu kifayah. PBK pendengaran ini merupakan kelompok yang tidak dapat berkomunikasi dengan baik yang mempunyai masalah pertuturan dan perlu memahami komunikasi dengan isyarat. Namun demikian, keperluan kepada dasar - dasar kerajaan yang menjamin kesaksamaan peluang dalam kalangan PBK ini bahawa pendidikan sepanjang hayat mampu mengatasi isu keciciran dan pembangunan rohani mereka. Malah, Omar et al., (2021) turut menyatakan cabaran dalam pengendalian aktiviti fardu ain PBK pendengaran ini perlu diperhatikan sewajarnya agar mereka mendapat hak untuk memahami agama dengan sebaiknya.

Sehubungan dengan itu, kajian lepas yang menggunakan kesepakatan lima pakar oleh Khamaruddin et al., (2020) telah memastikan proses pembelajaran solat bagi PBK dalam memahami ibadah dengan membuat penilaian terhadap bahasa isyarat baharu. Hal ini menunjukkan bahawa terdapat isu dan cabaran dalam mengendalikan pengajaran dan pembelajaran ialah memberikan kefahaman jati diri , konsep ibadah terhadap kehidupan PBK berdasarkan ajaran Islam kerana mereka merupakan mukallaf yang dikategorikan melaksanakan amalan agama bergantung kepada keupayaan yang ada (Ab Rahman et al., 2021; Dzulkifli & Suhid, 2018; Hashim et al., 2019; Hj Nor & Rashed, 2018; Omar et al., 2021). Malah, konsep yang perlu diketengahkan dalam kajian ini adalah bagaimana pendekatan pembelajaran dan pengajaran Pendidikan Islam yang boleh diadaptasi oleh golongan PBK (pendengaran) khususnya melalui kurikulum Pendidikan Islam di politeknik. Malah, kajian ini bertujuan untuk memahami kepelbagaian pendekatan pembelajaran dan pengajaran yang melibatkan istilah agama dari aspek akidah, syariah dan juga akhlak.

Golongan PBK dipoliteknik mendapatkan pembelajaran secara bersemuka dengan tenaga pengajar dalam bidang Pendidikan Islam. Namun, terdapat kekangan yang menunjukkan cabaran pensyarah yang kurang kompeten dalam berkomunikasi malah tahap kreativiti pengajaran serta latihan amali melalui pengurusan kuliah (Ab Rahman et al., 2021). Hal ini turut menjadikan peningkatan masalah sosial dalam kalangan PBK membimbangkan. Sebagaimana yang dinyatakan oleh Hj Nor & Rashed, (2018) bahawa kesukaran PBK berkomunikasi menghilangkan minat mereka untuk menilai sesuatu perbuatan itu betul atau tidak kerana ketiadaan ilmu terutamanya agama kerana tanpa pemahaman pembelajaran agama yang betul akan menyebabkan mereka tersasar.

Sehubungan dengan itu, objektif kajian ini ialah untuk:

- Memahami pendekatan pembelajaran dalam PBK (Pendengaran) dalam memahami istilah Pendidikan Islam dan kehidupan beragama

Oleh hal yang demikian, sorotan kajian ini turut meneliti tentang pendekatan pembelajaran yang boleh diubahsuai mengikut keperluan yang lebih menumpukan kepada, kaedah komunikasi, kaedah visual atau sentuhan serta latihan amali yang efektif. Malah, pendekatan yang dilaksanakan terhadap golongan kurang upaya pendengaran ini akan di pelbagai dengan penggunaan bahan bantu yang bertepatan. Disamping itu, usaha yang berterusan seperti menyediakan aktiviti pembelajaran, kuiz pengukuhan, pembelajaran berasaskan permainan atau praktikal turut membantu untuk memberi kefahaman yang baik berkaitan dengan istilah serta hukum dalam pembelajaran Pendidikan Islam.

2. Pembelajaran dan pengajaran Pendidikan Islam terhadap Pelajar Berkeperluan Khas (pendengaran)

Pendidikan Islam ialah kurikulum yang menitikberatkan pendidikan secara holistik sepertimana selari dengan Falsafah Pendidikan Kebangsaan. Malah, guru-guru Pendidikan Islam berusaha sebaiknya menjadikan pelajar faham dalam kehidupan beragama. Sehubungan dengan itu, Pelajar Berkeperluan Khas(PBK) turut tidak terkecuali menjadi seseorang yang seharusnya dibentuk memahami ajaran agama dan menjadi orang yang mentaati Allah SWT (Dayang Kamaliah & Norshidah, 2020; Mahd Nor, 2021) Antara tanggungjawab pendidik PBK ini ialah memikul tugas dan amanah yang berat agar mereka dapat mendedahkan pelajar untuk memahami didedahkan tentang al-Quran serta melaksanakan ibadat dalam kehidupan seharian dengan apa yang mereka fahami. Dzulkifli, (2021) telah menyenaraikan bahawa guru Pendidikan Islam khususnya yang mengajar kanak-kanak berkeperluan khas sentiasa menghadapi cabaran dalam menguasai kandungan pembelajaran serta pedagogi dalam menyampaikan kurikulum disebabkan daya fokus dan tumpuan yang rendah malah daya ingatan yang mudah lupa. Adakalanya mereka menunjukkan sifat agresif apabila tidak memahami apa yang disampaikan oleh guru kerana mereka tidak mampu bertutur dan membaca bahan pembelajaran dengan baik.

Sehubungan dengan itu, hala tuju Pendidikan Islam bagi PBK ialah menyediakan asas fardhu ain dan berpeluang menjalani dan memahami kehidupan beragama. Malah potensi mereka dalam bidang Pendidikan Islam ini turut berkembang dengan merekabentuk kurikulum yang sesuai dan mereka mampu menguasainya sebagai asas kehidupan muslim. Hashim et al., (2019) turut menyedari bahawa golongan pekak atau ketidakupayaan pendengaran tiada halangan untuk mereka belajar ilmu yang berkaitan dengan al-Quran, ibadah, akidah dan akhlak. Malah disokong oleh Safarina Ujang & Norshidah Mohamad Salleh, (2018) yang telah mengetengahkan Modul J-QAF (Model Amali Solat) yang diubahsuai berdasarkan keperluan PBK untuk dilaksanakan di sekolah Program Pendidikan Khas Integrasi (PPKI) namun memerlukan penambahbaikan amalan pengajaran dan pendekatan pembelajaran yang lebih berkesan. Selain itu, terdapat beberapa faktor yang mempengaruhi cabaran pengendalian PdP PBK ialah sikap dan intelek, prasarana, tiada kesedaran beragama, kekurangan tenaga pengajar yang kompeten serta bahan pembelajaran yang mampu memahami asas Fardhu Ain (Omar et al., 2021).

Asas Fardhu Ain bagi PBK tetap selari dengan kurikulum Pendidikan Islam arus perdana. Namun, mengelakkan keciciran bagi asas Fardhu Ain golongan ini perlulah kepada aktiviti yang lebih dirancang secara visual yang tersusun. Walaupun PBK pendengaran ini tidak mampu bertutur dengan sebaiknya terutamanya dalam melafazkan bacaan dalam solat maka,

gerak geri solat boleh diperhatikan untuk diikuti secara visual (Omar et al., 2021). Oleh hal yang demikian, Dzulkifli et al., (2020) menjelaskan bahawa bidang yang mencabar untuk dipelajari oleh PBK ialah tilawah al-Quran dan akidah. Hal ini kerana, bidang ini memerlukan menyebut dan membaca al-Quran. Tanpa bantuan alat pendengaran pelajar tidak dapat mendengar dan menyebut semula apa yang didengari serta memerlukan usaha dalam membaca gerakan bibir. Manakala asas akidah pula memerlukan kepada penjelasan seperti dosa, pahala, syirik yang membawa kepada kosa kata yang terhad. Oleh itu, asas Fardu Ain yang diajarkan kepada PBK pendengaran haruslah dirancang dan ditingkatkan kefahaman untuk memahami istilah dalam kehidupan beragama (Hj Nor & Rashed, 2018).

Golongan PBK di Politeknik perlu mengambil kursus pendidikan Islam sebagai kursus umum atau teras. Hal ini bertepatan dengan matlamat kurikulum pendidikan Khas iaitu bagi menyediakan ilmu dan kemahiran melalui proses pengajaran dan pembelajaran yang sesuai dan menyeluruh (Kementerian Pendidikan Malaysia 2022). Malah, kurikulum PBK yang dibentuk mencakupi komponen bidang pengurusan diri, bidang akademik berfungsi, bidang sosial, riadah dan kreativiti dan juga bidang kerohanian dan nilai-nilai murni. Maka, kursus Pendidikan Islam di politeknik adalah suatu keperluan bagi tujuan melengkapkan kurikulum PBK yang dilihat secara holistik. Sebanyak dua kursus pendidikan Islam di tawarkan kepada pelajar Sijil Kemahiran Politeknik iaitu Pendidikan Islam 1 bagi pelajar muslim semester 1 dan Pendidikan Islam 2 bagi pelajar muslim semester 2. Pada asasnya, penekanan kursus pendidikan Islam bagi PBK adalah sama seperti kursus Pendidikan Islam bagi pelajar Diploma di politeknik yang menekankan 3 asas utama dalam Islam iaitu aqidah, syariah dan akhlak (Kurikulum). Namun, ia mempunyai hasil pembelajaran yang berbeza mengikut kepada tahap keupayaan pelajar berkeperluan khas (pendengaran). Penggubalan silibus bagi kursus ini adalah mengikut kepada panduan JPPKK dan ianya telah mengalami beberapa penambahbaikan dari segi perubahan kod kursus, kandungan dan bentuk pentaksiran seiring dengan keperluan semasa sepertimana Jadual 1.

Jadual 1: Penambahbaikan kursus Pendidikan Islam 1 yang diambil oleh PBK di politeknik

Kod Kursus	Kuat kuasa silibus	Jumlah hasil pembelajaran	Pentaksiran
AK101 Pendidikan Islam 1	Jun 2011	5	Pembentangan, Praktikal, Kuiz Ujian, Portfolio
SUA1011 Pendidikan Islam 1	Jun 2015	3	Kuiz, Ujian Amali Pembentangan

Sehubungan dengan itu, hasil penambahbaikan kurikulum telah berlaku bertujuan untuk menghasilkan PBK yang lebih berkualiti pemahaman Islam mereka bersesuaian dengan kemampuan dan keupayaan mereka. Namun, pendekatan yang baik dalam pembelajaran dan pengajaran kursus ini adalah amat penting bagi mencapai hasil pembelajaran yang ditetapkan. Oleh hal yang demikian, amalan pengajaran yang mencakupi kesediaan guru, penguasaan

pedagogi, penguasaan kurikulum dan penggunaan teknologi dapat membantu proses pembelajaran dan pembelajaran yang kreatif bagi guru pendidikan Islam PBK(Jawas & Zulkifli, 2022). Tambahan pula, pendekatan yang melibatkan peningkatan kemahiran komunikasi guru, penggunaan bahan bantu yang efektif serta latih tubi yang pelbagai perlu diberi perhatian bagi memahami kehendak kurikulum PBK di politeknik.

3. Kompetensi guru dalam komunikasi berbahasa isyarat.

Peranan guru dalam memahami situasi PBK amat penting dalam menyampaikan ilmu dan kemahiran. Dayang Kamaliah & Norshidah, (2020) menjelaskan bahawa tenaga pengajar Pendidikan Islam yang mengajar tanpa mengikuti sebarang latihan mahupun khusus yang berkaitan dengan PBK akan menghadapi masalah ketika mengajar untuk memahami perhatian murid terhadap pembelajaran. Perubahan pembelajaran daripada secara bersemuka ke dalam talian turut mendatangkan kesukaran dalam interaksi. Memandangkan generasi kini telah mengalami perubahan berbanding sebelum ini yang dilaksanakan secara bersemuka kepada dalam talian. Maka kegagalan proses pembelajaran oleh PBK (pendengaran) perlu diberi perhatian yang lebih berbanding pelajar normal. Sistem pembelajaran yang dibangunkan haruslah seiring dengan penerapan nilai-nilai Pendidikan Islam agar PBK dapat memahami dengan baik bukan sahaja ilmu duniawi malah ukhrawi.

Permasalahan yang berlaku dalam kalangan pensyarah Pendidikan Islam PBK (pendengaran) ialah pada awalnya mereka tidak diberi pendedahan khusus dalam komunikasi serta kurang diberi latihan khas berkaitan silibus pendidikan khas (Hj Nor & Rashed, 2018). Malah cabaran guru sebanyak 48.38% dinyatakan dalam kajian (Sabdan et al., 2020) juga ialah kurang kreatif dalam mempelbagaikan kaedah pengajaran dan kurang berpengalaman dalam mengajar PBK. Hal ini menunjukkan bahawa pengalaman bersama dengan golongan ini sangat penting untuk memahami komunikasi dalam komuniti pekak ini. Malah Ab Rahman et al., (2021) berpandangan bahawa tahap kefahaman murid PBK untuk memahami arahan secara langsung adalah agak rumit maka, pensyarah perlu mewujudkan interaksi yang konsisten dengan mereka. Sehubungan itu, Dzulkifli et al., (2020) mencadangkan agar pelajar bermasalah pendengaran yang memakai alat bantuan pendengaran secara kerap supaya boleh bertutur dengan menggunakan alatan tersebut sebagai latihan komunikasi agar boleh memahami setiap arahan pembelajaran dengan baik.

Penggunaan Kod Tangan yang berbeza menyebabkan proses pembelajaran pelajar khas pendengaran tidak dapat memahami topik pembelajaran sebaiknya. Awang@Husain et al., (2012) mendapati bahawa kod tangan yang berbeza antara Kod KTBM dan BIM dimana bahasa isyarat rasmi di sekolah ialah Kod Tangan Bahasa Melayu (KTBM) manakala penggunaan secara harian PBK ialah Bahasa Isyarat Malaysia (BIM). Manakala , Hashim et al., (2019) menyatakan bahawa guru perlu bersedia untuk meningkatkan kemahiran diri mereka dari masa ke semasa dalam menguasai antara KTBM bersama BIM supaya pengajaran dan pembelajaran dapat disampaikan dengan lebih efektif terutamanya dalam bidang yang melibatkan pembacaan al-Quran dan juga perihal ibadah dan hukumnya. Hal ini kerana, penggunaan kod tangan yang tidak selari menyebabkan pelajar berkomunikasi dengan dalam kalangan mereka sahaja. Tambahan pula penggunaan istilah-istilah dalam Pendidikan Islam dengan kosa kata seperti hukum – hukum, rukun dan syarat perlu dijelaskan kedudukan sebenar istilah tersebut supaya tidak berlaku salah faham.

Pendekatan pembelajaran PBK memberi impak yang positif jika guru kompeten dalam menggunakan kepelbagaian bentuk komunikasi dan prihatin terhadap keperluan mereka. Malah, keberkesanan pendekatan pembelajaran PBK bergantung kepada sikap, penyesuaian bahan, motivasi dalam mengendalikan PBK, kepelbagaian input dan teknik pengajaran dan juga memperkasakan komunikasi menggunakan kod tangan untuk selari dengan situasi yang difahami pelajar. Hal ini seperti yang dinyatakan oleh Ab Rahman et al., (2021) bahawa kod isyarat yang seragam amat penting bagi mengelakkan kekeliruan terutamnya istilah yang melibatkan ibadah serta perihal tilawah al-Quran juga yang memerlukan mereka memahami akidah.

Selain itu juga pembelajaran ibadah, akidah dan tilawah yang dilaksanakan samada secara bersemuka atau dalam talian akan memberi kesan jika pendekatan yang menggunakan orentasi tangan dan ekspresi muka yang menggambarkan emosi dan situasi yang perlu difahami. Hal ini bertepatan dengan Dzulkifli et al.,(2020) menyatakan bahawa kaedah auditori verbal turut membantu pelajar untuk mendapatkan maklumat berdasarkan prinsip tertentu seperti terapi bersama ibu bapa, perkembangan bahasa semulajadi selain dari bacaan bibir. Komunikasi yang berkesan akan dapat dicapai dengan menggunakan pelbagai cara samada ejaan jari, tulisan, lukisan, gambar, video dan lain lain untuk menentukan objektif pembelajaran tercapai.

4. Kelengkapan bahan bantu mengajar yang sesuai secara visual dan pembangunan video.

Pengajaran dan pembelajaran memerlukan pemilihan kaedah, strategi, teknik untuk menyusun maklumat, aktiviti, pendekatan dan bahan media untuk membantu pelajar mencapai objektif yang telah ditetapkan (Baharuddin et al., 2002). Bagi Pelajar Berkeperluan Khas (PBK) pendengaran, faktor ketidakupayaan mereka seperti tahap kecerdasan atau kognitif yang rendah dari sudut memori, berfikir dan ingatan jangka pendek (Mohad et. al. 2015, Seman et al. 2016) adalah antara kriteria yang perlu diambilkira oleh pensyarah dalam menghasilkan kelengkapan bahan bantu mengajar yang bersesuaian berbanding pelajar normal. Menurut Seman et.al (2016) lagi, jika pelajar normal boleh menghubungkaitkan sesuatu maklumat dalam pembelajaran dengan maklumat yang lain untuk lebih mudah faham dan ingat, golongan PBK pendengaran adalah sebaliknya. Kekangan pendengaran menyebabkan mereka sukar menghubungkaitkan maklumat yang diterima dengan objek lain yang menyebabkan ingatan hilang atau ingatan hanya berlaku untuk jangka pendek.

Bagi golongan kurang upaya pendengaran, penggunaan bahasa isyarat adalah keperluan paling asas untuk membantu mereka belajar. Keunikan bentuk atau simbol tangan banyak memberi makna untuk membentuk kosa kata terhadap sesuatu keadaan menjadikan bahasa isyarat sebagai bahasa ibunda bagi golongan ini kerana ia memudahkan komunikasi, cara untuk memberi pendapat dan idea, meluahkan rasa, perasaan dan sebagainya (Khamaruddin et al., 2020). Dalam konteks ini, bahasa isyarat dilihat berperanan sebagai bahasa visual yang membantu penyampaian sesuatu perkara supaya lebih bermakna dan difahami.

Berdasarkan arus dunia teknologi hari ini, penggunaan bahan bantu pengajaran dan pengajaran dalam bentuk 3V – Visual, Video, Virtual Simulation dengan medium komunikasinya adalah Bahasa Isyarat Malaysia (BIM) ataupun Kod Tangan Bahasa Melayu (KTBM) adalah antara

pendekatan yang bersesuaian dibangunkan oleh pensyarah bagi PBK (pendengaran). Ini kerana bahan bantu pembelajaran dalam bentuk video dan visual yang dihasilkan akan membantu pelajar PBK pendengaran untuk mengulang tonton secara berulang kali kerana mereka merupakan golongan yang bergantung sepenuhnya dengan deria penglihatan. Secara tidak langsung ia dapat memberikan kesan atau meningkatkan ingatan yang lebih baik kepada pelajar serta mengukuhkan kefahaman terhadap topik yang perlu dilaksanakan secara praktikal.

Kaedah, pendekatan, aktiviti mahupun strategi bahan pembelajaran yang dipilih atau ingin dibangunkan mestilah mampu membantu peningkatan ingatan dan pemahaman pelajar terhadap sesuatu subjek dengan lebih baik termasuk bagi subjek Pendidikan Islam. Tenaga pengajar Pendidikan Islam PBK seperti yang dinyatakan (awas & Zulkifli,(2022) haruslah membangunkan modul BBM dengan mencipta bahan bantu mengajar (BBM) bagi mengatasi cabaran kekurangan BBM mengikut keadaan semasa bagi mencapai objektif pengajaran dan pembelajaran. Model dalam membangunkan bahan bantu sepertimana yang dijelaskan oleh Norakyairee & Nurul Thoilah (2017) mementingkan komponen asas kurikulum seperti keperluan pelajar, hasil pembelajaran, pengalaman dan situasi terkini dan kandungan yang memenuhi matlamat pendidikan. Tambahan pula disokong oleh Safarina Ujang & Norshidah Mohamad Salleh, (2018) mencadangkan bahawa pelajar PBK perlu dipersiapkan dengan kehidupan bermasyarakat hasil dari pembangunan modul PBK yang efektif yang mampu mencapai objektif yang memberi kesan dengan perubahan tingkah laku dan pemahamannya dalam kehidupan beragama. Sehubungan itu, aktiviti pembelajaran bagi PBK untuk meningkatkan pemahaman perlu diatasi selain dari pembangunan BBM model berasaskan kurikulum namun perlu berkesan dalam kehidupan mereka.

5. Pengukuhan amali dan latih tubi berasaskan simulasi virtual.

Pelaksanaan amali dalam pembelajaran merupakan suatu aktiviti yang menjadikan proses pembelajaran lebih bermakna. Hj Nor & Rashed, (2018) menyatakan peranan guru yang proaktif perlu diperkukuhkan melalui aktiviti latih tubi dan praktikal yang berpusatkan pelajar supaya boleh diukur dan dinilai tahap kefahaman tentang sesuatu topik. Malah latihan samada secara kognitif dan psikomotor seperti cara menyucikan najis, mengenali jenis-jenis air, cara berwuduk, amali solat secara pergerakan dengan memahami isyarat bacaan turut dilaksanakan sebagai praktis terhadap pembelajaran Pendidikan Islam. Namun demikian, penglibatan pelajar terhadap aktiviti yang melibatkan psikomotor memerlukan pengukuhan dari bahan visual yang telah diperolehi oleh pelajar (Ab Rahman et al., 2021; Dzulkifli et al., 2020). Sehubungan dengan itu, didapati bahawa amali praktikal yang hendak dilaksanakan bukan sahaja tunjuk cara dari video atau secara langsung bersemuka tetapi perlu diulang- ulang untuk memahami istilah seperti syarat wajib, rukun dan sebagainya.

PBK pendengaran perlu mengetahui dan memahami situasi diri bahawa mereka ialah golongan mukallaf. Malah membangunkan potensi dari aspek spiritual seperti yang dijelaskan oleh Dzulkifli & Suhid, (2018) bahawa Pendidikan Islam bagi golongan OKU perlu diterapkan untuk menjadi orang yang beriman, berakhlak, bertanggungjawab dan mengamalkan seperti yang diajarkan oleh Islam. Oleh hal yang demikian, latihan yang bersifat pengulangan amat penting dalam memahami topik asas fardu ain. Malah, sifat pengulangan menurut Siti Patonah et.al (2014) dan Sabdan et al.,(2020), yang diistilahkan sebagai takrir juga amat dituntut dalam pembelajaran agama kerana ia akan melibatkan pemindahan ingatan jangka pendek terhadap

suatu perkara yang di pasak dalam pemikiran secara berulang kepada ingatan jangka panjang. Selain itu, latihan yang mengadaptasi persekitaran sebenar sepertimana yang dicadangkan oleh Omar et al., (2021) iaitu pelajar perlu bimbingan dengan melaksanakan tunjuk cara yang realistik bagi perkara asas yang kebiasaannya boleh dipelajari secara teori. Namun, tunjuk cara seperi rukun solat, berwuduk, adab - adab boleh dikendalikan bentuk praktikal yang kreatif agar lebih berkesan dalam memahami Pendidikan Islam. PBK pendengaran perlu untuk mengetahui dan memahami situasi diri bahawa mereka ialah golongan mukallaf yang perlu dibangunkan potensi dari aspek spiritual dan kerohanian. Oleh itu, kepentingan membangunkan simulasi praktikal yang lebih efisyen boleh membantu PBK untuk mengukuhkan kefahaman agama secara amali.

Simulasi amali secara virtual turut menyumbang ke arah pelaksanaan praktikal dalam mengukuhkan pemahaman dalam Pendidikan Islam. Alsharbi et al., (2021) telah membangunkan sistem simulasi berasaskan pengukuhan pembelajaran al-Quran turut menyatakan bahawa implikasi penggunaan teknologi adalah sebagai medium melatih pembelajaran al-Quran yang perlu didukung dengan aplikasi yang dibangunkan berdasarkan keperluan yang bersesuaian terutamanya bagi mereka yang tidak pernah mempelajari bahasa Arab apatah lagi bagi pelajar yang kurang upaya. Oleh itu, pembelajaran al-Quran berasaskan simulasi ini turut dicadangkan perlu memenuhi kriteria yang melibatkan tenaga pengajar yang autentik, cara memperbetulkan bacaan dan melatih samada secara individu atau berkumpulan, cara ibu bapa boleh memantau perkembangan serta pengiktirafan yang boleh meningkatkan motivasi dalam mempelajari al-Quran terhadap semua peringkat dan golongan. Malah, penggunaan simulasi secara virtual ini memerlukan modul kreatif yang bersifat membantu mereka menyelaraskan kefahaman pelajar berdasarkan latar belakang pelajar yang pelbagai serta tidak mempunyai asas agama dan keperluan yang bersesuaian samada faktor dalaman atau luaran (Suzana Harun et al., 2021)

Elemen kreatif amat diperlukan dalam pembangunan modul samada secara dalam talian atau bersemuka agar latih tubi yang diberikan tercapai objektif pembelajaran. Hal ini disokong oleh Jawas & Zulkifli, (2022) menyesuaikan pembelajaran dengan amalan pengajaran kreatif dan kritis perlu diasaskan dengan kemahiran merancang dan bersedia, memberi arahan, memberi bimbingan dan merangsang intelektual dan spiritual. Malah, Achmad Fiqhi et al., (2020) menjelaskan bahawa modul hijaiyah yang dibangunkan untuk PBK perlu memberikan beberapa langkah yang akan memudahkan mereka berinteraksi dengan orang normal iaitu mengenalpasti isyarat tangan bagi huruf hijaiyah dengan visual dan teks malah bunyi juga turut diketengahkan sebagai latihan amali dengan berbantukan alat pendengaran. Sehubungan dengan itu, elemen kreatif yang membawa kepada kefahaman ke arah objektif harus direkabentuk dengan perancangan yang baik serta berkesan dalam memudahkan interaksi PBK melalui kurikulum Pendidikan Islam.

Kurikulum Pendidikan Islam di politeknik boleh mengambilkira kecenderungan pelajar supaya dapat mempelbagaikan teknik pengajaran yang kreatif. Omar et al., (2021) turut menyatakan bahawa pelajar PBK perlu ditarik minat dengan bimbingan yang membantu memupuk keyakinan diri dan menghindari dari sikap negatif agar mereka terhadap aktiviti pembelajaran. Penggunaan kaedah Fakih dibangunkan berasaskan warna dan nombor yang menunjukkan baris serta huruf membantu simulasi amali PBK memberansangkan (Sabdan et al., 2020). Tambahan pula menurut Syar Meeze Mohd Rashid et al., (2015) dalam kajiannya

mencadangkan bahawa tajuk yang berkaitan dengan aqidah iaitu lafaz syahadah, kemudian perihal rukun iman dan rukun islam serta ibadah yang melibatkan bersuci, solat, puasa dan kewajipan menutup aurat merupakan tajuk asas yang boleh dibangunkan modul yang berbentuk simulasi agar mereka memahami cara hidup bersyariat dan mendekatkan diri dengan Allah. Tambahan pula kajian Karamah et al., (2019) telah menggariskan pelbagai kaedah bacaan al-Quran PBK seperti kiu, fakih, bahasa isyarat arab selain dari kaedah iqra' yang memerlukan pengasingan antara PBK yang boleh mengeluarkan suara dan tidak boleh. Pengukuhan amali PBK ini memerlukan kelebihan tenaga pengajar yang proaktif dalam membimbing PBK lebih lebih lagi jika melaksanakan pembelajaran secara dalam talian.

6. Implikasi dan Cadangan

Pelaksanaan pembelajaran Pendidikan Islam PBK ini memerlukan implementasi secara sistematik dan konsisten. Hal ini kerana, berdasarkan penelitian sorotan kajian ini terdapat cadangan yang sepatutnya diberi perhatian bagi memenuhi pendekatan pembelajaran dan pengajaran PBK di politeknik iaitu :

a. Melaksanakan kursus kompetensi dan kemahiran mempelajari serta berkomunikasi menggunakan BIM untuk Pendidikan Islam sebagai komunikasi utama.

   Komunikasi menggunakan BIM selari dengan KTBM perlu diperhalusi. Kosa kata PBK sentiasa berkembang dari masa ke semasa melalui pemerhatian dan kehidupan sosial mereka. Pelaksanaan kursus kompetensi dan kemahiran amat penting untuk menentukan kod tangan utama yang diguna pakai dalam pembelajaran. Pembangunan bahasa isyarat yang boleh diaplikasikan samada BIM atau KTBM amat perlu bagi meningkatkan kefahaman PBK berkaitan dengan istilah dalam Pendidikan Islam. Siti Ramna Khamaruddin et al., (2018) dalam kajiannya turut menjelaskan bahawa pembangunan BIM yang boleh meningkatkan kefahaman Ibadah sangat diperlukan bagi PBK. Hal ini kerana istilah yang melibatkan syarat sah ibadah, rukun, perkara sunat dan haram, perkara membatalkan dan hukum hukum lain turut perlu dijelaskan penggunaan kosa kata BIM. Ahmad Razuan et al., (2019) turut mengetengahkan Kursus Dakwah Tanpa Suara (KDTS) kepada sukarelawan masyarakat yang normal untuk menjalani latihan secara konsisten dengan pelbagai modul supaya dapat menarik minat golongan ini terhadap Islam. Malah, melazimi komunikasi dengan PBK amat penting untuk meningkatkan kosa kata supaya boleh dipraktiskan melalui Bahasa Isyarat Islam.

b. Keperluan mereka bentuk pembelajaran dengan perisian yang mudah dalam pelaksanaan kurikulum serta meningkatkan peluang PBK untuk mempelajari agama dengan lebih baik dan berkesan.

   Reka bentuk kurikulum PBK memerlukan reaksi dari pihak tenaga pengajar dan juga pelajar. Hasil pembelajaran perlu selari dengan kehendak silibus samada secara teori mahupun praktikal. Disebabkan tiada kelas agama tambahan selain silibus Pendidikan Islam yang digubal sahaja maka, penerapan nilai dan istilah yang digunapakai dalam silibus perlu dimurnikan dan diperhalusi. Ahmad Razuan et al., (2019) menjelaskan bahawa wujudnya perisian seperti i-Sign QurANIS yang mengetengahkan konsep ibadah dan elemen transliterasi makhraj melalui video yang interaktif. Hal ini

menunjukkan perkembangan kosa kata dalam memahami istilah agama perlu kepada pembangunan rekabentuk kurikulum yang bertepatan dengan PBK. Penghasilan BBM dan konsep latihan berasaskan 3V boleh diketengahkan dengan mereka bentuk berasaskan gambar dan visual yang jelas, ejaan jari dan gerak bibir yang konsisten dan komunikasi gerak badan dengan memek emosi yang dilaksanakan samada secara bersemuka atau simulasi virtual.

Pendekatan pembelajaran dan pengajaran PBK memberikan implikasi yang positif dengan kerjasama yang baik antara guru, ibu bapa dan pelajar. Pemantauan terhadap penglibatan semua pihak samada sekolah, penggubal, pelaksana dan komuniti perlu diberikan ruang dan peluang menambahbaik kurikulum agar pelajar PBK mampu memahami agama dan mengamalkan sebaiknya. PBK perlu diberikan tahap kefahaman dalam melaksanakan tanggungjawab sebagai muslim walaupun mereka tidak seperti pelajar normal. Kurikulum Pendidikan Islam perlu diberi perhatian untuk pembangunan bahan yang interaktif, mesra pengguna, efektif dan fleksibel untuk dipraktis oleh PBK samada secara bersemuka atau dalam talian.

7. Kesimpulan

Perubahan pola pembelajaran samada dalam talian atau bersemuka tidak mengganggu perubahan PBK jika pendekatan yang digunakan bersesuaian dan bertepatan dengan objektif pembelajaran. Oleh itu, secara keseluruhannya didapati bahawa hala tuju Pendidikan Islam untuk PBK memerlukan usaha yang berterusan dalam meningkatkan kualiti dan membangunkan kompetensi guru terutamanya dalam mengaplikasikan Bahasa Isyarat Malaysia (BIM) dengan menerapkan istilah agama yang tepat. Malah, pengunaan BBM dan alat bantuan pendengaran dan pembelajaran perlu dimanfaatkan dengan susunan modul yang sesuai dan kreatif melalui video dan visual. Justeru, praktis dalam perihal amali samada bacaan, perbuatan, pemerhatian turut diambil berat untuk mengukuhkan kefahaman topik. Kajian amalan pengajaran Pendidikan Islam Khas boleh dilaksanakan untuk memahami konteks pengajaran PBK (pendengaran) dengan lebih berkesan berasaskan elemen komunikasi, bahan bantu dan praktikal amali. Implikasi dari pendekatan pembelajaran Pendidikan Islam PBK yang baik boleh memberi ruang dan peluang kepelbagaian kurikulum untuk dipraktiskan selari dengan kehidupan beragama. Hal ini kerana, kerjasama antara komuniti PBK, ibu bapa, intitusi pengajian dan pihak penggubal untuk memastikan istilah asas Fardu Ain boleh dipantau pemahaman dan dilatih dalam kehidupan dengan baik.

Penghargaan

Sekalung penghargaan untuk sesi *Bengkel Penulisan Ulasan Artikel* yang mendorong pembentukan tema dalam kertas ini. Selain itu, pensyarah kursus Pendidikan Islam KKA yang membantu memahami topik yang dikaji untuk menstrukturkan ulasan dengan lebih baik.

Rujukan

Ab Rahman, B., Hashim, A., & Ishak, H. (2021). the Medium of Communication Islamic Education Teachers in Al-Quran Recitation of Integrated Special Education Programme (Hearing Disability). *International Journal of Education, Psychology and Counseling*, *6*(38), 110–125. https://doi.org/10.35631/ijepc.6380010

Achmad Fiqhi, I., Diana, R., & Wita, I. (2020). Hijaiyah Letters Sign Language Recognition for Deaf and Hearing Impaired Children Based on Principal Component Analysis Method. *Journal of Physics: Conference Series*, *1569*(3). https://doi.org/10.1088/1742-6596/1569/3/032077

Ahmad Razuan, S. R., Mohd Raus, N., Hashim, M., Rasdi, M. N. A., Mohamed Yusoff, A., Ja'afar, N., & Muhamad, N. A. F. (2019). Pendidikan Al-Quran Bagi OKU: Pengalaman Pusat Penyelidikan Ibnu Ummi Maktum (UMMI). *'Abqari Journal*, *20*(2), 78–98. https://doi.org/10.33102/abqari.vol20no2.216

Alsharbi, B. M., Mubin, O., & Novoa, M. (2021). Quranic education and technology: Reinforcement learning system for non-native Arabic children. *Procedia Computer Science*, *184*(2019), 306–313. https://doi.org/10.1016/j.procs.2021.04.007

Awang@Husain, M. H., Zakaria, H. B., & Abd Rahim, R. A. (2012). Pendidikan Islam Golongan Masalah Pendengaran : Tinjauan Awal Isu dan Cabaran daripada Perspektif Guru. *Jurnal Teknologi (Social Sciences)*, *58*, 135–139. https://sainshumanika.utm.my/index.php/sainshumanika/article/view/213

Dayang Kamaliah, A. A., & Norshidah, M. S. (2020). Tahap kesediaan guru Pendidikan Islam terhadap pengajaran murid Pendidikan Khas di Sarawak. *Persidangan Antarabangsa Sains Sosial Dan Kemanusiaan*, *5*(November), 439–449.

Dzulkifli, I. (2021). Teaching and Learning AIDS to Support the Deaf Students Studying Islamic Education. *Pertanika Journal of Social Sciences and Humanities*, *29*(4), 2263–2279. https://doi.org/10.47836/pjssh.29.4.09

Dzulkifli, I., & Suhid, A. (2018). Pendidikan Islam Pemangkin Modal Insan OKU Muslim. *Journal of Quran Sunnah Education & Special Needs*, *2*(2), 37–45. https://doi.org/10.33102/jqss.vol2no2.17

Dzulkifli, I., Suhid, A., Fakhruddin, F. M., & Ahmad, N. A. (2020). Communication challenges in teaching islamic education to pupils with hearing impairment. *International Journal of Islamic Thought*, *18*, 13–26. https://doi.org/10.24035/IJIT.18.2020.177

Hashim, A., Rahman, B. A., & Ishak, H. (2019). Amalan Pengajaran Guru Pendidikan Islam dalam Bidang Tilawah Al-Quran Amalan Pengajaran Guru Pendidikan Islam dalam Bidang Tilawah Al-Quran Program Pendidikan Khas Integrasi (Masalah Pendengaran). *Journal of Islamic and Arabic Education*, *9*(2), 1–11.

Hj Nor, S. M., & Rashed, Z. N. (2018). Peranan dan Cabaran Guru-Guru Pendidikan Khas Membentuk Kemenjadian Murid-Murid Masalah Pendengaran dalam Abad ke 21. *Journal of Quran Sunnah Education & Special Needs*, *2*(1), 1–8. https://doi.org/10.33102/jqss.vol2no1.10

Jawas, S. A., & Zulkifli, H. (2022). Amalan Pengajaran Kreatif Guru Pendidikan Islam Bagi Murid Berkeperluan Khas Masalah Pembelajaran [Creative Teaching Practices By Islamic Education Teachers for Students With Learning Disabilities]. *QALAM International Journal of Islamic and Humanities Research*, *2*(1), 2022.

Karamah, U., Alias, B., Ishak, H. Bin, & Mohamad, S. Bin. (2019). Kaedah-Kaedah Bacaan al-Quran dalam Kalangan Orang Kurang Upaya Pendengaran Methodology of Qur ' an Recitation for Hearing-Impaired Person. *Jurnal Al-Turath*, *4*(2), 59–67.

Khamaruddin, S. R., Muhamad, N. A. F., Mohd Raus, N., Mohamed Yusoff, A., Hashim, M., Ja'afar, N., & Rasdi, M. N. A. (2020). Penilaian Bahasa Isyarat Baharu untuk Pengajaran dan Pembelajaran Solat bagi Orang Pekak: [Evaluation of New Sign Language for Teaching and Learning of Prayers for Deaf People]. *ULUM ISLAMIYYAH-The Malaysian Journal of Islamic Sciences*, *32*(1), 93–131. https://doi.org/10.33102/uij.vol32no1.01

Loughran, S. (2013). Cultural Identity, Deafness and Sign Language: A Postcolonial Approach. *Lux*, *2*(1), 1–8. https://doi.org/10.5642/lux.201301.19

Mahd Nor, N. I. (2021). Pendidikan Islam bagi Kanak-Kanak Berkeperluan Khas: Guru sebagai Murabbi. *Journal of Quran Sunnah Education & Special Needs*, *5*(1), 64–76. https://doi.org/10.33102/jqss.vol5no1.92

Omar, N., Yaakob, R., Sulaiman, R., & Yuslizam Yakar, S. (2021). Challenges in Teaching and Learning of Fardhu Ain Classes for the Deaf in Malaysia. *Sains Insani 2021*, *6*(3), 77–84.

Sabdan, M. S. Bin, Alias, N., Yusof, M. Y. @ Z. M., & Jomhari, N. (2020). Keperluan Pembangunan Modul Pedagogi Surah Al-Fatihah Dan Tiga Qul Berasaskan Teknologi Untuk Pelajar Pekak Di Kolej Vokasional. *Jurnal Kurikulum & Pengajaran Asia Pasifik*, *8(1)*(April), 2013–2025.

Safarina Ujang, & Norshidah Mohamad Salleh. (2018). Pelaksanaan Jawi, Al-Quran, Bahasa Arab, Fardu Ain (j-QAF) dalam Program Pendidikan Khas Integrasi. *Jurnal ORTOPEDAGOGIA*, *4*(1), 59–65.

Siti Ramna Khamaruddin, Nurul Asiah Fasehah Muhamad, Norakyairee Mohd Raus, Adnan Mohamed Yusoff, Mahyuddin Hashim, Noornajihan Jaafar, & Mohd Nur Adzam Rasdi. (2018). Analisis Keperluan Pembangunan Bahasa Isyarat Malaysia Bagi Terminologi Ibadah. *International Joural For Studies on Children, Women, Elderly and Disabled*, *4*, 63–68.

Suzana Harun, Hussin, Z., & Sulaiman, A. M. (2021). Pengajaran Guru Pendidikan Islam Di Kelas Inklusif: Fenomena Semasa Dan Keperluan Pembentukan Model. *Sains Insani*, *6*(2). https://doi.org/10.33102/sainsinsani.vol6no2.318

Syar Meeze Mohd Rashid, Norlidah Alias, Nazean Jomhari, & Mohd Yakub Zulkifli Mohd Yusof. (2015). Rekabentuk Isi Kandungan Kurikulum Bahasa Isyarat Malay. *Jurnal Kurikulum & Pengajaran Asia Pasifik*, *Bil 3*(3), 20–31.

PENERIMAAN PELAJAR TERHADAP PENGGUNAAN TELEFON PINTAR SEBAGAI ALAT PEMBELAJARAN

Nur Hazwani Nerrahim[1] dan Harziah Ahmad Hanif [2]

[1,2]Politeknik Kota Kinabalu
Sabah, Malaysia
[1]nurhazwani@polikk.edu.my
[2]harziah@polikk.edu.my

Abstrak: Kajian ini dilaksanakan bertujuan mengenalpasti sejauh mana penerimaan pelajar terhadap penggunaan telefon pintar sebagai alat pembelajaran. Kajian kuantitatif ini melibatkan seramai 144 responden dikalangan pelajar politeknik. Data dikutip dengan cara mengedarkan soal selidik secara *"google form"* menggunakan teknik Pensampelan Bertujuan. Data yang diperoleh telah dianalisis dengan mengunakan perisian SPSS v.23 untuk analisis deskriptif bagi mendapatkan nilai skor min. Hasil kajian mendapati responden bersetuju menerima telefon pintar untuk pembelajaran. Responden juga bersikap positif terhadap telefon pintar untuk pembelajaran dan bersetuju dengan penggunaan telefon pintar untuk pembelajaran pada masa hadapan. Walaupun begitu, ianya pada tahap sederhana. Penerimaan telefon pintar yang sederhana terhadap pembelajaran dan sikap yang sederhana terhadap telefon pintar untuk pembelajaran masa kini dan masa akan datang menggambarkan pelajar tidak menggunakan sepenuhnya telefon pintar untuk tujuan akademik dan pencarian ilmu pengetahuan. Pelajar mungkin menggunakan telefon pintar untuk tujuan lain yang kurang bermanfaat seperti hiburan dan permainan video. Pelajar perlu diberi pendedahan oleh ibubapa, guru-guru dan orang yang lebih dewasa tentang pelbagai manfaat yang boleh pelajar perolehi dari penggunaan telefon pintar dengan cara yang betul. Perisian pembelajaran yang menarik dan interaktif, yang boleh dilayari melalui telefon pintar juga perlu dibangunkan oleh pihak yang bertanggungjawab bagi menarik perhatian pelajar terhadap pembelajaran dalam.

Kata kunci: *Penerimaan telefon pintar, alat pembelajaran, pelajar Politeknik*

1. Pengenalan

Institusi pendidikan di seluruh negara terpaksa membuat keputusan yang sukar tentang pengajaran dan pembelajaran semasa krisis pandemik Covid-19 (Salleh et al., 2021). Untuk meneruskan pendidikan perlu diteruskan dengan memilih untuk menukar pembelajaran secara bersemuka kepada pembelajaran dalam talian. Instrumen pembelajaran seperti komputer riba dan telefon pintar mula digunakan secara meluas dengan sambungan internet untuk mengikuti

kelas dalam talian. Telefon pintar ialah instrumen yang inovatif dan berpotensi dalam tetapan pendidikan. Ia sangat membantu menyokong pengajaran di kampus dan meningkatkan aktiviti pengajaran dan pembelajaran. Selain itu, telefon pintar menawarkan cara baharu penglibatan pelajar yang mempunyai impak ketara kepada sistem pendidikan semasa (Abdul Hamid et al., 2019).

Di samping itu, telefon pintar boleh menggalakkan perbincangan dan perkongsian antara pelajar dan pendidik selain daripada membolehkan pelajar mengakses kandungan kursus dan maklumat lain yang berkaitan (Cochrane, 2010). Walaupun begitu, penggunaan telefon pintar bukan sekadar alat tetapi perlu juga kepada kekuatan internet. Tanpa internet, telefon pintar juga tidak dapat berfungsi untuk tujuan pembelajaran. Banyak tinjauan dijalankan di Sabah mendapati ramai pelajar mempunyai telefon pintar yang tidak canggih dan kekurangan internet berkelajuan tinggi, yang mungkin boleh mengubah persepsi dan penerimaan mereka terhadap telefon pintar. Oleh itu, tujuan kajian ini adalah untuk menilai tahap penerimaan pelajar Politeknik Kota Kinabalu terhadap penggunaan telefon pintar sebagai alat pembelajaran.

2. Metodologi

Responden kajian ini adalah terdiri pelajar Politeknik Kota Kinabalu daripada Jabatan Perdagangan. Seperti yang ditunjukkan dalam Jadual 1, sampel kajian terdiri daripada 144 pelajar: 47 lelaki dan 97 pelajar perempuan di semua peringkat diploma. Reka bentuk kajian adalah secara Kuantitatif. Teknik pensampelan bertujuan digunakan dengan membuat pertimbangan untuk mendapat saiz dan pilihan sample. Instrumen yang digunakan untuk mendapatkan data adalah menggunakan soal selidik menggunakan *Google form.* Data yang diperoleh akan dianalisis menggunakan perisian SPSS v.23 untuk analisis deskriptif bagi mendapatkan nilai skor min. Nilai skor min akan di terjemah kepada nilai tahap seperti yang dicadangkan oleh Ngadiman et al. (2019) seperti berikut: 1.00– 1.99 (Lemah), 2.00– 2.99 (Rendah), 3.00– 3.99 (Sederhana) dan 4.00– 5.00 (Tinggi).

3. Analisis

3.1 Latar Belakang Responden

Jadual 1 menunjukkan perincian latar belakang responden yang terdiri daripada pelajar dari semester 1 sehingga semester 6 Politeknik Kota Kinabalu, Sabah, yang terdiri daripada tiga program iaitu Diploma Akautansi ,Diploma Pemasran dan Diploma Logistik dan Rantaian Bekalan di Jabatan Perdagangan.Tempoh masa yang digunakan untuk mendapatkan data adalah selama seminggu selepas *"google form"* diedarkan. Item yang perlu dijelaskan di bahagian ini adalah majoriti pelajar menggunakan telefon pintar sepanjang pembelajaran dalam talian, berbanding dengan komputer riba, personal komputer dan lain-lain. Data juga menunjukkan bahawa ramai telefon pintar pelajar berharga RM1,000 lebih ke atas (34.0 peratus).

Jadual 1: Latar belakang responden

Item		n	%
Jantina	Lelaki	47	32.6
	Perempuan	97	67.4
Program	DAT	24	16.7
	DLS	97	67.4
	DPR	23	16.0
Kediaman pelajar	Asrama / kolej kediaman	22	15.3
	Rumah keluarga	118	81.9
	Rumah sewa	4	2.8
Semester	Semester 1 - 2	62	43.1
	Semester 3 - 4	54	37.5
	Semester 5 - 6	28	19.4
Kuota langganan internet	5 Gb Ke Bawah	37	25.7
	6 Gb Hingga 10 Gb	17	11.8
	11 Gb Hingga 20 Gb	15	10.4
	Tiada Had	75	52.1
Alat untuk pembelajaran dalam talian	Laptop/ komputer riba	60	41.7
	Personal Komputer	4	2.8
	Tablet	3	2.1
	Telefon pintar	77	53.5
Adakah anda rasa telefon bimbit anda benar-benar sesuai untuk semua tujuan pembelajaran	Tidak	37	25.7
	Tidak Pasti	18	12.5
	Ya	89	61.8
Adakah anda rasa perlu menukar telefon bimbit anda untuk semua tujuan pembelajaran?	Tidak	55	38.2
	Tidak Pasti	24	16.7
	Ya	65	45.1
Berapakah harga telefon pintar anda?	RM100	2	1.4
	RM200	5	3.5
	RM300	3	2.1
	RM400	9	6.3
	RM500	21	14.6
	RM600	18	12.5
	RM700	11	7.6
	RM800	15	10.4
	RM900	11	7.6
	RM1,000 dan keatas	49	34.0

3.2 Analisis Deskriptif

Jadual 2 menunjukkan tahap penerimaan dalam bahagian ini dibahagikan kepada tiga bahagian iaitu bahagian a) tahap penerimaan telefon pintar untuk pembelajaran; bahagian b) sikap terhadap telefon pintar untuk pembelajaran; dan bahagian c) kecenderungan untuk menggunakan telefon pintar untuk pembelajaran pada masa hadapan. Melihat kepada skor min yang diperoleh untuk ketiga-tiga bahagian adalah pada tahap sederhana .Untuk tahap penerimaan, secara keseluruhannya adalah pada tahap sederhana. Sementara itu, untuk sikap, semua item berada pada tahap sederhana juga. Manakala untuk penggunaan pada masa hadapan, tahap penerimaan pada masa hadapan juga pada tahap sederhana.

Jadual 2: Tahap Penerimaan Telefon Pintar Untuk Pembelajaran

Kod item	Item kajian	Sisihan Piawai	Skor Min	Tahap
	A. Penerimaan Telefon Pintar Untuk Pembelajaran			
M1	Belajar menggunakan telefon pintar adalah sangat mudah	1.08	3.84	Sederhana
M2	Saya dapati mudah untuk mendapatkan telefon pintar untuk tujuan pembelajaran	1.11	3.67	Sederhana
M3	Interaksi saya dengan telefon pintar akan jelas dan boleh difahami	0.98	3.82	Sederhana
M4	Saya dapati telefon pintar adalah fleksibel untuk berinteraksi dalam kelas	1.00	3.88	Sederhana
M5	Mudah untuk menjadi mahir menggunakan telefon pintar	0.98	3.94	Sederhana
M6	Menggunakan telefon pintar telah memudahkan saya belajar	0.99	3.88	Sederhana
M7	Menggunakan telefon pintar telah meningkatkan prestasi pembelajaran saya	0.99	3.74	Sederhana
M8	Menggunakan telefon pintar telah meningkatkan keberkesanan pembelajaran saya	1.00	3.82	Sederhana
M9	Menggunakan telefon pintar telah meningkatkan kecekapan pembelajaran saya	1.00	3.80	Sederhana
M10	Menggunakan telefon pintar telah memberi saya kawalan yang lebih besar dalam proses pembelajaran	0.99	3.75	Sederhana
M11	Saya dapati telefon pintar berguna untuk pembelajaran dalam talian.	0.99	4.00	Tinggi

B. Sikap Terhadap Telefon Pintar Untuk Pembelajaran				
S1	Menggunakan telefon pintar untuk pembelajaran adalah idea yang sangat baik	1.01	3.83	Sederhana
S2	Pada pendapat saya adalah sangat wajar menggunakan telefon pintar untuk pembelajaran	1.03	3.75	Sederhana
S3	Adalah lebih baik menggunakan telefon pintar	1.12	3.47	Sederhana
S4	Saya suka / tidak suka idea menggunakan telefon pintar untuk pembelajaran	1.11	3.54	Sederhana
C. Penggunaan Telefon Pintar Untuk Pembelajaran Pada Masa Hadapan				
P1	Saya berhasrat untuk memanfaatkan telefon pintar untuk pembelajaran pada masa hadapan	1.01	3.90	Sederhana
P2	Saya berhasrat untuk meningkatkan penggunaan telefon pintar pada masa hadapan untuk pembelajaran	1.03	3.88	Sederhana

4. Perbincangan

Penggunaan telefon pintar masih di tahap sederhana dalam penerimaan dan penggunaan telefon pintar di kalangan pelajar untuk proses pencarian ilmu pengetahuan, hal ini disebabkan pelajar tidak menggunakan sepenuhnya telefon pintar untuk tujuan akademik dan pencarian ilmu pengetahuan tetapi pelajar berkemungkinan menggunakan telefon pintar untuk tujuan lain yang kurang bermanfaat seperti hiburan dan permainan video. Hal ini merujuk kepada, kajian Abdul Hamid et al. (2019), menunjukkan bahawa telefon pintar menyokong pembelajaran pelajar, tetapi terdapat pengetahuan yang terhad mengenai hasil penggunaannya dalam tetapan pendidikan. Kajian tersebut memberikan gambaran tentang penggunaan telefon pintar oleh pelajar dalam pendidikan. Menurut Tuncay (2016), telefon pintar menggabungkan pelbagai ciri, memberikan mobiliti dan hiburan kepada penggunanya bahawa peranti teknologi canggih ini menjadi sebahagian yang tidak dapat dielakkan dalam kehidupan kebanyakan orang. Oleh itu, pelajar masih memerlukan pendedahan supaya mereka jelas bahawa penggunaan telefon pintar dalam pembelajaran dapat memberi manfaat dan kemudahan kepada mereka dalam proses pencarian ilmu pengetahuan. Dengan itu, kajian akan datang amat diperlukan untuk penambahbaikan, dalam membuat perbandingan antara penggunaan telefon pintar tujuan pembelajaran dan hiburan.

5. Kesimpulan

Penggunaan telefon pintar boleh dijadikan instrumen yang inovatif dan berpotensi dalam tetapan pendidikan. Ia sangat membantu menyokong pengajaran di kampus dan meningkatkan aktiviti pengajaran dan pembelajaran. Justeru, kajian ini mengukur tahap penerimaan penggunaan telefon pintar untuk pembelajaran, sikap terhadap telefon pintar untuk pembelajaran dan penggunaan telefon pintar untuk pembelajaran pada masa hadapan. Secara keseluruhannya, Hasil kajian mendapati responden bersetuju menerima telefon pintar untuk pembelajaran. Responden juga bersikap positif terhadap telefon pintar untuk pembelajaran dan bersetuju dengan penggunaan telefon pintar untuk pembelajaran pada masa hadapan. Walau bagaimanapun, ia masih di tahap sederhana dalam penerimaan dan penggunaan telefon pintar dalam kalangan pelajar untuk proses pencarian ilmu pengetahuan, hal ini disebabkan pelajar tidak menggunakan sepenuhnya telefon pintar untuk tujuan akademik dan pencarian ilmu pengetahuan tetapi pelajar berkemungkinan menggunakan telefon pintar untuk tujuan lain yang kurang bermanfaat seperti hiburan dan permainan video. Oleh itu, pelajar masih memerlukan pendedahan supaya mereka jelas bahawa penggunaan telefon pintar dalam pembelajaran dapat memberi manfaat dan kemudahan kepada mereka dalam proses pencarian ilmu pengetahuan. Dengan itu, kajian akan datang amat diperlukan untuk penambahbaikan, dalam membuat perbandingan antara penggunaan telefon pintar tujuan pembelajaran dan hiburan.

Rujukan

Abdul Hamid, N. F., Ali, N. S. H., & Mohd Nazri, N. S. (2019). Investigating the perception and acceptance towards smartphone and its application as learning tool among Universiti Teknologi MARA dental students.

Cai, G., & Ni, C. (2022). High-Reliability Business Management Strategy Analysis Based on GPRS Wireless Communication. *Wireless Communications and Mobile Computing*, *2022*.

Cochrane, T. D. (2010). Beyond the Yellow Brick Road: mobile Web 2.0 informing a new institutional e-learning strategy. *Australasian Journal of Educational Technology*, *26*(8).

Ngadiman, D. W. T., Yacoob, S. E., & Wahid, H. (2019). Tahap Harga Diri Kumpulan Berpendapatan Rendah yang Berhutang dan Peranan Organisasi dalam Sektor Perladangan. *Melayu: Jurnal Antarabangsa Dunia Melayu*, *12*(2), 238-254.

Rakhmatov, D. (2021). Mobile technologies in the higher education system. *Mental Enlightenment Scientific-Methodological Journal*, *2021*(02), 182-196.

Robinson, T., Cronin, T., Ibrahim, H., Jinks, M., Molitor, T., Newman, J., & Shapiro, J. (2013). Smartphone use and acceptability among clinical medical students: a questionnaire-based study. *Journal of medical systems*, *37*(3), 1-7.

Rung, A., Warnke, F., & Mattheos, N. (2014). Investigating the use of smartphones for learning purposes by Australian dental students. *JMIR mHealth and uHealth*, *2*(2), e3120.

Salleh, M., Jamaludin, M. F., Safie, N. S. M., & Yusof, J. M. (2021). Tinjauan keberkesanan pembelajaran secara dalam talian ketika pandemik Covid-19: Perspektif pelajar sains kejuruteraan Politeknik Ibrahim Sultan. *Jurnal Dunia Pendidikan*, *3*(1), 374-384.

Tuncay, N. (2016). Smartphones as Tools for Distance Education. *Online Submission*, *6*(2), 20-30.

Wang, H. (2021). Design and implementation of web online education platform based on user collaborative filtering algorithm. In *2021 4th International Conference on Information Systems and Computer Aided Education* (pp. 2911-2918).

A SHARIAH COMPLIANCE INTEGRATED E-COMMERCE TRANSACTION AN ANALYSIS OF SHOPEE.COM: A LITERATURE REVIEW

Armila Mat Lazim[1] and Sharifah Zuhaira Syed Mizuri[2]

[1,2]Politeknik Ungku Omar, Malaysia
[1]armila@puo.edu.my
[2]sharifah@puo.edu.my

Abstract: A few Shariah concerns may arise from the usage of information and communication technologies for online business transactions. Although numerous studies have touched on the concerns from an Islamic perspective, none of them present an empirical examination on e-commerce transactions in the context of Islamic contract law. Therefore, the objectives of this study are to first assess whether online purchases are permissible from a Shariah viewpoint, particularly in the context of Islamic contract law, and then to examine whether or not e-commerce transactions comply to Shariah standards. In order to achieve the study's first objective, library research is used to examine both classical and contemporary literature. Shopee.com is selected as a case study for the second purpose. This gives us a base for understanding how the Islamic law of contracts may be implemented to digital transactions. Results show that, in general, Shopee's online transactions satisfy the Shariah requirements of a valid contract, with the exception of two situations: (i) transactions involving prohibited goods like alcohol, pork, non-halal food and beverages, and (ii) payment methods using credit cards (interest).

Keywords: *E-commerce; Contract of Islamic Law; Shariah-compliance; Shopee.com*

1. Introduction

People are now able to do business online due to the internet's widespread adoption across a wide range of industries. E-commerce is basically comparable with traditional paper-based business transactions. Sellers offer their goods, prices, and conditions available to new customers in both situations. When possible, buyers will discuss conditions and pricing before making purchases and processing payments. With the delivery of the acquired goods, the procedures are finished. From the perspective of Shariah, each and every transaction, whether it takes place in a physical location or online, is viewed as a contract. The contract should follow a number of standards outlined by the Shariah in order to ensure the contract is valid. This is necessary for Muslims to accept and conduct online commercial transactions. Although several studies have looked at e-commerce related issues from an Islamic viewpoint, it has been observed that none have empirically reviewed the step-by-step processes of e-commerce transactions in the context of Islamic contract law. The research examines the fundamental elements of a contract and the principles of Shariah to fill this gap. It then conducts a case study on Shopee.com to explore into how Shariah-compliant its online transactions are.

E-commerce, in its broadest sense, is any type of commercial transaction carried out via the use of information and communication technology (ICT) (Majid & Yahaya, 2022). E-commerce is defined more specifically by (Adila et al., 2022) as the purchase process, offering for sale, transferring, or exchange of goods, services, and/or information over a network connection, including the Internet. Even though it is not a recent phenomenon of the contemporary day, e-commerce has a similar meaning to traditional commerce in Islam since it similarly requires contracts to exchange valuable assets or possessions from one party to another in order to make money (Muneer, 2016). Since Islamic law of contract primarily strives to safeguard the interests of parties engaged in a transaction and eliminate damages, all e-commerce activities must also comply to its guidelines and principles, therefore enhancing the Islamic ethical code of commerce and business (Ishfaq, 2021).

According to Mohd Zulkifli et al., (2021) there are some requirements for e-commerce that also apply to Islamic financial transactions, including: (i) all transactions are permitted unless there is a strong justification that implies otherwise; (ii) every transaction must ensure the mutual benefit and justice of the parties; (iii) every transaction must be free of basic forbidden characteristics like usury (*riba*), uncertainty (*gharar*), and gambling (*maysir*).

Riba occurs in loan and sale transactions. The former refers to increased amounts that the creditor earns from his debtor in considerations of the period allocated for the loan repayment, and the latter takes place when the exchange of money for money is not hand-to-hand or in an equivalent amount (Hassan et al., 2021). *Riba* is forbidden according to the Quran, Sunnah, and consensus. Shariah aims at removing not just the inherent exploitation of the institution of interest but also that which is inherent in all kinds of unfair exchange in all modes of economic dealings (Majid & Yahaya, 2022). *Gharar*, on the other hand, indicates a lack of knowledge, recklessness, and uncertainty (Rhanoui & Belkhoutout, 2019). In an exchange contract, it could be affixed to the thing being exchanged or the cost. *Gharar* may be divided into two categories: excessive and minor. Because it cannot be avoided completely in each business transaction, the latter category can be permitted. *Maysir* is also known as gambling. It means the obtain of riches via chance, whether or not it violates another person's rights (Borlakova & Kubanova, 2020). Islam forbids gambling because it believes that wealth should be acquired through hard labour and effort, not by luck alone (Abedifar, 2021).

In addition to the prohibition listed above, Islamic law stipulates that all transactions must satisfy fundamental requirements and associated criteria, such as contracting parties (buyer and seller), subject matter (object and price), and form (offer and acceptance) in order to assure the legality of transactions (Riyanti, 2022). From the standpoint of Islamic contract law, each of these prerequisites is described in the next section along with the conditions that must be met.

Conditions and Requirements for Lawful Online Transactions: The following criteria must be met in order for an online transaction to be legitimate and enforceable under Islamic valid contract. In terms of form, a contract has two parts which is an offer and an acceptance (Suhaimi et al., 2017). An offer is the initial suggestion made by either the buyer or the seller in a contract. An acceptance, on the other hand, is a declaration that the other party to the contract has read and agrees to the conditions of the offer (Rahman & Muhammad, 2021). The majority of Muslim scholars agree that, in addition to verbal communication, offers and acceptances can also be made through the phone, fax, or telex, or even by the actions or body

language of the parties to the contract. Offer and acceptance must be mutually consistent, unambiguous, and related (Adila et al., 2022).

In traditional commerce, the parties to the agreement meet in person for one meeting and discuss the details of the agreement. As a result, there is a connection, clarity, and consistency between the offer and the acceptance (Ribadu et al., 2020). There are two circumstances in which an offer and acceptance can occur in the context of e-commerce. The first scenario is the offer and acceptance take place in one meeting spot via instant writing, such as chatting, or via electronic communication, such as a teleconference, making the parties virtually present in the area (even when they are at different locations). In this case, the agreement will be seen as having been reached by the parties in attendance because it was reached at a constructive meeting (Gholo et al., 2022). Next circumstance is the offer and acceptance take place through computer screens, such as interactive websites and emails, without the parties being able to see, hear, or engage with each other physically or electronically (Rahman & Muhammad, 2021).

According to the Council of Islamic Fiqh Academy, a contract is considered to be finalised when the offeror conveys the offer to the offeree and the offeree tells the offerors of his acceptance. The decision is founded on the viewpoint of ancient jurists on how a contract between inter-absentees might be concluded, such as by a letter or a messenger. Even though there may be gaps in time and distance, the meeting location is seen to be consistent since the messenger or letter qualifies as ‘a representative’ acting and making an offer on the seller's behalf (Kambol, 2018).

Some believe that when a vendor posts an item for sale on their website, the meeting session for e-commerce begins instantly (Hidayat et al., 2020), however (Mohd Zulkifli et al., 2021) argues that the session should instead begin when a buyer expresses interest in a transaction by clicking on the listed item on a seller's website, then adds the item to his shopping cart after reviewing the details and the price. Therefore, an offer is made when a seller requests confirmation, such as "Are you in agreement?" When the buyer acknowledges the purchase and continues with the payment, acceptance has already occurred, and the contract is now complete. (Asuhaimi et al., 2022) viewpoint is thus chosen since in traditional commerce, the meeting session also begins when a customer selects an item from the shelves and proceeds to the checkout. He makes the payment, which completes the deal.

In terms of contracting parties, Islam places a strong emphasis on the need for mutual consent between contracting parties and forbids claiming another person's property without their permission (Rio et al., 2022). In a transaction, the necessity for mutual consent is essential, otherwise, the contract is invalid and has no legal force (Gholo et al., 2022). Without the owner's permission, no property should be removed from its owner. Such an idea is based on a passage from the Quran that reads: "O you who have faith! Do not unfairly divide your property among one another unless it is in the context of a deal agreed upon by all parties" (4:29). It has also been stated that the Prophet (peace be upon him) said, "Sale is but based on mutual consent." These facts make it very evident that all business dealings must be founded on the voluntary consent of all parties. Any element that breaches this condition might thus declare the contract void. For example, coercion invalidates the contract because there was no free will

involve in the transaction. But consent is a private, internal thing. As a result, the contractual parties' offers and acceptances serve as the exterior proof of consent.

Additionally, contractual parties must be people who are lawfully qualified to conduct business. The primary prerequisite for both the buyer and the seller is legal capacity (*ahliyyah*). According to Islamic law, it is the characteristic that makes a person eligible to receive what is legally due to him or qualify him to fulfil his legal responsibilities (Yaqin, 2022). Therefore, since a youngster lacks legal ability, his selling and purchasing acts are deemed illegal. Only with his guardian's consent would the transaction be legal. Additionally, the person presenting the item as the subject of the transaction must be the owner and have exclusive authority (*milkiyyah*) over it. "Do not sell what you do not have," the Prophet (peace be upon him) said. When mediating a transaction on behalf of another party, the mediator or broker must obtain authorization to serve in the capacity of an agent who represents the asset owner (Wan Ismail et al., 2020).

In terms of subject matter, a contract's subject matter which includes the item or thing being purchased and the price, must meet a number of requirements, most notably that it be valid, valuable, present, deliverable, and precisely specified. The item being traded must be acceptable and legal under Islamic law. As a result, since their consumption is forbidden in Islam, it is forbidden to sell wine, dead animals, or pork (Ab Halim & Mohd Salleh, 2020). The item also has to be real and delivered from one party to another. Accordingly, the transaction is invalid if the object does not exist and the seller is unable to provide it. For example, selling stray pets, birds in the sky, or fish in the sea is illegal since the vendor lacks the legal right to deliver the items. This criterion is essential to prevent doubt (*gharar*) that could result from the seller's incapacity to make delivery and to guarantee that the buyer would have unhindered access to the object.

The parties to a contract must also be aware of the object and the price, and they must be able to accurately identify and describe both. Lack of information of the subject matter and its features may render the transactions void since it may cause a dispute. Billah (2019) said that information on the issue may be discovered by physical observation, hint, or description.

2. Materials and Methods

The study uses library research to acquire data on the idea of contract in Islamic law, where both classical and contemporary literature has been investigated, in order to comprehend the permissibility of online transactions from the Shariah perspective. The study then uses a content analysis approach to examine the opinions, arguments, and disagreements among jurists and academics about Islamic contract law, particularly in light of contemporary digital transactions. In order to offer a foundation for future interpretation on the applicability of Islamic contract law in the situation of electronic transactions in an online environment, Shopee.com was chosen as the case study. In this respect, step-by-step procedures for completing an online transaction on the website were examined in accordance with the aforementioned crucial conditions of a contract under Islamic law.

Case Study: Shopee is an online marketplace where customers can browse, buy, and sell on the go. It aims to make online transactions safer and more convenient for both consumers and

sellers. Shopee.com is able to provide its clients with a wider variety of new, refurbished, and used goods in a variety of categories, including toys, groceries, jewellery, sports and outdoor gear, computers, autos, and industrial goods in addition to the usual selection of books, movies, digital downloads, electronics, and computers.

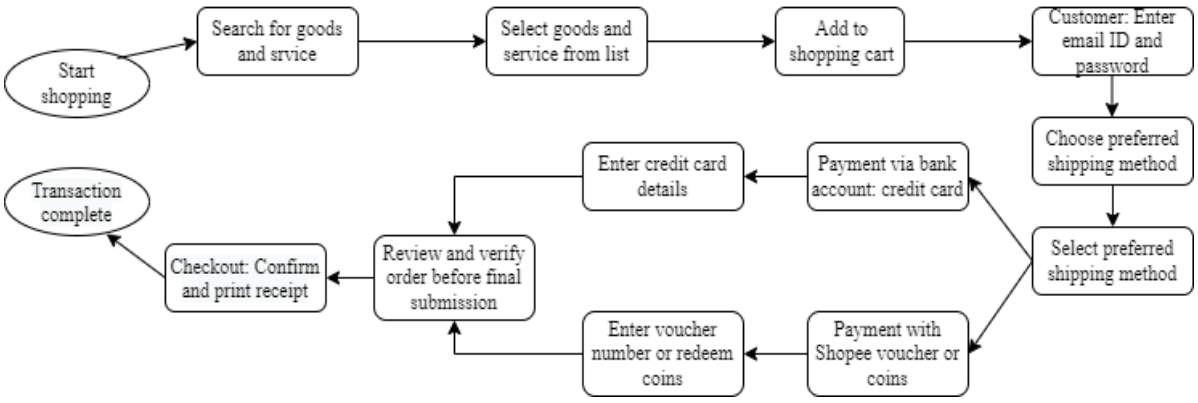


Figure 1: Processes for Standard Transactions on Shopee.com (Adapted from Shankar et al., 2021)

According to Figure 1, which shows the general flow of online transactions at Shopee.com, a transaction consists of six (6) specific components. After reviewing an online catalogue of goods and their costs, a customer (buyer) puts an order and makes payments online. Shopee.com is also known as a seller or broker, facilitates online purchases by offering items for sale and/or acting as a middleman. Shopee.com also makes sure that online payments are received before the seller completes and delivers an order. Product (subject matter) is an item traded during the transaction. Price: The sum requested as payment. Payment services is the main actors in online financial processing include banks, credit card firms, and payment clearing institutions. Product delivery is done by distributors and delivery services that fulfil orders for deliveries of the product.

3. Results and Discussion

This part describes the findings from an analysis of Shopee's digital purchasing, which are based on the crucial criteria indicated in the section before. Form: As was already said, an e-commerce meeting session begins when a purchaser clicks on a product supplied on a seller's website and then proceeds to the checkout cart to make a purchase. As a result, the offer is made when the seller shows the ‘place order’ button on the website interface, and the seller is informed that the offer has been accepted when the buyer clicks the button and continues with the payments. (Mohd Zulkifli et al., 2021) claims that such a transaction is permissible and legally binding since it satisfies the requirements of connection and conformity of the offer and acceptance. The offer and acceptance of a sale contract via Shopee.com follows the same process as it does for offers and acceptances made via other websites, with a few minor exceptions that don't significantly affect the legality of online transactions in the eyes of Shariah.

Contracting Parties: In order to assure the legality of a transaction made through Shopee.com, both the customer and the supplier, Shopee, must have the requisite legal capacity (*ahliyyah*) to do so. The scenario demonstrates how easy it is for any consumer to register for Shopee.com account. However, he must provide specific credit or debit card information when he wishes to engage in a transaction. Therefore, the possession of the card serves as confirmation that the consumer is authorised to complete the transaction. Shopee as a seller, must have a distinct legal characteristic, i.e., a legal entity with a distinct form from the persons who founded it. Islam considers a legal entity as a person but not a human being (Abdul Razak & Abd Ghadas, 2020). Therefore, Shopee.com is entitled to establish a legal connection and engage in business activities. Shopee.com is an online platform that enables third party sellers, businesses, and even individuals to sell new and used things to online customers in addition to selling products and commodities out of its warehouses. In this situation, Shopee.com serves as a broker, facilitating contact between buyers and sellers in order to conduct online business transactions. Retailers and individuals who use Shopee.com's platform to sell their items must pay a fee. It should be emphasised that the contractual connection between Shopee.com and customers is unaffected by the brokerage agreement between Shopee.com and independent vendors. Brokerage is permitted by Islamic law. Since a broker's fee is a compensation for their labour and efforts, it is permissible (Yusron Sholikhin & Nurul Fitri Amijaya, 2019). According to this justification, both parties are capable of closing the transactions and have the necessary legal capacity (*ahliyyah*).

Subject Matter: It examines the goods or items being exchanged on Shoppe.com as well as their costs. The majority of the things available on Shopee.com are permissible, with the exception of pig and products connected to it, alcohol and products related to it, non-halal food and beverages and things related to it that does not comply to Shariah. Islam considers the trade of these goods to be forbidden because they contradict with Shariah law. In order to avoid doubt (*gharar*) and ignorance, it is also important to provide clear product descriptions and information. In this case, Shopee.com defines its items using text and photographs, allowing for accurate genus, quantum, and identification. Each product has its own web page, which offers customers images and product information. A few of the goods have links that lead to more product details like supplier specs. Customers may also leave reviews and ratings on Shopee for items they have purchased. Additionally, the costs for delivery and the pricing of all items are specified. In order to prevent any excessive *gharar* and ignorance, Shopee.com complies with the Shariah's need to offer appropriate information about a product being traded.

Shariah also makes provisions for how the items must be delivered. Shopee.com promises to deliver all purchased goods to consumers within the allotted time limit. Once payment has been received, the item will either be shipped or made available for download (this technique applies to digital media goods, software, e-books, and photographs) (the order is forwarded to the manufacturer or third-party distributor, who will ship the product to the customer). Because the goods may be delivered, the Shariah criterion has been satisfied. According to Shariah, a hand-to-hand exchange is required for the sale of gold through Shopee.com, and both the payment and the delivery of the gold must take place on a spot basis (Ribadu et al., 2020). In the majority of online transactions made through websites, such as Shopee.com, the gold will only be sent by mail once the vendor has received the payment.

Credit and debit cards are the most common payment option for online purchases. However, Shopee.com offers clients another option, such as voucher and coins. Islam accepts electronic payments made using debit cards since they function similarly to cash and are provided in exchange for consumer bank deposits, transferring funds from the customer's account to the merchant's account virtually instantly. Therefore, there is no *riba* occurred by using a debit card (Fatonah et al., 2018). However, when a credit card is used to make an online purchase, the *riba* problem might occur. The usage of credit cards for online purchases is covered in the following sections.

How Does Credit Card Payment Work? A credit card is a type of payment that enables the cardholder to borrow money and make purchases with the promise of making a later payment to the card issuer (Syafinaz et al., 2020). A payment made online using a credit card would follow the steps shown in Figure 2.

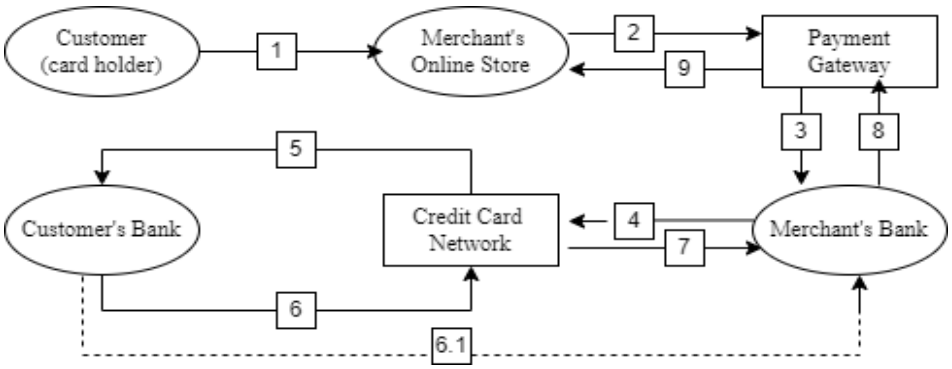


Figure 2: Credit Card Payment Flow Process (Adapted from Bakar et al., 2021)

Following is an explanation of how a credit card online payment works. Order is placed by the customer (card holder), who then enters their credit card information and click the Pay button (Flow 1). This information is sent to the payment gateway by the merchant's website together with the total payment amount (Flow 2). Information is forwarded by the payment gateway to the merchant's bank (Flow 3). The bank of the business transmits information to the credit card network and asks payment authorisation (Flow 4). To reach the customer's bank, the credit card network sends the request (Flow 5). Bank of the customer approves the transaction and transmits the authorization answer to the credit card network (Flow 6). At the same time, the customer's bank debits the customer's account and sends money to the merchant's bank (Flow 6.1). A portion of the transferred money are often retained by the customer's bank as an interchange fee, and a processing fee is charged by the merchant's bank. Bank of the merchant receives the authorisation answer from the credit card network (Flow 7). The authorization answer is sent to the payment gateway by the merchant's bank (Flow 8). The payment gateway sends the merchant's store the permission answer (Flow 9).

Credit cards signify a lending arrangement between the cardholder and the bank that issued the card. The cardholder is permitted to borrow money from the bank to pay for the products or services they have purchased. However, they must pay back the whole amount borrowed from the bank, less any applicable minimum charge fees, in order to complete the transaction. If the payment is made later than scheduled, interest will be charged until the whole amount is paid.

As has already said, *riba* is categorically forbidden by Shariah. Because of this, even if the cardholder pays the full amount due during the designated grace period to avoid the interest being assessed, using standard credit cards that charge interest on the money advanced is prohibited (Yusron Sholikhin & Nurul Fitri Amijaya, 2019).

An alternative payment method for online transactions is a credit card that complies with Islamic law. As an alternative, a credit card that complies with Islamic law has been designed to address the interest issue. Several underlying structures, including *bai' al-inah* (sale and buy back), *tawarruq* (tri-partite sale), *ijarah* (lease), a combination of *ujrah* (fee) and *kafalah* (guarantee), and a combination of *tawarruq* and *mudarabah* (also known as covered card), are the foundations for the free interest credit cards that Islamic banking institutions have issued (Mohd Zulkifli et al., 2021). In general, a credit card that complies with Shariah must meet the requirements listed below: (i) There is no imposition of interest; (ii) There is no interest charged on the delay in paying the outstanding debt amount; (iii) The issuer may charge an annual fee, which may be paid on a monthly basis; (iv) The issuer may charge a fee for cash withdrawals, but such a fee must not be a percentage of the amount withdrawn; rather, it should be a fixed fee; and (v) The issuer may receive commissions from third-party

Validity of online shopping on Shopee.com: The explanation above generally explains that from a Shariah perspective, contractual parties, goods, pricing, and form are vital for the success of online transactions. Additionally, it must make sure that the utilised manner of payment is acceptable in the eyes of Shariah. The Shopee.com case study shows that every component has satisfied Shariah validity requirements, with the exception of two situations: (i) those prohibited products, such as pork and products related to it, alcohol and products related to it, non-halal food and beverages products related to it that does not comply with Shariah; and (ii) payment methods that involve the element of *riba*. The overall validity of online transactions made through Shopee.com is represented in Figure 3.

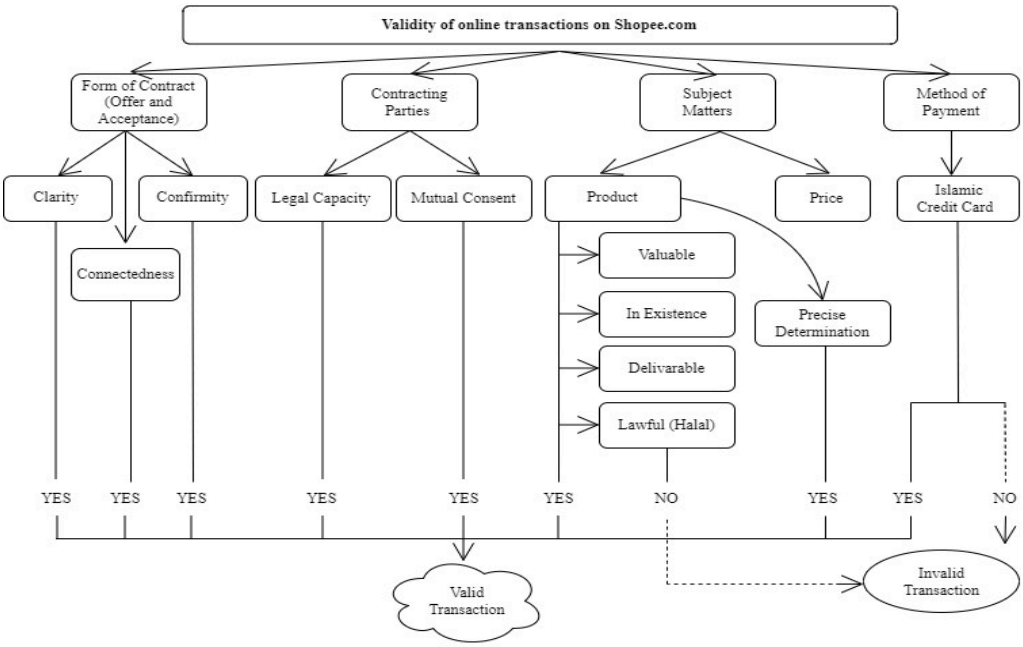


Figure 3: Shariah-compliant Online Transaction Validity on Shopee.com (Adapted from (Amboala et al., 2015)

4. Conclusion

The application of e-commerce is permissible in Islam. In order to comply with shariah norms, the paper included a comprehensive discussion of e-commerce transactions. However, for it to be legal and permitted, certain Shariah principles and standards must be met. To ensure their legitimacy from the standpoint of Islamic contract law, all e-commerce transactions must meet fundamental conditions relating to form (offer and acceptance), contracting parties (buyer and seller), and the subject matter (object and price). These elements and conditions include mutual consent of the contracting parties, the ability of both parties to engage in transactions, legal ownership of the asset being traded, permissibility of the asset and deliverability of the asset. They also include connectedness, clarity, and conformity of the offer and acceptance.

Every e-commerce transaction also has to ensure the benefit and justice of the contracting parties and be free of the elements of usury (*riba*), uncertainty (*gharar*), and gambling (*maisir*). Therefore, in order to ensure that online transactions are compliant with Islamic contract law, parties of the contract must filter the entirety of the processes involved.

Through its empirical examination of the online business transactions at Shopee.com, this study expands the body of knowledge on Shariah-compliant e-commerce. Additionally, it is regarded as an eye-opener for upcoming empirically based research that contributes to the limited body of knowledge in the field of study. Additionally, this study offers practitioners a space to better comprehend the principles and concepts of Shariah-compliant e-commerce. As a result, they will find it convenient to adhere to Shariah when performing online business and commerce.

References

Ab Halim, M. A., & Mohd Salleh, M. M. (2020). Consumer rights in Halal products: A study based on legal and Syariah perspectives. *Food Research*, *4*, 281–290. https://doi.org/10.26656/fr.2017.4(S1).S31

Abdul Razak, F., & Abd Ghadas, Z. A. (2020). From Barter System to E-Contract: Development on Trade in Malaysia. *International Journal of Academic Research in Business and Social Sciences*, *10*(12). https://doi.org/10.6007/ijarbss/v10-i12/8018

Abedifar, P. (2021). Absurdity of Islamic Finance Law: The Case of Gharar and Maysir. *SSRN Electronic Journal*, 1–19. https://doi.org/10.2139/ssrn.3871747

Adila, N., Noor, M., Sofea, H., Zameram, B., Ahmad, Y., Azlina, N., & Noor, M. (2022). *THE ISLAMIC CONCEPT OF E-COMMERCE IN SELLING AND BUYING ACTIVITIES : AN ANALYTICAL STUDY AMONG STUDENTS AT UITM TERENGGANU , DUNGUN CAMPUS*. *7*(4), 86–92.

Amboala, T., Mokhtar, A. H. A., Muhammad, M. Z., Noordin, M. F. bin, & Othman, R. (2015). Development Method for Shariah Compliant e-Commerce Payment Processing. *International Journal of Computer Theory and Engineering*, *7*(5), 408–415. https://doi.org/10.7763/ijcte.2015.v7.995

Asuhaimi, F. binti A., Ghadas, Z. A. binti A., Nawang, N. I., & Ghapa, N. binti. (2022). The Concept of Fitness for Purpose of Goods in Malaysian Today's Online Contract: Issues and Challenges. *Proceedings of the International Joint Conference on Arts and Humanities 2021 (IJCAH 2021)*, *618*(Ijcah), 520–527. https://doi.org/10.2991/assehr.k.211223.091

Bakar, M. A., Khilmy, A., & Rahim, A. (2021). *UJRAH CREDIT CARD : A PERSPECTIVE FROM SHARIAH ADVISORY COUNCIL , BANK NEGARA MALAYSIA*. *5*(1), 259–274.

Billah, M. M. (2019). Islamic Financial Products. *Islamic Financial Products*, *November 1984*, 45–62. https://doi.org/10.1007/978-3-030-17624-2

Borlakova, T. M., & Kubanova, L. A. Z. (2020). Islamic economic model: features, current state and prospects for further development. *Vestnik Akademii Znanii= Academy of Knowledge …*, *7*, 41–46. https://doi.org/10.5281/zenodo.5602025

Fatonah, S., Yulandari, A., & Wibowo, F. W. (2018). A Review of E-Payment System in E-Commerce. *Journal of Physics: Conference Series*, *1140*(1). https://doi.org/10.1088/1742-6596/1140/1/012033

Gholo, A. I., Rosman, A. S., & Jouda, A. A. (2022). Applicability of electronic administrative contract: Analysis from Islamic (Law) Shari'ah perspective. *International Journal of Academic Research in Business and Social Sciences*, *12*(1), 1170–1180. https://doi.org/10.6007/IJARBSS/v12-i1/12018

Hassan, M. K., Shah, M. A. R., Alazhari, M. A., & Selim, M. (2021). Towards the Implementation of Monetary Management in Islamic Economic System Based on Recent Developments. *International Journal of Islamic Economics and Finance (IJIEF)*, *4*(2), 177–206. https://doi.org/10.18196/ijief.v4i2.11777

Hidayat, R. K., Nawi, S., & Poernomo, S. L. (2020). Sale and Purchase Contracts Through the Internet (E-Commerce) Judging From Civil Law, Electronic Transaction Information Law (ETIL) and Islamic Law. *Gerechtiheid Law Journal*, *1*(1), 58–78.

Ishfaq, M. (2021). Islamic Perspective of E-Commerce Transactions: a Solution To Contemporary Commercial Problems. *The Scholar Islamic Academic Research Journal*, *7*(2). https://doi.org/10.29370/siarj/issue13aren4

Kambol, R. (2018). E-Commerce in the Context of Islamic Law of Contract of Sale. *Journal of Law & Governance*, *1*(1), 36–48.

Majid, M. N., & Yahaya, M. Z. (2022). Sadd Al- Dhara ' I ' Argument and Its Role in the Prohibition of Riba Transaction on Al- Buyu '. *Journal of Fiqhiyyat*, *1*(1), 101–104.

Mohd Zulkifli, M., Tamrin, A., Noormariana, M. D., Mohd Fahmi, G., & Razman Hafifi, R. (2021). A Model Development of Shariah Principle in E-Payment: The Case of Malaysia. *Lecture Notes in Networks and Systems*, *194 LNNS*, 1758–1771. https://doi.org/10.1007/978-3-030-69221-6_128

Muneer, A. (2016). *Possession in E-Commerce from Shar ī ʿ ah Perspective*. 127–130.

Rahman, S. M. A., & Muhammad, F. (2021). E-Commerce Transactions: A Sharia Economic Perspective. *Proceedings of the 2nd Southeast Asian Academic Forum on Sustainable Development (SEA-AFSID 2018)*, *168*, 384–387.

https://doi.org/10.2991/aebmr.k.210305.070

Rhanoui, S., & Belkhoutout, K. (2019). Risks faced by Islamic banks: A study on the compliance between theory and practice. *International Journal of Financial Research*, *10*(2). https://doi.org/10.5430/ijfr.v10n2p137

Ribadu, M. B., Rahman, W. N. W. A. B., Ghani, A. A. A., Kamaruddin, A., & Othman, M. S. (2020). Sharia compliance requirements framework for e-commerce systems: An exploratory study. *Journal of Theoretical and Applied Information Technology*, *98*(6), 994–1008.

Rio, A., Wahyu, M., Irawan, H., Permata, S., & Anwar, W. A. (2022). Imam Syafi'i's E-Commerce Concept's Relevance. *Jurnal Ilmiah Ekonomi Islam*, *8*(01), 538–544. http://dx.doi.org/10.29040/jiei.v8i1.4370

Riyanti, R. (2022). Legal status of digital financial transactions in sharia economic perspective. *International Journal of Social Sciences and Humanities*, *6*(1), 98–109. https://doi.org/10.53730/ijssh.v6n1.4916

Shankar, S. K., Balasubramani, S., Basha, S. A., Ariz Ahamed, S., & Kumar Reddy, N. S. (2021). Smart Trolley for Smart Shopping with an Advance Billing System using IoT. *Proceedings - 5th International Conference on Computing Methodologies and Communication, ICCMC 2021*, *Iccmc*, 390–394. https://doi.org/10.1109/ICCMC51019.2021.9418348

Suhaimi, R., Osman, M. R., Ahmad, I., Pinang, C. P., & Alam, S. (2017). *the Guide in Determining the Criteria in Developing Contract Parameters of Shari ' Ah Compliant E-Commerce*. *1*(November), 50–58.

Syafinaz, I., Shafie, M., Liza, Y., Yusof, M., Mahmood, A. N., Jamal, H. Z., Hidayatul, N., & Kasim, A. A. (2020). Factors Influencing the Adoption of E-Payment: An Empirical Study in Malaysia. *Advances in Business Research International Journal*, *4*(2), 53–62. https://myjms.mohe.gov.my/index.php/ABRIJ/article/view/10009

Wan Ismail, W. M., Mahat, I. R., & Mazlan, N. A. (2020). Awareness on Prohibited Elements in Muamalat: Common Practice in Life. *Journal of Contemporary Islamic Studies*, *6*(1), 95–110. https://doi.org/10.24191/jcis.v6i1.6

Yaqin, A. (2022). *Capacity of Persons with Disabilities as Legal Subjects in Islamic Law*. 199–214.

Yusron Sholikhin, M., & Nurul Fitri Amijaya, R. (2019). E-Commerce Based on the Law of Buying and Selling in Islam. *KnE Social Sciences*, *3*(13), 1360. https://doi.org/10.18502/kss.v3i13.4290

CONSUMER INTENTION TO ADOPT ONLINE BANKING IN MALAYSIA: A LITERATURE REVIEW

Sharifah Zuhaira Syed Mizuri[1] and Armila Mat Lazim[2]

[1,2]Politeknik Ungku Omar, Malaysia
[1]sharifah@puo.edu.my
[2]armila@puo.edu.my

Abstract: Recently, technology patterns captured to a rise in customer demand for services related to digital technology, also for online banking in Malaysia. Related to other countries, online banking has several improvements for the banking industry, banks must fully recognize the consumer intention in adopting online banking. However, there were still insufficient studies that systematically review the existing literature on online banking consumer in Malaysia. Hence the present article conducted a systematic literature review to identified factors that can give impact on consumers intention in adopting online banking in Malaysia. The period of this study covers then online banking activities since 2016 until 2021, the review was successful in locating 48 papers. The primary study question, what are the factors influencing customer intention to use online banking in Malaysia? serves as the foundation for the review. The results show that Awareness, trust, management, and social influence are the four key factors that have been identified as having an impact on customer intentions to use online banking. These findings can support the implementation of user development strategies by online banking service providers and serve as references for future study.

Keywords*: consumer intention; online banking; awareness; trust; management; social influence*

1. Introduction

The internet has had a considerable impact on the expansion of customers' acceptance of online banking, which is especially convincingly obvious in developing nations. In the case of online banking, adoption intention will influence the customer's choice of whether to keep using online banking or discontinue it. An intention to use online banking will be evident if they have a favourable perspective used online can support business activities (Menhat et al., 2021). Online banking has been widely adopted, because of the improvement of digital infrastructure and the global dissemination of online connectivity, enabling consumers to access financial information and converse thru online (Dwivedi et al., 2021) .As for financial services sector is also growing because of the beginning of the internet, which quick technical advancements, regulatory policies, globalisation, and the effects of shifting competitive factors (Anand,2015). In the future, financial services build on information sharing, which primarily relies upon information and interaction technology to gather, analyse, then disseminate data to all pertinent banking consumer (Rahman et al., 2017) . Consumers can access banking products on a website through online banking, often known as e-banking or Internet banking (M. S., Mahapatra et al., 2019)

In the meantime, physical bank branches with automated devices and banking staff are insufficient to meet consumer requests for quicker financial facilities to accommodate consumer busy lives. Consumers the one who conduct most of their banking operations online. Some more, government officials and health professionals encourage the use of online payment, open up new opportunities for consumer adoption online banking for making bills payments. Society without cash and technological innovation thru online get turn out to be more common to be used by banking consumer (Fabris, 2019). International volume of digital payments increased between 2019 and 2020 according to the (News & Guide, 2021) and (TA, 2020) , fastest growth rate seen in the previous ten years. (Z. U. Rehman & Shaikh, 2020) stated end of 2021 predicted that, measure up to billion persons in 2016, more than few billion consumers might employ their gadgets for online banking. Due to ongoing digital innovation and the acceptance of digital payments for financial inclusion, online banking growth in Asia is anticipated to accelerate (Research and Markets, 2020). Most high-value payments are made using online banking is utilised more frequently per person in than e-money, Malaysian consumers frequently utilise online banking to pay for their insurance, vehicles, and residences (Fintech News Malaysia, 2019). (Rahman et al., 2020), Malaysian customers utilise card payments for digital payments, and several percentage use online banking, primarily to pay for phone and internet bills. In several countries, young people have access to and use majority of basic financial goods and online banking (OECD, 2020). Furthermore, individual customers be able to profit from the availability of web-enabled devices for checking account balances, paying bills, applying for loans, transferring funds, trading securities, and other transactions (Tchouassi, 2016). As one of the nations in Asia with the fastest-growing online banking and telecommunications expertise markets, Malaysia continues to see a growth in smartphone usage, with the percentage of users expanding in 2016 to in 2017(MCMC, 2017). According to (Thomas, 2016) only few consumer transactions were practice online banking in Malaysia five years ago, one of the 33 countries around the world that have gone of payment solution cashless and online banking. Earlier research has investigated consumer online banking adoption in both developed and emerging economies in the country (Ege Oruç & Tatar, 2017).

As mentioned earlier the consumer adoption of online banking has increased significantly. Elderly and countryside people are examples of those who would not be able to access digital financial facilities also getting involved in online banking slowly. However, here still Malaysian consumers show less attention and passion towards adopting online banking services (Low et al., 2017). There is a lack in the awareness of Malaysian consumers acceptance, a behavioural intention, and in the identifying of factors affecting their intention to adopt online banking. Banks have a great chance to grow their client base across digital customers, they risk losing those customers to rivals like other online providers if they do not take into account how customers feel using digital banking methods. Therefore, Malaysia available banking environment needs to be explored in a more comprehensive way because of the several within the existing literature.

The goal of the current study to discovered on factors that can give impact on consumers intention in adopting online banking in Malaysia. Initially, to clarify the meaning customer intention to adopt online banking then we discuss how these factors have been applied in earlier literature. Next, we explain the approach that is use up towards select the relevant literature that is reviewed. Following that, we examine and analyze the variables that, in our opinion, are most crucial with relation to on consumer intention to adopt online banking. We discuss recommendations for increasing consumer intention on adopt online banking across the entire

text, recognize that banks strategies factors influencing consumer intention on adopt online banking. Finally, we offer recommendations for additional study. The factor awareness, trust, management, and social influence towards consumer intention using online banking are sought as the factors for customer adopt online banking. When there are money transfers involved, awareness is an important factor as new digital banking methods are adopted. According to the findings of other studies, customers feel more confident and trust if they are aware that their loved ones use internet banking (Tan & Leby Lau, 2016). The introduction of new mechanisms that can improve a bank's ability to provide consumers with a high-quality service and manageable has significantly influenced the character of the business environment, customers not be used online utilising banking services as needed secured and think they possess the technical expertise required to do so (Vuković et al., 2019). Studies that have already been conducted online financial transactions get shown social influence is a crucial indicator usage purpose (Tarhini et al., 2016) Here are several previous studies highlighted on consumer intention on adopting online banking Harris et al., (2016); Ahmadi Danyali (2018). However, just a not many study have specifically examined this issue in Malaysia. In advanced economies, young individuals can access to and use basic financial products including online banking at rates of approximately 90% and higher. The advancement of digital financial inclusion will be slowed down by people who might not be able to use them, such as countryside population, the impoverished, and the elderly, making it less likely that would be achieved for the future. Maturity, integrity, and commitment of the people are essential for success of Internet banking. The versatility of the internet banking system has surpassed that of a man. The primary study question, What are the factors impacting customer intention to use online banking in Malaysia, serves as the foundation for the review. This study sought to close the knowledge gap by thoroughly reviewing earlier, relevant studies of identifying the factor influencing consumer intention in adopting online banking in Malaysia. In order to highlight customers wants and perspectives on online banking for the benefit of both customers and the banking business, factors evaluation must be undertaken from the viewpoint of the customer. Online banking has many advantages, but then it also has drawbacks including hacking, data theft, and other difficulties that deter people from using the service (Banu et al., 2019).

The article review makes several important contributions to the body of knowledge and the practise. Interested parties, including financial institutions, policymakers, public, researchers, and environmentalists, can comprehend the necessity to uncover reasons that impact consumer purpose to use online banking by referring to the study. The study provided information on the precise topics and research aspects thing should take priority of the researchers' findings.

2. Methodology

The review was successful in locating 48 papers. The analysis includes several electronic databases available such as Emerald, Science Direct, Google Scholar and Springer Link were used to search for resources. There are 6 themes were formed namely consumer intention, online banking, awareness, trust, management and social influencing. Numerous countries have conducted studies on online banking, including Singapore, UK, Malacca (Ling et al., 2016) summarised the online banking research investigations that were carried out in various nations. The present study is aimed at identifying on factor influencing consumers on adopting

online banking in Malaysia. The identified articles were chosen to respond to the research questions in the study: What are the factor influencing consumer intention in adopting online banking in Malaysia? Resulting data was used in this study, which was a literature review, and it was gathered from empirical research, review articles, and case studies that have already been published. For the structure of the current research, recent research was reviewed.

3. Results and Discussion

3.1 Results

The data extraction was conducted according to the research inquiries - What are the factor influencing consumer intention in adopting online banking in Malaysia? It means that any information from the studies under consideration that could help answer the research questions was compiled and put in a table. The literature review was divided into different topics to allow for the separation of related areas of information. There are 6 variables were created namely consumer intention, online banking, awareness, trust, management, and social influencing to be explain, and then specific variables that influencing consumer intention online banking were thoroughly covered.

Table 1: The results Summary of Literature Factors Influencing consumers intention on adopting online banking in Malaysia

Studies	Variables	Findings
(Nabavi et al., 2016)	Consumer intention	Information technology, financial services, services management, and marketing strategy have all examined customer intention.
(Dwivedi et al., 2021)	Consumer intention	Given the speed advancement of the wide availability of internet access and digital infrastructure during the past ten years, consumer intention have been able to communicate and access information online.
(VERMA & KUMAR, 2020).	Consumer intention	Research has consistently stated that in order to determine the level of user acceptance of e-Banking services, it is important to consider the impact of the computer self-efficacy, and customer stance of intention on technology.
(Jamal et al., 2018)	Consumer intention	Both genders intentions to use Islamic online banking were found to be positively and significantly impacted by societal norms.
(Akram,T.et al., 2018)	Consumer intention	Focusing more on female intention users could offer Islamic banks better chances to promote acceptance of online banking.
(Kazi, and Mannan,	Online banking	The utilization of telecom and banking-related services has created possible to guarantee E-banking. Customers can

2013)		use online banking services with ease and freedom, which keeps costs down for users.
(Mercadante, 2018)	Online banking	The internet has led to the transition of traditional banking to electronic banking in the financial sector. The most effective transactional ways since they may cut costs and offer many advantages that offline banking channels cannot.
(OECD, 2020)	Online banking	In industrialised countries, young people have access to and use basic financial products including online banking at rates of 90% or higher.
(Personal & Archive, 2021)	Online banking	Advances in financial technology, such as mobile money services and internet banking, may make it easier for low-income families and small companies to make a living.
(Frączek & Urbanek, 2021)	Online banking	The goal of inclusive digital finance is to offer financial services through mobile money, internet banking, electronic transfers, insurance, loans, and a combination of these and newer fintech apps that reach out to previously underserved people.
(Tan & Leby Lau, 2016)	Awareness	The adoption of new digital banking channels is crucial when there are financial transactions involved. Customers feel safer if they know that their friends and family use internet banking, according to findings from previous study.
(Cicchiello et al., 2021)	Awareness	It raises awareness of the financial system's usage of cutting-edge technology. The pandemic has caused obvious changes from many angles, and it is vital that consumers have internet access to banking services.
(Kanungo & Gupta, 2021)	Awareness	A trend of societal severity is emerging, and there is a awareness of institutional and popular concern for equitable growth.
(Banu et al., 2019)	Awareness	The study's findings were captivating. First, customers are more likely to find online banking services useful when they are aware of them. The operational implication is to promote the service and inform the consumers.
(Tandon, 2017)	Awareness	The outcomes demonstrated that operational effectiveness, data centralization, customer awareness, and hospital image have a substantial impact on the implementation of online banking.

(Nazirul Islam Sarker et al., 2021)	Trust	The same findings were also obtained where consumer use innovative technology more often when they believe and trust it to be beneficial, and usability also has a big influence on usefulness.
(Cao et al., 2018)	Trust	In the area of online payments, trust is determined to only have an indirect impact on consumer intention via user happiness.
(Lee et al., 2016)	Trust	Trust developed through online payment experience can positively impact how important users view the company's mobile division, resulting in user happiness and usage behavior
(Rodríguez-Torrico et al., 2019)	Trust	For technologies where users (are expected to) provide sensitive information, trust may be especially important in countries where adoption and use of mobile payments are not yet widespread.
(Kang & Namkung, 2019)	Trust	Studies shows that trust may be especially crucial for technologies where consumer are obliged to provide sensitive information with the trusted online banking.
(M. Rehman et al., 2012)	Management	E-banking guarantees efficient management and boosts the speed of corporate operations. As a result, it actualizes effective service delivery and satisfies information availability
(Reepu & Arora, 2022)	Management	Recent risk incidences, including frauds in card payments and e-payments as well as bank transactions in general, have caused concern in the bank and consumer management.
(Hung et al., 2010)	Management	Through the management, development, and maintenance of successful customer relationships and interactions, customer relationship management, a cutting-edge technology, aims to increase customer pleasure, loyalty, and profitability.
(Stephen, 2016)	Management	Activities like looking for management information, chatting with other customers about products and services, and communicating with businesses are all growing in popularity online.
(Stephen, 2016)	Management	This has significant effects for customer experience management since, as customers grow accustomed to utilizing technology, it is expected that their initial delight would give way to expectations.

(Wang & Zhang, 2021)	Social influence	In order to transfer online information, channel personal or media influences, and encourage attitudinal or social behavioral change.
(Bede Uzoma et al., 2020)	Social Influence	This study is to ascertain financial innovation made social influencing possible by digital inclusion may help Sub-Saharan African (SSA) countries.
(Riffai et al., 2012)	Social Influence	Numerous research has focused on how social variables influence consumers' intentions to use Internet banking.
(Kanungo & Gupta, 2021)	Social Influence	Recently, there has been a lot of research done on value propositions created by the digitalization of banks, as well as various constructs relating to fair healthcare and social influence in consumer banking
(Tan & Leby Lau, 2016)	Social Influence	Social influence is a key predictor of intention to use, according to studies that have been done on mobile and online banking.

3.2 Discussion

This part describes the findings from the review studies factor influencing consumers intention on adopting online banking in Malaysia.

First, the consumer intentions study done by Nabavi et al., (2016), supported consumer intention has been studied in the fields of information technology, financial service, services management, and marketing strategy. In another study, mentioned that consumer intentions have positive relationship with online banking (Dwivedi et al., 2021). In contrast to research done by (VERMA & KUMAR, 2020) the findings revealed that consumer intention were significantly correlated with the impact of the computer self-efficacy, and customer stance of intention on technology. Besides, (Morris, 2009) study uses consumer intention as the dependent variable, shown that intention and technological acceptability are strongly and significantly correlated. Customers who embraced the new system would therefore be ready to adjust and to invest their time, energy, and intention into using it (Jahangir & Begum, 2008).

Second, online banking variables, a study by researchers (Nie & Amarayoun, 2019) discovered Malaysia outperforms its usage in terms of online banking readiness because to supportive government initiatives. These efforts, which seek to promote e-commerce growth and realise Malaysia's objective of dominating e-commerce in Southeast Asia, engage all levels of stakeholders. Even now, despite the worldwide economic slowdown, internet banking sales are rising (Sin et al., 2012). According to (OECD, 2020) The accessibility and usage rate of essential financial products and online banking by young people in developed countries are almost 90% and above. The advanced in financial technology, such as mobile money services and internet banking, may make it easier for low-income families and small companies to make a living (Personal & Archive, 2021). However, the study done by (Frączek & Urbanek, 2021)

Providing Mobile money, internet banking, electronic transfers, insurance, loans, and a combination of these with more recent fintech apps that reach out to previously underserved populations are all examples of financial services. is the purpose of inclusive digital finance.

Third, studies done discovered that awareness was found to raise general consumer protection awareness, and ease international e-commerce (Innovation & Program, n.d.). When there are financial transactions involved, awareness is key of the adoption of new digital banking channels. According to past research' findings, customers feel more secure if they tell that their friends and relatives utilize online banking (Tan & Leby Lau, 2016). This study stated raises awareness of the financial system's usage of cutting-edge technology. The pandemic has caused obvious changes from many angles, and it is vital that people have access to financial services online (Cicchiello et al., 2021) . (Kanungo & Gupta, 2021) A trend of societal severity is emerging, and there is an awareness of institutional and popular concern for equitable growth. (Banu et al., 2019) The study's findings were captivating. First, customers are more likely to find online banking services useful when they are aware of them. The operational implication is to promote the service and inform the consumers. And (Tandon, 2017) The outcomes demonstrated that operational effectiveness, data centralization, customer awareness, and hospital image have a substantial impact on the implementation of online banking.

Fourth, the study findings from (Strahorn et al., 2017) mentioned that trusts factors Many consumers still prefer to pay cash on delivery because they lack confidence and trust in online buying. This social influence effect increased the appeal of the same product or services to potential customers who might buy them. Many of these factors that influence buying are also inextricably linked to the advantages that the goods or services offer (Hussain et al., 2017). Past research done by (Cao et al., 2018) In the area of online payments, confidence is determined only have indirect impact on consumer intention via happiness consumers. Customers must put their trust in internet services because there are no assurances that people won't engage in harmful opportunistic behavior and because the environment is less regulated. Customers' trust in online services is more crucial than it is in any other channel, according to researchers. And Trust developed through online payment experience can positively impact how important users view the company's devices division, resulting in user happiness and usage behavior (Lee et al., 2016)

Fifth, studies done discovered that management information as found Recent risk incidences, including frauds in card payments and e-payments as well as bank operations in general, have caused concern in the bank and consumer administration (Reepu & Arora, 2022). This study (Yousafzai et al., 2003) stated online banking refers to the use of the Internet or other technology that enables users to log into their bank accounts and access any information management or services offered by banks, including bill payment, money transfers, checking accounts, and cash withdrawals. As a result, users can do these online banking services as well as many others more conveniently, quickly, and affordably from any location at any time. (Stephen, 2016) study Online activities such as management information seeking, discussing goods and services with other customers, and interacting with businesses are becoming more and more popular. (M. Rehman et al., 2012) E-banking guarantees efficient management and boosts the speed of corporate operations. As result, it actualizes effective service delivery and satisfies information availability.

Sixth, studies done discovered that social influence by (Phonthanukitithaworn et al., 2015) The adoption of online banking services will expand as a result of social standing and connections. The degree of acceptance could be raised by promoting them through social and community networks. (Bede Uzoma et al., 2020) This study is to ascertain financial innovation made social influencing possible by digital inclusion may help the countries. (Riffai et al., 2012) findings numerous research has focused on how social variables affect consumers' intentions to use Internet banking. (Kanungo & Gupta, 2021) Numerous studies have been conducted recently on the value propositions produced by the digitalization of banks, as well as on numerous constructions relating to just healthcare and social influence in consumer banking and Studies on mobile and internet banking by have found that social influence is a significant predictor of propensity to use. (Tan & Leby Lau, 2016)

The following above discussion drawn based on the result of the analysis review from previous studies factor influencing customer intention on adopting online banking in Malaysia, This shows that 6 variables is relevant to be discussed as the factor consumer intention on adopting online banking.

4. Conclusion and Recommendation

4.1 Conclusion

The main purpose of this study is to identify the factor influencing consumers intention on adopting online banking in Malaysia. The studies objective was accomplished through the questions posed, and they were verified and strengthened by the findings. The outcomes were in line with some of the referenced research. The variables are consumer intention, online banking, awareness, trust, management and social influencing which bringing to light the insights into the extent of online banking being intention by consumers. Furthermore, the results inform the researchers on the specific areas and content of studies related to online banking that should be the focus of their studies The success of online banking depends on the maturity, honesty and dedication of the people. Online banking system has proved to be more versatile for daily usage to make payment Frączek & Urbanek, (2021). Malaysia ranks higher in network readiness than its neighbours as a result of generally encouraging government actions and support. All levels of stakeholders are involved in these measures, which aim to encourage e-commerce growth and realise Malaysia's ambition of dominating e-commerce in Southeast Asia (Ismail & Masud, 2020).It is clear also that all Malaysian citizens including youngster and elders, have access to the Internet for online banking. Gaining consumer's awareness, trust in the information management and social financing elements of online banking is also crucial because consumers increased when accounts are protected with strict security on online banking. The MCMC and Pos Malaysia developed Address for All, which gives many rural residences a complete premise address, to enable extensive e-commerce coverage. In March 2017, complete addresses were given to almost 30,000 rural properties in Kemaman, Hulu Terengganu, Pulau Pangkor, Pulau Langkawi, Kota Belud, and Lundu (Suruhanjaya Komunikasi Multimedia Malaysia, 2017). BNM has launched a number of efforts to promote e-payment usage. Commercial banks are developing an e-payment roadmap with BNM's assistance in order to boost e-payment adoption, lower e-payment barriers, and boost the overall effectiveness of the payment system, which will have a favourable effect on the economy (Features & Framework, 2020).Other than that, in Malaysia recent technological

advancements and the format of online transactions must be understood by bankers. Additionally, bankers must interact with clients and solicit feedback to improve services.

4.2 Recommendations

The current research makes several contributions to the literature already in existence. It also provides a theoretical framework for addressing infrastructure and online banking issues. It is evident from a critical review of literature, there is inconsistent results across the study and limited research done in Malaysia. The primary contributions to the body of knowledge focus on improving comprehension of the elements impacting the adoption and use of online banking services. The study's findings are helpful to practitioners of any online financial service providers since they enhance the payment system. The research's suggested major researcher of customer intention to use online banking are then highlighted from the banker's perspective, which is helpful for improving the features and design of online banking. This review study could be used as a starting point for the government, consumers, and other researchers to conduct future research on Malaysian consumers' intentions to utilise online banking and their website's layout should be user-friendly. Additionally, it should be highlighted that this study develops new possibilities for research while analysing the material it has reviewed.

References

Ahmadi Danyali, A. (2018). Factors influencing customers' change of behaviors from online banking to mobile banking in Tejarat Bank, Iran. *Journal of Organizational Change Management*, *31*(6), 1226–1233. https://doi.org/10.1108/JOCM-07-2017-0269

Anand, N. M. (2015). E-Banking Trends in India : Evolution , Challenges and Opportunities. *Shanlax International Journal of Management*, *3*(2), 107–117.

Banu, A. M., Mohamed, N. S., & Parayitam, S. (2019). Online Banking and Customer Satisfaction: Evidence from India. *Asia-Pacific Journal of Management Research and Innovation*, *15*(1–2), 68–80. https://doi.org/10.1177/2319510x19849730

Bede Uzoma, A., Omankhanlen, A. E., Obindah, G., Arewa, A., & Okoye, L. U. (2020). Digital finance as a mechanism for extending the boundaries of financial inclusion in sub-Saharan Africa: A general methods of moments approach. *Cogent Arts and Humanities*, *7*(1). https://doi.org/10.1080/23311983.2020.1788293

Cao, X., Yu, L., Liu, Z., Gong, M., & Adeel, L. (2018). Understanding mobile payment users' continuance intention: a trust transfer perspective. *Internet Research*, *28*(2), 456–476. https://doi.org/10.1108/IntR-11-2016-0359

Cicchiello, A. F., Kazemikhasragh, A., Monferrá, S., & Girón, A. (2021). Financial inclusion and development in the least developed countries in Asia and Africa. *Journal of Innovation and Entrepreneurship*, *10*(1). https://doi.org/10.1186/s13731-021-00190-4

Dwivedi, Y. K., Ismagilova, E., Hughes, D. L., Carlson, J., Filieri, R., Jacobson, J., Jain, V., Karjaluoto, H., Kefi, H., Krishen, A. S., Kumar, V., Rahman, M. M., Raman, R., Rauschnabel, P. A., Rowley, J., Salo, J., Tran, G. A., & Wang, Y. (2021). Setting the future of digital and social media marketing research: Perspectives and research propositions. *International Journal of Information Management*, *59*(June).

https://doi.org/10.1016/j.ijinfomgt.2020.102168

Ege Oruç, Ö., & Tatar, Ç. (2017). An investigation of factors that affect internet banking usage based on structural equation modeling. *Computers in Human Behavior*, *66*, 232–235. https://doi.org/10.1016/j.chb.2016.09.059

Fabris, N. (2019). Cashless Society - The Future of Money or a Utopia? *Journal of Central Banking Theory and Practice*, *8*(1), 53–66. https://doi.org/10.2478/jcbtp-2019-0003

Features, K., & Framework, P. R. (2020). *Diagram 1 Key Features of E-Payments*. *i*, 1–4.

Fintech News Malaysia. (2019). *How Cashless is Malaysia Right Now? - Fintech News Malaysia*. 1–8. https://fintechnews.my/19964/payments-remittance-malaysia/cashless-malaysia-credit-debit-card-e-wallet-money/

Frączek, B., & Urbanek, A. (2021). Financial inclusion as an important factor influencing digital payments in passenger transport: A case study of EU countries. *Research in Transportation Business and Management*, *41*. https://doi.org/10.1016/j.rtbm.2021.100691

Cox, K. C., Musgrove, C. F., & Ernstberger, K. W. (2016). Consumer preferences for banking technologies by age groups. *International Journal of Bank Marketing*, *34*(4), 587–602. https://doi.org/10.1108/IJBM-04-2015-0056

Hussain, M. S., Mosa, M. M., & Omran, A. (2017). The Mediating Impact of Profitability on Capital Requirement and Risk Taking by Pakistani Banks. *Journal of Academic Research in Economics*, *9*(3), 433–443. https://www.ceeol.com/search/article-detail?id=676161

Ismail, N. A., & Masud, M. M. (2020). *Chapter 5*. *April*, 78–98.

Jamal, M., Changchun, G., & Akram, T. (2018). *ScienceDirect Exploring [4 _ TD $ IF] Gender [5 _ TD $ IF] Effects in [6 _ TD $ IF] Intention to Islamic [7 _ TD $ IF] Mobile [8 _ TD $ IF] Banking [9 _ TD $ IF] Adoption : an empirical study*. *13*, 25–38.

Kang, J. W., & Namkung, Y. (2019). The role of personalization on continuance intention in food service mobile apps: A privacy calculus perspective. *International Journal of Contemporary Hospitality Management*, *31*(2), 734–752. https://doi.org/10.1108/IJCHM-12-2017-0783

Kanungo, R. P., & Gupta, S. (2021). Financial inclusion through digitalisation of services for well-being. *Technological Forecasting and Social Change*, *167*(July 2020). https://doi.org/10.1016/j.techfore.2021.120721

M. S., Mahapatra, S. S., & Sreekumar, N. A. (2016). Service quality evaluation in internet banking: an empirical study in India. *International Journal of Indian Culture and Business Management*, *2*(1), 30. https://doi.org/10.1504/ijicbm.2009.021596

Lee, K. C., Lee, S., & Hwang, Y. (2016). The impact of hyperlink affordance, psychological reactance, and perceived business tie on trust transfer. *Computers in Human Behavior*, *30*, 110–120. https://doi.org/10.1016/j.chb.2013.08.003

Ling, G. M., Fern, Y. S., Boon, L. K., & Huat, T. S. (2016). Understanding Customer Satisfaction of Internet Banking: A Case Study In Malacca. *Procedia Economics and Finance*, *37*(16), 80–85. https://doi.org/10.1016/s2212-5671(16)30096-x

Low, Y. M., Goh, C. F., Tan, O. K., & Rasli, A. (2017). Users' Loyalty Towards Mobile Banking in Malaysia. *Journal of Internet Banking and Commerce*, *22*(S7), 1–12. https://www.icommercecentral.com/open-access/users-loyalty-towards-mobile-banking-in-malaysia.php?aid=85521&view=mobile

Menhat, M., Mohd Zaideen, I. M., Yusuf, Y., Salleh, N. H. M., Zamri, M. A., & Jeevan, J. (2021). The impact of Covid-19 pandemic: A review on maritime sectors in Malaysia. *Ocean and Coastal Management*, *209*(February), 105638. https://doi.org/10.1016/j.ocecoaman.2021.105638

Mercadante, K. (2018). The Future of cash- Will it disapper or become obsolete ? *Money UNder 30*, 1–10. https://www.moneyunder30.com/what-is-the-future-of-cash

Morris, M. G. (2009). Why Don ' T Men Ever Stop To Ask for Directions ? Gender , Social Influence , and Their Role in Technology and Usage Behavior1. *MIS Quaterly*, *24*(1), 115–139.

Nabavi, A., Taghavi-Fard, M. T., Hanafizadeh, P., & Taghva, M. R. (2016). Information Technology Continuance Intention: A Systematic Literature Review. *International Journal of E-Business Research*, *12*(1), 58–95. https://doi.org/10.4018/IJEBR.2016010104

Nazirul Islam Sarker, M., Ghani, M., Mustafa, M., Daud BUTT, H., & Nazirul Islam SARKER, M. (2021). Assessment of Bank Customer's Attitude Toward Financial Technology in Pakistan. *Researchgate.Net*, *8*(7), 545–0556. https://doi.org/10.13106/jafeb.2021.vol8.no7.0545

News, D., & Guide, B. (2021). *World Payments Report: Non-cash transaction growth hit hard by COVID*. *Cx*, 1–6.

Nie, J., & Amarayoun, W. (2019). The Factors Influence the Intention Use of Mobile Payment in Thailand E-Commerce. *Proceedings - 2018 5th International Conference on Information Science and Control Engineering, ICISCE 2018*, 561–568. https://doi.org/10.1109/ICISCE.2018.00122

OECD. (2020). Advancing the Digital Financial Inclusion of Youth. *Oecd*, 1–98.

Personal, M., & Archive, R. (2021). *Innovations for Financial Inclusion*. *107097*.

Rahman, M., Ismail, I., & Bahri, S. (2020). Analysing consumer adoption of cashless payment in Malaysia. *Digital Business*, *1*(1), 100004. https://doi.org/10.1016/j.digbus.2021.100004

Rahman, M., Saha, N. K., Sarker, M. N. I., Sultana, A., & Prodhan, A. S. (2017). Problems and Prospects of Electronic Banking in Bangladesh: A Case Study on Dutch-Bangla Bank Limited. *American Journal of Operations Management and Information Systems*, *2*(1), 42–53. https://doi.org/10.11648/j.ajomis.20170201.17

Reepu, & Arora, R. (2022). The Effect of Perceived Risk on Intention to Use Online Banking. *Universal Journal of Accounting and Finance*, *10*(1), 62–71. https://doi.org/10.13189/ujaf.2022.100107

Rehman, Z. U., & Shaikh, F. A. (2020). Critical Factors Influencing the Behavioral Intention of Consumers towards Mobile Banking in Malaysia. *Engineering, Technology & Applied Science Research*, *10*(1), 5265–5269. https://doi.org/10.48084/etasr.3320

Research and Markets. (2020). *Global Cards & Payments Market Insights, 2015-2019 &*. 2015–2019. https://www.globenewswire.com/news-release/2020/04/16/2017151/0/en/Global-Cards-Payments-Market-Insights-2015-2019-2019-2023.html

Rodríguez-Torrico, P., San-Martín, S., & San José-Cabezudo, R. (2019). What Drives M-Shoppers to Continue Using Mobile Devices to Buy? *Journal of Marketing Theory and Practice*, *27*(1), 83–102. https://doi.org/10.1080/10696679.2018.1534211

Stephen, A. T. (2016). The role of digital and social media marketing in consumer behavior. *Current Opinion in Psychology*, *10*, 17–21. https://doi.org/10.1016/j.copsyc.2015.10.016

Strahorn, S., Brewer, G., & Gajendran, T. (2017). The influence of trust on project management practice within the construction industry. *Construction Economics and Building*, *17*(1), 1–19. https://doi.org/10.5130/AJCEB.v17i1.5220

Suruhanjaya Komunikasi Multimedia Malaysia. (2017). Internet Users Survey 2017 (IUS2017). *The Statistical Brief*. http://www.mcmc.gov.my

TA. (2020). *GT PodCasts | Subscribe to Newsletter | Trending Now*. 6–11. https://www.globaltrademag.com/titanium-prices-to-keep-elevated-on-production-shortages-and-rising-demand-from-the-paint-and-aerospace-industries/

Tan, E., & Leby Lau, J. (2016). Behavioural intention to adopt mobile banking among the millennial generation. *Young Consumers*, *17*(1), 18–31. https://doi.org/10.1108/YC-07-2015-00537

Tandon, N. (2017). *Study to analyze the variables that affect the CRM implementation in the Hospitals*. *10*(5), 933–944. http://www.ripublication.com

Tarhini, A., El-Masri, M., Ali, M., & Serrano, A. (2016). Extending the utaut model to understand the customers' acceptance and use of internet banking in lebanon a structural equation modeling approach. *Information Technology and People*, *29*(4), 830–849. https://doi.org/10.1108/ITP-02-2014-0034

Tchouassi, G. (2016). Can mobile phones really work to extend banking services to the unbanked? *International Journal of Developing Societies*, *1*(2), 70–81.

Thomas, H. (2016). Measuring Progress Toward a Cashless Society. *Exclusive Insights from MasterCard Advisors*, 5. http://www.mastercardadvisors.com/cashlessjourney/

VERMA, S., & KUMAR, T. (2020). Antecedents of Online Banking Adoption: an Empirical Study in an Emerging Economy. *Journal of Services Research*, *20*(1), 7–19. http://vlib.excelsior.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=145767213&site=eds-live&scope=site

Vuković, M., Pivac, S., & Kundid, D. (2019). Structural equation modeling in the acceptance of internet banking in the city of Split. *Croatian Operational Research Review*, *10*(1), 141–152. https://doi.org/10.17535/crorr.2019.0013

Zhang, P. (2017). The evolution of social commerce: The people, management, technology, and information dimensions. *Communications of the Association for Information Systems*, *31*(1), 105–127. https://doi.org/10.17705/1cais.03105

BIMAR WEB APPLICATION FOR ISLAND RECLAMATION PROJECT

Shirley Chai Jia Lin[1] and Samikhah Muhammad @Munir[2]

[1,2]Civil Engineering Department
Politeknik Ungku Omar, Ipoh, Perak
[1]shirleychaijialin@gmail.com
[2]Peraksamikhah@puo.edu.my

Abstract: Industry 4.0 has lately become a popular term to describe the industrial world's trend toward digitalization and automation. The problem statement had been identified by using one set of pre-project questionnaires which involved 10 respondents. Based on the collected data, the analysis shows that the use of 2D drawing (which includes the limited information and less collaboration) and a lack of 3D modeling visualization causes misunderstanding and poor communication during the project presentation in the design phase. The scope of this study is an Island Reclamation Project located in the sea area near the south of Penang Island. The aim of this study is to develop a web-based application for project model viewers called the BIMAR Web application. The BIMAR Webapplication integrates Building Information Modelling with Augmented Reality. BIMAR Web application provides a better impact especially for a better understanding and visualization during project presentation. There is a total of 8 items that test the effectiveness of the BIMAR Web application that reported a mean score of more than 4.87 which gets a high interpretation. For the overall BIMAR Web application experience, the data analysis shows the standard deviation value of 0.000 which is categorized as the perfect agreement interpretation by using Cohen's Kappa interpretation table. BIMAR Web application is user-friendly and effective for project presentations.

Keywords*: Project Presentation, Building Information Modeling, Augmented Reality, BIMAR Web Application, User Friendly*

1. Introduction

Technological developments and inventions have accelerated Industry 4.0, the fourth industrial revolution. The literature claims that Industry 4.0 fosters growth and development through its ability for efficiency. Growth in the construction sector has an influence on the engineering and construction sector since it is a subset of the overall set of gross domestic product value (Lat et al., 2021). Construction productivity and quality are probably going to increase as a result of Industry 4.0, which is anticipated to draw both domestic and foreign investors. Drones, building information modelling (BIM), augmented reality, and three-dimensional (3D) scanning are a few examples of tools that have reached maturity in the industry. A strategy must be created that asks for coordinated and dedicated efforts in a number of fields, including as operations, technology, personnel, regulation, and others, in order to fulfil this potential (Gao et al., 2019).

1.1 Building Information Modelling (BIM)

Building information modelling for the Island Reclamation project has a problem. The report highlights a variety of advantages of BIM in construction, such as a decrease in cost, time, carbon footprint, and capital costs. Additionally, BIM may help improve coordination and communication between stakeholders and increase overall effectiveness. On the other hand, BIM implementation is challenging and requires collaboration between the public and commercial sectors (Haron et al., 2017). Among the many benefits of using building information modelling in the construction industry is enhanced communication between architects, clients, contractors, and other project stakeholders (Alaloul et al., 2018). In addition, BIM provides precise cost estimates for the building phase before it begins. Additionally, BIM may save project waste since it can identify disputes. This cooperative synchronisation system may automate design and construction procedures while also enhancing the ability to manage huge amounts of heterogeneous data. Industry 4.0 is projected to boost construction quality and productivity and draw both domestic and foreign investors (Smith, 2014).

1.2 Augmented Reality (AR)

The general population oftentimes overlooks augmented reality since virtual reality is so commonly utilised. In terms of educational, architectural, and field engineering operations for both students and professionals, augmented reality has a lot of potential for the construction technology market. However, this can just be the outcome of a fundamental misunderstanding of the concept. Augmented reality is a live, virtual representation of the actual world with the ability to add additional features to the environment. Augmented reality was first used in the gaming industry as a kind of entertainment, but today architectural and engineering institutions all over the world are prioritising it for its educational value. Due to its ability to display a project as planned rather than as built to demonstrate progress, augmented reality may dramatically improve scheduling in the construction sector (Bottani et al., 2019). In a poll of architects and designers, the findings of a study project by building progress monitoring supported the engineers' claims. On a tablet PC, augmented reality may be enhanced with a Gantt chart or other 3D models. (Ahmed, 2019). Effective communication and information retrieval are two crucial elements of project success in the construction business (Lin et al.,2014). Access to project information on-site has been improved thanks to the advent of various augmented reality (AR) systems compared to more traditional information sources (Pejoska et al.,2016). Thanks to these AR technologies, project managers may immediately decide on corrective steps to decrease costs and delays caused by performance discrepancies. Several businesses are beginning to build lightweight mobile devices to help with on-site information retrieval. According on the user's location, these companies are developing technologies that can project building plans and relevant information (Yeh, K et al., 2012). Researchers are also working on techniques that make use of the camera on a mobile device to assist locate and identify a field using just a single snapshot of the site. The enhanced visual benefits of AR technology enable more effective discussion and idea exchange amongst participants while working on a specific project. When new technologies appear as a result of innovation and new technology, the construction process becomes increasingly simple. These innovations address issues including the lack of managerial talent and the cost-effectiveness of construction projects. These developments include virtual reality and augmented reality, for instance. Augmented reality, a brand-new and developing building technology, is thought to overcome the drawbacks of the present BIM on-site application. (Wang, X. et al., 2013).

1.3 Augmented Reality and Building Information Modeling Integration In The Construction Industry

Technology is a key component of the engineering industry, and recent advancements have raised the bar. It has provided a wide range of tools for engineering work and professions to aid in improving results and increasing industrial production. The construction sector has a reputation for being sluggish to adopt new technology, resistant to change, and open to novel ideas. Due to the industry's reputation for being data-driven, massive volumes of data, drawings, specifications, and bills of materials must be maintained and processed often (Kim et al., 2021). BIM encompasses much more than just 3D models and representations. Signaling promotes greater stakeholder participation and consistent coordination among many stakeholders during the design and construction phases. A part of intelligently mixed reality, augmented reality (AR) is referred to be "the most ambitious portrayal of ambient intelligence." Since AR mixes both actual and virtual data sources, it naturally blends human emotions. It was also discovered that AR ought to be extensively used and compatible with precise location technologies like laser signalling. The information and data that BIM offers are mainly static and pre-characterized. Tracking is another use for augmented reality, in addition to local growth and position recognition using vision-based AR.

1.4 BIM Software

- Autodesk Revit

The building information modelling (BIM) programme Revit, created by the company Autodesk, is extensively used in industry. The most frequent users are architects, structural engineers, mechanical, electrical, and plumbing (MEP) engineers, designers, and contractors. In-depth 3D model creation, modification, and inspection are all possible for Autodesk Revit users. It is common to compare AutoCAD to Revit, a CAD tool also utilised in the AEC industry. The majority of AEC professionals utilise both Revit and AutoCAD at the same time, although these two programmes are significantly different from one another. It's possible that AutoCAD is a design tool that enables users to produce 2D and 3D drawings on a computer. However, Revit is used to create an intelligent 3D model that incorporates real-world data. For instance, doors are only a drawing's surrounds in AutoCAD. However, the Revit designs would have a genuine door model in addition to information about the material, price, etc (Shick et al., 2019).

- Autodesk Naviswork

For AEC professionals and teams, Navisworks is a project evaluation and management application. It provides a comprehensive analysis of combined models and data that includes a wide range of stakeholders during the preconstruction stage. Navisworks increases completion certainty with better management and operational optimization. Autodesk's description of Navisworks as "3D design review software" is accurate; it aids users in reviewing 3D designs. Navisworks may thus be the finest software for BIM projects. Another reason for its widespread popularity is the ease with which it connects with other Autodesk BIM systems like Revit and Civil 3D. Revit and Civil 3D models may be rapidly imported by Navisworks users. (Shick et al., 2019).

- AutoCAD

The Autodesk company developed the computer-aided design application known as AutoCAD. It can create and modify digital 2D and 3D designs more quickly and easily than a

person. The data may also be retained and saved in the cloud, making them available whenever and wherever needed. Here are a few more benefits of using AutoCAD:

(a) Easy Edits: Before computers, a designer had to make manual changes to designs. The user would have to start anew or modify an already existing document, which may become confusing and complicated. With AutoCAD, editing and manipulating designs is straightforward.
(b) Faster Production: may create a library of reusable blocks to speed up production and repeat design portions. The design process may be completed more quickly than if it were done manually thanks to the ability to use and reuse saved files.
(c) Better Accuracy: Fractional design is possible using AutoCAD. As a result, the design is more precise in every dimension. The finished design may be loaded into a 3D printer or otherdevice to create a prototype. Alternately, the dimensions of the design can be utilised to produce parts of a constructible object, such a home or building.

- Civil 3D

Civil engineers, designers, and other professionals may plan, build, and execute projects including transportation, water management, and land development with Autodesk's Civil 3D software. Civil 3D is a building information modelling (BIM) solution that is well-known in the civil engineering world as an industry-leading BIM solution. Civil 3D is used in infrastructure projects such as construction area development, road engineering, river development, dams, embankments, and many other types. People who are familiar with AutoCAD or who want to learn it can benefit much from using Civil 3D. Civil 3D changed from being an add-on for AutoCAD into a standalone solution based on the AutoCAD architecture as the software's ubiquity and demand grew. Civil 3D has a cosy design environment in addition to a wide range of AutoCAD-compatible shortcuts. Civil 3D supports real DWG (drawing) files, allowing you to store and share design data with other AutoCAD users. Pressure networks, corridor modelling, earthwork calculations, grading, pipelines, production drawings, geospatial analysis, and point clouds are just a few of the features and tools available for a project. (Mandal et al., 2019)

- QGIS Version 16 – Open Access

Users of the QGIS geographic information system (GIS) programme may produce, edit, and export graphical maps as well as analyse and change geographical data. QGIS supports both raster and vector layers, and vector data may be stored as either point, line, or polygon features. QGIS is essential for configuring and making sure that all drawings and models are in the correct coordinate reference system for 3D modelling. In addition, QGIS provides the appropriate aerial satellite image and Digital Elevation Model (DEM), a representation of the Earth's topography devoid of any vegetation, structures, or other surface characteristics, for the Island reclamation project (Correia et al., 2018).

2. Materials and Methods

The flowchart of the research design methodology in this study on the BIMAR Web application is displayed in Figure 1. The procedure begins with identifying the problem statement in the construction industry, data collection for the island reclamation model

design, development ofthe BIMAR Web application, and concludes by analyzing the data.

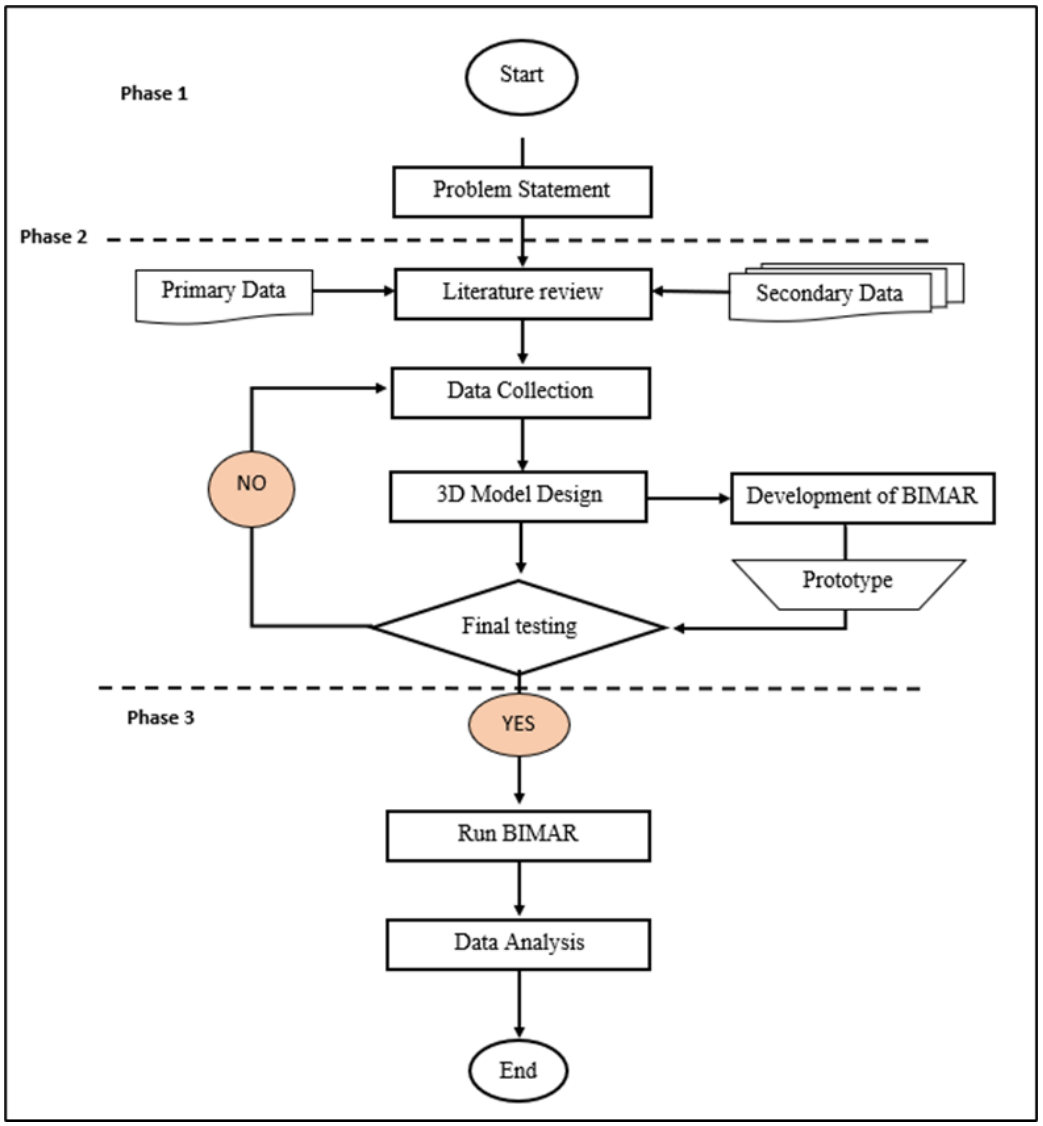


Figure 1. Research Design of the study

2.1 Questionnaire

There are two questionnaires which are Pre-Questionnaire and Post-Questionnaire in this study. The aim of the Pre-Questionnaire is to answer objective number 1 which is to collect the design components for the Island Reclamation project based on the Building Information ModellingLevel of Development 100 requirement. Besides, the post questionnaire being distributed andbeing analyzed to answer objective number 3, which is to evaluate the overall effectiveness ofthe BIMAR Web application. A number of 30 respondents from the construction industry give their feedback after experiencing the BIMAR Web Application.

2.2 Design Development

The innovation of the BIMAR Web application is to develop a web-based application for the Island Reclamation project which includes the 3D model, general project information, 4D simulation, and animation which can provide better visualization and understanding of the project. This application is being developed by using several software such as AutoCAD, Civil3D, Autodesk Infraworks, Navisworks, Google Earth Pro, and QGIS. All the BIM software is the student version and others are open sources hence the development of this project is free of charge. Table 1(a) and 1(b) below shows the process of developing the BIMAR Web application.

Table 1(a). BIMAR Web Design and Development

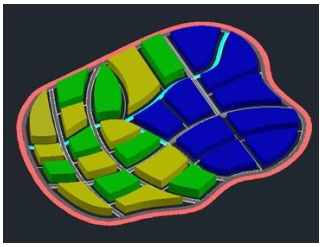
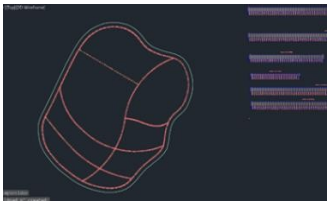
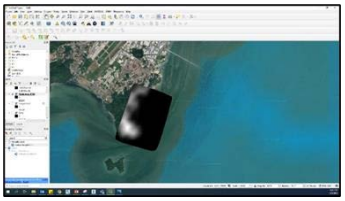
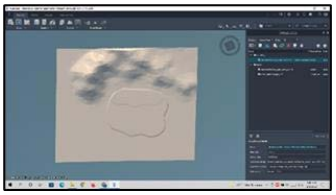
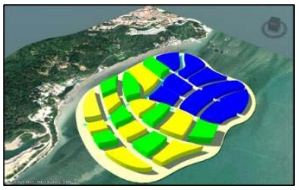
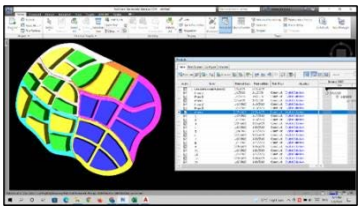
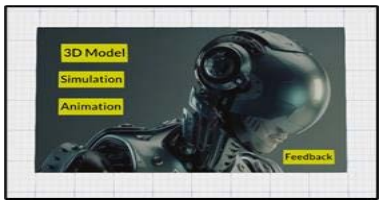
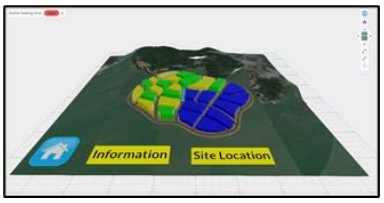
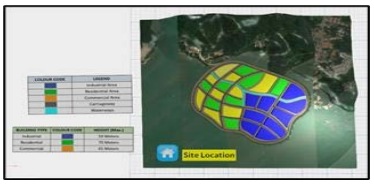
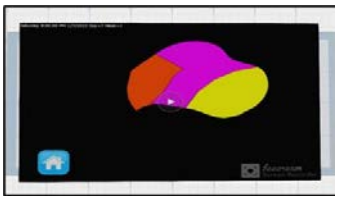
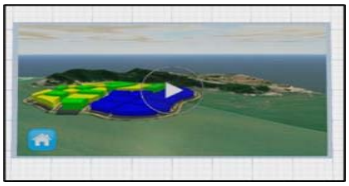
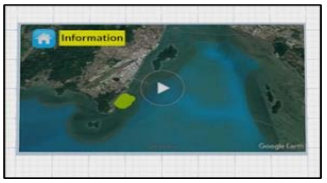
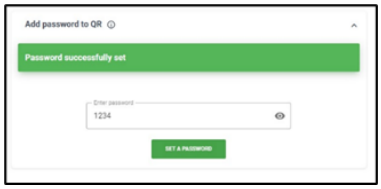
1. TIN Surface for the Model Platform	2. Extrude the Building envelope 
3. Roadways designed using Civil3D 	4. DEM for the study area using QGIS 
5. Import DEM and Island Platform 	6. Import all models in Infraworks 

Table 1(b). BIMAR Web Design and Development

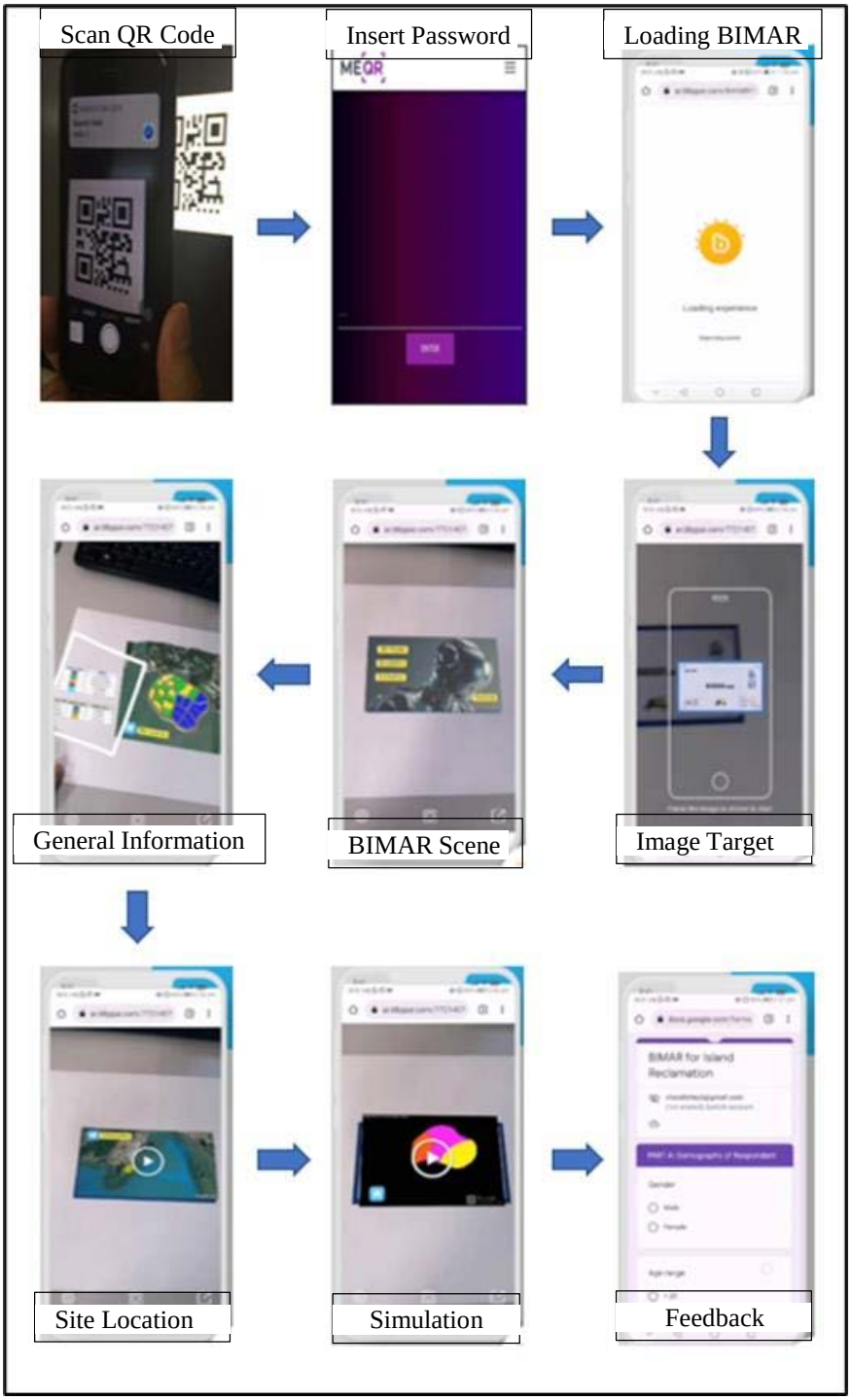
7. 4D Simulation using Navisworks 	8. Insert Image target in Blippar
9. Design scene on top of the image target 	10. Import Island Model into Blippar 
11. Insert model information into the scene 	12. Import 4D Simulation video 
13. Import Island Animation video 	14. Import Site Location zoom in video 
15. Set Password-Protected QR Code 	16. Generate and download QR Code

3. Results

BIMAR Web Application Prototype

Table 2 below shows the procedures to experience the BIMAR Web prototype which consists of 9 simple steps for the complete BIMAR Web application experience.

Table 2. BIMAR Web application prototype



The password-protected QR Code is designed to protect the privacy and confidentiality of company project data. Users have to key in the password before accessing the model. There are 3 main components in this application such as Island 3D model, site location zoom-in video, project general information, 4D simulation for island reclamation development progress, and the flythrough animation for the model. Users do not have to install any application because this is a web-based application that can access by both IOS and Android devices. The paperless concept was designed to save our environment and become more sustainable. A valid perception regarding the effectiveness of the product by the architect, site engineer, project manager, and planner. A set of questionnaires is being distributed to test the effectiveness and get feedback regards the BIMAR Web application for future improvement. Table 3 shows the result obtained by the developer regarding the effectiveness of the BIMAR Web Application based on mean score interpretation table.

Table 3. Mean score and standard deviation

BIL.	ITEM	RESPONDENT (N=30)		
		MEAN	SD	INTERPRETATION
1	Loading time for BIMAR Web	4.87	0.346	HIGH
2	IOS and Android friendly	4.97	0.183	HIGH
3	Private and confidential protection	5.00	0.000	HIGH
4	Provide better visualization for 3D Modelling through scanning	4.97	0.183	HIGH
5	Can get the project general information easily through scanning	4.93	0.254	HIGH
6	Improve communication between team members from a different department	4.87	0.346	HIGH
7	Reduce the paper used during the design phase	4.90	0.305	HIGH
8	Provide a better understanding forproject progress through 4D simulation	4.90	0.305	HIGH

Table 3 above shows the evaluation of the BIMAR Web Application's effectiveness in the project, there are a total of 8 items that have been tested by the respondents. The study recorded strongly agrees that the loading time for experiencing the BIMAR web is very short so this will save time during the model viewer (Mean=4.87). Besides, the BIMAR Web application can be accessed by both IOS and Android devices which were recorded strongly agreed by the respondents (Mean=4.97). This study also recorded the strongly agree of the respondent about the password-protected QR code which can provide private and confidential protection for company data (Mean= 5). In addition, the respondents also strongly agree by using the BIMAR Web application can provide better visualization for 3D modeling through scanning (Mean= 4.97). Because this application can get the project general information easily through scanning, the respondents after experience strongly agree about this function (Mean=4.93). Hence, the respondents also strongly agree about the BIMAR Web application can improve communication between team members from different departments (Mean=4.87). The study also recorded that using the BIMAR Web application was able to improve communication between team members from different departments (Mean=4.87). The study also recorded thatthe BIMAR Web Application provides a better understanding of project progress through 4D simulation (Mean=4.90). Furthermore, the respondents strongly agree with the paperless concept which can reduce the paper used during the design phase and can save our environment (Mean= 4.9). This study also recorded that the respondents strongly agree that by using the BIMAR Web application can provide a better understanding of project progress through 4D simulation (Mean=4.90).

4. Discussion

Based on the collected data, stated that the issues that occur in construction industry especially for the island reclamation project. The top 3 problems are the used of 2D drawing which included limited information, lack of 3D visualization which bring misunderstanding, and thepoor communication between different department during the project design phase presentation. Based on the problem that raised in the construction industry, the data collectionfor the island reclamation modeling based on Building information modelling level of development 100 requirement has been collected. All the modeling were modeled and createdby using BIM software such as AutoCAD, Civil3D, Infraworks, Navisworks, and QGIS opensource. The BIMAR web application is the web-based software where no application installation needed and can be access by both IOS and Android devices. The password- protected QR Code was developed to provide private and confidential protection. By using the BIMAR web application, users can access the BIMAR experience easily and can just simply scan to get the project general information which included the building envelope type, building maximum height, site location. Simulation, and animation for the island reclamation project. Besides, the google form was provided to collect the feedback and recommendation from userfor the BIMAR Web application future improvement. Overall, for the evaluation of the BIMAR Web application are very satisfied and all the respondents give a very positive feedback after experience the BIMAR Web application. The BIMAR web application will be upgrade to VRin the future for better visualization about the project.

5. Conclusion

In conclusion, the results of questionnaires and data collection completed can be identified asthe main problems in the construction industry, especially for the project design phase presentation such as the 2D drawing includes limited information or data (only portrayed in two dimensions), 2D drawing provide less collaboration with different disciplines which involve in the same project and lack of 3D visualization which causes misunderstanding and poor communication that affect project success. However, an innovative product which is an application that integrates Building Information Modelling with Augmented reality has been successfully developed to be used in the island reclamation project presentation. BIMAR Webapplication has been tested by using both IOS and also android devices where there is no application installation needed and can experience it through scanning the QR code. In addition, the data findings from the expected validity survey concluded that most respondentshad a positive perception (100%, 30 respondents) of the BIMAR Web application. Besides, the BIMAR Web application was very easy to access with a single scan on a password-protected QR code which secure the privacy and confidential protection of the model. Most important was no application installation was needed to experience the BIMAR model and users do nothave to worry about the phone storage. In addition, the details about the island reclamation project had been designed and developed which is required by the respondents. BIMAR Web application in the construction design phase would improve communication and give better understanding of the project.

Acknowledgments

I am indebted to a number of people who have contributed to the successful completion of this project, it would not be possible without the kind support and help of many individuals and organizations. I would like to extend our sincere thanks to all of them. First, I would like to thank my supervisor, Madam Samikhah Bt Muhammad @ Munir, for her guidance and valuable suggestions. In particular, I highly appreciate the great amount of time she spent for my program and her high availability to students. In addition, thanks to SRS CONSORTIUMSDN. BHD for giving me the opportunities to complete my internship there. My thanks also go to Mr. Rosli Bin Che Rose as my industrial supervisor and industrial mentor Head of Department BIM (Mr. Tony Joseph) for taking their time serving as members of my thesis defense committee also my parents, Mr. Chai Ng Jong and Madam Bernodette Then Lee Fongto give co-operation and encourage to help in completing this project. Finally, I would like to express my profound gratitude to my parents for their love and incredible support.

References

Alaloul, W. S., Liew, M. S., Zawawi, N. A. W. A., & Mohammed, B. S. (2018). Industry revolution IR 4.0: future opportunities and challenges in construction industry. In MATEC web of conferences (Vol. 203, p. 02010). EDP Sciences.

Ahmed, S. (2019). A review on using opportunities of augmented reality and virtual reality in construction project management. Organization, Technology and Management in Construction: An International Journal, 11(1), 1839-1852.

Bottani, E., & Vignali, G. (2019). Augmented reality technology in the manufacturing industry: A review of the last decade. Iise Transactions, 51(3), 284-310.

Correia, R., Duarte, L., Teodoro, A. C., & Monteiro, A. (2018). Processing image to geographical information systems (PI2GIS)—A learning tool for QGIS. Education Sciences, 8(2), 83.

Elshafey, A., Saar, C. C., Aminudin, E. B., Gheisari, M., & Usmani, A. (2020). Technology acceptance model for Augmented Reality and Building Information Modeling integration in the construction industry. J. Inf. Technol. Constr., 25, 161-172.

Gao, H., Koch, C., & Wu, Y. (2019). Building information modelling based building energy modelling: A review. Applied energy, 238, 320-343.

Haron, N. A., Raja Soh, R. P. Z. A., & Harun, A. N. (2017). Implementation of Building Information Modelling (BIM) in Malaysia: A Review of Pertanika Journal of Science & Technology. 25(3).

Kim, J., & Irizarry, J. (2021). Evaluating the use of augmented reality technology to improve construction management student's spatial skills. International Journal of Construction Education and Research, 17(2), 99-116.

Lat, D. C., Noor, S. M., Rahman, N. S. A., & Razali, R. (2021, May). Construction industry towards IR 4.0-A review. In AIP Conference Proceedings (Vol. 2339, No. 1, p. 020084). AIP Publishing LLC.

Lin, T. H., Liu, C. H., Tsai, M. H., & Kang, S. C. (2014). Using Augmented Reality in a Multiscreen Environment for Construction Discussion. Journal of Computing in Civil Engineering. 29(6).

Mandal, M., Pawade, P., Sandel, P., & Infrastructure, R. S. (2019). Geometric design of highway using Civil 3D. International Journal of Advance Research, Ideas and Innovations in Technology, 5(3).

Pejoska, J., Bauters, M., Purma, J., & Leinonen, T. (2016). Social augmented reality: Enhancing context-dependent communication and informal learning at work. British Journal of Educational Technology. 47(3). 474-483.

Shick Alshabab, M., Vysotskiy, A., Petrichenko, M., & Khalil, T. (2019, November). BIM-based quantity takeoff in autodesk revit and navisworks manage. In International Scientific Conference on Energy, Environmental and Construction Engineering (pp. 413-421). Springer, Cham.

Smith, P. (2014). BIM implementation–global strategies. Procedia engineering, 85, 482-492.

Wang, X., Love, P. E., Kim, M. J., Park, C. S., Sing, C. P., & Hou, L. (2013). A conceptual framework for integrating building information modeling with augmented reality. Automation in Construction. 34. 37-44.

Yeh, K. C., Tsai, M. H., & Kang, S. C. (2012). On-site building information retrieval by using projection-based augmented reality. Journal of Computing in Civil Engineering. 26(3). 342-355.

TAHAP PENGUASAAN KEMAHIRAN GENERIK DALAM PROSES PENGAJARAN DAN PEMBELAJARAN DIKALANGAN PELAJAR POLITEKNIK TUANKU SYED SIRAJUDDIN, PERLIS

Noor Halawati Che Meh[1] dan Mas Guieta Aton[2]

[1,2]Jabatan Teknologi Maklumat,
Politeknik Tuanku Syed Sirajuddin, Perlis
halawati@ptss.edu.my[1],
masguieta@ptss.edu.my[2]

Abstrak: Kemahiran generik merupakan salah satu penilaian afektif yang diukur dikalangan pelajar Politeknik Malaysia. Kemahiran generik berkait rapat dengan perasaan, emosi, sikap, jati diri, minat dan nilai seseorang individu terutama pelajar dalam pembangunan modal insan. Kajian ini bertujuan untuk mengenalpasti tahap penguasaan kemahiran generik dalam proses pengajaran dan pembelajaran dikalangan pelajar Politeknik Tuanku Syed Sirajuddin yang melibatkan kemahiran komunikasi, kemahiran kepimpinan, kemahiran kerja berkumpulan, kemahiran menyelesaikan masalah dan kemahiran etika dan profesional. Kajian ini melibatkan 407 orang responden yang terdiri daripada pelbagai jabatan dan semester yang dipilih secara rawak. Data dianalisis menggunakan statistikal deskriptif bagi menilai min, sisihan piawai dan frekuensi dan analisis inferensi digunakan untuk membuat ujian-t bagi melihat perbezaan yang signifikan untuk kelima-lima elemen kemahiran generik terhadap jantina responden. Data dianalisis menggunakan *Statistical Package for social science*. Hasil analisis kajian menunjukkan bahawa tahap penguasaan kemahiran generik bagi kelima-lima item adalah tinggi iaitu nilai min antara 4.04 dan 4.28. Dapatan Kajian bagi ujian-t menunjukkan kemahiran generik dari aspek kemahiran etika dan professional menunjukkan nilai $p = 0.01 < \alpha\ 0.05$, dimana terdapat perbezaan yang signifikan terhadap pelajar lelaki dan perempuan. Kajian ini penting buat pensyarah bagi mengenalpasti tahap penguasaan kemahiran generik dikalangan pelajar.

***Katakunci**: kemahiran generik; kemahiran komunikasi; kemahiran berkumpulan; kemahiran menyelesaikan masalah, kemahiran kepimpinan, kemahiran etika dan professional.*

1. Pengenalan

Kecemerlangan pelajar di institusi pengajian tinggi tidak dinilai dari aspek kognitif semata-mata, faktor kejayaan pelajar dinilai dari tiga aspek iaitu kognitif, psikomotor dan afektif. Kognitif akan menguji pelajar dari segi pemahaman dan kemampuan intelektual pelajar seperti peperiksaan akhir. Menurut (Mohd Syaubari Othman & Ahmad Yunus Kassim, 2016), kognitif merupakan aspek berfikir yang melibatkan pengetahuan, pemahaman, penerapan dan penguraian. Penilaian psikomotor akan dinilai di makmal atau bengkel bagi mempersiapkan diri pelajar kearah teknikal dan *hands on*, manakala afektif adalah dari segi sikap dan nilai moral seseorang individu itu sendiri. Penilaian afektif meliputi aspek kerjasama, disiplin, keberanian, tolerasi dan kesungguhan (Apsari & Sastiawati, 2021). Kemahiran generik di dalam kajian ini, adalah dibawah kategori penilaian afektif.

Kemahiran generik amat penting dalam pembangunan modal insan masa kini dalam mempersiapkan pelajar selaku pelapis pemimpin negara kelak. Jurutenik dan pembantu teknikal yang bakal dilahirkan di politeknik perlu mempunyai kemahiran generik yang menepati dan dapat mengadaptasikan diri dengan elemen sosial, ekonomi dan persekitaran alam pekerjaan (Mohd Yusof et al., 2015). Kemahiran generik merupakan elemen terpenting bagi kebolehpasaran graduan dari institusi pengajian tinggi (Ngadiman & Jamaludin, 2018). Menurut (Zainudin Hassan et al., 2007), berpendapat seorang graduan perlu mempunyai ciri-ciri dan sikap yang positif, kecerdasan emosi, kebolehan mencipta, berkebolehan dalam menyelesakan masalah, boleh bekerja dalam kumpulan dan berupaya menyesuaikan diri mengikut persekitaran. Majikan bidang globalisasi masa kini lebih memerlukan pekerja yang mempunyai elemen-elemen kemahiran generik (Suleman, 2016). Tiada disiplin yang dikhususkan bagi pembangunan kemahiran generic kecuali ia dibangunkan Bersama-sama dalam kusus yang diambil oleh graduan di institusi pengajian tinggi. Pelbagai jenis aspek kemahiran generik yang akan dinilai oleh setiap pelajar bergantung pada kursus yang diambil. Setiap kursus yang ditawarkan mempunyai kemahiran generik yang tersendiri. Dengan ini, ketrampilan pelajar akan diukur dari pelbagai aspek iaitu kognitif, psikomotor dan afektif.

Justeru itu, kajian ini dipilih oleh penulis bertujuan untuk mengkaji sejauh mana tahap penguasaan kemahiran generik dari aspek kemahiran komunikasi, kemahiran kepimpinan, kemahiran kerja berkumpulan, kemahiran menyelesaikan masalah dan kemahiran etika dan profesional merentasi jabatan dikalangan pelajar Politeknik Tuanku Syed Sirajuddin sebelum memasuki alam pekerjaan seterusnya, melihat perbezaan yang signifikan bagi kelima-lima elemen kemahiran generik terhadap jantina.

2. Bahan dan Metodologi

Kajian ini merupakan penyelidikan deskriptif iaitu lebih bersifat objektif dan berorientasikan kepada hasil tinjauan. Rekabentuk kajian ini menggunakan kaedah kuantitatif yang bersesuaian dengan tujuan kajian iaitu untuk menguji tahap penguasaan kemahiran generik dalam proses pengajaran dan pembelajaran dikalangan pelajar Politeknik Tuanku Syed Sirajuddin, Perlis. Borang soal selidik diedarkan dikalangan semua pelajar Politeknik Tuanku Syed Sirajuddin dan dianalisis menggunakan *Statistical Package for Social Science (SPSS)* untuk mendapatkan menghasilkan statistic inferensi iaitu ujian taburan (t-test) untuk melihat sama ada terdapat perbezaan min signifikan antara pelajar lelaki dan perempuan bagi setiap kemahiran generik yang dikaji iaitu (komunikasi, kepimpinan, kerja berkumpulan, penyelesaian masalah dan etika dan professional).

Sampel Kajian

Sampel kajian daripada enam buah jabatan iaitu Jabatan Teknologi Maklumat dan Komunikasi (JTMK), Jabatan Kejuruteraan Elektrik (JKE), Jabatan Kejuruteraan Mekanikal (JKM), Jabatan Perdagangan (JP), Jabatan Pelancongan dan Hospitaliti (JPH) dan Jabatan Rekabentuk dan Komunikasi Visual (JRKV) yang melibatkan semua pelajar semester satu hingga semester enam. Jumlah populasi kajian adalah seramai 3340 orang pelajar. Berpandukan kaedah persampelan Krejcie dan Morgan (1970) bagi menentukan sampel kajian adalah seramai 346 orang pelajar daripada keseluruhan populasi. Kajian ini mempunyai seramai 401 sampel kajian yang terdiri daripada pelbagai jabatan dan semester yang dipilih secara rawak. Kajian ini

dijalankan di Politeknik Tuanku Syed Sirajuddin, Perlis dan semua pelajar terlibat sebagai responden kajian.

Instrumen kajian

Instrumen kajian adalah menggunakan borang soal selidik yang diedarkan kepada responden kajian bagi mengumpulkan data dan maklum balas dari responden. Skala Likert 5 mata digunakan bagi mendapatkan maklum balas dari responden. Soal selidik kajian ini diadaptasi daripada beberapa kajian penyelidik terdahulu antaranya (Amiruddin et al., 2016), (Norzailawati Mohd Nor et al., 2008) dan (Othman & Syed Ali, 2019). Borang soal selidik ini terdiri daripada 6 bahagian iaitu demografi (bahagian A), kemahiran komunikasi (bahagian B), kemahiran kepimpinan (bahagian C), kemahiran kerja berkumpulan (bahagian D), kemahiran menyelesaikan masalah (bahagian E) dan kemahiran etika dan profesional (bahagian F). Nilai Alpha cronbach bagi elemen-elemen yang diuji ialah 0.9 iaitu melebihi 0.6 dan elemen-elemen yang diuji mempunyai kebolehpercayaan yang sangat baik, efektif dan mempunyai tahap konsistensi yang tinggi (Lily Hanefarezan Asbulah, Maimun Aqsha Lubis, 2018).

Analisis data

Kajian ini merupakan kajian kuantitatif. Data dianalisis menggunakan statistikal deskriptif bagi menilai min, sisihan piawai dan frekuensi untuk bahagian A, B, C, D, E dan F. Statistikal inferensi digunakan untuk membuat analisis inferensi iaitu ujian t (t-test) untuk melihat perbezaan yang signifikan bagi kelima-lima elemen kemahiran generik terhadap jantina responden. Semua data dianalisis menggunakan *Statistical Package for social science* (SPSS). Tahap kemahiran generik bagi kelima-lima item diukur berdasarkan kepada julat interpretasi skor min yang digunakan dalam kajian (Mohd. Khaidir Abdul Wahab, 2019) berpandukan Jadual 1 dibawah.

Jadual 1. Interpretasi Skor Min.

Skor Min	Interpretasi (tahap)
1.00 hingga 2.49	Rendah dan Tidak memuaskan
2.50 hingga 3.79	Sederhana dan Agak memuaskan
3.80 hingga 5.00	Tinggi dan Sangat memuaskan

Interpretasi skor min seperti Jadual 1 akan digunakan bagi menilai tahap penguasaan kemahiran generik bagi kemahiran komunikasi (bahagian B), kemahiran kepimpinan (bahagian C), kemahiran kerja berkumpulan (bahagian D), kemahiran menyelesaikan masalah (bahagian E) dan kemahiran etika dan profesional (bahagian F) dikalangan pelajar Politeknik Tuanku syed Sirajuddin, Perlis.

3. Keputusan

Dalam bab ini, pengkaji akan membincangkan hasil dapatan yang diperolehi dari data analisis yang diperolehi menggunakan SPSS yang merangkumi faktor demografi dan lima elemen yang terdapat di dalam kemahiran generik.

3.1 Profail responden berdasarkan jantina.

Jadual 2 menunjukkan bilangan responden berdasarkan jantina berdasarkan daripada 407 orang responden. Bilangan responden lelaki ialah 174 (42.8%) orang manakala jumlah responden perempuan ialah 233 (57.25) orang.

Jadual 2. Pecahan jantina berdasarkan responden.

Jantina	Bilangan	Peratus (%)
Lelaki	174	42.8
Perempuan	233	57.2

3.2 Profail responden berdasarkan jabatan

Jadual 3 menunjukkan pecahan jabatan berdasarkan responden yang terdiri daripada terdiri daripada enam jabatan yang terdapat di PTSS dan bilangan responden JTMK ialah 130 (31.9%) orang, JKE ialah 41 (10.1%), JKM ialah 42 (10.3%) orang, JP ialah 64 (15.7%), JPH ialah 75 (18.4%), dan JRKV ialah 55 (13.5%).

Jadual 3. Pecahan jabatan berdasarkan responden.

Jantina	Bilangan	Peratus (%)
JTMK	130	31.9
JKE	41	10.1
JKM	42	10.3
JP	64	15.7
JPH	75	18.4
JRKV	55	13.5

3.3 Tahap kemahiran komunikasi dalam pengajaran dan pembelajaran.

Jadual 4 menunjukkan min, sisihan piawai dan tafsiran min bagi setiap elemen yang diukur untuk mengenalpasti tahap penguasaan pelajar terhadap kemahiran generik dari aspek kemahiran komunikasi dalam pengajaran dan pembelajaran. Dapatan analisis membuktikan tahap penguasaan kemahiran generik pelajar dari aspek kemahiran komunikasi adalah pada tahap tinggi dengan nilai min tertinggi sebanyak 4.40 (SP=.711) bagi elemen kemahiran komunikasi (B6) dimana pelajar sediamaklum bahawa memberikan tumpuan ketika pensyarah memberikan penjelasan adalah salah satu kaedah kemahiran komunikasi. Nilai min terendah ialah 4.11 (SP=.795), item B3 dimana boleh berkomunikasi dalam melaksanakan pembentangan apabila diminta.

Jadual 4. Min, Sisihan piawai dan tafsiran min tahap kemahiran komunikasi.

Bil	Item Kemahiran Komunikasi	Min	Sisihan Piawai	Tafsiran Min
B1	Saya bersedia untuk mempelbagaikan kemahiran komunikasi selain lisan seperti komunikasi isyarat.	4.22	.758	Tinggi
B2	Saya akan berusaha menjadikan kemahiran komunikasi sebagai satu kemahiran yang penting pada saya untuk masa hadapan.	4.38	.692	Tinggi

B3	Saya boleh berkomunikasi dalam melaksanakan pembentangan apabila diminta.	4.11	.795	Tinggi
B4	Kemahiran komunikasi yang baik boleh berinteraksi dengan rakan sekelas yang berlainan bangsa dan agama.	4.38	.726	Tinggi
B5	Saya perlu sentiasa mendengar penerangan rakan sebelum memberikan pendapat.	4.37	.727	Tinggi
B6	Memberikan tumpuan ketika pensyarah memberikan penjelasan adalah salah satu kaedah kemahiran komunikasi.	4.40	.711	Tinggi
B7	Kemahiran komunikasi boleh dibentuk dengan berkeupayaan melahirkan idea secara lisan dengan jelas dan baik.	4.37	.707	Tinggi
B8	Saya perlu bersedia menjadi penghubung bicara di antara dua pihak yang bertelagah.	4.15	.811	Tinggi
B9	Saya perlu melaksanakan perbincangan dengan rakan sewaktu melaksanakan amali di bengkel.	4.31	.718	Tinggi
B10	Saya boleh berkomunikasi yang melibatkan interaksi dengan pensyarah dalam sesi soal jawab.	4.16	.786	Tinggi
	Purata	4.28		Tinggi

3.4 Tahap Kemahiran kepimpinan dalam pengajaran dan pembelajaran.

Jadual 5 menunjukkan min, sisihan piawai dan tafsiran min bagi setiap item kemahiran kepimpinan yang diukur untuk mengenalpasti tahap penguasaan pelajar terhadap kemahiran generik dari aspek kemahiran kepimpinan dalam pengajaran dan pembelajaran. Dapatan analisis membuktikan tahap penguasaan kemahiran generik pelajar dari aspek kemahiran kepimpinan adalah pada tahap tinggi dengan nilai min tertinggi sebanyak 4.47 (SP=.707) bagi elemen C1 dimana pelajar tahu bahawa kerjasama dalam satu kumpulan dalam melaksanakan amali di bengkel adalah sangat penting dalam kemahiran kepimpinan. Nilai min terendah adalah pada item C4 dimana pelajar sedia kalum bahawa keupayaan menggalas tanggungjawab yang diberikan sebagai ketua kumpulan adalah tugas yang mudah dengan mencatat nilai min 3.84 (SP=1.057).

Jadual 5. Min, Sisihan piawai dan tafsiran min tahap kemahiran kepimpinan.

Bil	Item Kemahiran Kepimpinan	Min	Sisihan Piawai	Tafsiran Min
C1	Kerjasama dalam satu kumpulan dalam melaksanakan amali di bengkel adalah sangat penting dalam kemahiran kepimpinan.	4.47	.707	Tinggi
C2	Pemimpin yang baik akan menyelesaikan perselisihan faham yang dihadapi antara ahli kumpulan dengan kadar segera.	4.46	.711	Tinggi
C3	Saya boleh memberikan arahan kepada ahli kumpulan dalam pembahagian tugas sewaktu amali di bengkel.	4.16	.830	Tinggi
C4	Keupayaan menggalas tanggungjawab yang diberikan sebagai ketua kumpulan adalah tugas yang mudah.	3.84	1.057	Tinggi
C5	Saya perlu bersedia memberikan kerjasama yang konsisten selagi diperlukan oleh ahli kumpulan.	4.36	.708	Tinggi
C6	Saya sentiasa perlu memberikan penghargaan kepada ahli kumpulan yang menjalankan tugas dengan cemerlang.	4.31	.748	Tinggi

C7	Saya boleh mengawal emosi terhadap ahli kumpulan walaupun dalam keadaan yang mencabar sewaktu melaksanakan kerja-kerja amali di bengkel.	4.19	.806	Tinggi
C8	Saya perlu menjaga hubungan yang baik sesama ahli kumpulan.	4.41	.730	Tinggi
C9	Saya boleh menerima keputusan yang telah dipersetujui oleh ahli kumpulan.	4.35	.727	Tinggi
C10	Seorang yang mempunyai kepimpinan yang cemerlang mampu menganalisis situasi kompleks dengan tepat dan cepat.	4.32	.800	Tinggi
	Purata	4.28		Tinggi

3.5 Tahap Kemahiran kerja berkumpulan dalam pengajaran dan pembelajaran.

Jadual 6 menunjukkan min, sisihan piawai dan tafsiran min bagi setiap item kemahiran kerja berkumpulan yang diukur untuk mengenalpasti tahap penguasaan pelajar terhadap kemahiran generik dari aspek kemahiran kerja kumpulan dalam pengajaran dan pembelajaran. Dapatan analisis membuktikan tahap penguasaan kemahiran generik pelajar dari aspek kemahiran kerja kumpulan adalah pada tahap tinggi dengan nilai min tertinggi sebanyak 4.37 (SP=.689) bagi elemen D5 dimana pelajar sangat menitikberatkan kerjasama di dalam kumpulan. Nilai min terendah adalah pada item D4 iaitu pelajar berkeupayaan dalam menyelaraskan hasil usaha kumpulan bagi mencapai matlamat organisasi dengan mencatat nilai min 4.27 (SP=.746).

Jadual 6. Min, Sisihan piawai dan tafsiran min tahap kemahiran kerja berkumpulan.

Bil	Item Kemahiran kerja kumpulan	Min	Sisihan Piawai	Tafsiran Min
D1	Saya berkeupayaan untuk bekerja keras untuk mencapai matlamat kumpulan dalam tugasan yang diberikan.	4.34	0.703	Tinggi
D2	Saya perlu berkeupayaan memberikan sumbangan dan merancang terhadap keputusan kumpulan.	4.30	0.695	Tinggi
D3	Saya berkeupayaan dalam melaksanakan proses sumbang saran di antara ahli di dalam kumpulan.	4.28	0.718	Tinggi
D4	Saya berkeupayaan dalam menyelaraskan hasil usaha kumpulan bagi mencapai matlamat organisasi.	4.27	0.746	Tinggi
D5	Sentiasa memberikan kerjasama di dalam kumpulan sangat dititikberatkan dalam kemahiran kerja berkumpulan.	4.37	0.689	Tinggi
D6	Saya boleh bekerja dengan rakan dari pelbagai peringkat umur, jantina, bangsa dan agama.	4.31	0.714	Tinggi
D7	Saya perlu menyesuaikan diri dengan cepat dengan ahli kumpulan yang lain.	4.29	0.750	Tinggi
D8	Saya berkeupayaan untuk melaksanakan perbincangan di antara ahli kumpulan dalam menyelesaikan masalah yang diberikan.	4.28	0.725	Tinggi
D9	Saya berkeupayaan untuk membezakan kebaikan dan keburukan bagi keputusan yang telah diambil oleh ahli kumpulan.	4.29	0.701	Tinggi
D10	Pemikiran kreatif dan perbincangan dengan ahli kumpulan akan memupuk kerjasama yang baik dalam menyelesaikan tugasan dengan lebih mudah.	4.35	0.707	Tinggi
	Purata	4.30		Tinggi

3.6 Tahap Kemahiran menyelesaikan masalah dalam pengajaran dan pembelajaran.

Jadual 7 menunjukkan min, sisihan piawai dan tafsiran min bagi setiap item kemahiran menyelesaikan masalah. yang diukur untuk mengenalpasti tahap penguasaan pelajar terhadap kemahiran generik dari aspek kemahiran menyelesaikan masalah dalam pengajaran dan pembelajaran. Dapatan analisis menunjukkan tahap penguasaan kemahiran generik pelajar dari aspek kemahiran menyelesaikan masalah adalah pada tahap tinggi dengan nilai min tertinggi sebanyak 4.47 (SP=.707) bagi elemen E3 dimana pelajar berupaya menyemak semula proses penyelesaian masalah dengan mengekalkan kebaikan dan menambah baik proses yang telah dijalankan. Nilai min terendah adalah pada item E7 iaitu pelajar mampu menyelesaikan masalah yang rumit dalam masa yang sangat lama dengan mencatat nilai min 4.09 (SP=0.829).

Jadual 7. Min, Sisihan piawai dan tafsiran min tahap kemahiran menyelesaikan masalah.

Bil	Item Kemahiran Menyelesaikan Masalah	Min	Sisihan Piawai	Tafsiran Min
E1	Saya berkeupayaan untuk menyelesaikan masalah yang diberikan dalam masa yang ditetapkan.	4.14	0.77	Tinggi
E2	Saya berupaya untuk mengenal pasti maklumat yang diperlukan dalam menyelesaikan masalah.	4.21	0.749	Tinggi
E3	Saya perlu menyemak semula proses penyelesaian masalah dengan mengekalkan kebaikan dan menambah baik proses yang telah dijalankan.	4.30	0.706	Tinggi
E4	Saya akan menggunakan teknik menyoal kepada diri sendiri dalam menyelesaikan masalah sewaktu diberikan tugasan.	4.25	0.757	Tinggi
E5	Saya boleh merancang strategi yang boleh digunakan dan diterima oleh individu yang terlibat dalam menyelesaikan masalah.	4.18	0.763	Tinggi
E6	Saya mampu menunjukkan pemikiran kritis dan kreatif dalam menyelesaikan tugasan yang diberikan.	4.18	0.79	Tinggi
E7	Saya mampu menyelesaikan masalah yang rumit dalam masa yang sangat lama.	4.09	0.829	Tinggi
E8	Saya mampu untuk membangunkan proses yang efektif untuk menyelesaikan masalah.	4.14	0.787	Tinggi
E9	Saya berupaya memilih beberapa kaedah yang sesuai dalam menyelesaikan masalah.	4.23	0.729	Tinggi
E10	Saya boleh membuat penilaian untuk proses yang dijalankan dalam menyelesaikan masalah.	4.22	0.737	Tinggi
	Purata	4.19		Tinggi

3.7 Tahap Kemahiran etika dan profesional dalam pengajaran dan pembelajaran.

Jadual 8 menunjukkan min, sisihan piawai dan tafsiran min bagi setiap item kemahiran etika dan profesional yang diukur untuk mengenalpasti tahap penguasaan pelajar terhadap kemahiran generik dari aspek kemahiran etika dan profesional dalam pengajaran dan pembelajaran. Dapatan analisis membuktikan tahap penguasaan kemahiran generik pelajar dari aspek kemahiran etika dan profesional secara purata pada tahap tinggi dengan nilai min tertinggi sebanyak 4.40 (SP=.691) bagi elemen F7 dimana pelajar tahu bahawa disiplin yang baik dalam membentuk personaliti yang cemerlang wujud dalam kemahiran etika dan

professional. Nilai min terendah (sederhana) adalah pada item F2 dimana pelajar tidak boleh menghormati orang yang mempunyai bakat yang lebih daripadanya dengan mencatat nilai min 3.11 (SP=1.523).

Jadual 8. Min, Sisihan piawai dan tafsiran min tahap kemahiran etika dan profesional.

Bil	Item Kemahiran etika dan profesional	Min	Sisihan Piawai	Tafsiran Min
F1	Saya berkeupayaan untuk menjadi seorang yang mempunyai peribadi yang berkeyakinan tinggi dalam segala aspek.	4.20	0.755	Tinggi
F2	Saya tidak boleh menghormati orang yang mempunyai bakat yang lebih daripada saya.	3.11	1.523	Sederhana
F3	Saya telah dimaklumkan tentang berpakaian kemas mengikut peraturan yang ditetapkan dalam menghadiri kuliah dan bengkel.	4.37	0.740	Tinggi
F4	Saya perlu bersikap positif untuk membentuk sikap dan tingkah laku yang baik.	4.38	0.712	Tinggi
F5	Saya boleh menerima teguran daripada orang lain walau dalam keadaan emosi tidak stabil ketika itu.	4.20	0.803	Tinggi
F6	Saya sentiasa diterapkan nilai-nilai murni samada di dalam kelas mahupun di bengkel]	4.35	0.714	Tinggi
F7	Disiplin yang baik dalam membentuk personaliti yang cemerlang wujud dalam kemahiran etika dan professional.	4.40	0.691	Tinggi
F8	Saya tidak boleh menerima teguran daripada orang lain walau dalam keadaan emosi tidak stabil ketika itu.	3.33	1.467	Sederhana
	Purata	4.04		Tinggi

3.8 Analisis Inferensi (ujian-t)

Jadual 9 menunjukkan analisa ujian-t bagi mendapatkan perbezaan nilai min kemahiran generik dengan jantina pelajar terhadap lima aspek kemahiran generik iaitu kemahiran komunikasi, kemahiran kepimpinan, kemahiran kerja berkumpulan, kemahiran menyelesaikan masalah dan kemahiran etika dan profesional menggunakan aras keertian signifikan 0.05. Dapatan kajian menunjukkan nilai p bagi kemahiran generik (komunikasi, kepimpinan, kerja kumpulan dan menyelesaikan masalah) terhadap jantina ialah $p > \alpha$ 0.05. Ini menunjukkan tidak terdapat perbezaan yang signifikan bagi keempat-empat elemen terhadap pelajar lelaki dan perempuan. Dapatan kajian bagi kemahiran etika dan professional menunjukkan nilai $p = 0.01 < \alpha$ 0.05, menunujukkan terdapat perbezaan yang signifikan terhadap pelajar lelaki dan perempuan.

Jadual 9. Analisa ujian-t membandingkan nilai min kemahiran generik dengan jantina.

Kemahiran Generik	Jantina	N	Min	Sisihan Piawai	t	Sig (2-tailed)
Kemahiran Komunikasi	Lelaki	174	4.35	.5817	1.780	0.76
	Perempuan	233	4.24	.6839	1.822	
Kemahiran Kepimpinan	Lelaki	174	4.34	.65484	1.476	1.41
	Perempuan	233	4.24	.6620	1.479	
Kemahiran Kerja Berkumpulan	Lelaki	174	4.36	.61678	1.485	1.38
	Perempuan	233	4.26	.6560	1.499	

Kemahiran Menyelesaikan Masalah	Lelaki	174	4.27	.6556	2.174	.030
	Perempuan	233	4.13	.6820	2.186	
Kemahiran Etika dan Profesional	Lelaki	174	4.12	.6442	3.368	.001
	Perempuan	233	3.89	.6969	3.407	

* Signifikan pada aras keertian .05

4. Perbincangan

Hasil kajian daripada ke lima-lima aspek kemahian generik yang dikaji telah mencapai objektif yang telah ditetapkan. Purata tahap penguasaan bagi kemahiran generik terhadap pelajar di Politeknik Tuanku Syed Sirajuddin yang melibatkan enam jabatan yang pilih secara rawak adalah berada pada tahap yang tinggi.

Tahap penguasaan kemahiran generik pertama yang dikaji ialah kemahiran komunikasi yang mencatat purata min 4.28 (tinggi). Min tertinggi bagi item yang diukur ialah bagi elemen B6 iaitu “memberikan tumpuan ketika pensyarah memberikan penjelasan adalah salah satu kaedah kemahiran komunikasi”.Pendapat pengkaji, ini adalah kerana tumpuan yang diberikan didalam kelas mampu membantu pelajar melibatkan diri secara aktif didalam sesi soal jawab antara pelajar dan pensyarah yang lebih berkesan dan secara tidak langsung dapat membantu pelajar lebih memahami kursus yang dipelajari. Kesedaran yang tinggi dalam kemahiran komunikasi dikalangan pelajar didorong oleh motivasi diri yang kuat serta keyakinan diri yang tinggi (Marliana Musa & Ahmad Esa, 2009). Min kemahiran komunikasi tertinggi yang diperolehi adalah item kemahiran interaksi dikalangan pelajar dan pensyarah dimana kecenderungan komunikasi yang berkesan akan tercetus sekiranya dua pihak memahami perkara yang ingin disampaikan (Amiruddin et al., 2016).

Tahap penguasaan generik kedua yang dikaji ialah kemahiran kepimpinan yang mencatat purata min 4.28 (tinggi). Elemen C1 mencatat min tertinggi iaitu “kerjasama dalam satu kumpulan dalam melaksanakan amali di bengkel adalah sangat penting dalam kemahiran kepimpinan”. Catatan tertinggi ini adalah kerana kebanyakan kursus yang melibatkan bengkel di Politeknik Tuanku Syed Sirajuddin akan dilaksanakan secara berkumpulan dan setiap ahli didalam kumpulan akan memainkan peranan yang berbeza. Hasil yang diperolehi dari setiap ahli dalam kumpulan akan digabungkan dan dibentang didalam kelas, dengan cara itu, kemahiran kepimpinan akan tercetus secara tidak langsung sebelum perbentangan dilaksanakan bagi mendapatkan markah yang terbaik bagi setiap tugasan kumpulan yang diberikan oleh pensyarah. Kepimpinan merupakan satu proses bagi setiap individu dalam mencipta idea-idea yang baru, kreatif dan inovatif untuk kecemerlangan organisasi (Harvard, 2012).

Tahap penguasaan generik ketiga yang dikaji ialah kemahiran berkumpulan yang mencatat purata min 4.30 (tinggi). Elemen D5 mencatat min tertinggi ialah “sentiasa memberikan kerjasama di dalam kumpulan sangat dititikberatkan dalam kemahiran kerja berkumpulan”. Pendapat penulis mengenai item D5 yang memperolehi nilai min tertinggi kerana rubrik yang digunapakai bagi menilai pemarkahan pelajar adalah secara individu tetapi hasil tugasan dilihat secara berkumpulan, pemarkahan yang tinggi memerlukan setiap komitmen dari setiap ahli kumpulan bagi memperolehi markah yang tinggi didalam kerja kursus. Pembelajaran secara berkumpulan semasa proses pengajaran dan pembelajaran yang berkesan, membolehkan

pelajar itu sendiri kerap merujuk kepada rakan-rakan yang lain sekiranya menghadapi kesukaran dalam tugasan yang diberikan (Marliana Musa & Ahmad Esa, 2009).

Tahap penguasaan generik keempat yang dikaji ialah kemahiran menyelesaikan masalah yang mencatat purata min 4.19 (tinggi). Elemen D5 mencatat min tertinggi ialah "saya perlu menyemak semula proses penyelesaian masalah dengan mengekalkan kebaikan dan menambah baik proses yang telah dijalankan". Dapatan kajian ini disokong dengan dapatan kajian yang dilaksanakan oleh (Amiruddin et al., 2016; Othman & Syed Ali, 2019). Menurut (Lisa Gueldenzoph Snyder & Mark J. Snyder, 2008), proses kemahiran pemikiran kritis dan penyelesaian masalah perlu diperkembangkan, diamalkan dan disepadukan secara berterusan ke dalam kurikulum untuk melibatkan pelajar dalam pembelajaran aktif.

Tahap penguasaan generik kelima yang dikaji ialah kemahiran etika dan profesional yang mencatat purata min 4.04 (tinggi), namun terdapat dua item yang berada pada tahap sederhana iaitu item F2 "Saya tidak boleh menghormati orang yang mempunyai bakat yang lebih daripada saya" dan item F8 "Saya tidak boleh menerima teguran daripada orang lain walau dalam keadaan emosi tidak stabil ketika itu". Pendapat penulis, penyumbang kepada min sederhana yang diperolehi ini adalah kerana amalan tegur menegur tidak diamalkan dan sering dikaitkan dengan ego dan emosi. Amalan saling menegur dapat memberikan manfaat kea rah kebaikan, namun adab dan akhlak dalam menyampaikan teguran mestilah sentiasa dipelihara. Sekiranya ianya tidak dipelihara, akan berlaku seperti beberapa pemerintahan zaman dahulu yang mengalami kejatuhan akibat keengganan kelompok tertentu untuk berlapang dada dan berjiwa besar dalam mendengar saranan, nasihat dan teguran yang disampaikan oleh para ilmuan yang ikhlas dan jujur (Datuk Mohd Ajib Ismail, 2022).

Dapatan analisa ujian-t yang digunakan bagi mendapatkan perbezaan nilai min untuk kemahiran generik (komunikasi, kepimpinan, kerja kumpulan dan menyelesaikan masalah) terhadap jantina ialah $p > \alpha$ 0.05, menunjukkan tidak terdapat perbezaan yang signifikan bagi keempat-empat elemen terhadap jantina pelajar. Walaupun demikian, kemahiran generik yang kelima iaitu kemahiran etika dan professional menunjukkan terdapat perbezaan yang signifikan terhadap pelajar lelaki dan perempuan apabila mendapat nilai $p = 0.01 < \alpha$ 0.05. Dapatan ini tidak disokong dengan kajian yang dibuat oleh pengkaji terdahulu iaitu (Amiruddin et al., 2016; Megat Aman Zahiri Megat Zakaria et al., 2007; Norzailawati Mohd Nor et al., 2008) namun disokong dengan kajian yang dilaksanakan oleh (Nur Amirah Amiruddin et al., 2006).

5. Kesimpulan

Pelaksanaan kemahiran generik seiring dengan pembangunan sahsiah untuk melahirkan seorang pekerja yang seimbang dari segi intelek, jasmani, emosi dan rohani selain berketrampilan. Elemen-elemen ini sangat penting dalam era pembangunan negara yang pesat membangun bagi menghadapi persaingan global yang sihat pada masa kini (Abdul Hannan et al., 2018). Tahap penguasaan kemahiran generik yang tinggi terhadap pelajar di Politeknik Tuanku Syed Sirajuddin secara tidak langsung membuktikan bahawa, telah bersedia untuk menempuhi era persaingan global pada masa akan datang. Kajian ini penting bagi mengetahui keberkesanan kemahiran generik pelajar terhadap pelbagai kemahiran, dalam mencapai moto PTSS iaitu ilmu pemangkin pembangunan. Pembentukkan dan perlaksanaan kemahiran generik semasa proses pengajaran dan pembelajaran di institusi Pendidikan merupakan nadi

utama dalam nilai tambah bagi seseorang mahasiswa dalam menempuhi alam pekerjaan. (Norsela Binti Abdul Manaf et al., 2021).

Penghargaan
Penyelidik ingin mengucapkan terima kasih kepada keluarga yang banyak memberi galakan, sokongan dan semangat tanpa jemu, kakitangan Unit Penyelidikan Inovasi dan Kecemerlangan (UPIK) yang telah membantu memudahkan perjalanan proses penyelidikan di PTSS dan majlis perwakilan pelajar PTSS yang membantu dalam penyebaran soalan kaji selidik dikalangan pelajar PTSS.

Rujukan

Abdul Hannan, M., Mohd Zain, A. S., Salehuddin, F., Hazura, H., Idris, S. K., Hanim, A. R., & Yusoff, M. (2018). Development of LPG leakage detector system using arduino with Internet of Things (IoT). *Journal of Telecommunication, Electronic and Computer Engineering*, *10*(2–7), 91–95.

Amiruddin, M. H., Ngadiran, I. A., Zainudin, F. L., & Ngadiman, N. (2016). Tahap kemahiran generik pelajar Malaysia dalam proses pengajaran dan pembelajaran : Kajian kes pelajar Institut Kemahiran Mara , Johor Baharu Malaysian students ' l evel of generic skill in teaching and learning process : A case study of Mara Skills Insti. *Journal of Society and Space*, *3*(3), 111–121.

Apsari, N., & Sastiawati, S. (2021). Kemampuan Kognitif, Afektif Dan Psikomotorik Siswa Sekolah Dasar Pada Pembelajaran Ipa Menggunakan Metode Inkuiri. *Jurnal Pendidikan Dasar*, *9*(1), 37–45. https://doi.org/10.46368/jpd.v9i1.344

Datuk Mohd Ajib Ismail. (2022). Tegur biar beradab. *My Metro*.

Harvard, J. . (2012). The Hearts of Change : Real-life Stories of How People Change Their Organizations. Boston. *Harvard Business School Press: Boston*.

Lily Hanefarezan Asbulah, Maimun Aqsha Lubis, A. A. & M. S. (2018). Kesahan dan Kebolehpercayaan Instrumen Strategi Pembelajaran Kolokasi Bahasa Arab: Analisis Menggunakan Model Rasch (Validity and Realibility of Arabic Collocation Learning Strategies Instrument: Analysis Using Rasch Model). *Jurnal Pendidikan Malaysia*, *43*(03), 131–140. https://doi.org/10.17576/jpen-2018-43.03-14

Lisa Gueldenzoph Snyder, & Mark J. Snyder. (2008). Teaching Critical Thinking and Problem Solving Skills. *The Delta Pi Epsilon Journal*, 90–100. https://tccl.arcc.albany.edu/knilt/images/a/a5/Teaching_critical_thinking.pdf

Marliana Musa, & Ahmad Esa. (2009). Tahap Penguasaan Kemahiran Generik Dalam Kalangan Pelajar Tahun Akhir Diploma Kejuruteraan Elektrik Serta Pendidikan, Uthm. *Techno Social*, *1*(January), 77–94.

Megat Aman Zahiri Megat Zakaria, Baharudin Aris, Jamaluddin Harun, & Mohd. Zolkifli bin Abd. Hamid. (2007). Hubungan Antara Kemahiran Generik dengan Jantina, Pengkhususan dan Pencapaian Guru-Guru Pelatih UTM: Satu Tinjauan. *Seminar Penyelidikan Pendidikan Institut Perguruan Batu Lintang Tahun 2007*, *2005*, 1–6.

Mohd. Khaidir Abdul Wahab. (2019). Potensi Falsafah Bahasa untuk Penyatupaduan Nasional:

Pandangan Guru Bahasa Melayu. *Sains Insani*, *4*(1), 85–96.

Mohd Syaubari Othman, & Ahmad Yunus Kassim. (2016). Elemen Kemahiran Berfikir Aras Tinggi (KBAT) di dalam amalan pengajaran guru Pendidikan Islam menurut Imam Ghazali. *Jurnal Sultan Alauddin Sulaiman Shah*, *3*(2), 80–91.

Mohd Yusof, H., Seri Bunian, M., & Abdul Hamid, A. (2015). Persepsi Pelajar Kejuruteraan Politeknik Terhadap Kemahiran Employability : Satu Kajian Kes. *Advanced Journal of Technical and Vocational Education*, *1*(2), 25–32.

Ngadiman, S. H., & Jamaludin, M. F. (2018). Hubungan di antara Kemahiran Kerja Berpasukan dan Kemahiran Komunikasi dalam Kalangan Pelajar Semesta Akhir Politeknik. *International Journal of Education, Psychology and Counseling*, *3*(19), 1–18. https://doi.org/http://www.ijepc.com/PDF/IJEPC-2018-19-09-01.pdf

Norsela Binti Abdul Manaf, Intan Rahimah Binti Ahmad, & Nurul Ilyana Binti Baharudin. (2021). Hubungan Antara Kemahiran Generik Dengan Aktiviti Sukarelawan Dalam Kalangan Pelajar. *3rd National Conference in Sports & Co-Curriculum @ PMJB*, *7*(2), 1–12.

Norzailawati Mohd Nor, Sharif Mohamed Mustafa, Razali Firdausi, & Meriam Yusoff. (2008). Kemahiran Generik Dikalangan Pelajar IPT : Satu Kajian Tahap Keyakinan Merentas Jantina. *Persidangan Pembangunan Pelajar Peringkat Kebangsaan*, 22–23.

Nur Amirah Amiruddin, Wan Salihin Wong Abdullah, & Wan Abd Aziz Wan Mohd Amin. (2006). *Perbezaan dalam Dimensi Kemahiran Generik Pelajar Baru KUSTEM*. Kolej Univesiti Sains & Teknologi Malaysia (KUSTEM), %5Cn21030 Kuala Terengganu, Terengganu

Othman, R., & Syed Ali, S. M. (2019). Tahap Penguasaan Kemahiran Generik Di Kalangan Pelajar Tahun Akhir Diploma Kejuruteraan di Politeknik Kota Kinabalu. *Kajian Pendidikan Teknikal SPI Zon Sabah 2012*, *February*.

Suleman, F. (2016). Employability Skills of Higher Education Graduates: Little Consensus on a Much-discussed Subject. *Procedia - Social and Behavioral Sciences*, *228*(June), 169–174. https://doi.org/10.1016/j.sbspro.2016.07.025

Zainudin Hassan, Mohd Anuar Abdul Rahman, Mohd Najib Abdul Ghafar, & Kamariah Zakaria. (2007). *Penerapan Kemahiran Generik dlm Pengajaran Kejuruteraan di SMT Terengganu*. 21.

KAJIAN KEROSAKAN TURAPAN JALAN DI BANDAR BARU BANGI, SELANGOR

Muhammad Syamir Hafiy Hussain[1], Abu Hanifah Yusof[2], Muhamad Razuhanafi Mat Yazid[1], Mohd Azizul Ladin[3]

[1] Department of Civil Engineering, Faculty of Engineering & Built Environment, Universiti Kebangsaan Malaysia, Malaysia, 43600 Bangi, Selangor, Malaysia.
[2] Civil Engineering Department, Politeknik Kota Bharu, KM24, Kok Lanas, 16450 Ketereh, Kelantan
[3]Faculty of Engineering, Universiti Malaysia Sabah, Kota Kinabalu, Malaysia

Corresponding author: razuhanafi@ukm.edu.my

Abstrak: Penyelenggaraan turapan jalan adalah sangat penting untuk memanjangkan jangka hayat turapan dan juga untuk memelihara jalan agar berfungsi dengan baik, selamat, dan selesa kepada pengguna jalan raya. Secara umumnya, pengabaian atau melambatkan aktiviti penyelenggaraan jalan raya boleh meningkatkan kos penyelenggaraan dan juga memberi kesan negatif atau masalah pengguna jalan raya. Kajian ini bertujuan untuk menilai keadaan turapan Jalan Bandar Baru Bangi sepanjang 3 kilometer. Tujuan utama kajian ini dijalankan adalah untuk mengenalpasti jenis-jenis kegagalan turapan dan menentukan kaedah penyelenggaraan yang sesuai dilaksanakan untuk menangani masalah kerosakan permukaan jalan turapan. Kajian ini memberi tumpuan kepada kaedah pemerhatian dan penilaian tapak untuk turapan boleh lentur di sepanjang laluan jalan kajian dengan merujuk kepada garis panduan daripada "*A Guide To Visual Assessment Of Flexible Pavement Surface Condition*"(JKR 20709-2060-92). Dari kajian ini, jenis kerosakan turapan yang biasa telah ditemui pada jalan kajian telah direkodkan antaranya adalah keretakan, kerosakan permukaan, ubah bentuk permukaan, tampalan, lelubang dan kerosakan tebing. Kerosakan keseluruhan paling banyak berlaku pada jalan *Inbound* iaitu 50.6% berbanding 49.3% di jalan *Outbound*. Majoriti kerosakan turapan berlaku sepanjang jalan Inbound, yang mana 20% keretakan, 22% kerosakan permukaan, 3% bagi tampalan dan lelubang serta 1% kerosakan tebing dan ubahbentuk permukaan. Mengikut tahap-tahap kerosakan, kerosakan tahap rendah mencatat 34.4%, kerosakan tahap sederhana 48% dan kerosakan tahap tinggi adalah 17.5%. Dalam kajian ini didapati kerosakan jenis keretakan adalah paling tinggi direkodkan disebabkan oleh akibat tekanan daripada beban trafik yang dikenakan secara berterusan..

***Kata Kunci**: Penyelenggaraan turapan; Penyelenggaraan jalan; Tekanan beban trafik*

1. Pengenalan

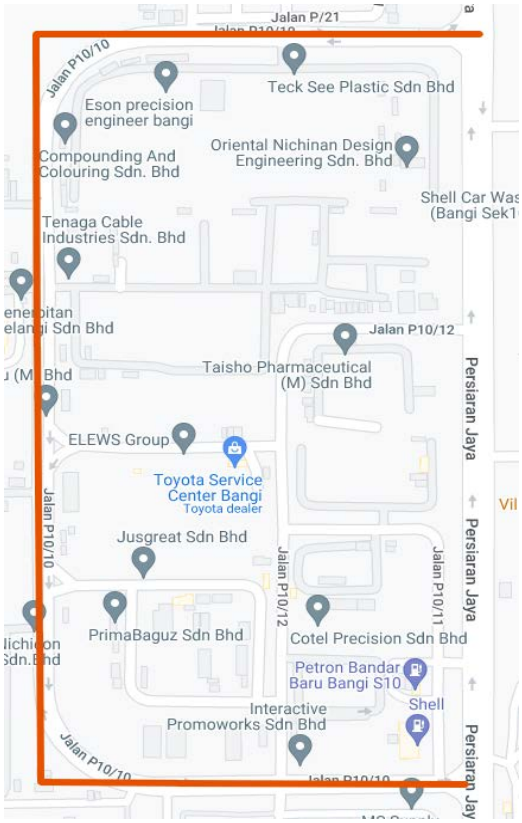
Struktur turapan kebiasaanya direka bentuk untuk memenuhi hayat perkhidmtatan dengan mengambil kira kualiti bahan yang digunakan dan faktor persekitaran (Hatmoko et al. 2019) . Keadaan permukaan turapan jalan adalah parameter yang digunakan untuk menentukan kualiti sistem lalu lintas jalan raya . Dalam kajian ini keadaan permukaan turapan yang diperiksa ialah geseran turapan, kekasaran dan alur (Deme 2020). Kesan kerosakan permukaan turapan terhadap kemalangan jalan raya menjadi kebimbangan semua pengguna. Struktur turapan jalan dibuat daripada pelbagai lapisan bahan yang diproses dan dipadatkan dalam ketebalan yang berbeza terutamanya bagi menyokong muatan kenderaan serta memberikan kualiti pemanduan yang lancar (Dhir et al. 2019). Walaupun lapisan turapan jalan telah dipadatkan dengan baik dan diklasifikasikan sebagai sangat sesuai untuk menampung bebanan lalu lintas secara tidak langsung ia juga berkait dengan kegagalan turapan jalan. Kegagalan turapan jalan berlaku sebaik sahaja permukaan turapan tidak lagi mengekalkan bentuk asalnya dan membentuk tegasan bahan. Apabila turapan mencapai hayat tamatnya , permukaan turapan jalan tidak lagi dapat memberi kelancaran terhadap pengguna jalan (Chu & Fwa 2016).

Turapan ialah permukaan jalan yang dibuat tahan lasak dan boleh digunakan untuk menampung beban trafik ke atasnya. Turapan memberikan geseran kepada kenderaan sekaligus memberikan keselesaan kepada pemandu dan memindahkan beban lalu lintas dari permukaan atas kepada tanah semulajadi. Pada awalnya, sebelum lalu lintas kenderaan menjadi paling biasa, laluan batu buntar adalah biasa untuk kereta haiwan dan pejalan kaki. Kebiasaanya, turapan digunakan oleh kenderaan dan pejalan kaki. Perkara yang menjadi keutamaan dalam rekabentuk turapan adalah saliran air ribut dan keadaan persekitaran. Turapan lebuhraya ialah struktur yang terdiri daripada lapisan bahan yang diproses di atas subgred tanah semula jadi dimana fungsi utamanya adalah untuk meratakan beban kenderaan kepada subgred. Struktur turapan seharusnya menyediakan kualiti permukaan yang baik, rintangan gelincir yang mencukupi, ciri pemantulan cahaya yang menggalakkan dan bunyi yang rendah pencemaran. Matlamat utama adalah untuk memastikan bahawa tegasan yang diberikan kepada beban roda dapat dikurangkan dengan secukupnya supaya ia tidak melebihi kapasiti galas subgred (Mohod & Kadam 2016).

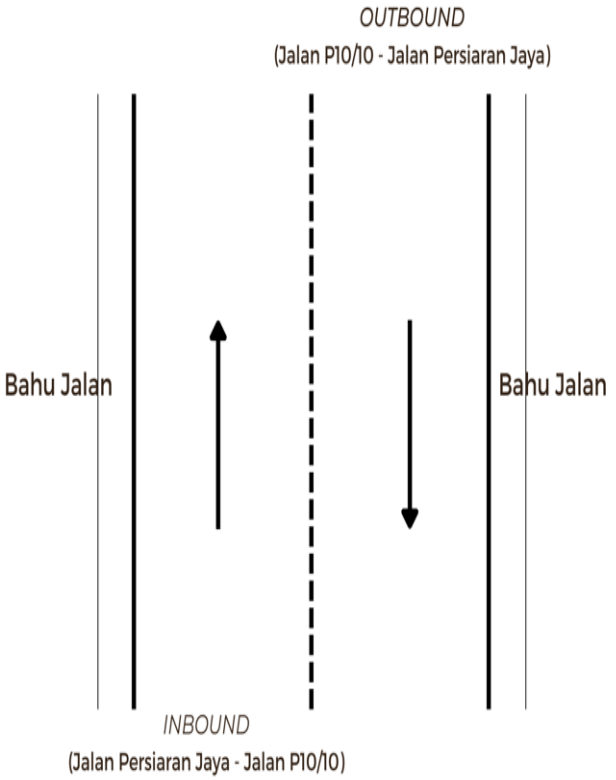
Pandey et al. (2021) menyatakan turapan tegar diberi nama disebabkan fakta bahawa struktur turapan terpesong sangat sedikit di bawah beban oleh kerana modulus elastik yang tinggi di permukaan lapisan. Turapan tegar adalah istilah teknikal yang digunakan di mana jalan yang dibina adalah daripada konkrit. Jalan-jalan ini memberikan bentuk penampilan yang sangat menarik. Turapan tegar tidak mengukur tahap fleksibiliti sebagai perbandingan dengan turapan anjal. Turapan tegar pada asasnya terbentuk daripada simen konkrit atau papak konkrit bertetulang sama ada daripada konkrit pelan, bertetulang atau prategasan. Antara ciri-ciri turapan tegar sering dikaitkan dengan kekuatan lentur dan ketegaran yang mengakibatkan beban diagihkan ke atas kawasan subgred yang lebih luas. Kajian ini adalah bertujuan bagi mengenalpasti jenis kerosakan jalan di Bandar Baru Bangi. Selain itu, kajian ini akan mengenalpasti kaedah penyelenggaraan jalan yang dilakukan oleh pihak Jabatan Kerja Raya Daerah Hulu Langat.

2. Metodologi

Secara amnya, kajian kes bagi mengenalpasti jenis-jenis kerosakan turapan jalan seperti keretakan, ubahbentuk permukaan, kerosakan permukaan, penampalan, lelubang dan kerosakan tepi jalan di daerah Bandar Baru Bangi adalah dengan menggunakan kaedah pemerhatian yang mana dilaksanakan melalui pandangan mata di tapak kajian dengan merujuk garis panduan Jabatan Kerja Raya Malaysia iaitu "*A Guide To Visual Assessment Of Flexible Pavement Surface Conditions, 1992*". Untuk melaksanakan kajian ini, beberapa pendekatan telah diambil bagi mencapai objektif kajian. Pada peringkat awal, pelaksanaan kajian yang dijalankan adalah berdasarkan kepada berkaitan dan mengumpul data-data yang diperlukan menerusi kajian terdahulu yang diperolehi dari pihak yang terlibat iaitu Jabatan Kerja Raya (JKR). Kajian yang dilakukan ini hanya bertumpu kepada kerosakan permukaan jalan berturap di kawasan Jalan P10/10 Bandar Baru Bangi, Selangor seperti Rajah 1 dan Rajah 2 di bawah.

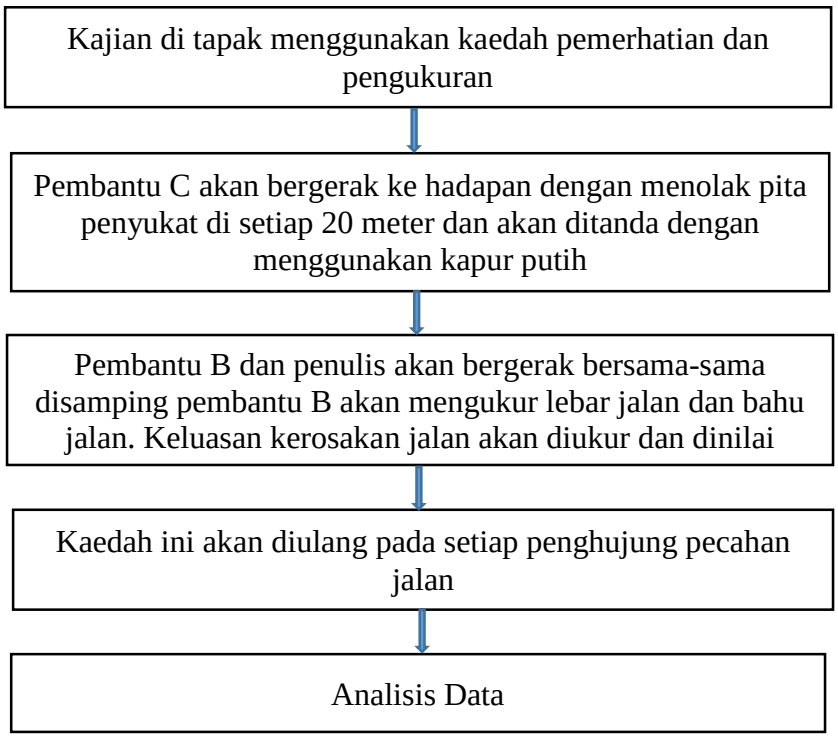


Rajah 1 Peta Kawasan Kajian



Rajah 2 Ringkasan Lakaran Kawasan Kajian

Aturcara kerja yang akan dijalankan di tapak untuk mendapatkan data akan dijalankan seperti Rajah 3 berikut :



Rajah 3 Aturcara kerja di tapak kajian

Semua maklumat penilaian yang diperolehi di setiap 20 meter akan memberikan penilaian keadaan fizikal kerosakan turapan jalan dan setiap perincian yang berkaitan akan menentukan jenis-jenis kerosakan turapan jalan yang berlaku dan faktor-faktor penyebab berlakunya masalah ini dapat dikenalpasti dengan merujuk garis panduan daripada "*A Guide To Visual Assessment Of Flexible Pavement Surface Condition*"(JKR 20709-2060-92).

Kaedah temubual atau temuramah merupakan salah satu cara yang terbaik bagi pengumpulan data untuk mengealpasti kaedah penyelenggaraan yang biasa dilakukan bagi jalan-jalan di Daerah Hulu Langat. Beberapa pihak terlibat secara langsung dan tidak langsung sepanjang proses pengumpulan data dilaksanakan. Segala maklumat yang diperolehi hasil temubual akan direkodkan termasuklah tahap kerosakan turapan, punca atau sebab berlakunya kerosakan turapan jalan serta kaedah penyelenggaraan dan pemuliharaan yang digunapakai yang sesuai di sepanjang jalan kajian. Kaedah temuramah ini melibatkan beberapa pihak termasuklah pegawai JKR Hulu Langat iaitu Ir. Muhammad Azhar Bin Azizan yang merupakan Jurutera Fasiliti di JKR Hulu Langat, temuramah ini dilakukan pada 13 Jun 2022 bertempat di Unit Senggara, JKR Hulu Langat .

3. Hasil Kajian

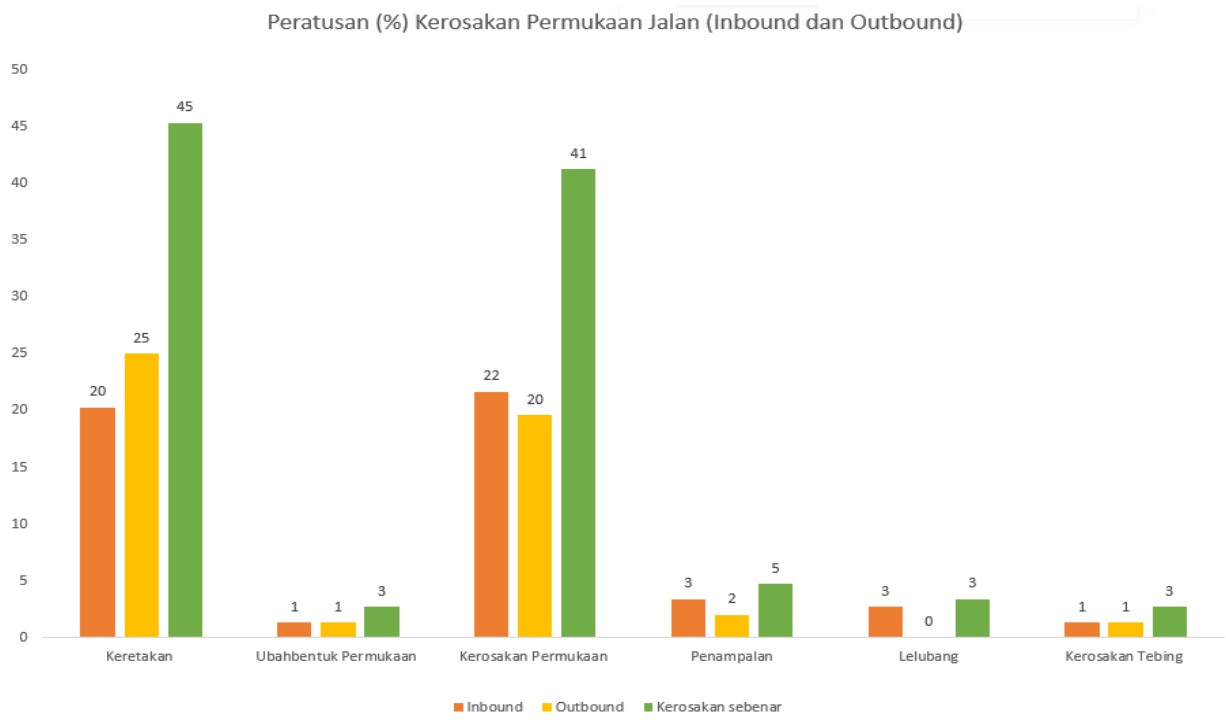
3.1 Jumlah segmen kerosakan

Daripada keseluruhan 150 segmen jalan kajian yang terlibat, hanya 102 segmen atau 68% terlibat dengan kerosakan turapan yang mana meliputi 35% atau 52 segmen di *Inbound* dan 33% atau 50 segmen di *Outbound*. Sebanyak 32% atau 48 segmen menunjukkan tiada kerosakan turapan direkodkan pada *Inbound* dan *Outbound*. Ringkasan daripada hasil kajian pada jalan *Inbound* dan *Outbound* dikelaskan seperti Jadual 1.

Jadual 1 Jumlah segmen dan peratusan kerosakan

Jenis Kerosakan	Jumlah segmen	
	Inbound	**Outbound**
Tiada Kerosakan	23	25
Kerosakan	52	50
Jumlah	**75**	**75**

3.2 Jenis-jenis kerosakan turapan jalan

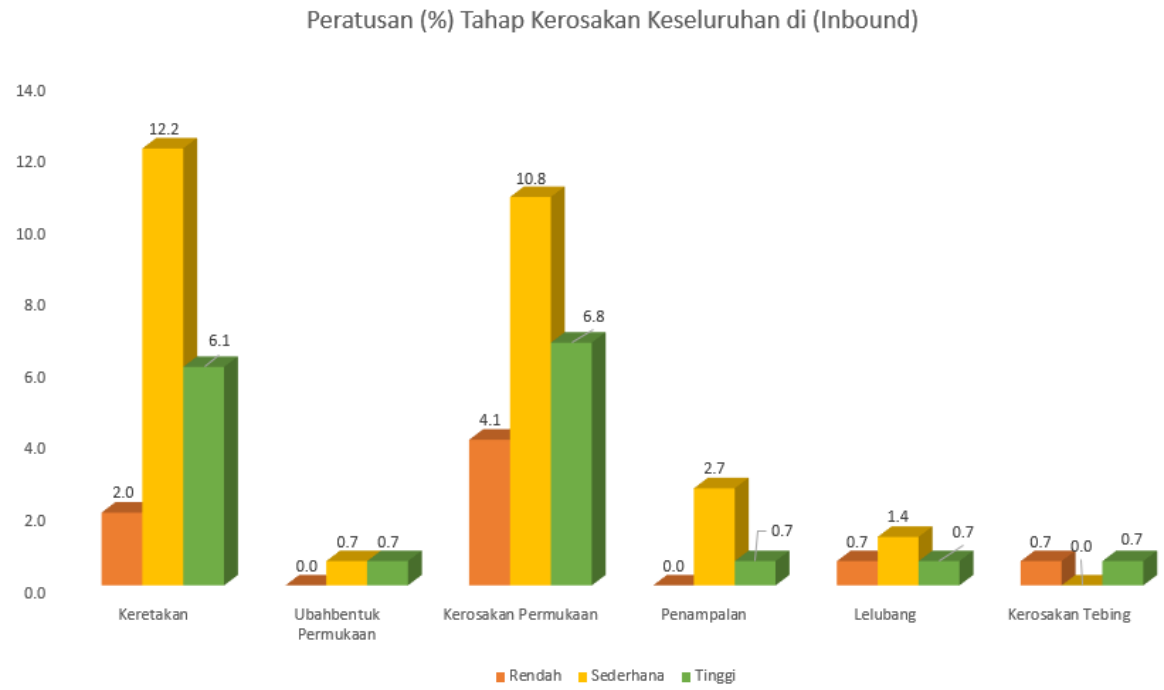


Rajah 4 Taburan peratusan jenis kerosakan jalan kajian (*Inbound* dan *Outbound*)

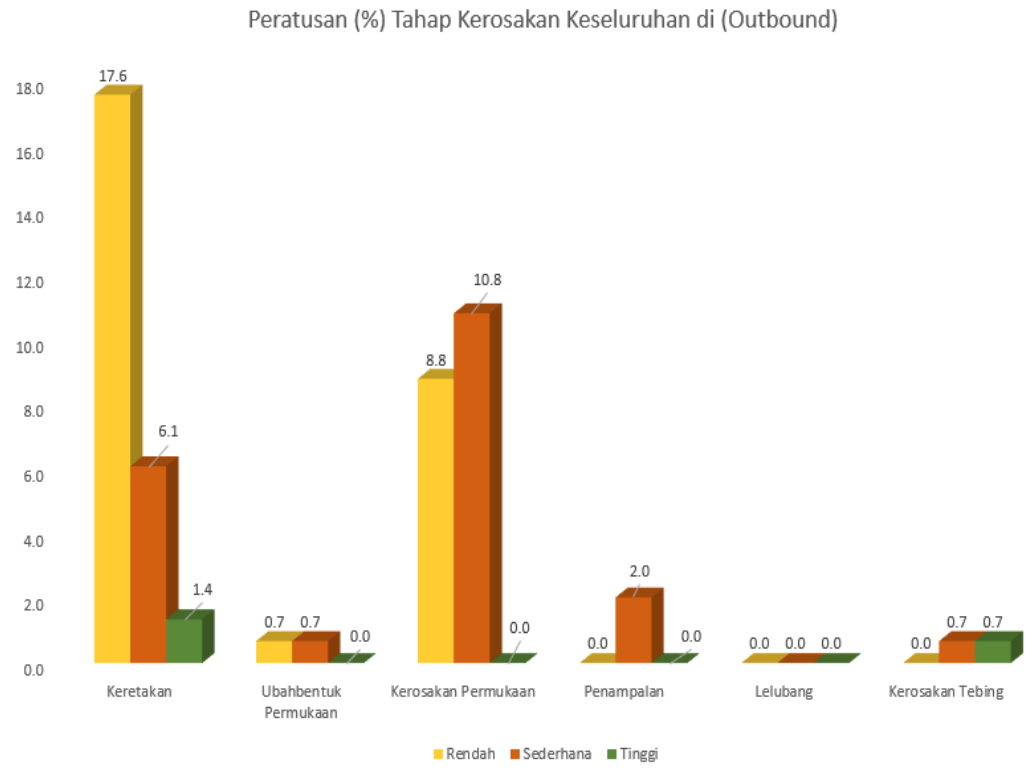
Hasil daripada keputusan analisis yang dijalankan, sebanyak 148 bilangan kerosakan daripada

102 segmen dikenalpasti. Secara keseluruhan, kerosakan jenis keretakan merekodkan jumlah kerosakan paling tinggi berbanding jenis kerosakan lain iaitu sebanyak 45% melibatkan 30 keretakan didapati di *Inbound* dan 37% keretakan berlaku di *Outbound*. Peratusan bagi kerosakan sebenar seeperti ubahbentuk permukaan adalah 3% manakala kerosakan permukaan adalah sebanyak 41%. Bagi jenis kerosakan penampalan adalah 5% dan kerosakan akibat lelubang dan kerosakan tebing adalah 3%. Hasil pemerhatian di tapak kajian didapati kenderaan berat seperti lori membawa muatan yang berat melalui jalan *Inbound* dan *Outbound.* Hal ini selaras dengan penyataan (Adlinge & Gupta 2009), yang menyatakan berat beban trafik mempengaruhi tahap kerosakan jalan yang dilaluinya.

3.3 Tahap kerosakan (*severity level*) Turapan Jalan



Rajah 5 Taburan kerosakan jalan kajian (*Inbound*)



Rajah 6 Taburan kerosakan jalan kajian (*Outbound*)

4. Perbincangan

Secara keseluruhan, tahap-tahap kerosakan (*severity level*) pada kedua-dua jalan (*Inbound* dan *Outbound*) telah dikenalpasti melalui kajian ini. Dalam setiap segmen terdapat lebih daripada satu kerosakan dikenalpasti. Kerosakan tahap rendah (*low severity level)* mencatat 34.4% atau 51 kerosakan direkodkan, tahap sederhana (*medium severity level*) 48% atau 71 kerosakan direkodkan dan bagi kerosakan tahap tinggi (*high severity level*) adalah 17.5% atau 26 kerosakan direkodkan terlibat dengan kerosakan turapan.

Kerosakan permukaan (*surface defects*) melibatkan kerosakan jenis ternyahlapisan (*delamination*) paling banyak iaitu melibatkan 43 segmen jalan. Semasa pemerhatian yang dibuat di tapak kajian, jumlah kerosakan ternyahlapisan yang mempunyai tahap kerosakan sederhana (*medium severity level*) adalah paling banyak iaitu 32 segmen jalan yang mana setiap satunya berkeluasan antara 1meter persegi sehingga 2 meter persegi. Selain itu, kelihatan butiran batu-batu kecil terkeluar dari turapan bitumen. Hal ini disokong oleh pendapat (Kazi Tamrakar 2019), menyatakan ternyahlapisan berlaku disebabkan oleh lapisan permukaan yang lemah akibat daripada kehadiran air di antara lapisan asfalt dan permukaan batu baur yang menyebabkan ikatan lekitan antara permukaan batu baur dan asfalt berpecah atau terurai. Taburan peratusan tahap kerosakan turapan secara keseluruhan di *Inbound* dan *Outbound* dapat dirumuskan seperti di Rajah 5 dan Rajah 6.

Daripada data yang diperolehi kerosakan jenis keretakan banyak direkodkan pada kedua-dua jalan kajian iaitu di *Inbound* dan *Outbound* berbanding dengan jenis kerosakan lain. Kerosakan jenis keretakan yang dikenalpasti di jalan kajian adalah kerosakan retak memanjang, retak blok, retak buaya dan retak bulan sabit. Kerosakan kerap berlaku pada jarak lingkungan 1.0 Kilometer pertama iaitu melibatkan segmen pertama sehingga segmen ke-50. Ini kerana pada arah tersebut terdapat industri besar dan terdapat beberapa buah kilang. Ini bertepatan dengan pendapat (Zumrawi 2016), menyatakan tekanan daripada beban gandar yang berlebihan dan kerap boleh mengakibatkan struktur turapan menjadi lemah dan boleh menyebabkan keretakan turapan berlaku. Rajah 7 sehingga Rajah 10 menunjukkan kerosakan yang dapat dikenalpasti di kawasan kajian.

Rajah 7 Retak Blok

Rajah 8 Retak Memanjang

Rajah 9 Retak Buaya

Rajah 10 Ternyahlapisan

5. Kesimpulan

Daripada keseluruhan 150 segmen jalan kajian yang terlibat, hanya 102 segmen atau 68% terlibat dengan kerosakan turapan yang mana meliputi 35% atau 52 segmen di *Inbound* dan 33% atau 50 segmen di Outbound. Sebanyak 32% atau 48 segmen menunjukkan tiada kerosakan turapan direkodkan pada *Inbound* dan *Outbound*.Hasil daripada keputusan analisis yang dijalankan, sebanyak 148 bilangan kerosakan daripada 102 segmen dikenalpasti. Secara keseluruhan, kerosakan jenis keretakan merekodkan jumlah kerosakan paling tinggi berbanding jenis kerosakan lain iaitu sebanyak 45% melibatkan 30 keretakan didapati di *Inbound* dan 37% keretakan berlaku di *Outbound*.Bagi jangka masa panjang untuk mengatasi masalah kerosakan turapan pada jalan kajian supaya tidak berulang, kajian trafik seperti untuk mengambil isipadu dan ciri-ciri kenderaan yang melalui jalan tersebut perlu dijalankan bagi memastikan jalan tersebut sesuai untuk menampung beban trafik yang banyak pada masa akan datang sekaligus dapat mengurangkan kerosakan turapan daripada terus berlaku.

Penghargaan

Penulis ingin mengucapkan terima kasih kepada Universiti Kebangsaan Malaysia dan Politeknik Ungku Omar di atas bantuan dan kemudahan yang disediakan dalam menyiapkan kajian ini. Projek ini telah dibiayai oleh UKM di bawah Projek **GUP-2021-014**

Rujukan

Aguib, A. A. 2013. Flexible Pavement Design AASHTO 1993 versus Mechanistic-Empirical Pavement Design. Master of Science in Construction Engineering, Construction and Architectural Engineering, School of Sciences and Engineering, The American University in Cairo

"A Guide to Visual Assessment Of Flexible Pavement Surface 16 Conditions" oleh Jabatan Kerja Raya Malaysia dan Institut Kerja Raya Malaysia (IKRAM)

Celko, J., Kovac, M. & Decky, M. 2011. Analysis of selected pavement serviceability parameterS. Komunikacie 13(3): 56–62.

De Solminihac, T. H., Salsilli, R., Köhler, E. & Bengoa, E. 2003. Analysis of pavement serviceability for the AASHTO design method: The Chilean case. Arabian Journal for Science and Engineering 28(2 B): 143–160.

Flamarz Al-Arkawazi, S. A. 2017. Flexible Pavement Evaluation: A Case Study. Kurdistan Journal of Applied Research 2(3): 292–301.

Haji Mazlan Bin Haji Embong, (2004) "Kajian Kerosakan Permukaan Jalan Raya Dan Kerja-Kerja Membaiki Di Bawah Jabatan Kerja Raya Kuala Terengganu" Universiti Teknologi Malaysia Skudai, Johor.

Hasan, A. S., Tabassum, K. & Roksana, K. 2019. Maintenance and possible remedy for pavement distress in flexible pavement using pavement condition rating. (June): 27–34.

Introduction, I. 2017. A Study on The Rigid Pavement Construction, Joint and International Journal of Modern Trends in Engineering and Research (IJMTER) 138–143.

IP-09. 2004. Flexible pavement rehabilitation design.

Kordi, N. E., Endut, I. R. & Baharom, B. 2010. Types of Damages on Flexible Pavement for Malaysian Federal Road. Proceeding of Malaysian Universities Transportation Research Forum and Conferences 2010 2010(December): 421–432. Retrieved from http://www.uniten.edu.my/newhome/uploaded/coe_civil/mutrfc2010/044 Types of Damages on Flexible Pavement for Malaysian Federal Road.pdf.

Mohod, M. V. & Kadam, K. N. 2016. A Comparative Study on Rigid and Flexible Pavement: A Review. IOSR Journal of Mechanical and Civil Engineering 13(3): 84–88.

Pandey, S., Sachan, A. K., Rawat, A. & Singh, S. 2021. Optimum Pavement Thickness for Rigid Pavement in UP Eastern Region. International Journal of Engineering and Advanced Technology 10(5): 173–181.

Sarie, F., Bisri, M., Wicaksono, A. & Effendi, R. 2015. Types of Road Pavement Damage for Road on Peatland, A Study Case in Palangka Raya, Central Kalimantan, Indonesia. IOSR Journal of Environmental Science 9(12): 53–59.

Tharun, A. 2017. Flexible Pavement Design and Material Characteristics. International Journal and Magazine of Engineering, Technology, Management and Research 4(3): 317–325.

Zakaria, N. M., Jaffary, M. F. M., Hassan, M. K., Hamim, A., Yusoff, N. I. M. & Nayan, K. A. M. 2015. Penentuan sifat kekukuhan dan ketebalan lapisan permukaan berasfalt menggunakan kaedah Pencarian Resonan Tambahan (ERS). Jurnal Teknologi 76(1): 15–23.

Zumrawi, M. M. 2015. Survey and Evaluation of flexible Pavement Failures. International Journal of Science and Research (IJSR) 4(1): 1602–1607. Retrieved from www.ijsr.net.

TOWARDS AN INTEGRATED ELECTRONIC WORKFORCE INTEGRATION TRACKING SYSTEM

Muhammd Azmeer Bakar[1], Azuin Ramli[2], Rufaizal Che Mamat[3] and Mohd Arman Meohan[4]

[1,2,3]Politeknik Ungku Omar, Malaysia
azmeer9799@gmail.com
[4]Primareka Konsultan
armanmeohan@gmail.com

Abstract: The use and application of digital tools to improve the process of delivering and operating the built environment is known as digital construction. The construction industry in Malaysia has been slow to adopt technology, but it is poised to see the integration of several digital technologies. The advantages of digitalization in the construction industry include increased productivity, profitability, and firm innovation capabilities. This study aims to develop E-Workforce Tracking System (E-WITS) for project monitoring in the construction industry. Quantitative data were statistically examined using descriptive analysis (mean, standard deviation) and internal consistency using the Cronbach alpha value. The value of Cronbach's Alpha is 0.75 for the 20 numbers of questions which means that the questionnaire has excellent consistency. The result shows that respondent preferred using E-WITS (Mean = 4.929, SD = 0.196) compare with existing method (Mean=1.161, SD = 0.211). This means that E-WITS was more effective compared with the existing method. E-WITS was highly recommended to be used by personnel in the industry since the users are highly satisfied with this user-friendly website tracking system.

***Keywords**: E-Workforce Tracking System; Digitalization; Quantitative; Monitoring*

1. Introduction

The construction sector is experiencing a wave of innovation due to the introduction of new materials and energy sources, design concepts, digital technological advancements, and big data. Creating technology is not an easy undertaking that requires careful attention to detail. By doing this, the project will be carried out efficiently and to the best of its capacity. To find the best methods for executing a new project or technology and addressing its limitations, researchers and investors must work efficiently together. Technology is one of the sustainable techniques that might help the building sector. Technology development is necessary for the construction sector to grow sustainably. Therefore, scientific, and progressive theories should be established, and new technologies, processes, materials, operational concepts, and management modes should be implemented (Tung et al., 2021).

While assessing the causes and effects of delays in the Malaysian construction industry, a study discovered ten most problematic factors. These issues include the contractor's poor site management, poor contractor experience, insufficient client finance and payments for

completed work, problems with subcontractors, material shortages, labour supply, equipment availability and failure, a lack of communication between parties, and mistakes during the construction stage (Olanipekun & Sutrisna, 2021; Wang et al., 2022).

Therefore, after looking at the failures and problems that occur in our country and abroad, the idea arose to create a website-based platform named Electronic Workforce Integration Tracking System (E- WITS) that is expected to help and address related problems. E- WITS are created to resolve such issues and weaknesses by way of monitor and track work progress and storing documents digitally. It can become an integration platform between the person in charge and workers involve in every single project. It also acts as an alert to the individuals involved to complete the work according to the planned time and ensure that the project journey is always on track. While at the same time, it also can solve sustainable issues as it can bring savings in the use of paper, which causes waste and danger to the environment. The aim of this study is to investigate the effectiveness of the E-WITS.

2. IR 4.0 and It Future in the Construction Industry

Smart construction is an inevitable trend for the future development of the construction industry. In Malaysia, smart construction has already been applied to projects. According to Lyu (2021), the smart site system uses internet technology and collects real-time information data on construction site personnel, machinery, and equipment as well as other key elements. The system uses big data, cloud computing and other technologies for rapid analysis and processing. An increase in the implementation of smart construction could potentially improve the quality of workers, equipment, safety and quality in comprehensive and timely manner, which could improve the digitalization, refinement and intelligent management of construction (Papadonikolaki et al., 2022; Sepasgozar & Davis, 2019).

During the digital transformation process, digital tools such as materials procurement digital platforms, industrial robots and drones, digital marketing, service digital tools, and BIM infrastructure are used (Gamage, 2021). Furthermore, organizations can maximize the benefits of digital transformation by combining a variety of digital tools. Technical aspects of digital transformation include cloud computing, the Internet of Things (IoT), mobile technology, big data, and data analysis (Ikuabe et al., 2020).

The ability to connect data quickly and efficiently is a relatively new phenomenon in the industry. Considering the available tools and resources to support digital transformation, it is critical to select the best tools and technologies to implement digital transformation in construction projects. Therefore, the design and implementation of a web-based system are critical to ensuring that the process runs smoothly and according to plan. This system has used the website as a tool for the project. Website is a developing technology that turns the information and networking industry into a wireless networking infrastructure that supports mobile devices (Kudryavtseva & Vasileva, 2021). As reported, the growth in the number of new technology devices was spurred by the advancement of mobile networks, such as the capacity to access the network using desktops, laptops and notebooks.

3. Methodology

The study was conducted in the form of a survey, with data being gathered via questionnaire. Pre-test and post-test surveys were adopted to identify the effectiveness of the Workforce Integration Tracking System (E-WITS). It consists of two sections: section 1 for demographic characteristics of respondents and section 2 contains 20 items, measured on a five-point likert scales (ranging from 1 = Strongly Disagree to 5 = Strongly Agree). Statistical analyses were performed using the Statistical Package for the Social Sciences (IBM SPSS Statistics, Version 20.0). The participants of this study were 30 from the construction stakeholder industry. This research was analyzed using descriptive study which aims to compile information about the effectiveness of E-WITS compare to existing method.

3.1 Prototyping

This project is expected to assist in each project's launch by tracking and recording the work done for each project. E- WITS using web-based application that perform tracking, recording, and alerts via a web browser. The planning design of E-WITS is implemented through a visual basic coding template and using a Hypertext Preprocessor-PHP as a programming scripting language. In this system development, login page containing id and password was design due to cyber security programming. Its personal id was created by admin to make sure the user is identified by company. In the first step, the users need to register the account. The requirement must be filled for register such as username, password, confirm password, full name (Figure 1). Next, home page displays the main board of daily task and submission and the department due to their position. Task was separate in different department to easier for the searching and task submission. This is a home page containing the mainboard that makes it easy for the personnel to track their task. Also have three departments: administration, road department, and civil/structural department.

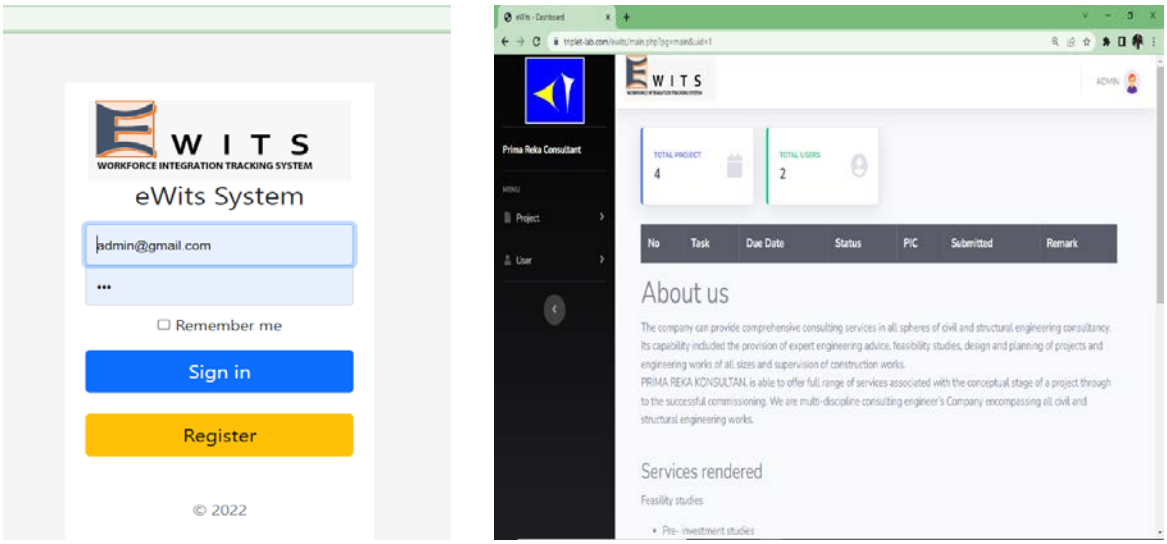


Figure 1. The Main Page Interface

The contents of E-WITS containing a list of ongoing and completed projects used to track the progress of tasks in a project. For a civil engineering consulting firm, project tracker is a tool that lets managers measure the progress of their team as they execute tasks and use resources. As a result, this website is more relevant for operations and planning departments to keeping projects on schedule and within their budgets. As shown in Figure 2, user can access the percentage of progress of the project. This percent value moves automatically where it will increase through the file to be sent. This percentage is believed to help users be more aware of the progress of the project. Project progress will be reviewed in this section where the breakdown of work will be divided with the person in charge. Monitoring through small work is believed to be easier and more transparent.

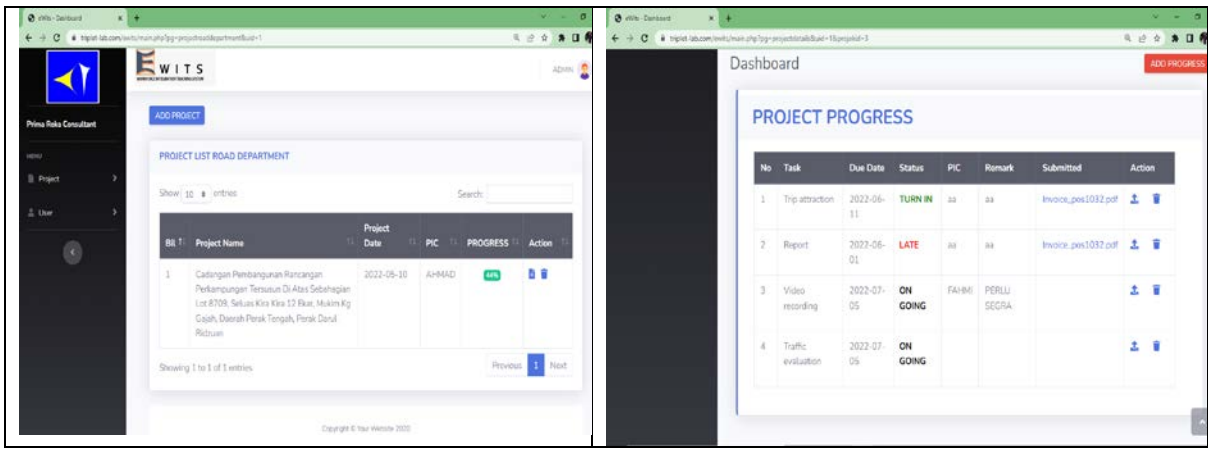


Figure 2. The Main Page Interface

3.2 Data Analysis

To ensure the validity of this survey reliability test had be done also. The purpose of the reliability analysis is to know the internal consistency of the questionnaire that distributed to the respondent. The Cronbach's Alpha have the range between 0-1. But many experts saying that the result of reliability analysis must more than 0.7 to get conformity of consistency for the questionnaire. Based on Nunnaly (1980), the score below 0.6 is poor, between 0.60 and 0.70 is acceptable, between 0.8 and 0.9 is good and above 0.9 is excellent. The value obtained for the coefficients Cronbach's Alpha is greater than 0.7. Therefore, from the Table 1 below showed the value of Cronbach's Alpha is 0.78 for then 20 numbers of questions which mean that the questionnaire has excellent consistency.

Table 1: Reliability Test show the Cronbach's value

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.75	.78	20

Table 2 below show the result of respondent about the issues related to tracking system on existing method. There are ten attributes of effectiveness. Overall, the result showed that majority of respondents do not agree with the current system (desktop applications) effectively for construction companies to make it easy to access data. It was proved due of lower average mean value. Considering the need to improve construction processes and delivery, as well as the importance of the industry to any nation's economy, there is an urgent need to redirect the methods and ways of carrying out digitalization in the industry. One of these steps is the incorporation of digital technology into construction processes.

Table 2: Effectiveness of tracking system on existing method

	Variables	Mean	Std. Deviation
1	Do you feel comfortable using of your current system?	1.27	0.449
2	Do you feel current system help in communication with your team?	1.07	0.442
3	Do you think current system practical for project planning?	1.60	0.000
4	Do you think current system effective in project monitoring & tracking?	1.00	0.183
5	Do you feel current system user- friendly?	1.07	0.305
6	Do you think current system solve/ minimize delay issue?	1.00	0.254
7	Do you think current system help in time saving/ planning?	1.27	0.000
8	Does the current system help you for timely submission?	1.00	0.000
9	Does current system make it easier for you to recover old files?	1.00	0.000
10	Do you agree that current system offer sustainable practice?	1.33	0.479

Table 3 shows the means and standard deviations for effectiveness of E-WITS tools in construction industry. The survey instrument intended to explore the effectiveness of using the E-WITS. Majority respondents indicate on scale 4 and above. The sample results show that most of the respondents feel that E-WITS is an effective platform for project planning in sustainable construction practice (mean = 5.00). Standard deviation results showed that data points are close to the mean, which is showed a good fit of the data. This finding corroborates the ideas of Sepasgozar & Davis (2019), who suggested that the use of digitalization in a construction company may be able to digitally transfer its project processes to achieve more benefits including increased productivity and collaboration.

Table 3: Effectiveness of E-WITS tracking system

	Variables	Mean	Std. Deviation
1	Do you feel comfortable using E-WITS?	4.93	0.254
2	Do you think E-WITS help in communication with your team?	4.72	0.442
3	Do you think E-WITS practical in project planning?	5.00	0.000
4	Do you think E-WITS effective in project monitoring and tracking?	4.97	0.183
5	Along with the manual guide is included do you think E-WITS easier to grasp than existing system?	4.90	0.305
6	Do you think E-WITS solve/ minimize delay issue?	4.93	0.254
7	Do you think E-WITS help in time saving/ planning?	5.00	0.000
8	Does E-WITS help you for timely submission?	4.97	0.183
9	Does E-WITS make it easier for you to recover old files?	4.87	0.339
10	Do you agree that E-WITS offer sustainable construction practice?	5.00	0.000

4. Conclusion

Construction companies have relied on closed systems, in-house developments, desktop applications, and on-premises servers to manage their operations. The transfer of accurate data was tedious and manual, relying on spreadsheets, manual data entry, and re-entry. For companies taking their first steps into digital efficiency, E-WITS is effective for personnel tracking system compared to existing method. E-WITS was developed by using website which is easier for user to complete the small task and overall project. E-WITS can improve processes and efficiency, streamline operations, and improve productivity. This finding gives the idea that the role data plays in making smarter and faster decisions. Therefore, further research is required to establish cloud-based platforms combined with Application Programming Interface (APIs). APIs enable data from different systems to be exchanged automatically.

References

Gamage, A. N. K. K. (2021). Study of Challenges in Implementing Digital Transformation in Construction Projects. *International Journal of Progressive Sciences and Technologies*, *30*(1), 350–363. http://www.ijpsat.es/index.php/ijpsat/article/view/3912

Ikuabe, M., Aghimien, D., Aigbavboa, C., & Oke, A. (2020). Exploring the adoption of digital technology at the different phases of construction projects in South Africa. *Proceedings of the International Conference on Industrial Engineering and Operations Management*, *0*(March), 1553–1561.

Kudryavtseva, V. A., & Vasileva, N. V. (2021). Digitalization as the basis for the construction industry development. *IOP Conference Series: Earth and Environmental Science*, *751*(1). https://doi.org/10.1088/1755-1315/751/1/012100

Olanipekun, A. O., & Sutrisna, M. (2021). Facilitating Digital Transformation in Construction—A Systematic Review of the Current State of the Art. *Frontiers in Built Environment*, *7*(July), 1–21. https://doi.org/10.3389/fbuil.2021.660758

Papadonikolaki, E., Krystallis, I., & Morgan, B. (2022). Digital Technologies in Built Environment Projects: Review and Future Directions. *Project Management Journal*, 1–19. https://doi.org/10.1177/87569728211070225

Sepasgozar, S. M. E., & Davis, S. (2019). Digital construction technology and job-site equipment demonstration: Modelling relationship strategies for technology adoption. *Buildings*, *9*(7), 1–33. https://doi.org/10.3390/BUILDINGS9070158

Tung, Y. H., Chia, F. C., & Yan-Yan, F. Y. (2021). EXPLORING the USAGE of DIGITAL TECHNOLOGIES for CONSTRUCTION PROJECT MANAGEMENT. *Planning Malaysia*, *19*(3), 13–22. https://doi.org/10.21837/PM.V19I17.983

Wang, M., Wang, C. C., Sepasgozar, S., & Zlatanova, S. (2022). *An Investigation of Digital Technology Implementation in Off-Site Construction with a Focus on Efficiency Improvement*. 8. https://doi.org/10.3390/environsciproc2021012008

DEVELOPMENT OF VISUALIZE OFFLINE TEACHING (ViOT) METHOD OF TOOL BIT CUTTING TECHNIQUES FOR BEGINNERS

Muhammad Arieef[1], Sazali [2,] and Adi Firdaus [3]

[1,2,3]Politeknik Ungku Omar,
Jalan Raja Musa Mahadi, 31400 Ipoh,
Perak, Malaysia

[1]arieef@puo.edu.my
[2]sazali@puo.edu.my
[3]adi@puo.edu.my

Abstract: ViOT or abbreviated to Visualize Offline Teaching Method – Tool Bit Grinding Techniques for Beginner, is a technique that applies the Teaching and Learning (T&L) concept with the aid of video demonstrations. This method implies a sense of vision as the primary medium in focusing mainly on tool bit grinding topics. This approach was implemented for DJJ10022 and DJM10012 Mechanical Workshop Practice 1 for first-semester Mechanical Engineering students at Politeknik Ungku Omar. The instructional video was produced with the Viva Video premium edition for Android and Microsoft Office PowerPoint. The teaching material is disseminated to students through social media platforms, primarily YouTube and Telegram. As a result of this effort, a thorough instructional teaching and learning video was created. This video was made specifically to guide students through the lecturers' perspectives and lesson outcomes. By revising the footage repeatedly, students can memorize the technique demonstrated and apply it. Overall, the application of this T&L video helps to assist students' practical skills.

Keywords: *Teaching and Learning 1; visualization 2; tool bit 3; machining process 4.*

1. Introduction

Visualize Offline Teaching, or ViOT is a teaching pedagogy with video assistance. This method implies visual sense as the primary medium where students should focus on particular topics. As part of Malaysia's 2013 Transformation of Technical and Vocational Education Training (TVET), teaching methods for TVET must also change (Abdullah et al., 2021), (Md Sahir & Mohd Ayub, 2015). This transformation eliminates the idea that TVET is like a second-grade education for academic dropout students (Md Sahir & Mohd Ayub, 2015). One of the transformations of teaching and learning is the application of technology, Information, and Communication (ICT) in teaching. ICT can generate and develop educators' ideas and creativity in school teaching and learning (Md Sahir & Mohd Ayub, 2015). A video is a form of information and communication technology that can be used in educational strategies. For example, teachers assign students to watch videos both in and out of the classroom to introduce a topic, watch recorded lectures, promote discussion, learn a second language, explain activities or assignments, and record step-by-step instructions to complete a procedure or process on a computer (Campbell & Cox, 2018). Also, the use of video in education is not a novel concept

(Muniandy & Veloo, 2011). Therefore, creating digital media is a good strategy for learning and demonstration (Donnelly et al., 2013)(Norton & Hathaway, 2010)(Kamlin & Keong, 2020).

According to (Hartsell & Yuen, 2019), video learning can draw students' attention since it displays the lesson's information that is easily understood and assimilated by the student. (Siang et al., 2019), agreed video technology delivers s (Md Sahir & Mohd Ayub, 2015) or disk audio-visual media that displays motion (Shojaei et al., 2020) (Hamdan & Mohd Said, 2020). Video is essential in multimedia because it can add to and impact multimedia applications (Md Sahir & Mohd Ayub, 2015). Using video-integrated audio, text, pictures, and animations can stimulate students to understand better or master the skills required. In addition, the video can be repeated during the screening process and is convenient to play on several technology platforms, including computers, mobile phones, tabbed computers, et cetera (Md Sahir & Mohd Ayub, 2015)(Mehrotra et al., 2022) (Okta Priantini, 2021).

In this case, the subject would be the tool bit grinding process. It is essential to all Diploma in Mechanical Engineering students since these are the vital skills they have to possess when machining using a lathe machine. Due to the time constraint factor, the student will be assessed on the first meeting, and they cannot imagine the techniques and the outcome of the tool bit. Previous assessments on tool bit evaluation showed unsatisfactory results obtained by students, even though they had been brief and demonstrated by their lecturers. This method will help generate students' understanding before they start their practical work. Additionally, this would make it simpler for lecturers to engage with their students while conducting in-class demonstrations. As a lesson learning aim, students should be able to grind tool bits in line with their geometry and specifications to succeed in their assessments. On top of that, they must also be able to grind well in such a short period.

The problem that occurs among new students were as follow;
i. Semester 1 students registered for DJJ10022 Mechanical Workshop Practice 1 and DJM10012 Mechanical Workshop Practice 1 lacks basic knowledge and skills in grinding tool bits; ii. Time taken by students to produce a tool bit was too long; iii. The end product was unsatisfactory as the tool bit did not meet the specific geometry. This study embarks on the following objectives; To design and develop an instructional education video on tool bit grinding technique.

Currently, available Teaching and Learning kits are in the form of hardcopy tool bit sketches as in figure (1) stationed at every grinding machine. Also, an illustrated sharpening technique for tool bit as in figure (2) was used to brief the students previously. The only available replica of a tool bit was crafted in wooden blocks as in figure (3). These tools were stationed in the workshop and used by lecturers during their briefing and demonstration sessions. Even though these tools were beneficial to students, unfortunately, it was only accessible during practical hours. Students had to go for other revision sources such as handbooks, websites, or online videos besides these hours. Most of these sources were common in general and did not focus on the assessment rubric for this course.

Figure 1: Tool bit sketches stationed at the grinding machine

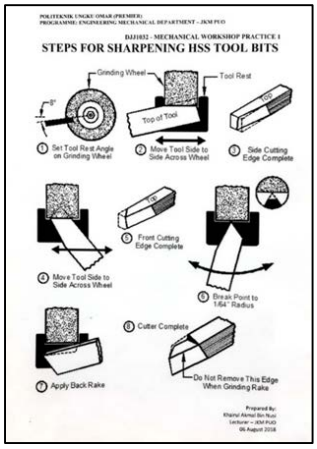


Figure 2: Tool Bit grinding process diagram

Figure 3: Tool bit wooden block sample. Teaching and Learning tool kit

The demand to produce a new education Teaching and Learning (T&L) tool kit adapting new techniques with comprehensive coverage of methods and techniques in line with social media evolution are essential. There is a need for a learning medium that can effectively deliver practical information clearly and comprehensively. A learning video is an appropriate medium for achieving these objectives. It is essential to promote video learning(Siang et al., 2019).

2. Literature Review

According to (Norton & Hathaway, 2010), instructional strategies are "the plans and techniques that the instructor or instructional designer utilizes to engage the student and facilitate learning," as well as "a strategy, method, or group of activities designed to achieve a certain purpose." The subsequent phase is video production. Researchers engage in brainstorming sessions to establish objectives and compelling content. (Siang et al., 2019) (Mayer & Moreno, 2003) suggested the procedural model is a descriptive model that illustrates the steps involved in producing the product. (Siang et al., 2019) (Sidek & Hashim, 2016) (Syaripuddin et al., 2019) recommended three phases: planning, design, and development. This process involves identifying the need, aims, and objectives, locating the source of materials, and creating flowcharts, as well as developing storyboards, screenplays, and narrative outlines (Hofer & Swan, 2008), while (Campbell & Cox, 2018) proposed the ICSDR (Identify, Conceptualize and Connect, Storyboard, Develop, Review, Reflect, Revise) model for videography.

The process of creating content involves capturing raw footage and then processing it (Shojaei et al., 2020). Considering the current technological advancement, it is prudent the produced video should be at a resolution near 4K. (Muniandy & Veloo, 2011) (Okta Priantini, 2021). A good video lesson requires the instructor to prepare the right equipment. A standalone 4K video camera and a sturdy tripod should be employed (Lipomi, 2020). Previously, video usage was considered an expensive option due to a lack of equipment and preparation time. Various tools and applications exist now for the creation of video-based learning. Therefore, instructors can create video clips based on their instructional style and creativity (Syaripuddin et al., 2019) (Sidek & Hashim, 2016). Today's smartphones make the video quality more satisfactory with the installation of 4K mode and many more instructional T&L videos may be developed in the future, thanks to the increasing sophistication of smartphone technology and other digital devices with video recorder functionality. 4K video gives greater image clarity and detail than regular video recordings, even when digitally amplified. 4K video can move from a global to a detailed view without reducing clarity, which is vital for this application. The benefit is that videos can be sent straight to a server or a cloud storage system (Woolfitt, 2015). It is one of the factors that has led to the widespread adoption of video as a powerful communication medium.

Videos will be more entertaining and impactful if the audio is relevant and appropriate. The following are some provisions on music and sound effects: The music used as accompaniment should have a low volume level (be mild) so that it does not interfere with the visual presentation and the narrator. The background music should be instrumental; refrain from using music with popular tunes. It will result in the distraction of students who are more focused on the sound of the song, using sound effects to enhance the scene, match the visual presentation, and improve the overall impression (Sulihin et al., 2020). It has been proven that, contrary to other pedagogical methods, music has a lot of advantages because it provides a comfortable atmosphere, elicits emotional responses, stimulates the neuro-mental activity of pupils, and has a positive effect on the physiological functions and emotional state of the body (Akhmadullina et al., 2016).

One of the major features that should be addressed to optimize student attention is the design of brief learning video recording duration (Kamlin & Keong, 2020); (Buchner, 2018); &

(Roller, 2016); nevertheless, the usage of multimedia-based instructional media has the potential to raise cognitive load (Mayer & Moreno, 2003); (Falvo, 2008); hence, a reasonable time frame for this instructional video must be considered. (Debra S. Osborn, 2010) suggested to educators that video lectures must not exceed 15 to 20 minutes. To overcome the issue of limited attention, (Kay & Kletskin, 2012) recommended the length of the produced video clip to a minimum duration of 3 minutes. The maximum time is 15 minutes. (Henno et al., 2014); (Whatley & Ahmad, 2007) consensually agree to 5 to 10 minutes for video duration with the maximum being 10 minutes (Fonte & Nistal, 2018). Contrary to (Martin & Martin, 2015), students do not study educational tutorial recordings for more than three minutes. (Noor et al., 2014) (Buchner, 2018) states that six minutes is the maximum time for videos. Students prefer to view some or a portion of the movie, skipping to the sections they felt were most relevant to them (Bowles-Terry et al., 2010). It will be able to limit the cognitive burden of students (Sidek & Hashim, 2016) if other researchers provide the proposed period for creating videos. Synchronization is the critical factor in producing this systematic instructional video and fulfilling the objectives at the required time.

3. Methodology

The project was initiated with brainstorming sessions with fellow collaborators to gain ideas and directions for this T&L video. A flow chart of activities as of figure (4) was formed based on the (Siang et al., 2019) (Sidek & Hashim, 2016) (Syaripuddin et al., 2019) recommendation. There were three phases involved; planning, design, and development. This process involves identifying the need, aims, and objectives, locating the source of materials, and creating flowcharts, as well as developing storyboards, screenplays, and narrative outlines (Hofer & Swan, 2008). These elements are determined based on; **i**. teaching pedagogy, **ii**. the objective of the video, **iii**. the outcome expectation and safety reminders, and **iv**. working procedures (grinding technique, marking rubric specification, and tool bit output figure complete with parameter checklist). Important elements such as essential parameters in the tool bit were highlighted for better understanding.

Figure 4: ViOT design and development flowchart

After creating a flowchart, then proceed with making a written storyboard. Storyboards are made to make it easier to visualize the ideas in mind so that they are more organized. followed by the next step development or video production. The storyboarding process was done by sketching out ideas on a piece of paper while the discussion keeps on continued so that each opinion or argumentation was pointed out clearly and highlighted. The next step is the decision-making and idea refinement process where only the critical element is selected. This video must be presented in a short and simple but loads with information.

The next step is the script and narration process. At this level, scripts were drafted according to key elements selected in the previous process. The aim was, that any subtitle embedded in this T&L video must be simple, straight forward and easy to understand. The third step is taking pictures or shooting videos. This audio and video production process includes shooting video, downloading, and image and voice recordings according to the demands of the storyboards and scripts that have been prepared previously. For this process, the image was captured and video shooting sessions were done by using multiple smartphones with tripods as a stabilizer. 4K video modes were selected for the whole shooting process. Microsoft PowerPoint software and Viva Video premium edition application for android were chosen for editing and narrating video stories. The Premium edition removes branding watermarks and can narrate a video for more than five minutes compared to the free version. . By applying Viva Video applications, video and audio are flawlessly blended. Images using the.jpg format and audio using the.wav format are used for MPEG video formats. Text or subtitles are added to video narration to make the video more understandable and engaging. The length of this video was fixed to five minutes. Suitable upbeat genre music is also included in this instructional video so that it will be more exciting. Music was downloaded from the Viva Video library.

4. Result and Discussion

Educational innovation based on digital technology has opened up a wide space for instructors to explore new knowledge toward producing pedagogical methods that are accepted by students in line with current technological developments. An idea started with designing until developing a new alternative teaching method leads to a successfully skill-based instructional video produced. The objective of this T&L video production was successfully fulfilled and achieved the goal. Important elements to convey to students were successfully summarized in a short video packed with information and demonstrations. The narration started with the front cover of the T&L video as figure (5) clearly stated the title. Students could easily identify the kind of T&L video they going to watch. To make the students attach to the video, as planned, the aim and the objective of the T&L video were shared with them before the actual demonstration started as in figure (6). Meanwhile, figure (7) showed how the video reminds all students to always wear personal protective equipment before handling the operation. Of course, on-site, the lecturers will ensure these safety precautions will be obeyed by students.

Figures5: Front page of T&L video

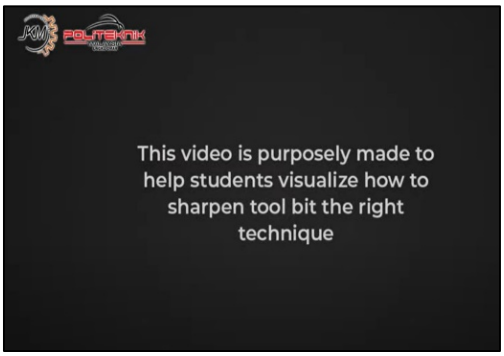


Figure 6: The aim and the objective of the video presented at the beginning ofthe video.

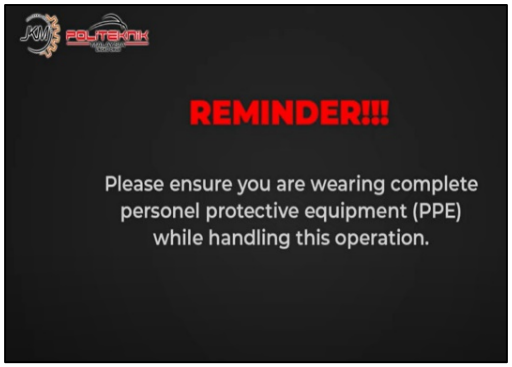
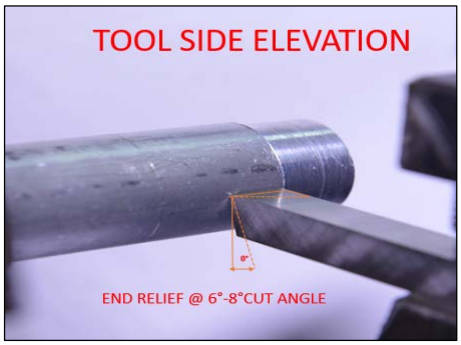
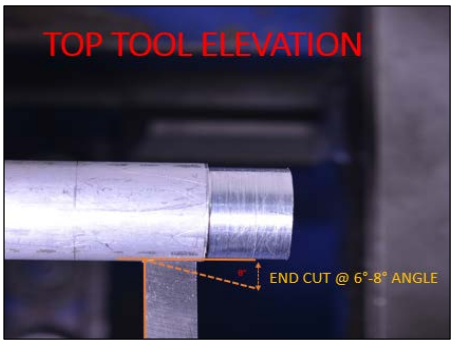


Figure 7: Students are reminded to wear personal protective equipment (PPE) while handling this operation

Still shots of components and processes captured by cellphones in 4K high-definition mode enhanced the clarity and vibrancy of the scene. Figures (8) and (9) illustrate the image quality produced by various smartphones. This will enable the instructor to visually communicate to students which angle to cut at and also indicate the tool bit's components. The tripod stabilizers are extremely useful for capturing stable images and videos. This video's content is more engaging as a result of its crystal-clear visual and video quality.



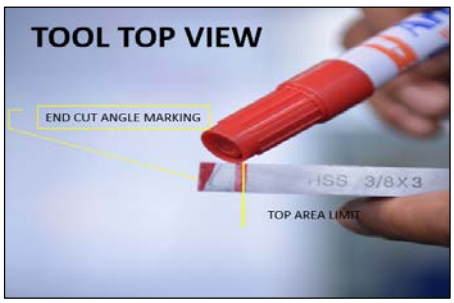


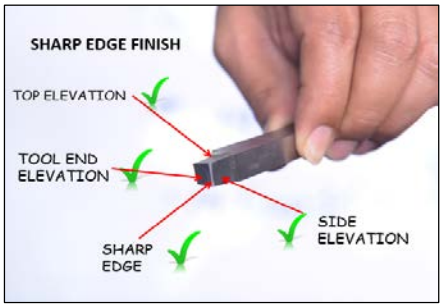
Figures 8 & 9: Image captured with a 4K resolution smartphone with a tripod for stability helps enhance photo clarity

Microsoft Office PowerPoint is software for animating and converting main slides to video to be utilized as parts of video content. Fonte & Nistal, 2018, employed a similar method to capture a slide show that might include audio for the explanation. The first phase involves photographing or filming. Using Microsoft PowerPoint slides is the simplest method for accentuating significant information and details. Therefore, the arrangement and editing of narration would indeed be simple. Using this software made animation and video transcoding straightforward. Key aspects such as objectives, lesson outcomes, tool bit parameter labelling, and other graphics can be animated to make them more engaging and then converted to video format. Any free Android video application edition is limited to 15-minute recordings and includes a watermark, and webcam recordings are limited to 5 minutes. (Snelson, 2018).

When creating this video, the major consideration was the students' concentration. The developer of the video does not want the instructor to distract the viewer's attention from the main objective. Throughout the entire process, only the instructor's hand is visible to the students, not the instructor. Therefore, students will only devote attention to the technique and not the instructors. Figures 12 and 13 illustrate how demonstration tactics are only applicable to the instructor's hand. With the inclusion of high-definition images and videos, the creators ensure that only the tool bit parameters, techniques, and procedures are highlighted by zooming in. The video is more systematic and also of higher quality when it incorporates step-by-step demonstration methods. Text or subtitles were other essential elements necessary to complete this video. By reading the subtitles, any technical terminology or instructions could be comprehended more easily. Despite video presentations, this certainly improves students' comprehension of the procedure. Therefore, embedded subtitles and Google's Artificial Intelligence (AI) voice-over were added to the video. Figures 10 and 11 demonstrate how subtitles are inserted within a video.

Figures 10 & 11: Subtitles embedded in the video in the simplest way for better understanding





Figures 12 & 13: Figure focusing only on the key lesson rather than to instructor

To make this T&L video more accessible, this video had been uploaded to YouTube aside from Whats App and Telegram platforms. More quality videos with high-definition clarity can be made when it comes to YouTube. This will enable the video size limitation when it delivers thru Whats App. This Teaching and Learning (T&L) video was shared with respective workshop lecturers and from them, the video will be disseminated to students. It was effectively implemented during the practical workshop by all lecturers. This T&L video was applied explicitly to all semester one students in Mechanical Engineering Department, Politeknik Ungku Omar. (Muniandy & Veloo, 2011) and adding elements of effective audio and images help students learn and remain focused (Forbes et al., 2016). Through the use of video application techniques (Syaripuddin et al., 2019) (Kamlin & Keong, 2020) benefits must be identified in the use of video in learning. Consequently, the benefits of this instructional film were as follows;

i. This Teaching and Learning (T&L) video only took a 5-minute duration and is in acceptable size for downloads. It is convenient for students to share the video without compromising their internet data.

ii. Students could improvise the demonstration concept presented in the Teaching and Learning (T&L) by watching the video repeatedly.

iii. Students' psychomotor movement will automatically react with pre-captured motion via visualization, (Snowdon et al., 2008).

iv. Proper demonstration techniques shown by lecturers would benefit directly students in producing accurate geometry. The use of pictures, sounds, animations, and videos in teaching affects the intelligence of students in a certain field (Salsidu et al., 2018).

v. With proper skills, waste could be reduced tremendously and this will help sustainability in raw material consumption.

vi. This video would also be benefited all levels of the community out there who are involved in lathe machining and also for those who need a reference for the tool bit grinding process.

vii. Access to video content for an unlimited population of students

5. Conclusion

This T&L innovation video was strategically built by covering the whole aspect of the teaching and learning method. Its begins by highlighting the learning outcome, safety precautions, and personal protective equipment reminders. The order sequence also was planned in detail according to the right method and important labelling was also provided visually to help the students enhance their understanding. The way this video is presented makes it more simple, more practical, and easy to revise. It helps them more when it comes to the practical session along with the guidance of lecturers. Furthermore this T&L video not only benefited Politeknik Ungu Omar students but also all communities who pursue knowledge and lifelong learning. Future studies on the efficacy of this T&L video must be carried out so that the collected data can prove how well this T&L video has an impact on students or vice versa.

References

Students can adopt 21st-century skills Abdullah, A. S., Rosli, S., Yazid, M. R. M., Yusoff, N. I. M., Borhan, M. N., & Ishak, A. (2021). Interaktif multimedia “e-LABS” untuk makmal Kejuruteraan. *Journal of ICT in Education*, *8*(4), 13–21. https://doi.org/https://doi.org/10.37134/jictie.vol8.sp.2.2.2021

Akhmadullina, R. M., Abdrafikova, A. R., & Vanyukhina, N. V. (2016). The use of music as a way of formation of communicative skills of students in teaching English language. *International Journal of Environmental and Science Education*, *11*(6), 1295–1302. https://doi.org/10.12973/ijese.2016.400a

Bowles-Terry, M., Hensley, M. K., & Hinchliffe, L. J. (2010). Best practices for online video tutorials in academic libraries: A study of student preferences and understanding. *Communications in Information Literacy*, *4*(1), 17–28. https://doi.org/10.15760/comminfolit.2010.4.1.86

Buchner, J. (2018). How to create Educational Videos : So gelingen Lernvideos : *R&E Source*, *12*(September), 1–10.

Campbell, L. O., & Cox, T. (2018). Digital Video as a Personalized Learning Assignment: A Qualitative Study of Student-Authored Video using the ICSDR Model. *Journal of the Scholarship of Teaching and Learning*, *18*(1), 11–24. https://doi.org/10.14434/josotl.v18i1.21027

Debra S. Osborn. (2010). Using Video Lectures to Teach a Graduate Career Development Course. *VISTAS Online*. http://www.counseling.org/

Donnelly, K., Rizvi, S., & Barber, M. (2013). An avalanche is coming. Higher education and the revolution ahead. *Voprosy Obrazovaniya / Educational Studies Moscow*, *2013*(3), 152–236. https://doi.org/10.17323/1814-9545-2013-3-152-229

Falvo, D. A. (2008). Animations and simulations for teaching and learning molecular chemistry. *International Journal of Technology in Teaching and Learning*, *4*(1), 68–77.

Fonte, F. A. M., & Nistal, M. L. (2018). Methodologies and software for creating audiovisual open educational resources. *SIIE 2018 - 2018 International Symposium on Computers in Education, Proceedings*, 1–6. https://doi.org/10.1109/SIIE.2018.8586715

Forbes, H., Oprescu, F. I., Downer, T., Phillips, N. M., McTier, L., Lord, B., Barr, N., Alla, K., Bright, P., Dayton, J., Simbag, V., & Visser, I. (2016). Use of videos to support teaching and learning of clinical skills in nursing education: A review. *Nurse Education Today*, *42*, 53–56. https://doi.org/10.1016/j.nedt.2016.04.010

Hamdan, A. R., & Mohd Said, N. A. (2020). Kesediaan Pelajar Mempelajari Mata Pelajaran Pengajian Kejuruteraan Awam Di Sekolah Menengah Teknik Kuantan. In *SELL Journal* (Vol. 5, Issue 1).

Hartsell, T., & Yuen, S. C. (2019). Video Streaming in Online Learning. *European Financial Services Law*, *14*, 612–613. https://doi.org/10.5771/9783845279893-612-1

Henno, J., Jaakkola, H., & Mäkelä, J. (2014). From Learning to E-learning to M-learning to C- learning to ... ? *2014 37th International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), 26 - 30 May 2014, Opatija, Croatia (Pp. 616-622). Croatian Society for Information and Communication Technology, Electronics and Micr*, *May*, 26–30. https://doi.org/https://doi.org/10.1109/MIPRO.2014.6859641

Hofer, M., & Swan, K. O. (2008). Technological pedagogical content knowledge in action: A case study of a middle school digital documentary project. *Journal of Research on Technology in Education*, *41*(2), 179–200. https://doi.org/10.1080/15391523.2008.10782528

Kamlin, M., & Keong, T. C. (2020). Adaptasi Video dalam Pengajaran dan Pembelajaran. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, *5*(10), 105–112. https://doi.org/10.47405/mjssh.v5i10.508

Kay, R., & Kletskin, I. (2012). Evaluating the use of problem-based video podcasts to teach mathematics in higher education. *Computers and Education*, *59*(2), 619–627. https://doi.org/10.1016/j.compedu.2012.03.007

Korbach, A., Ginns, P., Brünken, R., & Park, B. (2020). Should learners use their hands for learning? Results from an eye-tracking study. *Journal of Computer Assisted Learning*, *36*(1), 102–113. https://doi.org/10.1111/jcal.12396

Lipomi, D. J. (2020). Video for Active and Remote Learning. *Trends in Chemistry*, *2*(6), 483–485. https://doi.org/10.1016/j.trechm.2020.03.003

Martin, N. A., & Martin, R. (2015). Would You Watch It? Creating Effective and Engaging

Video Tutorials. *Journal of Library and Information Services in Distance Learning*, *9*(1–2), 40–56. https://doi.org/10.1080/1533290X.2014.946345

Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational Psychologist*, *38*(1), 43–52. https://doi.org/10.1207/S15326985EP3801_6

Md Sahir, A., & Mohd Ayub, A. F. (2015). Keberkesanan Penggunaan Video dalam Amali Masakan. *International Journal of Education and Training (InjET) 1(2) November: 1-8 (2015)*, *1*(2), 1–8. http://www.injet.upm.edu.my

Mehrotra, R., Verma, R. M., Devi, M., & Jakhar, R. S. (2022). Online Teaching Skills and Competencies. *World Journal of English Language*, *12*(3), 187. https://doi.org/10.5430/wjel.v12n3p187

Muniandy, B., & Veloo, S. (2011). Views of Pre-service Teachers in Utilizing Online Video Clips for Teaching English Language. *International Journal of Social Science and Humanity*, *13*, 224–228. https://doi.org/10.7763/ijssh.2011.v1.39

Noor, N. M., Hamizan, N. I., & Rahim, R. A. (2014). The framework for learning using video based on cognitive load theory among visual learners. *2013 IEEE 5th International Conference on Engineering Education: Aligning Engineering Education with Industrial Needs for Nation Development, ICEED 2013*, 15–20. https://doi.org/10.1109/ICEED.2013.6908295

Norton, P., & Hathaway, D. (2010). Content Learning and Teacher Practice.Pdf. *Contemporary Issues in Technology and Teacher Education*, *10*(1), 145–166.

Okta Priantini, D. A. M. M. (2021). The Development Of Teaching Video Media Based On Tri Kaya Parisudha In Educational Psychology Courses. *Journal of Education Technology*, *4*(4), 448. https://doi.org/10.23887/jet.v4i4.29608

Roller, S. A. (2016). What they notice in video: a study of prospective secondary mathematics teachers learning to teach. *Journal of Mathematics Teacher Education*, *19*(5), 477–498. https://doi.org/10.1007/s10857-015-9307-x

Salsidu, S. Z., Azman, M. N. A., & Pratama, H. (2018). Trend Pembelajaran Menggunakan Multimedia Interaktif Dalam Bidang Pendidikan Teknikal : Satu Sorotan Literatur. *Sains Humanika*, *10*(3), 21–27. https://doi.org/10.11113/sh.v10n3.600

Shojaei, A., Rokooei, S., Carson, L., Ford, G., & Mahdavian, A. (2020). Immersive Video Capture Technology for Construction Management Education. *20th International Conference on Construction Applications of Virtual Reality (CONVR 2020), September*, 163–172.

Siang, J. L., Hasan, B., & Tamhir, L. (2019). Video Development as Supporting Learning Media for Teachers at SMP Negeri 5 Tidore Islands [Pengembangan Video Sebagai Penunjang Media Pembelajaran Bagi Guru di SMP Negeri 5 Tidore Kepulauan]. *Proceeding of Community Development*, *2*, 111. https://doi.org/10.30874/comdev.2018.141

Sidek, S., & Hashim, M. (2016). Pengajaran berasaskan video dalam pembelajaran berpusatkan pelajar: analisis dan kajian kritikal. *Journal of ICT in Education*, *3*(1), 24–33.

Snelson, C. (2018). Video production in content-area pedagogy: a scoping study of the research literature. *Learning, Media and Technology*, *43*(3), 294–306. https://doi.org/10.1080/17439884.2018.1504788

Snowdon, A. W., Hussein, A., High, L., Stamler, L., Millar-Polgar, J., Patrick, L., & Ahmed, E. (2008). The Effectiveness of a Multimedia Intervention on Parents' Knowledge and Use of Vehicle Safety Systems for Children. *Journal of Pediatric Nursing*, *23*(2), 126–139. https://doi.org/10.1016/j.pedn.2007.08.020

Sulihin, S., Asbar, A., & Elihami, E. (2020). Developing of Instructional Video Media to Improve Learning Quality and Student Motivation. *EDUMASPUL: Jurnal Pendidikan*, *4*(2), 51–55. https://ummaspul.e-journal.id/maspuljr/article/view/692/346

Syaripuddin, R., Razaq Ahmad, A., & Mahzan Awang, M. (2019). *The Use of Video in Teaching and Learning 21st Century History Education in Malaysia*. *2*, 182–186. https://doi.org/10.32698/gcs.0194

Whatley, J., & Ahmad, A. (2007). Using Video to Record Summary Lectures to Aid Students' Revision. *Interdisciplinary Journal of E-Skills and Lifelong Learning*, *3*(January 2007), 185–196. https://doi.org/10.28945/393

Wibawa, S. C., & Clark-Gareca, B. (2015). Students' Creative e-Portfolios: Using Android Cell Phone Cameras for Inventive Beauty Photography. *Proceedings of the 2014 International Conference on Advances in Education Technology*, *11*(ICAET), 121–124. https://doi.org/10.2991/icaet-14.2014.29

Woolfitt, Z. (2015). *The effective use of video in higher education*. *October*, 1–49. https://www.inholland.nl/media/10230/the-effective-use-of-video-in-higher-education-woolfitt-october-2015.pdf

THE EFFECTIVENESS OF USING GRAPHS AND CHARTS VIDEO PRESENTATION GUIDELINES FOR DUE50032 COMMUNICATIVE ENGLISH 3

Fazlind Mohd Shuraimi[1], Nalanie Raja Gobal[2], and Bong Rose Lin[3]

Jabatan Pengajian Am, Politeknik Ungku Omar, Malaysia

fazlindshuraimi@gmail.com
nalanie@puo.edu.my
bong@puo.edu.my

Abstract: DUE50032 Communicative English 3 is one of the English language courses offered to Malaysian polytechnic students. This course aims to equip the students with knowledge of graphs and charts descriptions and job-hunting mechanics. One of the course learning outcomes of DUE50032 Communicative English 3 is to use the proper language forms and functions to properly convey acquired data in graphs and charts. The students' graphs and charts description presentations were carried out face to face to assess their ability to present using appropriate language forms and functions. However, this method of assessment is not possible due to pandemic restrictions. Therefore, video presentations were introduced in 2020. As an innovative initiative a Google Site with guidelines, sample AVAs, presentation scripts, and videos was created to assist the students The objective of this innovation is to demonstrate the appropriate way of presenting their graphs and charts assessments via communication platforms. It also enables them to create suitable visual aids for their presentation of graphs and charts. The Google Site is used as a platform to guide the students on how to deliver their presentation of graphs and charts effectively. An online survey consisting of 10 items via Google Form was given to students to evaluate the effectiveness of the Google Site. A total of 127 Ungku Omar Polytechnic (UOP) students completed the survey. The findings show that the majority of students agreed that the guideline via Google Site helps them to deliver video presentations effectively with a significant difference in T-Test 7.2840 after comparing two different classes. Based from the findings, it can be deduced that the guidelines via Google Site have been proven to be successful and effective in guiding students to achieve better results in their video presentation assessment specifically graphs and charts, so therefore, it is recommended for The Google Site for DUE50032 Communicative English 3 Course: Description of Graphs and Charts Video Presentation to be used by all the language course lecturers teaching at Ungku Omar Polytechnic and other polytechnics.

Keywords: *graphs and charts, video presentation, assignment, guidelines, DUE50032 Communicative English 3, Google Site*

1. Introduction

DUE50032 Communicative English 3 is one of the compulsory English language courses that must be taken by semester 3 or 4 students in Malaysian Polytechnic Education. This course aims to equip the students with knowledge of graphs and charts descriptions and job-hunting mechanics. As stated in the course syllabus developed by the Department of Polytechnic Education and Community College Education (2019), there are a total of three intended Course Learning Outcomes **(CLO)** in DUE50032 Communicative English 3, which are:

CLO1 : Present gathered data in graphs and charts effectively using appropriate language forms and functions.

CLO2 : Prepare a high impact resume and a cover letter, highlighting competencies and strengths that meet employer's expectations

CLO3 : Demonstrate effective communication and social skills in handling job interviews confidently.

There are two assessments i.e., Test and Oral Presentation for CLO 1 (Department of Polytechnic Education and Community College Education, 2019). This study focuses on the oral presentation assessment which carries 20% out of 100% of continuous assessment. The students' graphs and charts description presentations were carried out face to face to assess their ability to present the descriptions of graphs and charts created with the right linguistic structures. However, this method of assessing not possible due to the pandemic restrictions. Therefore, video presentations were introduced in the year 2020. Prior to this, Students are given input on graphs and charts during class lessons but do not have any specific references on how to do the assignment. Thus, an innovative initiative using a Google Site which consists of video preparation guidelines, sample presentation scripts, sample videos and AVAs were created to assist the students in preparing their graphs and charts description video presentations effectively.

1.1 Problem Statements

The main problems were identified by the lecturers at Ungku Omar Polytechnic who were teaching DUE50032 Communicative English Course on the creation of graphs and charts video presentations before the Google Site was used in their teaching and learning sessions was most students find it challenging / unable to create effective video presentations with good content. Apart from that, it has been discovered that there were no guidelines and samples which students can use to refer to when preparing their graphs and charts description video presentations. This is supported by Angra et al (2017) that there are resources available to assist both professionals and learners become more adept at choosing and creating graph formats. Angra et al (2018) further elaborated that the materials rarely focus on the sophisticated rationale underpinning graph selection and construction, nor are they founded in a specific discipline's concepts and metrics. It is consequently challenging to select a suitable graph for data (for example, a bar graph for summarised categorical data) without first weighing the benefits and drawbacks of doing so in the context of a particular scientific discipline or audience.

1.2 Research Objectives

This study is carried out to achieve the following objectives:

- To evaluate the effectiveness of using Google Site as a reference platform in creating graphs and charts description videos for the Communicative English 3 (DUE50032) course.
- To analyse the difference of students who uses Google Site as a reference platform and students who do not use the site in creating graphs and charts description videos for the Communicative English 3 (DUE50032) course.

2. Literature Review

Learning is no longer restricted to classrooms with traditional methods of teaching as the only technique of delivering knowledge, with the immense development of numerous technologies and innovations; throughout the years, an electronic learning medium has developed. This statement is supported by Dinç (2017), who cited Nachmias et al. (1998), the Internet today plays a variety of important roles in education, including delivering teaching, promoting communication, supplying information, and providing an environment for creativity. Due to Covid-19 pandemic, Gustiani (2020) mentioned that all educational institutions are subjected to the online learning regulation. Learning is being transferred from conventional face-to-face methods to remotely accessible digital platforms.

The definition of online learning is come up by Stern (2020) that Online learning is an instruction that is delivered through the Internet and it goes by a variety of names, including "e-learning." Stern (2020) stated that the phrase "distance learning," as it includes all forms of learning that occur across distance and outside of a traditional classroom, is only used to refer to one sort of online learning. Coman et al (2020) explained that online learning has grown in popularity due to its immense potential to deliver additional versatile access to information and instruction by: improving the availability of learning experiences for those who are unable or do not wish to attend traditional public schools, more effectively organising and distributing information and instructional content, and materials as well as enhancing student – instructors' ratios while accomplishing learning outcomes comparable to conventional classroom teaching. The best way to maintain the association between online education and the ideals of traditional education is to ensure that online learning is "delivered" by educators who are completely competent and passionate about teaching in a web-based environment. In relation to this study, a Google Site was created as an independent online platform which students can use asynchronously after their online synchronous classes and that eventually goes in line with TVET.

Technical and Vocational Education and Training **(TVET)**'s main role is to prepare the younger generation for future employment. The Industrial Revolution 4.0 necessitates the incorporation of 21st century skills into education (Shabbir et al, 2019). Shabbir et al (2019) explained that vocational education and training should be a part of the education system in order to encourage a competent and effective workforce. The effective implementation of TVET in line with Industrial Revolution 4.0 needs would be able to successfully prepare the country with quality technical workforce to boost the economic growth. Shabbir et al (2019) further elaborated and quoted from Busian and Shroder (2015) that high-caliber ICT professionals are required by the convergence of automated production lines, the internet, and artificial intelligence; which therefore the enforcement of TVET will lessen the country's

reliance towards migrant workers while improving the competitiveness and boost the employees' potential in ICT.

According to Singgih et al. (2021), the Covid 19 pandemic pressures the government to enact home learning as well as enforce social distancing as one of the health procedures to stop the spread of the Covid 19. Due to the implementation of online learning, teaching and learning activities are carried out via the online learning platforms provided by video conference developers such as ZOOM, GOOGLE MEET, MICROSOFT TEAMS, CISCO WEBEX, and etc. Singgih et al. (2021) further said that online learning has its own array of issues in terms of implementation. Online learning is relatively new in Malaysian education. On top of that, most educators who are unfamiliar with online learning have difficulty utilising it. Not only that, online learning is challenging when there is a limited internet allotment as well as a volatile internet network, both which impede online teaching and learning (Singgih et al, 2021).

Although the majority of students in most countries may not have access to digital gadgets or the internet, assisting governments in developing sustainable online education models will free up institutional capacities and resources, allowing them to emphasis on providing alternative learning strategies for students who do not have the same opportunities. (Reimers et al, 2020). According to Singgih et al. (2021), despite the difficulties, most educators believe that the viable solution to deliver online learning is accomplished through the use of video as a medium for information delivery, which can provide the information and documents effectively than minimising students' poor internet allotment by using video conference. In line with Singgih et al (2021) claim, this study has adopted the use of video presentation to assess the students' graph and chart descriptions and used samples of graphs and charts description video presentations in the Google Site.

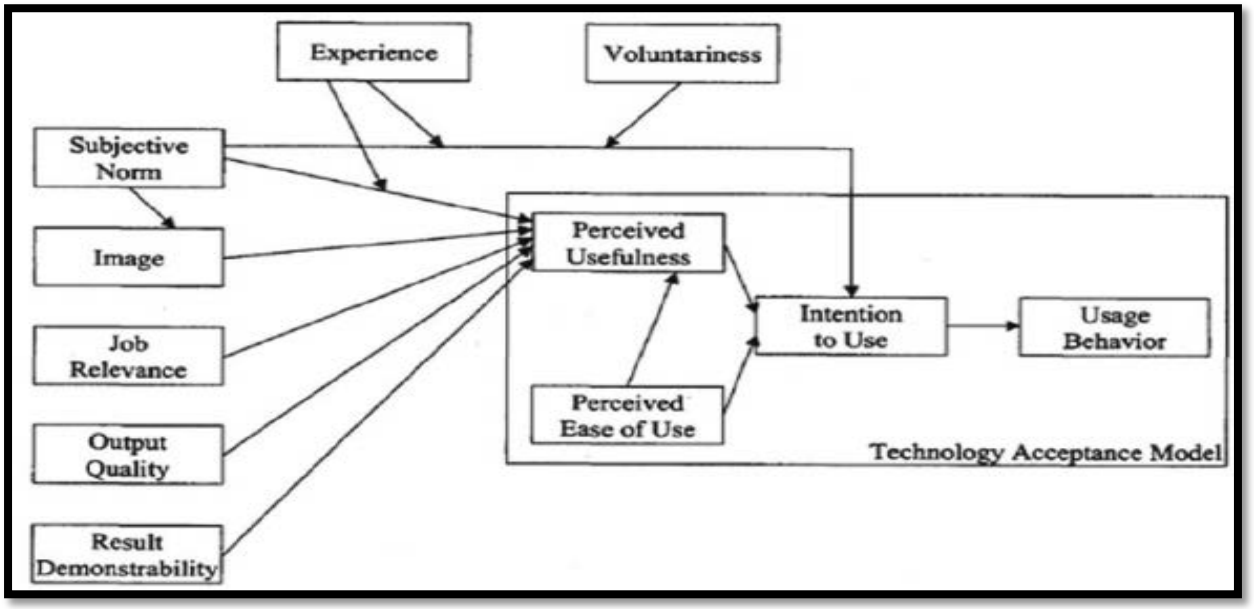
Visualizing correlations in the data using graphs is a common practise method, according to Angra et al (2017) who cited from Slutsky (2014). Generally, students have demonstrated their weaknesses in graphs and charts presentation by presenting inappropriate data, ineffective use of AVAs, inaccurate use of language form and functions and poor content organisation. According to Angra et al (2018), interpreting graphs is a difficult and complicated task. Angra et al (2018) went on to clarify that graph interpretation skill is influenced by a variety of factors, including graph properties, graph content, and users' prior knowledge. Hubbard et al (2017) quoted from Glazer (2011) confirming that undergraduates found figures and tables are more challenging to engage with than the accompanying text, postgraduates on the other hand claimed that both the text and the figures/tables of results sections were equally simple to comprehend. This could be attributed to the specialised knowledge required to comprehend graphs and other visual representations of data hence might contribute to biases and misreading of graphs (Hubbard et al, 2017). Students often struggle to comprehend how to present information in the form of graphs and charts, which results in the presentation of irrelevant data of graphs and charts. Furthermore, they are unable to analyse the graphs or charts effectively using appropriate lexical items to describe trends and giving sufficient details like time frame and data. Finally, students also tend to present too much data, which confuses the audience during the presentation with poor content organisation and choice of AVA. Therefore, the Graphs and Charts Video Presentation Guidelines for DUE50032 Communicative English 3 Course via Google Site is specifically designed for students with the following aims:

- To expedite students' learning on the DUE50032 Communicative English 3 course, primarily on graphs and charts descriptions.
- To provide a reference platform which consists of guidelines, sample presentation scripts, sample videos and sample AVAs for students to be used asynchronously.
- To improve students' video presentations of graphs and charts descriptions.

Google Sites is a tool for creating web pages that is available with Google Apps for project management, workgroups, and committees. Google Site allows a person to build a website without any hassle. The purpose is to create an all essential information may be found in one place, including text, calendars, presentations, calendars, photos, documents, and folders. Then, the information is swiftly and securely shares it with the entire organisation or the entire world.

Due to the accessibility and availability for students and lecturers, the Google site is used instead of apps. The Google site does not necessitate the installation of any apk (Android Application Package File) or apps on mobile devices. Since it is free to use, it allows and enables students and educators to gain free access of the information they wish to acquire. Apart from that, Google site enables the creator to be able to integrate the site with other Google products i.e., Google Drive, Google Forms, Google Images etc. as it enables the creator to easily access the information, files, and folders easily as long the creator has internet connection. Google site is selected due to its user-friendly and easy to learn by the users. Basically, it is not time consuming to learn and utilise Google site to disseminate the information easily; to put it simply, one does not need to acquire special kind of certification or high-level database skills to create the website. Furthermore, Google site offers extra security features to ensure the security of the website by featuring 2- step verification which could prevent any possible hacking or cyber-attacks.

The advantage of this Google site is that no papers are used at all. The guidelines are provided via the Google site hence preventing any carbon footprint. Zhongming et al (2020) quoted from Sundar Pichai (2020) mentioned that climate change is no longer a distant threat; therefore, by committing to a bold initiative to run data centres and campuses on 24/7 carbon-free energy by 2030, Zhongming et al (2020) again quoted from Pichai (2020) said that Google had become carbon neutral since 2007 and would continue to do so. As a result, no paper is being consumed. Apart from that, Zhongming et al (2020) further cited from Pichai (2020) explained that Google has taken an initiative to introduce new ways for people to use Google products which could potentially lower carbon footprint in accordance to support clean energy and eco-friendly.



3. Methodology

3.1 Theoretical Framework

Venkatesh and Davis (2000) Technology Acceptance Model

Adoption and utilisation of information technology in the workplace remains an important focus of information systems study and experimentation (Venkatesh and Davis, 2000). According to Venkatesh and Davis (2000), a high-priority research question is to figure out on how to get human organisations to adopt information systems and how to create those conditions. Venkatesh and Davis (2000) explained that over the past ten years, significant advancements have been achieved in our understanding of and ability to forecast users' acceptance of information technology in the workplace. The Development of Graphs and Charts Video Presentation Guidelines for DUE50032 Communicative English 3 Course via Google Site adapted from Venkatesh and Davis (2000) Technology Acceptance Model where the development begins with the subjective norm, where students need to achieve good results in graphs and charts video presentation assessment, therefore, the intention to help the students lead towards the development of the Google site which offers guidelines to the students.

Based on the TAM, subjective norms with the existence of image, job relevance, output quality and result demonstrability, along with experience and voluntariness lead towards the perceived usefulness. The perceived usefulness in this innovation is measured by using the effectiveness survey to investigate the students' responses on the effectiveness and usefulness of the Graphs and Charts Video Presentation Guidelines for DUE50032 Communicative English 3 Course via Google Site. Perceived ease of use of this innovation emulate TAM where the Google site is user friendly and it allows every user from different walk of life to use it without any difficulty. With the existence of perceived usefulness and perceived ease of use, it will eventually lead towards the intention to use, since the Graphs and Charts Video Presentation Guidelines for DUE50032 Communicative English 3 Course via Google Site is easy to use and

offer simple explanations as well as descriptions, students and educators began to develop the intention to fully utilise the Google site to make the teaching and learning easier, hence, lead towards usage behaviour; where the users (students and educators) will continue to utilise it and eventually will promote the Google site to the other students. To put it simply, the development of Graphs and Charts Video Presentation Guidelines for DUE50032 Communicative English 3 Course via Google Site fulfil the Technology Acceptance Model.

3.2 Stages of Development

The development of Graphs and Charts Video Presentation Guidelines for DUE50032 Communicative English 3 Course via Google Site comprises several stages. Below are descriptions of the stages involved:

Stage 1

Before the development of Google site begins, an authentic bar graph entitled 'The Holiday Accommodation chosen by Asians in 2018' was constructed by using Microsoft PowerPoint and it was converted into PNG form. Once the graph is completed, a sample script is prepared to provide insights for the students on how to create a script which describes the graphs that they are going to present.

Stage 2

The second phase involves the development of the website. The preferred website i.e. Google Site is selected as Google site is user-friendly among the developers. The website comprises several pages i.e., Home page, About Us, Guidelines on Video Presentation, Visual Aids examples, Sample Scripts, Sample Video, Instructions and Rubrics, Effectiveness Survey as well as Contact. The Guideline on Video Presentation is the informational page where it informs the students of the dos and don'ts that the students must bear in mind before recording their video presentation. In addition, the Visual Aids examples page is created to provide insights for the students about the methods that are available for them to create visual aids for their video presentation task.

Stage 3

The developers also decided to add a Sample Script page which is created to provide more insights and guidance on how to prepare and rehearse their presentation before the recording takes place. It is believed that without the sample script page, students are unable to have the gist on how to describe their choice of graphs and charts effectively. Next, the creation of a Sample Video page is created. The video creation is created specifically to demonstrate to the students on how a simple video recorded presentation is carried out. The video recording is recorded via Microsoft Teams where the video is automatically stored straight into Microsoft Streams once the record is completed hence Microsoft Streams enables the developer to download and upload in YouTube channel as Google Site only enables video sharing via YouTube.

Stage 4

The developer believes that the site should include the instructions and rubrics of DUE50032 Graphs and Charts video presentation assessment as one of many materials in the Google site. It is important for the students to have clear instructions on presenting graphs and charts via video presentation. This site also includes the effectiveness survey to collect the responses of students who partake in DUE50032 course on the effectiveness of the Description of Graphs

and Charts website. The eight questions in the form of the Likert Scale are created via Google Form for the respondents to answer where students required to select the scale range from 1 (Strongly Disagree) to 4 (Strongly Agree). Once the students have finished, the results are instantly generated into graphs and charts and the analysis of the questionnaire is carried out for each question.

Stage 5

This site also enables students to communicate with their lecturer effectively by including a Contact page in order to help them overcome difficulties while preparing their video presentation assessment tasks. Pilot study is conducted by selecting two sample classes which comprises of DAT3B (30 students) and DTK 3B (28 students) are selected to analyse the efficiency of the google site towards their academic performance by conducting t-test and p-value analysis. By the end of the presentations, the results of the students' graphs and charts description video presentation from both DAT3B and DTK3B students are collected, tabulated, and analysed by respective lecturers who teach and participate in this study to support the effectiveness of the website to the students in presenting graphs and charts via video presentation. Once the pilot study is completed at the end of the semester, a total number of 127 students participated in the survey on the effectiveness of using Google site as a source of reference particularly video presentation on graphs and charts are carried out via Google Forms where the results are instantly generated once the students finished answering the survey questions.

4. Results

4.1 Pilot study's T-test and P-value analysis

As the semester 1 2021/2022 session ended, the samples of two classes were taken i.e., the controlled group and the experimental group. DAT3B represented the experimental group which comprised 30 students whereas DTK3A represented the controlled group which was made up of 28 students. The results of the T-test for both classes are 7.4578 which simply mean that there are significant differences between DAT3B and DTK3A. The difference in the T-test simply indicates that the results generated are not likely to happen by chance or happened due to sampling errors with the standard error of difference being only 0.524. The T-test values of both classes are supported by the P-value which is less than 0.0001. With the figure of 0.0001, both data stipulated that the differences between the two classes are considered to be extremely statistically significant where both sets of data would not happen by accident or coincidence.

Based on the results, the results displayed that DAT3B and DTK3A achieved the mean of 15.550 and 11.643 respectively. Apart from that, the standard deviation for DAT3B and DTK3A achieved 2.230 and 1.704 respectively with a difference of 0.526. The standard deviation of both classes described that both classes have values that are close to the mean of the set rather than spread out over a wider range. Based on the data collected for both classes, the t-test and p-test for both classes have demonstrated the effectiveness of the Google Site among the students and its importance in assisting students in achieving good results in their assessment particularly the video presentation of Graphs and Charts topic in DUE50032 Communicative English 3.

4.2 Class Effectiveness Survey Analysis

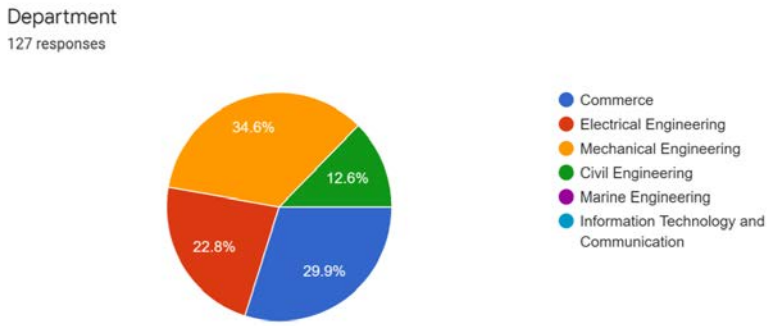


Figure 1: Participants' Departments

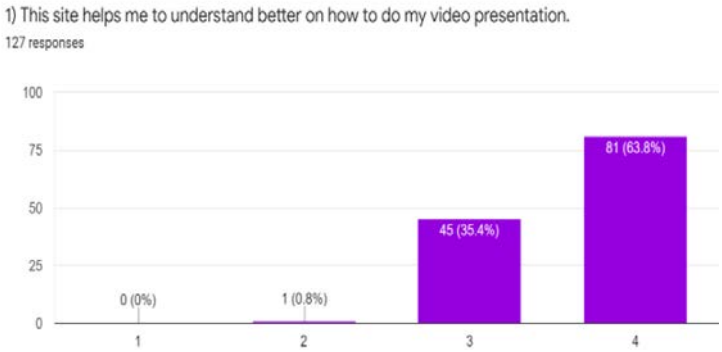


Figure 2: Participants' Comprehension on Video Presentation

Based from the findings to investigate the effectiveness survey carried out via Google Form, a total of 127 respondents from four departments namely Electrical Engineering, Commerce Department, Mechanical Engineering Department and Civil Engineering Department took part in the survey. However, Marine Engineering and Information Technology and Communication Department students did not participate in the effectiveness survey. Based on the chart, it can be described that the majority of respondents are from Mechanical Engineering students which is slightly more than a third i.e. 34.06% with the lowest percentage of respondents coming from Civil Engineering students at 12.6%.

Figure 2 demonstrates that the 43.3% of students with the percentage strongly agree and 52% of students who responses agree indicated that the Google site helps them to understand better on how to do their presentation. However, a small minority which contributes about 0.8% stated that the site does not help them to understand better on how to do their presentation. It can be

postulated that this site has served as an effective guideline for the students on how to do their video presentation in accordance to their lecturer's expectations as the objective of Google site is to disseminate information shares it with the entire organisation or the entire world.

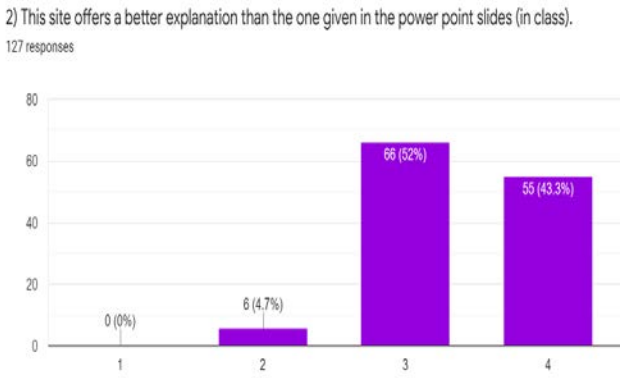


Figure 3: Google Site explanations

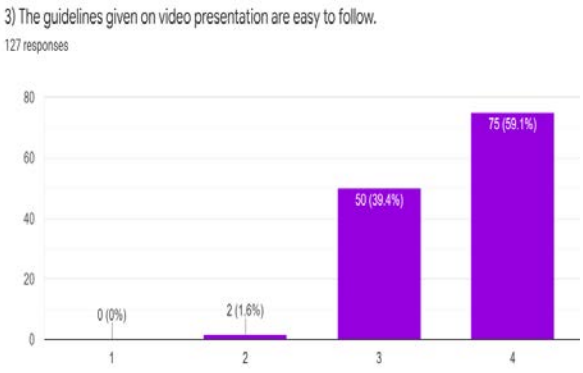


Figure 4: Guidelines on video presentation

Based on Figure 3, more than half of the respondents (52%) agreed that the Google site offered better explanation than the one given in the power point used in class. However, the percentage of the respondents who strongly agreed was lower with 8.7% which is 43.3%. Regardless of the difference, the respondents agreed that the site offers detailed explanations on Graphs and Charts visual aids constructions. Students can always browse the site as their reference without depending heavily on the lecture alone. Only a miniscule number of students; that is less than a tenth (4.7%), responded that they disagreed that the site offers a better explanation. In other words, only a small minority of the respondents prefer depending on their lecturer's slides as their source of reference.

Figure 4 show that 59.1% of the respondents who responded strongly agreed and 39.4% who responded agreed the guidelines easy to follow as compared to 1.6% who responded disagreed. This can be interpreted that the guidelines offer straightforward information on what is expected to do for the graphs and charts video presentation. With the integration of Google Drive as well as Youtube channel, it allows the creator to easily integrate it with Google Site to provide clear example of video presentation. It also can be assumed that they may have difficulties in comprehending the contents of the guidelines from the Google site and may require further assistance particularly the responded who responses disagree.

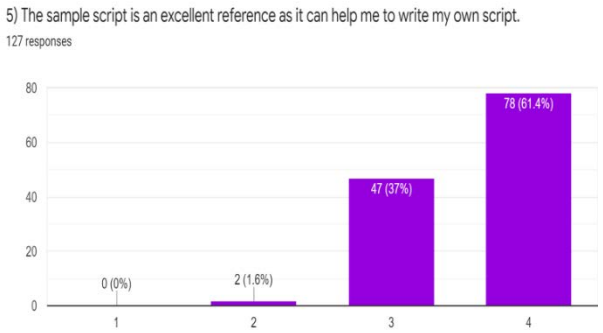


Figure 5: The sample script

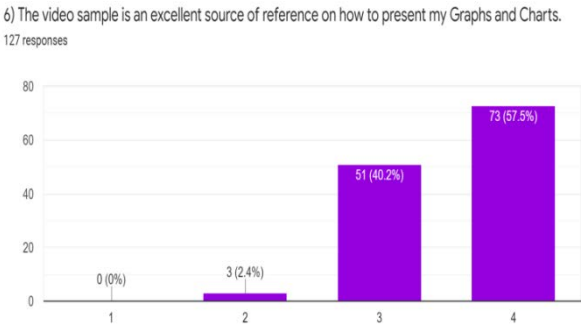


Figure 6: Video sample

Figure 5 shows that 61.4% and 37% who responded strongly agree and agree respectively believed that the sample script provided in the Google site serves as an excellent reference in helping them to write their own script. The remaining 1.6%, however, did not particularly find the scripts in the Google site helpful. Furthermore, Figure 6 shows that the respondents who strongly agreed and agreed contribute 57.5% and 40.2% respectively believing that the video samples provided in the Google site is an excellent source of reference on how to present their Graphs and Charts video presentation appropriately. Despite the positive responses from the respondents, a small number of respondents (2.4%) did not agree that the video sample as an excellent source of reference. It can also be hypothesised that the sample video is sufficient as a reference which hence they responded they disagree that the video sample is an excellent source of reference for them to do video presentation. Based from the responses, Google site successfully integrated the Google Drive and Youtube channel to be feature in the Google site.

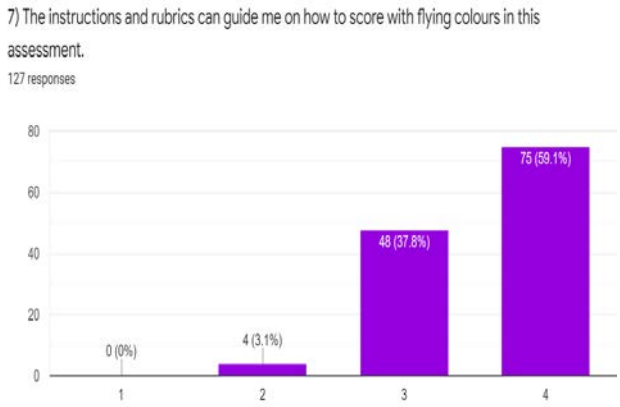


Figure 7: The instructions and rubrics

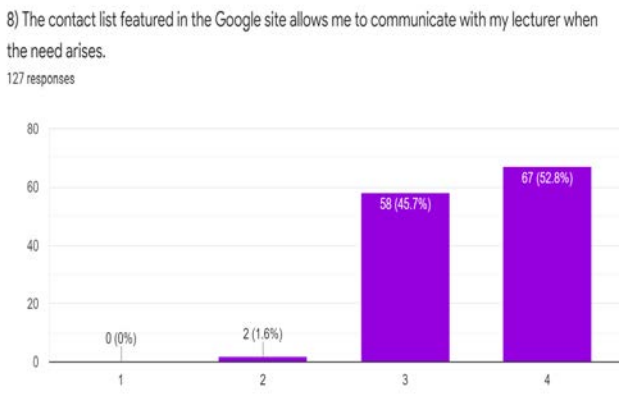


Figure 8: Contact list in Google Site

Figure 7 also shows similar results as the others. Respondents who responded agreed and strongly agreed with the statement that the instructions and rubrics can guide them on how to score with flying colours in the assessments is totalled up to 96.9%. However, a small number of respondents (3.1%) did not think that the instructions and rubrics in the site help them to achieve flying colour results. The rubrics and instructions included in the Google site allow the creator to incorporate the Google application effectively.

Majority of the respondents with 52.8% and 45.7% with strongly agreed and agreed response confirmed that the contact list in the Google site has allowed them to communicate with their respective lecturer when the need arises as can be seen in Figure 8. This demonstrated that the Google Site incorporate Google Form as the source of communication between lecturer and students. Only a small percentage of 1.6% responded that they disagreed with the method as the respondents preferred to depend on social media platforms such as WhatsApp or Telegram that would give them instant responses from their lecturer.

5. Conclusion and Recommendations

Based on the data analysis and findings, it can be postulated that the Graphs and Charts Video Presentation Assignment Guideline via Google Site has been proven to be effective in providing guidelines for the students on how to achieve good results particularly in Video Presentation on Graphs and Charts Assessment. The T-Test and P-Test results have proven that significance results yielded by two sample classes are not achieved via coincidence. It is confirmed that the guidelines on Graphs and Charts Video Presentation via Google site have produced a considerable number of students who achieved the score more than 50% of Video Presentation Assessment score.
The data analysis of Google Site for DUE50032 Communicative English 3 Course: Description of Graphs and Charts Video Presentation survey shows that:

1. 95.3% of the respondents are of the opinion that the Google site has offered better explanation on how to prepare their Description of Graphs and Charts Video Presentation.
2. Majority of the students (98.5%) found the guidelines are easy to follow while preparing their Description of Graphs and Charts Video Presentation.
3. 98.4% of the respondents that the sample script provided in the Google site serves as an excellent reference in helping them to write their own script.
4. 97.7% of the respondents believed that the video samples provided in the Google site is an excellent source of reference on how to present their Description of Graphs and Charts video presentation appropriately.
5. 96.9% of the respondents agreed that the instructions and rubrics guided them to score the assessments.
6. Majority of the respondents (98.5%) agreed that the contact list in the Google site has allowed them to communicate with their respective lecturers when there is a need.

Based on the preceding data, it is possible to deduce that the creation of Google Site for DUE50032 Communicative English 3 Course: Description of Graphs and Charts Video Presentation is effective in six areas as mentioned above. Since the guidelines have been proven to be successful and effective in guiding students to achieve better results in their video presentation assessment specifically graphs and charts, it is recommended for The Google Site for DUE50032 Communicative English 3 Course: Description of Graphs and Charts Video Presentation to be used by all the language course lecturers teaching at Ungku Omar Polytechnic and other polytechnics. Not only that, a similar approach of using Google site as a supplementary and reference platform can be done for other learning courses. Finally, it is also expected that a similar type of study can be replicated with a larger number of respondents in different fields.

References

Angra, A., & Gardner, S. M. (2017). Reflecting on graphs: Attributes of graph choice and construction practices in biology. *CBE—Life Sciences Education*, *16*(3), ar53.

Angra, A., & Gardner, S. M. (2018). The graph rubric: Development of a teaching, learning, and research tool. *CBE—Life Sciences Education*, *17*(4), ar65.

Coman, C., Țîru, L. G., Meseșan-Schmitz, L., Stanciu, C., & Bularca, M. C. (2020). Online teaching and learning in higher education during the coronavirus pandemic: Students' perspective. *Sustainability*, *12*(24), 10367.

Dinc, E. (2017). Web-based education and accessibility. *International Journal of Technology in Education and Science*, *1*(1), 29-35.

Department of Polytechnics and Community College Education (2019). Course Information DUE50032 Communicative English 3. Course Information DUE50032 Communicative English 3.

Glazer, N. (2011). Challenges with graph interpretation: A review of the literature. *Studies in science education*, *47*(2), 183-210.

Gustiani, S. (2020). Students' Motivation in Online Learning During Covid-19 Pandemic Era: A Case Study. *Holistics*, *12*(2).

Hubbard, K. E., & Dunbar, S. D. (2017). Perceptions of scientific research literature and strategies for reading papers depend on academic career stage. *PloS one*, *12*(12), e0189753.

Poe, M., & Stassen, M. L. (2002). Teaching and learning online: Communication, community, and assessment. *A Handbook for UMass Faculty. Office of Academic Planning and Assessment, University of Massachusetts, Amherst*, *6*, 56-62.

Reimers, F., Schleicher, A., Saavedra, J., & Tuominen, S. (2020). Supporting the continuation of teaching and learning during the COVID-19 Pandemic. *Oecd*, *1*(1), 1-38.

Shabbir, M. S., Arshad, M. A., Mahmood, A., & Sulaiman, M. A. B. A. (2019). 4th Industrial Revolution and TVET: The Relevance of Entrepreneurship Education for Development. *Opción: Revista de Ciencias Humanas y Sociales*, (24), 11-21.

Singgih, S. (2021). Video-based learning for "learning from home" solution in pandemic. In *Journal of Physics: Conference Series* (Vol. 1760, No. 1, p. 012011). IOP Publishing.

Stern, J. (2020). Introduction to online teaching and learning. *Retrieved on*, *2*(6).

Slutsky, D. J. (2014). The effective use of graphs. Journal of wrist surgery, 3(02), 067-068.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*, *46*(2), 186-204

Zhongming, Z., Linong, L., Xiaona, Y., Wangqiang, Z., & Wei, L. (2020). Google's third decade of climate action: Realizing a carbon-free future.

APPENDIX

DUE50032 - COMMUNICATIVE ENGLISH 3 (June 2021)					
ORAL PRESENTATION (20%)	Content	T/M/DP	LANG	DELIVERY	TOTAL
DAT3B	(6 marks)	(6 marks)	(6 marks)	(2 marks)	20%
01DAT20F1028	3	2.5	3.5	1	10
01DAT20F1037	5	2	3	0.5	10.5
01DAT20F1025	5	4.5	3.5	0.5	13.5
01DAT20F1041	4.5	4.5	3.5	1	13.5
01DAT20F1058	4	4.5	3.5	1.5	13.5
01DAT20F1035	5	4	3.5	1.5	14
01DAT20F1048	5	4	4	1	14
01DAT20F1054	5	4.5	3.5	1.5	14
01DAT20F1056	5	4	4	1	14
01DAT20F1026	4.5	4.5	4	1.5	14.5
01DAT20F1050	4.5	5	4.5	0.5	14.5
01DAT20F1047	5	5	3.5	1.5	15
01DAT20F1049	6	5	3.5	0.5	15
01DAT20F1061	5	5	4.5	0.5	15
01DAT20F1042	6	4	4	1.5	15.5
01DAT20F1046	5	5	3.5	2	15.5
01DAT20F1020	6	4.5	4	2	16.5
01DAT20F1044	6	4.5	4	2	16.5
01DAT20F1043	5	5	4.5	2	16.5
01DAT20F1034	5	6	5	1	17
01DAT20F1038	5.5	5	4.5	2	17
01DAT20F1052	5	5	5	2	17
01DAT20F1057	5	6	4.5	1.5	17
01DAT20F1060	6	5	5	1	17
01DAT20F1053	6	5	4.5	2	17.5
01DAT20F1059	6	5	5	1.5	17.5
01DAT20F1039	6	5	5	2	18
01DAT20F1032	6	6	5	2	19
01DAT20F1040	5.5	6	5.5	2	19
01DAT20F1055	6	6	5	2	19

Registration No.	PRESENTATION -20.00%		
	PRESENTATION		
	CLO 1	TOTAL (/20)	%
01DEE19F1074	10	10	10.00%
01DEE19F1090	10	10	10.00%
01DTK20F1012	10	10	10.00%
01DTK20F1019	10	10	10.00%
01DTK20F1021	10	10	10.00%
01DTK20F1026	10	10	10.00%
01DTK20F1027	10	10	10.00%
01DTK20F1002	10.5	10.5	10.50%
01DTK20F1010	10.5	10.5	10.50%
01DTK20F1020	10.5	10.5	10.50%
01DTK20F1023	10.5	10.5	10.50%
01DTK20F1005	11	11	11.00%
01DTK20F1028	11	11	11.00%
01DTK20F1004	11.5	11.5	11.50%
01DTK20F1015	11.5	11.5	11.50%
01DTK20F1017	11.5	11.5	11.50%
01DTK20F1022	11.5	11.5	11.50%
01DTK20F1025	11.5	11.5	11.50%
01DTK20F1001	12	12	12.00%
01DTK20F1003	12	12	12.00%
01DTK20F1016	12	12	12.00%
01DTK20F1007	12.5	12.5	12.50%
01DTK20F1011	13	13	13.00%
01DTK20F1014	13	13	13.00%
01DTK20F1006	14	14	14.00%
01DTK20F1024	14.5	14.5	14.50%
01DTK20F1008	15	15	15.00%
01DTK20F1013	16.5	16.5	16.50%

STUDENTS WHO ACHIEVE MORE THAN 10% FROM 20%	93.33%
STUDENTS WHO ACHIEVE 10% AND BELOW FROM 20%	6.67%
NUMBER OF STUDENTS	30
NO. OF STUDENTS WHO ACHIEVE MORE THAN 10% FROM 20%	28
NO. OF STUDENTS WHO ACHIEVE 10% AND BELOW FROM 20%	2

STUDENTS WHO ACHIEVE MORE THAN 10% FROM 20%	60.71%
STUDENTS WHO ACHIEVE 10% AND BELOW FROM 20%	39.29%
NUMBER OF STUDENTS	28
NO. OF STUDENTS WHO ACHIEVE MORE THAN 10% FROM 20%	17
NO. OF STUDENTS WHO ACHIEVE 10% AND BELOW FROM 20%	11

APPENDIX

Scan the QR Code to go to the Google Site:
https://sites.google.com/view/descriptionofgraphsandcharts/home

SCAN ME

A STUDY ON LEARNERS' PERCEPTIVENESS OF TRANSITIONAL SPACES AS INFORMAL ACADEMIC LEARNING SPACE IN UNGKU OMAR POLYTECHNIC

V Ramu[1], Naeemah Yusof[2], and Awangku Isma Muzafar Pg Bagul[3]

[1,2,3]Politeknik Sultan Idris Shah, Malaysia
[1]ramuvelusamy@gmail.com

Abstract: Currently, the expansion of ICT changeover in teaching pedagogies highlights the critical need to change learning perspectives more towards collaborative and self-regulated learning. The impact of learning ambient turn more notable due to education revolution 4.0. Consequently, there are prerequisites establishing an ideal informal academic learning space that fosters learner-centered pedagogy. Furthermore, learner-centered learning necessitated that a notable amount of learner's learning time is anticipated to be spent outside-classroom. This fact elucidates the demand for exploring the transitional spaces as informal academic learning spaces, namely, semi-outdoor transitional spaces: courtyard, terrace, porch and external corridors. This study infuses case study research and quantitative data collection. Consequently, the research is based on a survey questionnaire that was participated by 300 diploma learners from diploma academic programmes in Ungku Omar Polytechnic. The paper provides insight for future evaluation of higher education informal learning spaces by analysing the relationships between the semi-outdoor informal academic learning space and the transitional space attributes. The finding reveals that interaction attributes contribute the highest prediction on learners' perception of semi-enclosed informal academic learning space followed by aesthetics, comfort, ICT facilities, semi-privacy, and privacy. Unfortunately, autonomy attributes do not predict learners' perceptions towards informal academic learning space. This study grants a profound insight centred upon learners' perspective on the spatial alignment of education 4.0 learning ecosystem can be configured to enhance collaborative and self-regulated learning activities by distinguishing the critical preference of informal academic learning space.

***Keywords**: Informal academic learning space, transitional spaces, learners-centered learning, semi-outdoor, informal learning*

1. Introduction

Learning occurs when a person communicates each other in an informal-milieu ambience. Higher education has lately turned into a profound prerequisite in societies via proficient scholars searching to expand net generation learning approaches, comprising informal learning approaches (Salih et al., 2021). Sourav & Afroz (2021) deliberated that tertiary education settings must address learners' various cultures. Social and academic desires. Multiple learning spaces must be incorporated on campus to attain learners' desired academic goals, including physical and virtual, formal and informal, outdoor, personal, and practice-based spaces (Salih et al., 2021; Sourav & Afroz, 2021). Ramu et al. (2020) stated that academic revolution is the interconnection of transformation and revolution, which has swayed most of the significant aspects in tertiary education worldwide. Consequently, an ultimate academic learning space has becomes a substantial topic and has been

crucially debated among scholars across the globe (Ibrahim et al., 2013). Tertiary education currently shifting from limitations seeing into the most compatible net-generation learning space amalgamated by formal, informal, and virtual learning environments (refer Figure 1)(Martin-gutierrez et al., 2017). Wilson & Cotgrave (2016) stated that diverse learning activities occur outside of class time than ever before. Hence, it is essential to explore the new emerging notion of informal learning space (ILS) to promote student engagement and informal learning experiences. Furthermore, ILS is one of the important component in online learning which need more research.

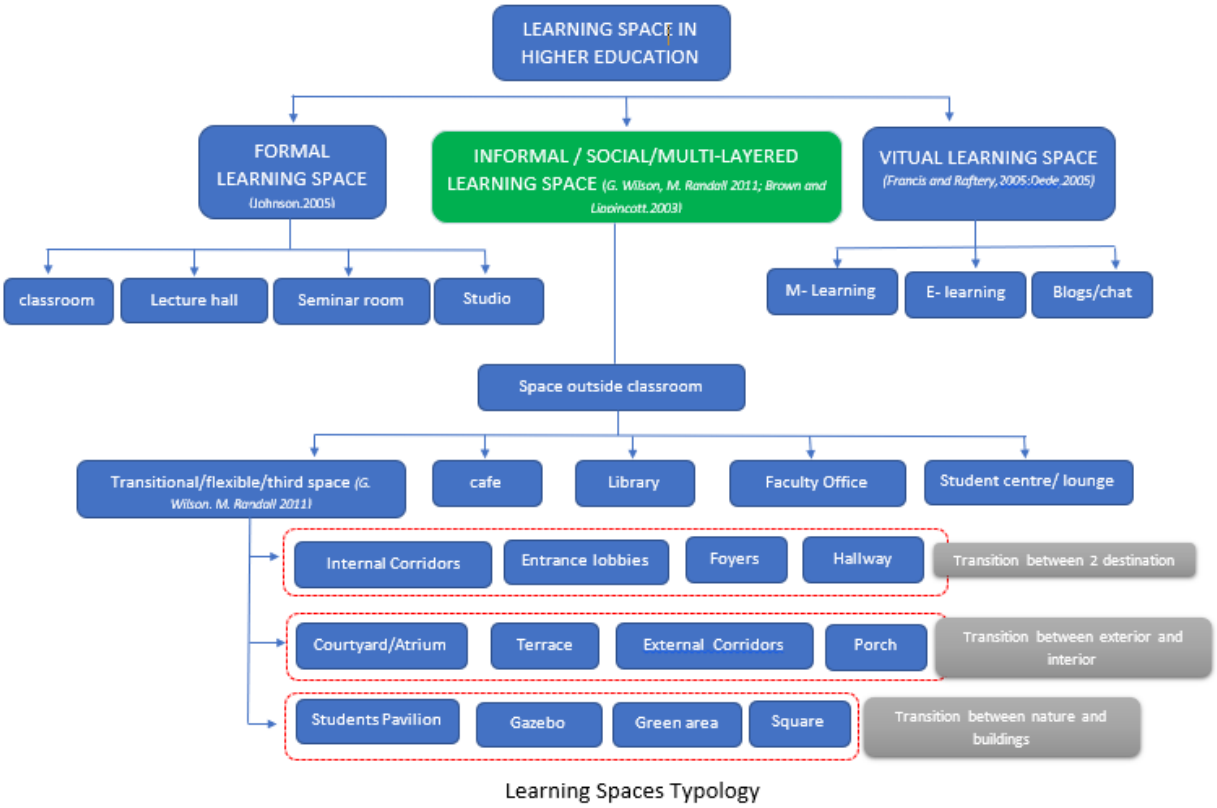


Figure 1: Typology of Academic Learning Space Source: Author

2. Literature Review

Informal learning is classified as a residual learning type that does not need a formally organised learning syllabus (Kumar & Bhatt, 2015). Meanwhile, Walton & Matthews (2018) defined informal learning as the results of incidental learning and taking place during leisure time. Harrop & Turpin (2013) state that new or redeveloped learning spaces with particular growth take place in what is termed “informal learning spaces”. Informal learning spaces are defined as non-discipline specific spaces utilised by both staff and learners for self-regulated learning undertakings. Niemi (2021) had acknowledged the prerequisite for research on learning spaces and the connectivity to learning. The essential to recognise why and how informal learning spaces can remain relevant is pressing, and achieving this can donate a response to the question: what makes successful higher education informal learning spaces? The informal learning spaces vary from the garden, square, cafeteria, internal and external corridor, gazebo, library, courtyard, and lobby. This study explores the learners' perceptions of the spaces mentioned above that are mainly used for informal learning activities. In this study, the

transitional spaces are segmented into three IALS, namely: i) semi-enclosed IALS: internal corridors, external lobbies, foyers and hallway; ii) semi-outdoor IALS: courtyard, atrium, terrace, external corridors and porch; and iii) outdoor IALS: gazebo, green space and square (Liang, 2013). As stated by Maheran et al. (2017) an outdoor learning space is considered an outdoor education facility that inspires educators, learners and teachers to gain better knowledge and offer substitutions to learn and understand the interconnectedness of the natural resources. In higher education institutions, this method is designated as an instrument that permits learners and lecturers to move their educational curriculum outdoors and experience the natural and physical-created elements in natural surroundings (Maheran et al., 2017). As revealed by Norhani Ibrahim et al. (2013) outdoor learning spaces provide opportunities to experience a "natural studies environment", as the physical environment positively impacts learners' learning possibilities and learning outcomes. Likewise, a good landscape campus situation is profound to enhance learners' physical and cognitive expansion and improve learning abilities (Matloob et al., 2014). Therefore, learners tend to spend their break time indoors rather than outdoors, as the outdoor spaces are not functionally designed to support their learning activities.

The previous planning of Malaysian University campuses is designed to accommodate formal teaching activities, such as lecture halls, air-conditioned classrooms, and laboratories, with the least consideration on integration with campus ground (Norhani Ibrahim et al., 2013). Research by Neda & Andrew (2021) also agreed that there is a lack of natural element settings from primary schools to the university level. Inconsiderate outdoor areas and pocket spaces for learners' learning led to distinct interaction between the quality of the outdoor environment and the quality of life on the campus. Currently, Malaysian campus planning is still based on conventional education practices, which disservice to the academic aspirations of 21st-century teaching institutions enriches learners' lives with exposure to the natural environment and emphasises the actual experience gained outside of the classroom. The arrangement of informal learning spaces in higher education institutions is vital to inspire learners to utilise the spaces vigorously and encounter learners changing study needs (Norhani Ibrahim et al., 2013). Hence, adequate informal learning spaces provide varying learning undertakings and promote technological accessibility to aid students' learning processes. According to Harun & Salamuddin (2013)connecting learners with outdoor informal learning space aid in developing a sense of belonging, developing social connections among peers, and enhancing personal skills performances, including positive self-concept. A study by Norhani Ibrahim et al., 2013 underline the advantages of the outdoor informal learning space in the learning ecosystem, which is (i) broadening educational performances, (ii) developing individual potential, (iii) motivating towards self-directed learning and also (iv) sharpening learners' intellectual ability and psychological development. Furthermore, studies by Maheran et al. (2018) acknowledges the component of outdoor spaces for active learning is according to the experiences and understanding of the connectivity between the architecture and landscape environment. Table 1 illustrates the three key features of an outdoor informal learning space for learners.

Table 1. Key features of design spaces. Source: (Maheran et al., 2017)

Key features of design spaces for active learning
1. Sense of belonging - The space that accommodates diverse students and the public - Maximize the use of daylighting to reduce energy use - Multipurpose spaces for varying learning activities - Comfortable spaces build a feeling of connection towards the environment
2. Flexibility and multi-use spaces - Movable furniture to incorporate multifunction activities - Highly flexible, self-contained and free distraction spaces - Increasing flexibility spaces for specific functions/multifunction activities - Design features that maximise user control
3. The uses of non-classroom spaces for learning - Design spaces to overcome function and services - Space availability merges social interaction - Usable transaction space between indoor and outdoor

The functional aspects of learner-centered learning are associated with active learning, deep learning, blended learning, learner's responsibility, and accountability and a sense of autonomy. As mentioned by Ibrahim et al. (2013) learner-centered learning indicates that students are required to spend a significant amount of their learning time outside-classroom to plan their learning activities. Based on the statement above, it is clearly stated that there is a need to evaluate the existing conditions of IALS. The emergence of ICT and new modern technology has influenced the learning space from traditional classrooms into various learning settings. In fact, there is an alteration in the principles of obtaining knowledge as well (Amit Kumar, 2015). Thus, learners enquire for a new and motivating learning space that is more flexible, efficient, smart, and integrated.

Mostly, IALS is widely spread around the campus and conveys several attributes, namely: (i) interaction, (ii) academic and non-academic discussion, and (iii) entertainment (Yun et al., 2016). Furthermore, IALS is also known as a social learning space or third space as well. Poutanen (2013) concluded that creating a third space on campuses results in a successful campus environment that encourages learners' satisfaction compared to home, informal off-campus, on-campus, and classroom study locations. IALS can be in the form of physical and virtual environments (Norhani Ibrahim et al., 2013). In short, IALS can be categorised as enclosed spaces, semi-enclosed spaces, semi-outdoor spaces and outdoor spaces. Kumar and Bhatt (2015) stated that IALS and libraries are among the predominant informal built environments. Chen et al. (2016) define IALS conferring to breakout space, outdoor learning space, group learning space and individual pod. Imperatively, the informal learning environment turned equally students-centred as the formal learning environment. Interestingly, vast academic activities have occurred in the informal learning space ever before (Nenonen, 2015). Concerning this, the query is the extent to which the existing higher learning institutions in Malaysia can accommodate and be compatible with this present-day educational trend. Presently, learners substitute transitional spaces as informal learning venues in higher learning institutions. Basically, learners will designate a space that fits learners affirmatively for informal learning activities.

3. Research Method

The focus population in this research is Ungku Omar Polytechnic students, which was established in 1969. In addressing this limitation, research needs to be executed in order to explore the learners informal academic learning space preferences attributes. This survey research involves (N=300) full-time diploma students who comprise technical and non-technical academic programmes. In detail, technical academic programme consist of diploma in Architecture, diploma in Electrical, diploma in Marine Engineering, and diploma in Mechanical Engineering. Meanwhile, non-technical academic programmes consists of diploma in commerce, diploma in Islamic Banking, diploma in accounting, and diploma in Marketing. The questionnaire that developed to acquire research data encompasses two parts- Part A and B. Part A involves questions associated with learners' demographics. Part B of the survey related to learner's preferences on social learning space entailing of seven constructs adapted from Beckers, van der Voordt, & Dewulf, (2016) The students were clustered based on semester and a consensus number of 100 students (4 semesters) were randomly selected from each polytechnic. In sum, a total of 300 students were selected. During the experts' review procedure, it has been suggested by the educational experts that the survey items have to be bilingual, which is in Bahasa Malaysia and English language.

The entire quantitative data collection is governed by the researcher personally. Indeed, this had the advantage that the researcher could collect the completed survey set in a short time and ensure an almost 100% response rate. In fact, by doing this, the researcher delivered the research topic and objective directly to the respondents and assisted them immediately if they had any queries regarding the topic (Sekaran & Bougie, 2016). In this case, the researcher read and explained the questionnaire clearly to confirm that the students clearly understood the survey set. The respondents took approximately 15 to 20 minutes to complete the survey. The pilot study was conducted on 30 students to ensure the instruments' appropriateness, wording, sequence, format and (Thien et al., 2014). A few problems arose during the second pilot test. Few items needed to be rephrased and deleted due to the ambiguities of the items. Respondents get confused with the 6- point Likert scale questionnaire and the estimated time to complete the survey exceeded 30 minutes. Finally, a set of dual-language version questionnaires with a 5-point Likert-type scale ranging from 1 (strongly disagree), 2 (disagree), 3 (not sure), 4 (agree), and 5 (strongly agree) was administered. The estimated time to complete the survey is between 20 to 25 minutes. Before the pilot test, the survey items were revised and submitted to three experts to evaluate the content validity. Construct validity was achieved after the pilot study by using factor analysis (Kaisen-Meyer-Olkin (KMO) value is 0.9, and Bartlett's test of sphericity is $p<0.01$). Meanwhile, the overall Cronbach's alpha for the instrument was 0.933. This study adopted the standard type of multiple regression to examine the relationship between the types of IALS and IALS preferences attributes.

4. Results of analysis

The results for tolerance and VIF are shown in Table 2 for the second model. Based on Table 2, for all independent variables, the tolerance value is more than 0.10, and the VIF value for all independent variables is less than 10. The results suggest that there is no multicollinearity problem in this regression model, and the model is appropriate. This also indicates that the independent variables are not measuring the same thing.

Table 2: Regression Coefficients (Model 1)

Model		Standardized Coefficients			Collinearity Statistics	
		Beta	t	Sig.	Tolerance	VIF
1	Constant	2.102	20.789	**.000**		
	Comfort (X_1)	.105	3.040	**.002**	.280	3.570
	ICT (X_2)	-.093	-5.070	**.000**	.412	2.429
	Layout (X_3)	.049	2.015	**.044**	.615	1.626
	Interaction (X_4)	.237	8.928	**.000**	.637	1.570
	Aesthetics (X_5)	.023	.897	.370	.485	2.060
	Autonomy (X_6)	-.004	-.243	.808	.622	1.607
	Privacy (X_7)	.036	2.245	**.025**	.654	1.529
	Semi-Privacy (X_8)	-.022	-1.226	.221	.447	2.237

Since all the preliminary analyses for multicollinearity, outliers, normality, linearity and homoscedasticity have met the assumptions. Therefore, the regression model is appropriate. As showed in Table 3, the model summary presents how much variance in the dependent variables (perceptions) is explained by the independent variables (IALS preferences attributes).

Table 3: Model 1 Summary

Model	R	R Square	Adjust R Square	Std. Error of the Estimate
1	.400[a]	.160	.153	.40032

a. Predictors: (Constant), Layout, Privacy, Autonomy, ICT, Interaction, Aesthetics, Semi Privacy, Comfort

Based on the Model 1 summary, as illustrated in Table 4, the coefficient determination for the developed model is .160 (R^2 =0.160). The coefficient determination (R^2) indicates the percentage of dependent variables that predicted the independent variables (Hair et al., 2014). Thus, the independent variables can explain 16.0% of learners' perceptions.

Table 4: Modal 1 ANOVA

Model		Sum of Square	df	Mean Square	F	Sig
1	Regression	32.574	8	4.072	25.408	.000[a]
	Residual	171.477	1070	.160		
	Total	204.051	1078			

a. Predictors: (Constant), Layout, Privacy, Autonomy, ICT, Interaction, Aesthetics, Semi-Privacy, Comfort

Next, the ANOVA table as shown in Table 4.0 was used to assess the statistical results. The model has a significant level of 0.00 ($p<0.001$). Therefore, this model is appropriate to predict learners' perception towards IALS. Table 2.0 can be referred in order to determine which independent variables predicted learners' perceptions towards IALS. Based on the Figure 2, five attributes predicted the learners' perception towards semi-outdoor IALS: comfort $p<0.05$ (ß=-0.105, t=3.04, Sig. 0.00); ICT facilities $p<0.05$ (ß=-0.093, t=-5.07, Sig. 0.00); Interaction $p<0.05$ (ß=0.237, t=8.92, Sig. 0.00); Layout $p<0.05$ (ß=0.049, t=2.01, Sig, 0.04); and Privacy $p<0.05$ (ß=0.36, t=2.24, Sig. 0.02). Meanwhile, semi-privacy, aesthetic and autonomy attributes are not statistically significant in making contribution to learners' perception towards semi-outdoor IALS: Semi-Privacy $p>0.05$ (ß=-0.022, t=-1.22, Sig. 0.22); aesthetic $p>0.05$ (ß=-0.023, t=-0.89, Sig. 0.37); and autonomy $p> 0.05$ (ß=-0.004, t=-0.24, Sig. 0.80).

$$Y = 2.102 + 0.105(X_1) – 0.093(X_2) + 0.049(X_3) + 0.237(X_4) + 0.036(X_7)$$

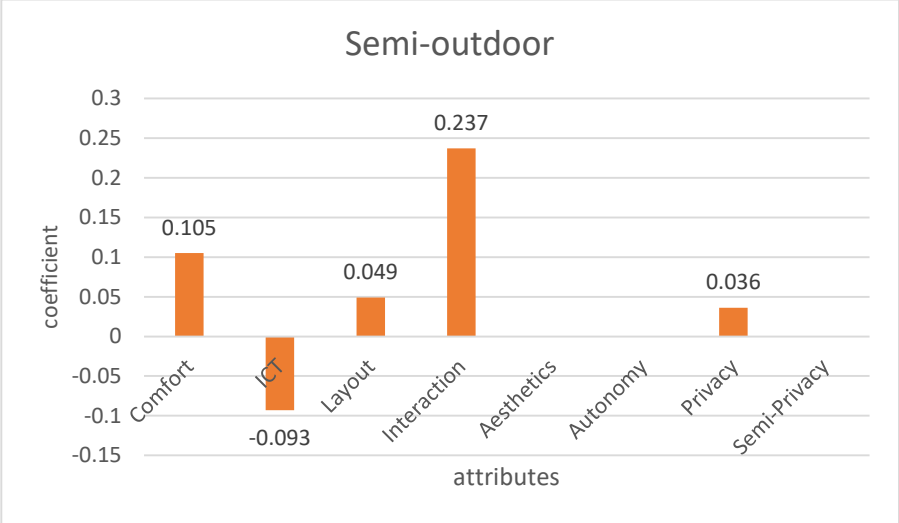


Figure 2: Coefficients of conditions for interpreting semi-outdoor IALS *(Adjusted R square = 0.160)*

5. Conclusions

The findings designated that interaction attributes make the most substantial contribution to learners' perception of semi-outdoor IALS (β=.237). Undoubtedly, learners use IALSs for collaborative learning, group work, meeting up-points, and gathering venues that enhance interaction and collaboration accomplishments. Consequently, the net-generation learning space has to be interactive, flexible and a technology-rich teaching setting. This study also indicated that privacy attribute contributes to predicting learners' perception on semi-outdoor IALS (β=.036). Privacy attribute refers to a space that can provide concentration and retreat. This study revealed that learners prefer semi-outdoor IALS as a space for privacy purposes. A space that provides more privacy and personal space and is not shared by both genders. This study's findings indicated that comfort attributes have a significant positive influence on learners' perception of semi-outdoor IALS (β= .105). Comfort attributes refer to a thermally comfortable space, shaded space, moveable tables and chairs, good ventilation with fresh air, and space utilised 24 hours for collaborative and individual learning.

Walton and Matthews (2018) mentioned that the rapid development of ICT is one of the many that influence how higher education is delivered. However, the finding indicated that ICT facilities negatively correlate with semi-outdoor IALS (β=-.93). ICT facilities are attributed to printing service availability, 3-pin electrical power point, quick online access and strong wireless network. The previous study by Nenonen et al. (2015) revealed that learners have their own culture, so-called Bring Your Own Device (BYOD). BYOD refers to the use of personal smartphones and devices on a university network (Walton and Matthews, 2018). The BYOD culture is possible with the latest mobile socio-digital technology, and advanced insight on blended learning make the BYOD culture possible. As stated by Nenonen et al. (2015) the use of own device (BYOD) encourages the use of personal digital tools. Moreover, this method makes a less ICT-heavy environment possible, whereas the concentration in promoting collaboration and learning is mediated by the best and most appropriate digital technology potential. Studies by Beckers (2016) indicated that layout significantly correlates with learning space preferences. For the same reason, the current study found a significant correlation between semi-outdoor IALS with the layout. Layout refers to a spatial arrangement that permits collaborative and individual learning with proper furniture setting, space that allows food and beverage, and as a small pit stop venue. Moreover, the semi-outdoor IALS's permit small gatherings among learners, collaborative learning activities, self-regulated learning, and more freedom. Sommerville and Collins (2008) discovered that learners favour open, unconfined learning spaces. According to Jamieson (2016) layout, comfort, and aesthetics are profound elements of the learning environment that should meet learners' individual requirements.

In this study semi-outdoor IALS does not show any correlation with aesthetic attributes. Aesthetics in the context of informal learning refers to an attractive space with a natural environment such as soft and hard landscapes and proper floor finishing and wall decoration that allows for learning to take place, yet in an informal way. In the future, more research needs to be done on outdoor IALS associated with natural futures. Many studies have emphasised the impact of physical aspects of IALS that influences learning and teaching, in particular, aesthetics (Yang et al., 2013). In fact, in a diary logbook study, he further elaborated that learners prescribed aesthetics attribute as one reason for choosing specific learning spaces (Beckers 2016). Nevertheless, autonomy is the only attribute that does not contribute to learners' perception. In this study context, autonomy refers to a homely environment, a small corner for a power nap, and a private space for learners-lecturer discussion. In contrast with Beckers (2016), the finding mentioned that autonomy significantly influences IALS preferences, nevertheless, to a certain extent. Autonomy is more associated with self-regulated learning, which occurs at home.

References

Beckers, R., van der Voordt, T., & Dewulf, G. (2016). Learning space preferences of higher education students. *Building and Environment*, *104*, 243–252. https://doi.org/10.1016/j.buildenv.2016.05.013

Harrop, D., & Turpin, B. (2013). A Study Exploring Learners' Informal Learning Space Behaviors, Attitudes, and Preferences. *New Review of Academic Librarianship*, *19*(1), 58–77. https://doi.org/10.1080/13614533.2013.740961

Harun, M. T., & Salamuddin, N. (2013). Applying elements of outdoor education in teacher education innovation. *Asian Social Science*, *9*(16 SPL), 15–21. https://doi.org/10.5539/ass.v9n16p15

Ibrahim, N., Fadzil, N. H., & Saruwono, M. (2013). Learning Outside Classrooms on Campus Ground: Malaysia. *Asian Journal of Environment-Behaviour Studies*, *4*(13), 97–110.

Kumar, A., & Bhatt, R. K. (2015). A Study of Using Informal Learning Spaces at Indian Institute of Technology, Delhi. *Library Philosophy and Practice (E-Journal).* http://digitalcommons.unl.edu/libphilprac

Liang, Y.-W. (Mark). (2013). Design Intervention Transitional Space. In *Thesis R&D Interventions, Probess & Prototypes*. https://doi.org/10.1002/j.2161-1874.2014.00026.x

Maheran, Y., Fadzidah, A., Nur Fadhilah, R., & Farha, S. (2017). A Review of Criteria for Outdoor Classroom in Selected Tertiary Educational Institutions in Kuala Lumpur. *IOP Conference Series: Materials Science and Engineering*, *291*(1). https://doi.org/10.1088/1757-899X/291/1/012014

Martin-gutierrez, J., More, C. E., Anorbe-Diaz, B., & Gonzalez-Marrero, A. (2017). Virtual Technologies Trends in Education. *Journal of Mathematics Science and Technology Education*, *13(2)*, 469–486. https://doi.org/10.12973/eurasia.2017.00626a

Matloob, F. A., Sulaiman, A. B., Ali, T. H., Shamsuddin, S., & Mardyya, W. N. (2014). Sustaining Campuses through Physical Character–The Role of Landscape. *Procedia - Social and Behavioral Sciences*, *140*(August), 282–290. https://doi.org/10.1016/j.sbspro.2014.04.421

Neda, A., & Andrew, B. (2021). The Significance of Outdoor Learning Environments in Innovative Learning Environments. *Proceedings of the 2020 APRU Sustainable Cities and Landscapes Hub PhD Symposium*, *December*, 13–28. https://doi.org/10.17608/k6.auckland.13578134.v2

Niemi, K. (2021). "The best guess for the future?" Teachers' adaptation to open and flexible learning environments in Finland. *Education Inquiry*, *12*(3), 282–300. https://doi.org/10.1080/20004508.2020.1816371

Poutanen, J. (2013). A designed third place as social learning space in higher education - case motivaattori. *7th International Technology, Education and Development Conference (inted2013)*.

Ramu, V., Taib, N., & Aziz, N. F. (2020). The Attributes of Future Social Learning Built Environments Towards 21st Century Education in Tertiary Education. *Journal of the Malaysian Institute of Planners*, *18*(3), 326–336.

Salih, S. A., Ismail, S., & Ismail, N. A. (2021). On-Campus Pocket Parks for Enhancing Outdoor Learning Experience in Malaysian Universities. *International Journal of Academic Research in Business and Social Sciences*, *11*(10). https://doi.org/10.6007/ijarbss/v11-i10/11453

Sekaran, U., & Bougie, R. (2016). *Research Method for Business* (7th Edition). West Sussex, United Kingdom.

Sourav, Z., & Afroz, D. (2021). Emergence of Informal Learning Space in University Campus: a Comparative Scenario in the Context of Khulna City. *FARU- 14th International Research Conference*, *December*, 248–256. https://doi.org/10.31705/faru.2021.24

Thien, L. M., Abd Razak, N., & Ramayah, T. (2014). Validating Teacher Commitment Scale Using a Malaysian Sample. *SAGE Open*, *4*(2). https://doi.org/10.1177/2158244014536744

Walton, G., & Matthews, G. (2018). *Exploring Informal Learning Space in the University*. Routledge.

Wilson, H. K., & Cotgrave, A. (2016). Factors that influence students' satisfaction with their physical learning environments. *Structural Survey*, *34*(3), 256–275. https://doi.org/10.1108/SS-01-2016-0004

Yun, Z., Anan, L., Huiping, S., Lan, L., & Fengkuang, C. (2016). The design reserach of future informal learning space constructing the "smart space" of Beijing Normal University Library. *19th International Conference on Knowledge-Based and Intelligent Information & Engineering Systems, May 2015*. https://doi.org/10.1007/978-3-319-19875-0

APPLYING UTAUT MODEL TOWARDS THE CAPABILITIES OF SME ENTREPRENEURS AND USING DIGITAL PLATFORMS

Nor Aziza Abdul Aziz[1], Supaat Hj Zakaria@Jawahir[2], Mardiyana Marzuki[3]

Politeknik Sultan Abdul Halim Mu'adzam Shah, Malaysia[1,3]
Politeknik Ungku Omar, Malaysia[2]
[1]aziza@polimas.edu.my
[2]supaat@puo.edu.my
[3]mardiyanadiana82@gmail.com

Abstract: Information and communication technology (ICT) is a very important component underlying innovation in business and entrepreneurship that allows activities to take place regardless of place, distance, age, and time in increasing competitiveness in businesses and economies around the world in line with Industry 4.0 can benefit firms in mapping out a global direction. To ensure business can be implemented well and effectively, the digital platform is used as a complement in supporting the business activities undertaken. The objective of this study is to examine the acceptance to use digital platforms by SME entrepreneurs in Kedah by using the Theory of Combined Technology Acceptance and Use (UTAUT) model. Data collection involved is the distribution of questionnaires. Only 355 questionnaires were considered suitable to be analysed further, with response rate of 47 percent. The study has successfully proven that social influence and facilitating concern are significantly correlated to acceptance to use digital platform. Therefore, regression testing shows that prediction facts on acceptance to use digital platform produce the value R^2 of 67.8 percent. Besides, the results of this study are expected to benefit SME entrepreneurs, SME support service agencies, policy makers and SME program development related to the importance of digital platforms in business activities today. Thus, the study also contributes to existing literatures which focuses on the development of entrepreneurship in Malaysia. Lastly, detailed implications of the theory and practices as well as suggestions for future study also discussed.

Keywords: *digital; platform; entrepreneurs; acceptance; Small and Medium Enterprise;*

1. Introduction

Developments and advances in Information and Communication Technology (ICT) have brought great changes in human life and provided great competition in the business world. Accordingly, the increasing use of digital in the Industrial Revolution 4.0 (Industry 4.0) has provided opportunities and attractions to the field of entrepreneurship to change the mind-set toward digital transformation (Grabowska & Saniuk, 2022; Ramdani et al., 2021) In addition, the field of entrepreneurship has the potential to contribute to the socio-economic development and productivity of the country. More equitable, distribution of income will improve the standard and quality of life of the people, in turn bringing social benefits to society. Sustainable economic growth can be promoted through an innovative and creative entrepreneurial nation, as well as through a new economy and a digital economy. The new wave of the digital economy

is able to create a variety of business and employment opportunities, thus increasing the income of the people as a whole, including in rural areas (Tomić et al., 2022). The transition of the existing economy to a digital economy is important because it accelerates the growth of the local and national economy, with the driving force being mostly entrepreneurs and small and medium enterprises. This situation indirectly gives an important focus to increase and stimulate the resilience of the country's digital economy, further helping the people and businesses affected by COVID-19(Ivanova et al., 2022).

The new wave digital economy is able to create various business opportunities and jobs, thus increasing the income of the people as a whole, including in rural areas. In general, many spaces and opportunities can be explored in the digital world. Business skills plus digital skills will give space for entrepreneurs to explore further. Besides, Khrais and Alghamdi (2022) stated that the development of digital technology brings changes to existing business models and new creations, the introduction of new products and services as well as increased efficiency of business processes which contributes to increased competitiveness. However, the use of digital platforms in firms was found to be still at a low level, especially among developing countries. In addition, most micro and small firms are still not able to maximize the use of digital platforms, and some are not even motivated to use digital platforms in their business dealings (Bahari et al., 2021). Besides, the acceptance and use of new technology have become an obstacle and a burden to SME entrepreneurs against the introduced technology initiatives. The rapid emergence of digital platform ecosystems in the context of SME entrepreneurial use is still underdeveloped. Therefore, a literature review was conducted to identify the evolution of usage measurement models and identify the factors influencing the actual use of digital platforms among SME entrepreneurs(Chatterjee et al., 2022; Saiful Afzan Baru et al., 2014). The problem faced in the efficiency of SMEs in managing the business they are working on lies in the inefficient use of alternative resources that the expected solution is the application of appropriate technology to support resource efficiency so that the continuity of the SME business can be well established (Mansur, 2022). Accordingly, this study provides further understanding of the issues related to the adoption of ICT by SME entrepreneurs. It investigates behaviour towards technology adoption by examining behavioural intentions towards different technologies in various cultural settings and identifying findings from other studies. Several theoretical models have been perused to seek factors that influence behavioural intentions to use technology to manage user behaviour (Azilahwati Adam et al., 2019; Mansur, 2022). Several technology acceptances models and theories have been applied to different phenomena and varying cultural settings in many studies, yielding varying results.

2. Literature Review

This study using UTAUT model to show about SMEs entrepreneurs adopt ICT and digital platform in their business. Unified Theory of Acceptance and Use of Technology (UTAUT) is an integrated model used to identify user acceptance of technology. Previous studies showed a big number of UTAUT model applied in various fields. However, limited studies had been done using UTAUT model in the field of entrepreneurships and business.

2.1 Adopt Technology Acceptance Measurement Model

The Unifying Theory of Technology Acceptance and Use (UTAUT) was developed by Venkatesh et al., (2003) which describes conceptual and empirical similarities across different models of technology acceptance. This theory states that user acceptance and use of technology is explained by several factors. The process of social influence explains that individuals face the opportunity to accept or reject a new system consisting of subjective norms, voluntariness and image. Cognitive processes emphasize the relevance of individual work and the value of output. UTAUT states that user acceptance and use of technology explained by four factors, that is performance expectations, effort expectations, social influence and convenience are direct determinants of behavioural intention and behaviour (Venkatesh et al., 2003). According to this study, Alawadhi and Morris (2008) conducted a study on 880 students in the use of e-government services using the UTAUT model. The results revealed that performance expectancy, effort expectancy and peer influence determine behavioural intention. Similarly, facilitating conditions and behavioural intentions determine usage of e-government services. Besides that Dong et al. (2009) found that performance expectancy and social influence determine users' behavioural intention toward Internet banking. Result of an empirical investigation conducted by Maldonado et al., (2009) on 240 secondary school students in Peru in the acceptance of an e-learning technology suggests that social influence significantly predicts behavioural intention.

2.2 Digital Entrepreneurship

The emergence of digital entrepreneurship is the result of changes in the business world due to transformations in the field of technology. The discussion of digital entrepreneurship aspects has gained attention among scholars due to the insistence and demand for the use of technology in business. Therefore, digital participation is access and use of the internet that includes various activities related to the achievement of an inclusive information society (Faradillah Iqmar Omar et al., 2022; Man & Yang, 2022). Besides, the rapid growth of online businesses (e-commerce) as well as businesses that use social media has resulted in the outbreak of economic globalization and has led to an increase in customers from within the country as well as customers across borders. In addition, entrepreneurs are offered a variety of new opportunities with the existence of the internet in order to start and grow a business. Through new and traditional forms of internet and information technology, entrepreneurs are able to reach customers, become more efficient and generate their business in a way that could not be done before. In particular, Li et al. (2018) stated that the digital platform approach as a complex transformation is able to influence the backbone of an organization. With that, the capabilities of digital platforms need to focus on technology networks that involve drastic changes towards the use of internal and external resources of the organization. Meanwhile, study by Beliaeva et al. (2020, revealed that significant differences in a set of supporting innovation ecosystem's actors and relationships throughout the development of the company from lower to higher levels of digitalization. The research brings implications to SMEs in high-tech industries that are aiming to transform their business toward greater digitalization, and stresses the importance of strategic partners in innovation ecosystem in this process.

2.3 Adoption Technology towards SMEs

In Malaysia, the government continues to introduce various programs and strategies towards empowering the use of ICT to improve the standard of living of the community, especially for B40 entrepreneurs (Faradillah Iqmar Omar et al., 2022). Previous studies show that firm managers play a significant role in the establishment, development and advancement of the organisation. Similarly, Azilahwati Adam et al. (2019), Khrais & M.Alghamdi (2022) and Mohamad Rohieszan Ramdan et al.(2020) stated that technology adoption is based on three stages of cognitive, affective and behaviour. They explained that at the cognitive stage, SMEs' managers become aware of the technology and through analysis of benefits and feasibility, they develop feelings towards it. If the feeling is favourable, the SME will move to behavioural stage in terms of actual usage of ICT, which is translated into organisational willingness. According to Mansur (2022), digital transformations offer a possibility or a challenge for SMEs, their strategic response is critical. SMEs participating in the digital economy require digital innovation to overcome significant obstacles and enhance their technological expertise (Faradillah Iqmar Omar et al., 2022). On the other hand, the term digital innovations refer to new products Chatterjee et al., (2022), processes, or business strategies enhanced by technology (Harifah Mohd Noor et al., 2022).

3. Methodology

This study adapted a quantitative approach which is a cross-sectional study. Data is collected once that requires respondents to answer a questionnaire distributed by researchers. Through the applied method, the real situation can be known as it is suitable for obtaining personal and social facts, beliefs, and attitudes (Kerlinger, 1973). This study aimed to examine factors influencing social media adoption for business purposes by utilizing the UTAUT model. IBM SPSS Statistics version 22 was utilized to validate the proposed hypotheses and verify our suggested conceptual framework. The data were collected from a self-completed online questionnaire converted to a Google Form format. A convenience sampling technique was adopted in this study via an online questionnaire as the research instrument.

3.1 Sampling and Data Collection

The population of this study is gained from TEKUN Nasional Kedah entrepreneurs. A total of 750 questionnaires were distributed, however, only 355 were returned and analysed as data to be used as the study sample. A simple sampling method was chosen because the researchers gave the questionnaires to the selected sample only. Respondents agreed and responded voluntarily.

3.2 Instrument

This study uses a quantitative approach and a questionnaire as the main instrument used to obtain data from the respondents. The instrument used in this study is a questionnaire that uses a 5-point Likert scale; 1= strongly disagree, 2= disagree, 3= neutral, 4-= agree, and 5= strongly agree. Items constructed based on Technology Acceptance and Use Theory (UTAUT) developed by (Venkatesh et al., 2003). The scale includes items of performance expectations, effort expectations, social influence, and facility conditions. All the questions used have been

tested and used in previous studies (Saiful Afzan Baru et al., 2014). All the data obtained after the collection process, the validity test using Cronbach's alpha method is done first. This aims to ensure that each item to be tested reflects the characteristics to be measured. Additionally, Hair et al. (2010); and Sekaran (2003) suggested a Cronbach value above 0.7 is considered good. Table 1 shows the summary of variable used in this study.

Table 1 Summary of Variables

Variable	Item
Performance Expectancy	5
Effort Expectancy	4
Social Influence	4
Facilitating Conditions	4
Use Behavior	4

3.3 Research Model

The purpose of this study is to determine the strength of predictors (EE, PE, SI, and FC) on the intention of SME entrepreneurs to accept and use ICT as a platform used for buying and selling and research. The factors that can influence the adoption of ICT by SMEs are illustrated in Figure 1. The study is based on the model of Venkatesh et al. (2003), which had four exogenous variables and one endogenous variable used in this study. Venkatesh et al. (2003) utilised UTAUT model to understand human acceptance behaviour across a range of disciplines. This study utilises this model, which integrates the following factors (Venkatesh et al., 2003, p. 447–453):

1- Performance Expectancy (PE): This refers to “the degree to which an individual believes that using the system will help him or her to attain gains in job performance”.
2- Social Influence (SI): This refers to “the degree to which an individual perceives that important others believe he or she should use the new system”.
3- Effort Expectancy (EE): This refers to “the degree of ease associated with the use of the system”.
4- Facilitating Conditions (FC): This refers to “the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of the system”

The conceptual framework is presented in Figure 1. Use behaviour was proposed to be a dependent variable. Meanwhile, Effort expectancy, performance expectancy, social influence and facilitating condition were independent variables. The selection of these variables was based on a review of extant digital platforms literature and discussions with executives in the entrepreneurship contexts. Each component of the model and key relationships are shown in Figure 1.

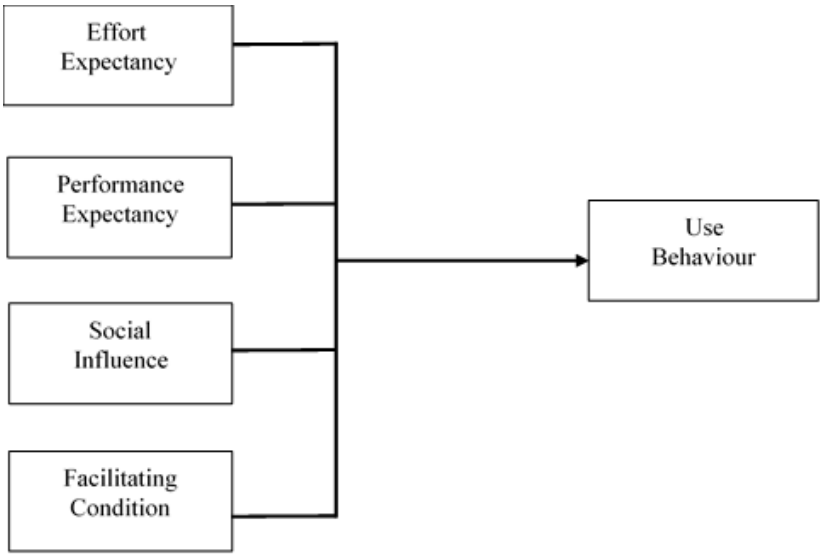


Figure 1: A Conceptual Model of Use Behaviour by UTAUT Model

4. Analysis and Result

4.1 Descriptive analysis of demographic information

Data were analysed using the IBM Statistical Package for Social Sciences (SPSS) version 22. This study used descriptive and multiple regression to analyse the data. The descriptive statistics of the sample are listed in Table 1. The sum of the respondent of this research was 355 entrepreneurs located in Kedah. The result showed the percentage for each respondent's details according to the category placed in the questionnaire. All the data that has been collected is analysed and the results are summarized in a table. Overall, the questions stated in the study on demographics are gender, age, status, education level, income, platform use, type of business sector, type of ownership. The demographic profiles are detailed in Table 2.

Table 2 Demographic Profile of respondent Characteristics

Demographic Profile		Frequency	Percentage (%)
Gender	Male	125	35.2
	Female	230	64.8
Age	18 -25 years	54	15.2
	26-33 years	80	22.5
	34-41 years	101	28.5
	42-49 years	86	24.2
	50 above	34	9.6
Status	Single	30	8.5
	Married	285	80.3
	Divorced	40	11.2
Level Education	SPM	67	18.9
	Diploma	158	44.5
	Degree	100	28.2
	Master	30	8.4

Monthly Income	Below RM5000	44	12.4
	RM5,000-RM10,000	152	42.8
	RM11,000-RM16,000	89	25
	RM17,000-RM22,000	45	12.7
	RM23,000 above	25	7.1
Platform Use	Facebook	126	35.4
	Instagram	78	21.9
	Twitter	39	10.9
	WhatsApp	105	29.5
	Others	7	1.97
Business Entities	Sole proprietorships	271	76.3
	Partnership	84	23.7
Business Category	Manufacturing	183	51.5
	Service	147	41.4
	Agriculture	25	7.1

4.2 Principal Component Analysis

The exploratory factor analysis was used to determine the construct validity of performance expectancy, effort expectancy, social influence, facilitating concern, behavioural intention, and use behaviour. The Principal Component Analysis (PCA) was used to assess the dimensionality of the measures, in this light, PCA performed to assess the factorial structure of the scales. The results of the factor analysis showed the Kaiser-Meyer-Olkin (KMO), which surpassed the .6 and the Bartlett Sphericity test (BTS) which was significant with $p<.05$. One possible reason is the number of samples which was less than 200 people, Hair, Black, Babin., and Anderson (2010) suggested that the adequacy of the sample measured is .45. All of the variables passed both the statistical tests of Kaiserr-Meyer-Olkin (KMO) which is a measure of sampling adequacy and Bartlett's Test of Sphericity for statistical significance. These tests confirmed the factorability of the data collected through the scales. The reliability score for performance expectancy, 0.865, effort expectancy 0.835, social influence, 0.853, facilitating concern0.821and use behaviour 0.853. The results of the factor analysis as shown in Table 3, indicated that each factor was validly represented by its relevant items.

Table 3 Validity and Reliability of Instruments

Item	Performance Expectancy	Effort Expectancy	Social Influence	Facilitating Concern	Use Behaviour
PE1	0.772				
PE2	0.845				
PE3	0.894				
PE4	0.799				
PE5	0.658				
EE1		0.791			
EE2		0.803			
EE3		0.755			

EE4		0.727			
SI1			0.839		
SI2			0.743		
SI3			0.682		
SI4			0.664		
FC1				0.741	
FC2				0.732	
FC3				0.782	
FC4				0.805	
BI1					
BI2					
BI3					
BI4					
UB1					0.903
UB2					0.895
UB3					0.865
UB4					0.769
Reliability	0.865	0.835	0.853	0.821	0.853

4.3 Finding

The findings from Table 4 revealed that the social influence and facilitating concern have positive significant relationship towards use behaviour. The result shows the value of R^2 presents as much as 67.8 percent of use behavior is explained by the variables. Next, the F-Statistic value proves that variables such as performance expectancy, effort expectancy, social influence and facilitating concern contribute to the use technology among SME entrepreneurs ($F= 85.63$; $p<0.01$). Then overall the results present findings related to performance expectancy variables ($\beta = .120$; $t=.749$; $p>0.05$), effort expectancy ($\beta = .054$; $t=.962$; $p>0.05$) social influence ($\beta = .130$; $t=2.462$; $p<0.05$) and facilitating concern ($\beta = .034$; $t=2.022$; $p<0.05$). The empirical findings showed that performance expectancy and effort expectancy cannot be proven to influence the use of technology of SME entrepreneurs. Meanwhile, social influence and facilitating concern can each be proven as independent variables that influence and have a significant relationship to the use of technology in the development of entrepreneurship.

Table 4 The Effects of UTAUT Model towards use technology as Platform

Variable	Beta	T Value	P value
Performance Expectancy	0.120	0.749	0.455
Effort Expectancy	0.054	0.962	0.338
Social Influence	0.130	2.462	0.015
Facilitating Concern	0.034	2.022	0.045
R^2 0.678			
F- Statistic 85.63			
Sig: 0.009			

5. Discussion and Conclusion

This study empirically proofs the critical factors that impact the usage of ICT by SME entrepreneurs. The results obtained in this study showed social influence and facilitating concern have a significant relationship with the use of digital platforms among entrepreneurs. In terms of social influence, results have a positive relationship and provide significant results. Result revealed that social influence plays an important role in the use of digital technology for entrepreneurs. Therefore, family, friends, peers and others who are around the entrepreneur will influence positively or negatively to adopt digital technology in the business being conducted. In additional, the facilitating concern has a positive relationship and gives a significant relationship to the use technology for entrepreneurs. This can be interpreted that fast internet access, good facilities and sufficient equipment give entrepreneurs the opportunity to continue their business. This situation is explained because the use of digitization technology helps increase revenue through fast Internet access as well as e-commerce providers that are used to help businesses become more efficient. Hence, the viewpoint of the UTAUT model was adopted. After the review of relevant literature, which gave strong theoretical and conceptual underpinning for an integrated conceptual framework to be designed, the four-predictor research model that was yielded explained 67% of the variance in ICT usage after running principal component analysis (PCA). Therefore, these are significant results for SMEs that are digitally stable since they require digital platforms, internet of things, and digital orientation to address the significant difficulties associated with the developing digital economy and to enhance their technical knowledge. Thus, technology acceptance research ages back two and half decades with varying results and different supporting technology acceptance models or theories. This study has shown that the choice of UTAUT model is completely appropriate for the subject under analysis. Given the seeming importance of these variables, it looks likely that they may become part of a basic model in the future. The key contribution of the paper in theoretical terms is the introduction of convertibility into the model. Based on the overall findings of this study, it clearly shows that SME entrepreneurs in Malaysia are aware of the importance of digital platforms in their respective businesses and have a high intention to use the platform. The use of digital platforms also shows that the software is capable of adding value to the business performance of SMEs in Malaysia if entrepreneurs can fully utilize the internet and the power of social media in marketing activities or buying and selling goods and services. In addition, regular exposure to current technological developments, especially those related to increasing sales and profits of SMEs, needs to be publicized more effectively. This is because the decision of an SME entrepreneur to use a digital platform is also influenced by other stakeholders who are around the entrepreneur. Therefore, for parties interested in SMEs in Malaysia to establish a support group either for knowledge or skill improvement.

References

Alawadhi, S., & Morris, A. (2008). The use of the UTAUT model in the adoption of e-government services in Kuwait. *Proceedings of the Annual Hawaii International Conference on System Sciences*, *January*. https://doi.org/10.1109/HICSS.2008.452

Azilahwati Adam, Jessnor Elmy Mat Jizat, & Syaharizad Abdul Razak. (2019). Jangkaan usaha terhadap niat usahawan PKS untuk menggunakan s-dagang. *International Journal of Accounting,Finance and Usiness*, *4*(18), 1–8.

Bahari, A., Norzaila Mohamad Nor, & Wan Mahani Adullah. (2021). Aplikasi Model UTAUT untuk platform digital usahawan PKS milikan wanita. *International Journal of Muamalat*, *5*(1), 133–143.

Beliaeva, T., Ferasso, M., Kraus, S., & Damke, E. J. (2020). Dynamics of digital entrepreneurship and the innovation ecosystem: A multilevel perspective. *International Journal of Entrepreneurial Behaviour and Research*, *26*(2), 266–284. https://doi.org/10.1108/IJEBR-06-2019-0397

Chatterjee, S., Chaudhuri, R., Vrontis, D., & Thrassou, A. (2022). SME entrepreneurship and digitalization – the potentialities and moderating role of demographic factors. *Technological Forecasting & Social Change*, *179*(April), 121648. https://doi.org/10.1016/j.techfore.2022.121648

Cheng, D., Liu, G., & Qian, C. (2008). On determinants of user acceptance of Internet banking: A theoretical framework and empirical study. *Advanced Management of Information for Globalized Enterprises*, 61–65. https://doi.org/10.1109/AMIGE.2008.ECP.20

Faradillah Iqmar Omar, Ummi Munirah Syuhada Mohamad Zan, Mawar Murni Yunus, & Nor Azlili Hassan. (2022). Penggunaan ICT sebagai medium komunikasi perniagaan usahawan B40 : Satu Kajian Rintis. *Jurnal Penyelidikan Dan Inovasi*, *9*(1), 152–166.

Grabowska, S., & Saniuk, S. (2022). Business models in the Industry 4.0 environment — Results of web of science Bibliometric analysis. *Journal of Open Innovation: TEchnology,Market, and Complexity*, *8*(19).

Hair, J. F., Black, W. C., Babin., B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (6th ed.). New York, NY: Pearson/Prentice Hall.

Harifah Mohd Noor, Uong Imang, Jurry Foo, Norhuda Salleh, Marja Azlima Omar, & Rima Abdul Rahman. (2022). Manfaat pemasaran produk secara atas talian dalam kalangan pengusaha makanan kecil semasa Pandemik Covid 19 di KOta KInabalu Sabah. *International Journal of Social Sciences Research*, *4*(2), 251–263.

Ivanova, N., Popelo, O., & Avhustyn, R. (2022). Marketing strategy of the small business adaptation to quarantine limitations in the Sphere of Trade Entrepreneurship. *International Journal of Computer Sciences and Network SEcurity*, *22*(1).

Kerlinger, F. N. (1973). *Foundations of behavioural research*. Holt, Rinehart & Winston.

Khrais, L. T., & Alghamdi, A. (2022). Factors that affect digital innovation sustainability among SMEs in the Middle East Region. *Sustainaility*, *14*, 1–13.

Li, L., Su, F., Zhang, W., & Mao, J. Y. (2018). Digital transformation by SME entrepreneurs:

A capability perspective. *Information Systems Journal*, *28*(6), 1129–1157. https://doi.org/10.1111/isj.12153

Maldonado, U. P. T., Khan, G. F., Moon, J., & Rho, J. J. (2009). E-learning motivation, students' acceptance/use of educational portal in developing countries: A case study of Peru. *ICCIT 2009 - 4th International Conference on Computer Sciences and Convergence Information Technology*, *0*, 1431–1441. https://doi.org/10.1109/ICCIT.2009.77

Man, M. M. K., & Yang, L. R. (2022). The future prospect of digital marketing in the Malaysian context. *Internationa; Business Research*, *15*(1), 72–79. https://doi.org/10.5539/ibr.v15n1p72

Mansur, D. M. (2022). Digital-based SME innovation development strategy : Marketing, entrepreneurship insight and knowledge Management. In *Golden Ratio* (Vol. 2, pp. 65–84).

Mohamad Rohieszan Ramdan, Nor Liza Abdullah, Rosmah Mat Isa, & Mohd Hizam Hanafiah. (2020). Meneroka faktor-faktor yang mempengaruhi penggunaan platform digital oleh Perusahaan Mikro dan Kecil. *Jurnal Pengurusan*, 1–17. https://doi.org/10.17576/pengurusan-2020-59-05

Ramdani, B., Raja, S., & Kayumova, M. (2021). Digital innovation in SMEs : a systematic review , synthesis and research agenda. *Information Technology for Development*, *0*(0), 1–25. https://doi.org/10.1080/02681102.2021.1893148

Saiful Afzan Baru, Lazim Abdullah, Azwadi Ali, & Hafiz Yusoff. (2014). Pemodelan penerimaan pelajar terhadap persekitaran pembelajaran Maya (Vle). *Journal of Business and Social Development*, *2*(2), 36–47.

Sekaran, U. (2003). *Research method for business: A skill building approach* (4th ed.). John Wiley & Sons, Inc.

Tomić, N., Kalinić, Z., & Todorović, V. (2022). Using the UTAUT model to analyze user intention to accept electronic payment systems in Serbia. *Portuguese Economic Journal*, *0123456789*. https://doi.org/10.1007/s10258-022-00210-5

Venkatesh, V., Morris, M. G., B.Davis, G., & D.Davis, F. (2003). User acceptance of information technology: Towards a unified view. *MIS Quarterly*, *27*(3), 425–478.

ANTI – SMELL AND COMPOST POWDER (ASC)

Babby Freskayani@ Izyani Kaliwon[1], Nor Aziah Fatma Abdul Ayah @ Abdul Aziz[2], Jevoey Stand Lee Melin[3], Donathan Donic[4], Nur Khaleda Lalim[5] and Dimar Abdul[6]

[1,3,4,5,6]Polytechnic Kota Kinabalu, Malaysia
[2]Polytechnic Sultan Mizan Zainal Abidin, Malaysia
[1]izyani@polikk.edu.my
[2]aziahfatma@gmail.com
[3]Jevstlee98@gmail.com
[4]donathandonic@gmail.com
[5]nurkhaledal@gmail.com
[6]dimarabdul98@gmail.com

Abstract: Nowadays, the reuse of waste to make fertilizer has been less applied. The objectives of this study were to produce Anti-Smell and Compost powder (ASC) as well as compare the strength of the smell and compare the decomposition time. The main purpose of ASC powder was to eradicate the smells produced by waste and to help decrease the decomposition time for compost fertilizer. The composting process divided into three condition; waste mixed with ASC, waste mixed with Bokashi, and waste without any mixture. The researcher distributed a questionnaire to test the smell from 350 respondents in Kota Kinabalu Polytechnic (PKK) area comprising of the PKK residents. The results of the study showed that ASC powder successfully achieved the objective, which the ASC mixed waste produced less smell compared to the other two samples. 69% chose with waste ASC powder will reduce the smells. While, the composting time for waste with ASC powders is more rapidly decomposing compared to existing products where in the second week ASC interventions began to show signs of decomposition. In the other hand, the temperature of the ASC approximately to ground temperatures which is at 32°C and for the waste with ASC powder textures is medium and a bit hard after 3 weeks. In conclusion, the results show that ASC powder can reduce the smell rate and accelerate the decomposition process and make the waste as compost fertilizer.

Keywords*: Anti-Smell and Compost (ASC); Bokashi; Decomposition; Powder Texture*

1. Introduction

Solid waste management and zero open disposal by 2020 in an integrated manner is not just a goal but an effort towards managing solid waste resulting from human activities and taking care of the polluted environment. Care of the environment is very important because it is an important asset to the well-being of human life. Therefore, the implementation of integrated solid waste management is very important considering that the waste disposal statistics increase every year where the Local Authority states that each individual dispose of 1 kilogram of solid waste every day. If all the waste produced by the entire population is collected during 1 month

only, it will fill about four Kuala Lumpur Towers. The amount of waste generated is expected to continue to increase along with the increase in the number of people and the uncontrolled disposal of waste by all of us (Augustine, 2022).

Solid waste is the most easily available waste material and most produced. This happens because of an increase in resources or the source of the solid waste. Among the causes that cause the increase in solid waste are population increases, socioeconomic and lifestyle of Malaysians, untimely garbage/waste collection, unsystematic waste management and unconcerned community attitude.

Nowadays, the reusing waste materials is disappearing in the current of modernization because some communities still use the conventional method which is open dumping method or known as open dumping where all the solid waste that has been collected from houses and buildings will be released or thrown away in an open garbage disposal area. As a result, the problem of solid waste management in our country is getting more complicated. Local Authorities (PBT) are facing problems in finding suitable areas to dispose of the increasing amount of waste. In addition, awareness of water quality that decreased at a rate of 0.9 percent in 1994 is an example of the effects of water pollution as a result of inconsistent solid waste management. To overcome this problem, the researcher made a study on how to overcome this kind of problem. ASC powder is a powder made from organic materials to get rid of foul odours by indirectly composting materials such as waste. In this study, this powder has properties to reduce the smell of garbage and produce organic matter. This is because the problem of garbage nowadays is increasing and it is complicated to dispose of it. Therefore, this study was conducted to see the effectiveness of this powder in carrying out its function as a garbage odour remover and composting waste materials into organic compost fertilizer.

The main objective of this study was to produce Anti-Smell and Compost (ASC) powder. In this study, the effectiveness of ASC powder is more focused on the composting and reduction of waste odor. From the assessment made, overall ASC powder is effective in reducing odors and compostable waste. ASC powder also uses low cost in the process of making the powder. This ASC powder is able to decompose waste into organic compost. Overall, with Anti-Smell and Compost Powder (ASC) it can reduce waste disposal and cleaning work can be reduced. In addition, it will also help streamline solid waste management from having too much waste.

In this study, the scope of the study are as follows:

- Using ASC powder and additional organic matter.
- Using materials such as waste.
- The study only examined the effectiveness of ASC powder on waste.
- Make a composting time test (time will be recorded to know the time used during the composting process).
- Data collection such as moisture content, Phosphorus, Magnesium, Calcium, texture and temperature.

The significances of the research are as follow:

- Identify ASC powder that can work to reduce the bad smell of garbage.
- Compost waste material to become organic fertilizer.
- Making it easier for local communities to dispose of their own garbage by composting waste materials.
- Produce a substance that removes the smell of garbage using ASC powder.
- Identifying whether ASC powder can be used as an ingredient composting.

2. Literature Review

Reuse of waste materials is one of the methods profitable savings due to its cost-effective materials, easier and safer to use. Today's technology requires a lot of materials new that can replace existing natural materials now.

2.1 Waste Disposal

Waste disposal, the collection, processing, and recycling or deposition of the waste materials of human society. Waste is classified by source and composition. Broadly speaking, waste materials are either liquid or solid in form, and their components may be either hazardous or inert in their effects on health and the environment. The term waste is typically applied to solid waste, sewage (wastewater), hazardous waste, and electronic waste (Brittanica, 2019).

2.2 Food Waste Disposal

Food Waste represents a large percentage of the waste steam for many industries such as restaurants, hospitals, nursing homes, food manufacturing and processing facilities, supermarkets, schools, prisons, hotels, Corporate Offices, Catering Halls, food courts and many other locations. There is growing pressure for removing the organic waste from landfills. For establishments that serve food there is an average of 1 pound of waste per meal served when both pre-sale and post-sale waste is considered. Below is a brief overview of some of the ways to address food waste. Of course, the solution for each industry and even each facility within the same industry will vary depending upon many factors (Kennedy, M. 2013).

2.3 Activated Charcoal

Charcoal is an odourless, tasteless, fine black powder, or black porous solid consisting of carbon, and any remaining ash, obtained by removing water and other volatile constituents from animal and vegetation substances. Charcoal has been used since the earliest times for a range of purposes, including art, medicine, and fuel (M. Abdollahi & A. Hosseini, 2014). Activated charcoal is a popular home remedy for several other ailments and it’s sometimes used for other household and cosmetic purposes. However, most of these purported benefits aren’t backed by science. Water filtration is one of the benefits used from activated Charcoal. Activated charcoal may help filter water by removing contaminants, suspended solids, and microorganisms like bacteria — all without affecting the water’s pH or taste (Petre, A., 2021).

2.4 Rice Husk

Rice husk is an organic waste and is produced in large quantities. It is a major by-product of the rice milling and agro-based biomass industry. Rice husk is a cellulose-based fiber and contains approximately 20% silica in amorphous form. In addition, it consists of 60–65% volatile matter, 10–15% fixed carbon, and 17–23% ash. It contains approximately 40% cellulose, 30% lignin group, and 20% silica. Rice husk can absorb water ranging from 5% to 16% of unit weights, and the unit weight of rice husk is 83–125 kg/m3 (Phonphuak, N. & Chindaprasirt, P., 2015).

2.5 Rice Bran

Rice bran is a rice processing by-product which accounts for tons of food waste per year, composed by numerous nutrients and bioactive substances that are able to reduce the risk of noncommunicable chronic diseases. Therefore, rice bran can be considered a good candidate as a sustainable functional ingredient (Ferreira, S. C & Fernandez, A. M., 2019).

Rice bran is used as a good source of proteins, oils, crude fibers, carbohydrates, energy, phenolic compounds, γ-oryzanols, and fatty acids (saturated fatty acids 16.59%– 21%; monounsaturated fatty acids, 39.82%–49.95%; and polyunsaturated fatty acids, 33.23%–38.57%). Fermented rice bran (FRB) can be prepared by dual fermentation using fungi and lactic acid bacteria for improvement of its functional properties (Md. Alauddin & Md. Zakir, 2019).

2.6 Bokashi

BOKASHI is a word in Japanese that has the same meaning as organic matter that is fermented by containing a group of active bacteria bokashi called Effective Microorganism and can be known as EM. According to EM expert Dr. Imamura, bokashi is one of the good materials to fertilize the soil. Under normal conditions, bacteria these exist together where each has its own function and depend on each other. EM has contained types of Microbes into 4 categories; 1. Photosynthetic Bacteria; 2. Lactic Acid Bacteria; 3. Actinomycetes; 4. Yeast (Yamada, K., 2000).

2.7 Distilled Water

Distilled water is steam from boiling water that is been cooled and returned to its liquid state. Some people claim distilled water is the purest water you can drink. All water, no matter if it comes from a natural spring, artesian well, or regular tap, may have trace but safe amounts of minerals, bacteria, pesticides, and other contaminants. Distilling rids water of all those impurities. It also removes more than 99.9% of the minerals dissolved in water. Distilled water is a type of purified water. Salts, minerals, and other organic materials are removed by collecting the steam from boiling water. Distilled water is safe to drink. But probably find it flat or bland. That is because it was stripped of important minerals like calcium, sodium, and magnesium that give tap water its familiar flavour. What was left is just hydrogen and oxygen and nothing else (Blades, N., 2020).

2.8 Lactic Acid

Lactic acid is an organic compound with the formula $CH_3CH(OH)COOH$. It is white and soluble in water in its solid form while liquid, visible colourless. It is produced naturally or synthetically. Position its hydroxyl group adjacent to the carboxyl group makes. This

acid is classified as an alpha-hydroxy acid (AHA). Its conjugate base form, for example lactate, plays a role in several biochemical processes.

Lactic acid fermentation, commonly referred to as lacto-fermentation, is one of the most common and easiest methods of home preservation. Lactic acid fermentation was a method used to preserve dairy products, vegetables, and meat for extended periods of time before the advent of refrigeration and modern canning practices and today is also utilized in industrial fermentation. Lactic acid bacteria such as Lactobacillus spp., lactococci, Streptococcus thermophilus, and leuconostocs are examples of lactic acid bacteria that have the ability to convert sugars into lactic acid. Lactic acid inhibits the growth of subsequent and potentially harmful bacteria of other species. It also creates favourable conditions for yeast activity, a property that is utilized in the production of wine and beer (Malo, P. M. & Urquhat, U. A., 2016).

Lactic fermentation is a bacterial process that takes place during the production of numerous food products. It provides the final products with characteristic aromas and textures and plays a crucial role in food safety and hygiene. Among the bacteria responsible for lactic fermentation are lactic acid bacteria, which display high morphological and physiological diversity. The term lactic acid bacteria emerged at the beginning of the twentieth century to describe a heterogeneous group of bacteria that are currently defined as spherical (cocci) or rod-shaped (bacilli), gram-positive, catalase-negative, immobile, nonsporulating, anaerobic, aerotolerant, and producers of lactic acid (the main metabolite generated during the fermentation of sugars by these bacteria) (Munoz, R. & Rivas B. D.L., 2011).

2.9 Coffee Grounds

Coffee is a popular beverage consumed all over the world. Coffee grounds have many practical uses around the home and garden and can even help spruce up the beauty routine. Soil does not contain the essential nutrients needed for optimal plant growth. Also, as plants grow, the plant absorb nutrients from the soil, ultimately leaving it depleted. Thus, most gardens need to be fertilized to ensure that plants have the nourishment they need to survive. Coffee grounds contain several key minerals for plant growth like nitrogen, calcium, potassium, iron, phosphorus, magnesium and chromium (McDonell, K., 2018).

There are so many benefits of coffee grounds as the source of the fertilizer of the garden, composting, repel insect and pests, remove fleas from the pet, neutralize odours, natural cleaning scrub and so on. Coffee grounds have become one of the main additives in the process the production of ASC powder where the chemical properties of this material have been used by researchers in this research. This is because coffee grounds that are able to absorb odours are able to reduce to a minimum the smell that results from waste that will compost researcher. Coffee grounds also have nutrients for which plants will help the growth of garden plants or ornamental plants at home.

3. Materials and Methods

ASC powder is a powder that is able to compose waste and at the same time remove unpleasant odours from waste materials such as domestic waste. ASC powder is made from organic ingredients and the others additives such as coffee and charcoal.

3.1 Introduction

The effectiveness of this study is to ensure whether the ASC powder using organic materials is able to remove odours and compost garbage. In addition, ASC powder is affected by several factors such as waste capacity, physical characteristics of waste, and physical characteristics of powder ASC itself. In order to ensure that this ASC powder can work well, it is necessary monitored and managed systematically from time to time. With this, use ASC powder can last longer while saving costs and even fostering students about awareness of recycling in everyday life and culture aspects of entrepreneurship through recyclable materials.

3.2 The Materials

There are the materials that can be used and composted in this study are like domestic waste (fruits, vegetables, meat, fish, cheese, eggs, bread, tea bags, wilted flowers, tissues and other foods) and industrial waste (oil). The materials that used of ASC powder production are rice bran, paddy husk, charcoal, coffee ground, white rice, brown sugar and distilled water.

ASC powder is dry ingredients that have carbon elements, for example rice/wheat bran, rice/wheat husks that are ground and then mixed with EM (microbes), molasses, water and some other ingredients and fermented for a certain period before drying. When it is ready, these dry ingredients are finally full of microbes.
In addition to being used in compost, this ASC Powder can also be used to treat/remove the smell of animal excrement, put in regular compost, can improve soil conditions (provide additional microbes in the soil), can also be used as additional feed for chickens/ducks.

3.3 The Method

This method is made on ASC powder that will be made until deep research implementation process. The methods of producing ASC Compost of cycle are as follow:

- Collection of ingredients to make ASC powder.
- Production of Acid Lactic Process.
- Production of ASC powder within 1 week.
- Collection of waste such as food waste.
- Mixing ASC Powder and Food Scraps.
- The sealing process is done within 3-5 week.
- Production of organic fertilizers.

Figure 1. Acid Lactic Production Process.

Figure 2. Production of ASC Process.

Figure 3. Mixing ASC Powder and Food Scraps

4. Results

The results of the analysis in Figure 4 show waste with ASC powder recorded a high which is 69% of respondents felt that ASC powder with waste produced less odor followed by no mixing material which recorded 33% of respondents felt that no waste was mixed with the odor but not as strong as such as waste with Bokashi powder. The waste with Bokashi powder recorded a percentage of only 3%. This is due to the waste with Bokashi powder that produces a very strong odor compared to the absorbed waste material and waste with ASC powder.

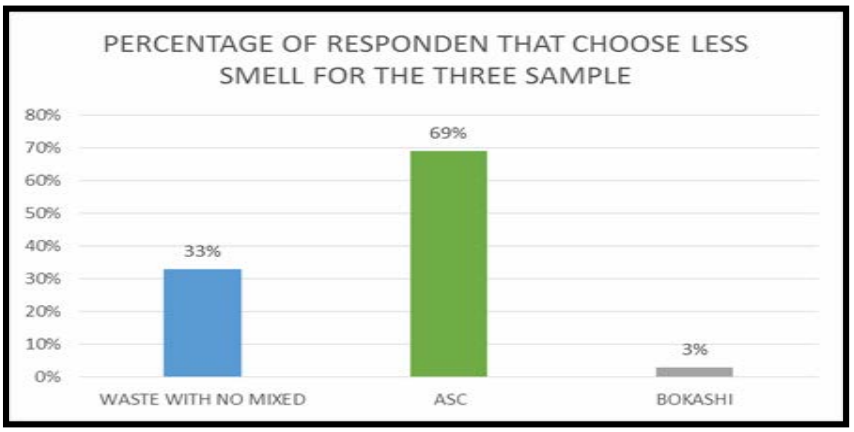


Figure 4. Percentage of respondent that choose less smell for three sample.

Table 1 show the temperature test and pH value of the three of waste without mixture, waste mixed with Bokashi and waste mixed with ASC. Temperature analysis was taken 3 times to compare the soil temperature with the three waste materials. Meanwhile, the pH value is taken to see the acidity and alkalinity of the three waste materials. The pH value test shows that the level of alkalinity of both waste materials, that is no mixture with Bokashi mixture, shows a higher level of alkalinity compared to the waste material with ASC which shows a neutral value (7). The pH value of waste with ASC powder is 7 which is neutral. While, the pH value of waste mixed with Bokashi powder and waste with no mix is 8 which is alkaline.

After 5 weeks, the temperature of waste with ASC powder is 32°C which is approximately soil temperatures. While, the temperature of waste mixed with Bokashi powder is 31.6°C and the temperature of waste with no mix is 31°C.

Table 1. Temperature Test and pH Value

About	Week	Waste Without Mixture	Waste Mixed with Bokashi	Waste Mixed With ASC
Temperature (°C)	Week 2	30.4	30.9	31.6
	Week 3	30.5	31.0	31.8
	Week 5	31.0	31.6	32
pH Value	Week 5	8.0	8.0	7.0

As a result of the tests that have been done by MARDI, the waste mixed with ASC has lost moisture which is 63.3g/100g or more than 60% loss humidity. According to studies that have been conducted on shrinkage tests moisture, waste material mixed with compost fertilizer takes

4-5 months to achieve 60% moisture reduction. However, waste materials mixed with ASC more than 60% moisture reduction in just 5 weeks.

Table 2 show the texture of waste in three weeks while the Figure 5 show the changes of the texture in three weeks. The texture was tested through two physical forms, namely the colour and toughness of the three samples waste. The changing of the waste with no mixture are decomposition begins and the colour of the waste become brownish orange within three weeks. The texture was rough material. For the waste mixed with Bokashi, decomposition is taking place and the colour of the waste becomes blackish brown and coarse texture. The waste mixed with ASC show the fast decomposition and the waste materials begin to become compost and the colour was dark brown. The texture is medium texture but a bit rough.

Table 2. The Texture of Waste in 3 weeks

About	Waste Without Mixture	Waste Mixed with Bokashi	Waste Mixed With ASC
Colour	Brownish Orange	Blackish Brown	Dark Brown
Moisture	Very Clay	Clay	Less Clay
Types of Texture	Coarsely and Clay Textured	Coarsely Textured	Medium Texture but a bit Rough

Figure 5. The Texture of Waste in 3 Weeks.

5. Discussion

For ASC powder, odour effectiveness tests were conducted throughout this process. This product has been tested by sprinkling it on waste material and leaving it for a long time a few days before doing the questionnaire to collect data. The test was done according to the responses from the respondents who answered the questionnaire which has been distributed. Next, the researcher has also done this study and the result was that almost all respondents said that this ASC powder is lacking gives off an unpleasant odour compared to the ready-made product is on the market.

In addition, composting tests are carried out by making observations every day and data are taken on the temperature and texture changes of the waste material with ASC powder. Organic fertilizer will be produced when it returns to the soil temperature of 32°C. By that, the temperature of waste material with ASC powder is close to 32°C and can be organic fertilizers.

As for the texture, organic fertilizers have a fragile texture and rattled. Based on the research carried out, the texture of the waste material mixed with ASC powder is almost similar to the texture of organic fertilizer normal. In terms of colour, the waste material has turned brown and in terms of toughness, the waste material is clay due to the presence of water from the waste material which is taken which makes the waste material still slightly moist. For the moisture test, waste material mixed with ASC has reached the percentage a decrease in humidity of 63.3% which is the study that has been done previously a waste material that has been mixed with compost it takes 4-5 months to reach a 60% shrinkage percentage. But ASC mixed waste only takes 5 weeks, material the waste has reached more than 60% reduction humidity.

6. Conclusion

The main objective of this study is to produce Anti-Smell powder and Compost (ASC). The collection of data and information about this powder is through a questionnaire distributed to the people of Kota Kinabalu Polytechnic. An odour effectiveness study was conducted to prove that ASC powder is effective and helps in reducing the smell of garbage. In this study, the effectiveness of ASC powder is more focused on composting and waste odour reduction. From the assessment made, overall ASC powder is effective in reducing odours and substances waste can be composted. ASC powder also uses low cost in the powder manufacturing process. In addition, the required workforce in the manufacturing process of this product is a total of four people. This ASC powder capable of decomposing waste materials into organic fertilizers.

The collection of data and information on this through a questionnaire distributed to the residents of Kota Kinabalu Polytechnic. In this study, the effectiveness of ASC powders is more focused on composting and reducing waste. From the assessment, overall ASC powder is effective in reducing smell and waste can be compost. Overall, with the presence of Anti- Smell and Compost powder (ASC) it can reduce waste disposal and reduced cleaning works.

Currently the Anti-Smell and Compost (ASC) Powder in process to get the certification scheme drawn up by Malaysian Department of Agriculture, formerly known as Good Practice Scheme of Malaysia (SALM) to recognize farms or factory that practice Malaysian Good Agricultural Practice (myGAP). For future development, we plan to do more researches and studies on the composition of ASC Fertilizer in terms of mineral content to refine the advantages and benefits to the community. We also plan to install the sensors in the dustbin to acquire direction information. The sampling methods will be improved or upgraded using ARDUINO where temperature and humidity sensor are placed. The recording data of temperature and humidity will be sending the data to a cloud server for research purpose.

References

Abdollahi, M. & Hosseini, A. (2014). "Charcoal". Encyclopedia of Toxicology (Third Edition). Retrieved on 22 August 2022, from https://www.sciencedirect.com/topics/chemical-engineering/charcoal

Augustine Towonsing (2022). "Penjagaan Alam Sekitar: Cabaran Dan Pengurusan Sisa Pepejal Domestik". Dicapai pada 10 Ogos 2022, daripada https://www.malaysian-ghost-research.org/pengurusan-sisa-pepejal-domestik/

Blades, N. (2020). "Distilled Water". Retrieved on 10 August 2022, from https://www.webmd.com/diet/distilled-water-overview#:~:text=Distilled%20water%20is%20steam%20from,purest%20water%20you%20can%20drink.

Britannica (2019), The Editors of Encyclopaedia. "waste disposal". *Encyclopedia Britannica*, Retrieved on 10 August 2022, from https://www.britannica.com/technology/waste-disposal-system. Accessed 10 August 2022.

Ferreira, S. C. & Fernandez, A. M. (2019). "General and Global Situation". Encyclopedia of Food Security and Sustainability. Retrieved on 10 August 2022, from https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/rice-bran

Kennedy, M. (2013). "Food Waste Disposal and Handling – Practices to Consider". Retrieved on 10 August 2022, from https://www.wastecare.com/Articles/Food-Waste-Disposal-and-Handling.htm

Malo, P. M. & Urquhart, E. A. (2016). Fermented Foods: Use of Starter Cultures. Retrieved on 10 August 2022, from https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/lactic-acid-fermentation

McDonell, K. (2018). "16 Creative Ways to Use Old Coffee Grounds". Retrieved on 10 August 2022, from https://www.healthline.com/nutrition/uses-for-coffee-grounds

Md. Alauddin & Md Zakir Hossen Howlader (2019). "Development of Rice Bran Functional Food and Evaluation of Its Healthful Properties". Rice Bran and Rice Bran Oil. Retrieved on 10 August 2022, from https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/rice-bran

Mohammed Fadzli. (2000). "Individu dan alam sekitar". Bulletin Perlindungan Pengguna.BIL 5/2000. Kementerian Perdagangan Dalam Negeri Dan Hal Ehwal Pengguna, Malaysia dengan kerjasama Majlis Hal Ehwal Pengguna (WP) Kuala Lumpur. Dicapai pada 7 Ogos 2018, daripada *Buletin Perlindungan Pengguna*

Munoz, R. & Rivas, B.D.L. (2011). Lactic Acid Bacteria. Molecular Wine Microbiology. Retrieved on 10 August 2022, from https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/lactic-acid-fermentation

Petre, A. (2021) "What Is Activated Charcoal? Benefits and Uses". Retrieved on 22 August 2022, from https://www.healthline.com/nutrition/activated-charcoal

Phonpuak, N. and Chindaprasirt, P. (2015). "Types of waste, properties, and durability of pore-frming waste-based fired masonry bricks". Retrieved on 22 August 2022, from https://www.sciencedirect.com/topics/engineering/rice-husk

Yamada, K. (2000). "Properties and Applications of an Organic Fertilizer Inoculated with Effective Microorganism". Journal of Crop Production. *3*(1): 255–268. DOI:10.1300/J144v03n01_21. Properties and Applications of an Organic Fertilizer Inoculated with Effective Microorganisms: Journal of Crop Production: Vol 3, No 1 (tandfonline.com)

Yunanto Wiji Utomo (2012). "Ampas Kopi Hilangkan Bau Tak Sedap". Dicapai pada 20 Julai 2018, daripada https://sains.kompas.com/read/2012/02/21/09281819/Ampas.Kopi.Hilangkan.Bau.Tak.Sedap

COLLABORATION AND INDUSTRY INVOLVEMENT ENHANCES THE EMPLOYBILITY OF BCT PUO GRADUATES

[1]Samikhah Muhammad @ Munir, [2]Mazziyatol Farizza Mat, [3]Noraziah Hamid

[1,2,3]Politeknik Ungku Omar, Malaysia
[1]samikhahpuo@gmail.com
[2]mazziyatol@puo.edu.my
[3]aziahhamid1965@gmail.com

Abstract: Collaboration is the fifth (5) pillar in Department of Polytechnic and Community College Education (DPCCE) Strategic Plan 2018-2025 by increasing cooperation with the industry. Thus, Work-Based Learning (WBL) aspires to enhance the students' learning experience by extending the industry's collaboration in the design and delivery of technical education programmes. The outcome of this strategy is expected to produce work-ready graduates with rapid technology advancement competencies in terms of technical, personal and interpersonal skills that can be acquired through experiential learning that is included in the curriculum. Hence, the Work-Based Learning (WBL) educational strategy helps build the inner strength of polytechnic students to face the challenges of 21st-century learning and the demands of the 4th Industrial Revolution. The objective of this study is to focus on PUO-Industry strategic collaboration for work-based learning for undergraduate students via structured on-the-job training (OJT) for a period of 10 months. The signing of Notes of Collaboration (NoC) between PUO and industry players has opened great opportunities to the student whilst undergoing their WBL as attachment placement at the participating companies is secured. The findings strongly validate the empowerment of BCT graduates' marketability by engaging in industry collaboration. Trend analysis of six (6) WBL cohorts had been analysed to display data over time of graduate employability rate. The result shows that 4 out of 6 cohorts have a 100% graduate employability rate and more graduates were hired by company outside of MBAM participating companies' bubbles. These graduates have been employed either by the partners' company or other companies in the same field locally and overseas, some became entrepreneurs, others pursue further studies.

***Keywords**: PUO-Industry, Structured OJT, WBL, Work-ready, Graduate Employability*

1. Introduction

Those employability skills are considered a valuable asset to employers (Mohamad Sattar et al., 2010; Mohamad Sattar et al., 2012; Makhbul, Yussof & Awang, 2015) and also help to gain the competitive advantage as well as leads survival the organization products or services in the global market (Anuar et al., 2016; Hanapi et al., 2016; Rahmat et al., 2016). Similarly, through the study of Yelasmanchili (2018), the aspects of employability skills such as leadership skills will influence the culture of critical thinking and build more competitive teamwork within an organization. As such, students need to be exposed to the real working environment, thus, higher education institutions shall create access to established resources to enhance their

personal experience. Employability skills are also known as job readiness skills which are needed by students to prepare themselves to become competent and competitive worker after they have completed their studies. According to Hillage and Pollard (1998), the term employability skills is a capability to move sufficiency within the labour market to realize a potential through sustainable employment. In a similar perspective, according to Naddhirah (2014) and Mohammad Sattar et al. (2014), employability skills are an individual capability for his or her own to practice and determine the skills of employability to sustain and cater in a job environment. In general, employability skills required not only to gain employment, but it's also a progress of employee to carry out their role to the best of their ability towards achieve the potential strategic organization or business.

These are timely initiatives, as a study by MOHE. The study showed that the graduate employability rate decreased by 1.8% in 2020. The 2020 Graduate Tracking Study found that Malaysian graduates had a marketability rate of 84.4%, compared to 86.2% in the previous year. In other words, up to 40,550 graduates were not able to secure a job within six months of graduating. To help make it easier for graduates to find out about job offers and other opportunities, the government introduced Graduates Reference Hub for Employment and Training (GREaT) in September 2020. The one-stop portal now even includes a feature to automatically match unemployed graduates with suitable job vacancies found in their database. Nevertheless, a positive sign is that polytechnic graduates are in high demand, with a marketability rate of over 90% for five years in a row. Despite the pandemic, polytechnic graduates still had a 91.2% marketability rate in 2020. That is why the Ministry of Higher Education will continue to look at the betterment of the Technical and Vocational Education and Training (TVET) programme as a whole, along with programme accreditation and recognition at the international level.

2. Methodology

In 2013, Polytechnic Ungku Omar (PUO) commenced WBL program for Bachelor of Civil Engineering Technology with Honours for undergraduates' study and this program implemented work-based learning mode for several courses in semester 7 and semester 8. Therefore, this study is focusing on PUO-Industry strategic collaboration for work-based learning for undergraduate students via structured on the job training for a period of 10 months. The aim of this study is to establish strategic collaboration with construction industries thus enhancing graduate employability. This experience was developed together with the industry partners to meet the training needs of the industry and to provide a real-life work environment. This study applies qualitative and quantitative methods to obtain the necessary data. Graduate tracer study questionnaires were distributed to BCT graduates after completing WBL. While the quantitative data is obtained from WBL monitoring reports, minutes of meeting and appraisal form involving the industry partners.

2.1 Work-based Learning

According to the Engineering Technology Accreditation Council Standard (BEM, 2020), WBL is an industrial training approach that provides students with authentic context for learning and real- life work experiences in an engineering environment. It is essential that the engineering environment must fulfil the aims and learning outcomes of the program. Thus, BCT's WBL is designed as a well-structured on-the-job training (OJT) program developed together with

BCT's industry partners to meet the training needs of an industry and to provide a real-life work environment. It has been designed as a structured internship program with core discipline courses incorporated in the learning track for BCT Year 4.

2.2 WBL Implementation

In facilitating the student's learning process, PUO lecturers and industry mentors use learning activities, learning environment and assessments that align with the learning outcomes (Biggs, 2003). To assist the industry mentors, a team-teaching approach consisting of two or more lecturers teaching the same course are paired-up with the industry mentors (Buckley, 2000). The team-teaching from both PUO and industry will enable them to share ideas and convey knowledge to the students. This can shape the value of teamwork among lecturers and industry mentors in delivering teaching and learning (T&L). The industry mentors oversee the practical aspects of the course whilst the theoretical aspects are led by the PUO lecturers.

The chart in Figure 1, summarizes the implementation of PUO BCT-WBL program. It begins with a meeting with Master Builders Association Malaysia (MBAM), one of the leading body representing the construction industry and services sector in Malaysia. PUO Management Team, MBAM Education Team and several MBAM members have agreed to work together in the structured on the job training (OJT) program known as work-based learning (WBL). Students will be attached to the companies and undergo an Induction Session at the companies. While attached at the company, these students will be assigned industrial task on site based upon the agreed curriculum by their mentor. At the same time students are required to register their courses online, and they will be given tasks accordingly to be completed by the end of the semester.

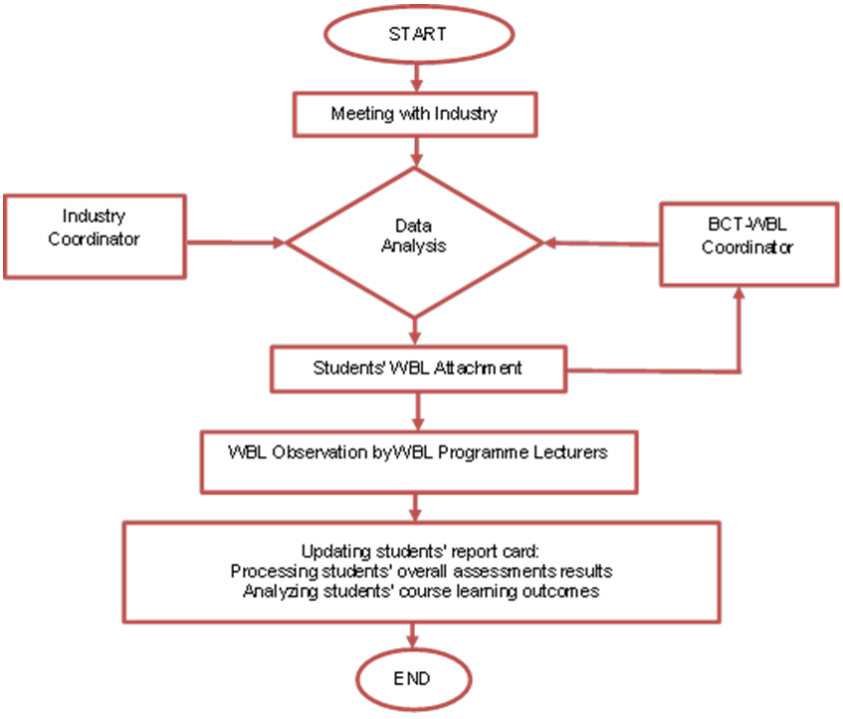


Figure 1. PUO BCT-WBL Implementation Flow Chart

2.3 Collaboration with industry

A successful collaboration between Politeknik Ungku Omar (PUO) and Master Builders Association Malaysia (MBAM) as WBL industry partner for Bachelor in Civil Engineering Technology (BCT) programme had commenced since 2015 when the Notes of Collaboration (NOC) were signed on 9 December 2015 (Figure 2). The Vice President of MBAM, Tan Sri Dato' Sri Sufri bin Mohd Zin, and MBAM Education Committee had coordinated the participation of MBAM member companies in the WBL-BCT programme.

Figure 2. Signing NOC between PUO and MBAM Participating Company

This collaboration had been carried out through various jointly planned activities to increase the effectiveness of WBL implementation in the industry. Table 1 shows the list of companies collaborating with PUO. Until 2021, a total of 22 public listed construction companies had participated in the WBL-BCT as follows:

Table 1. List of companies collaborating with PUO

No.	Company	Collaboration Since
1	Master Builders Association Malaysia	2015
2	Sunway Construction Sdn Bhd	2015
3	Bina Puri Sdn Bhd	2015
4	TRC Synergy Berhad	2015
5	Putra Perdana Construction Sdn Bhd	2015
6	MITC Engineering Sdn Bhd	2015
7	Premier Construction Sdn Bhd	2015
8	Mudajaya Corporation Berhad	2015
9	Syarikat Pembenaan Yeoh Tiong Lay Sdn	2017
10	Fajarbaru Builder Sdn Bhd	2017
11	Ocned Water Technology Sdn Bhd	2017
12	Pembinaan Mitrajaya Sdn Bhd	2017

13	Trans Elite Group Sdn Bhd	2018
14	Bauer (Malaysia) Sdn Bhd	2018
15	MGB Global	2018
16	Dhaya Maju Infrastructure (Asia) Sdn Berhad	2019
17	IJM Corporation Berhad	2020
18	Pembinaan Tetap Teguh Sdn Bhd	2020
19	CLCE Construction Sdn Bhd	2020
20	Matlamat Anggun Sdn Bhd	2021
21	Orange Beam Construction Sdn Bhd	2021
22	Gamuda Berhad	2021

Figure 3 shows the milestone of collaboration between MBAM and PUO since 2015.The good collaboration with MBAM participating company increase number of companies signing NOC with PUO not only for student development but also for thr academia. The WBL approach for BCT programme has been designed as a structured on-the-job training (OJT) programme with core discipline courses incorporated in the learning track for BCT Year 4. The WBL course design integrates theory and industrial practises in the workplace. WBL courses consists of 4 components: Dependent Learning, Independent learning, Industrial Guidance, and Assessment, all of which contribute to the effective learning time and credits calculation (BEM, 2020).

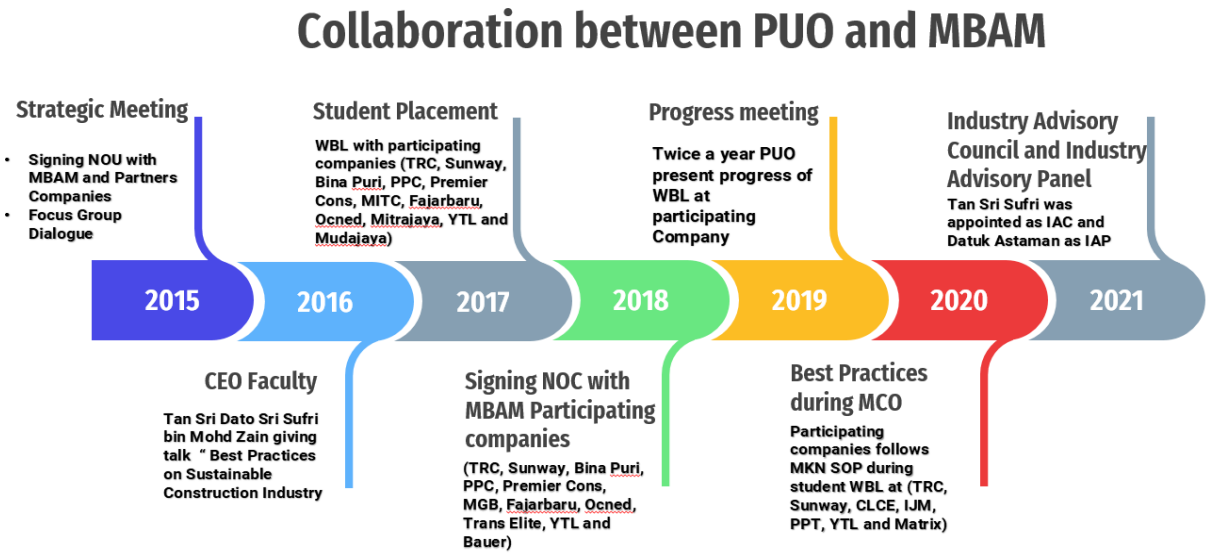


Figure 3. The milestone of collaboration between MBAM and PUO

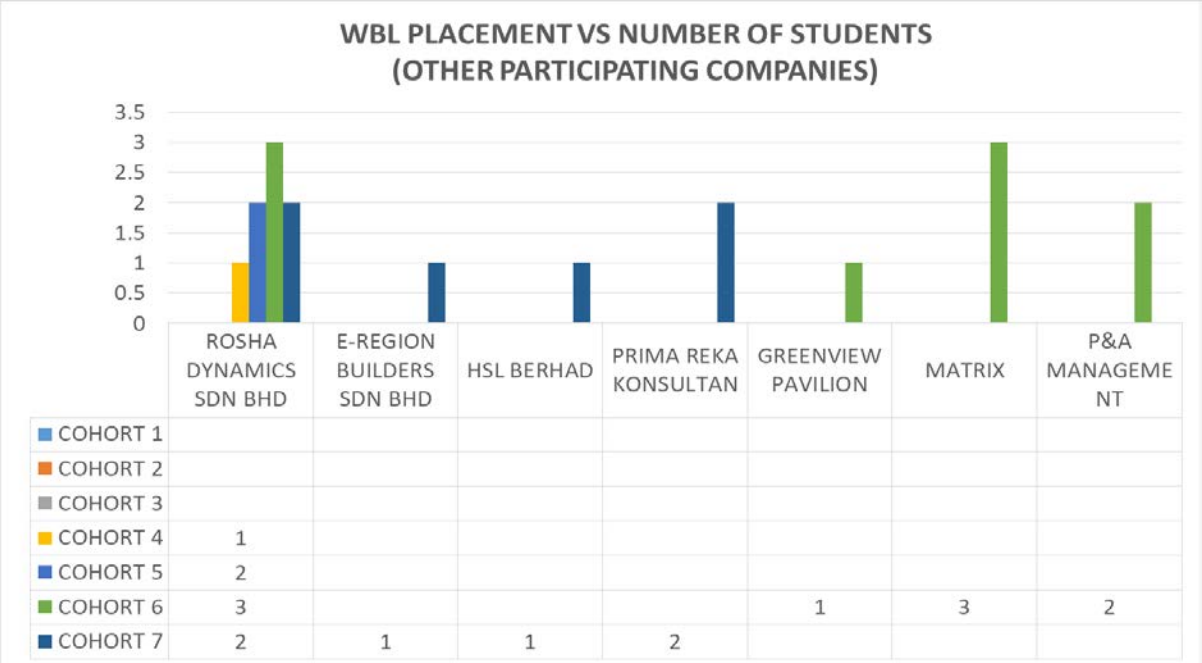
On September 15, 2017, a discussion was held between the Director General of Department of Polytechnic and Community College Education (DPCCE), Prof Dato Dr. Mohd Ismail bin Abdul Aziz, and the Group Managing Director of Trans Resources Synergy Berhad (TRC), Tan Sri Dato' Sri Sufri bin Mohd Zin, to strengthen the industry-academia collaboration. TRC has agreed to enhance existing collaboration by establishing an Industry-Academia Centre or Teaching Factory at PUO. The centre will function as a Technology Enabled Collaborative Centre (TECC) and named TRC Edu Center. TRC has actively implemented the Industrial Visiting Lecturer (PPI) programme at the TRC EDU Center on a regular basis through technical

talks by industrial experts, employability training, technical training and technical visits. The following are some of the benefits received from the establishment of the TRC Edu Center:

i. As a Centre of Technology (COT) for the Department of Civil Engineering based on the concept of sustainable cities.
ii. As a resource centre for lecturers, students, and industry in conducting of reskilling and upskilling programmes.
iii. Technology transfer from TRC to PUO faculty in TRC's specialization of project management and sustainable construction technology.
iv. A conducive environment for knowledge sharing sessions with the Faculty's CEO.
v. Enhancements of Active Learning for PUO students.

3. Results and Analysis

As a result of the success of the collaboration network with MBAM, PUO proceeds with its endeavours to guarantee that students continue to get a placement to undergo WBL. Therefore, there are also other construction companies showing similar interest in placing students to undergo WBL in their companies. The inclusion of these different organizations began in 2018 until the present year. The number of these companies is also expanding from time to time and is very helpful for PUOs in finding student placements as the country faces the threat of the Covid-19 pandemic. Figure 4 and Figure 5 are the number of student placement data at MBAM participating companies and others participating company respectively.



	ROSHA DYNAMICS SDN BHD	E-REGION BUILDERS SDN BHD	HSL BERHAD	PRIMA REKA KONSULTAN	GREENVIEW PAVILION	MATRIX	P&A MANAGEMENT
COHORT 1							
COHORT 2							
COHORT 3							
COHORT 4	1						
COHORT 5	2						
COHORT 6	3				1	3	2
COHORT 7	2	1	1	2			

Figure 4. Student placement data at other participating companies

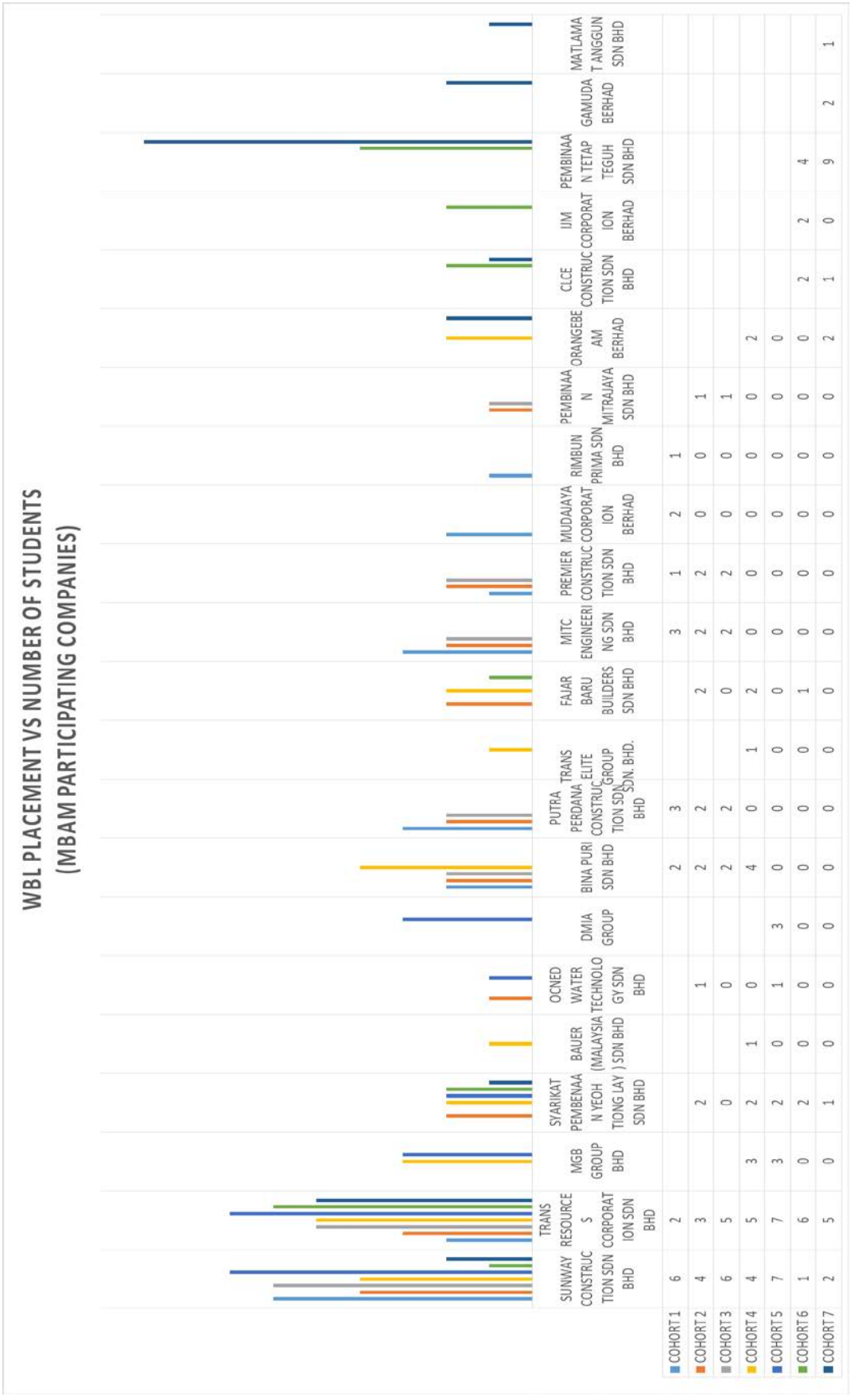
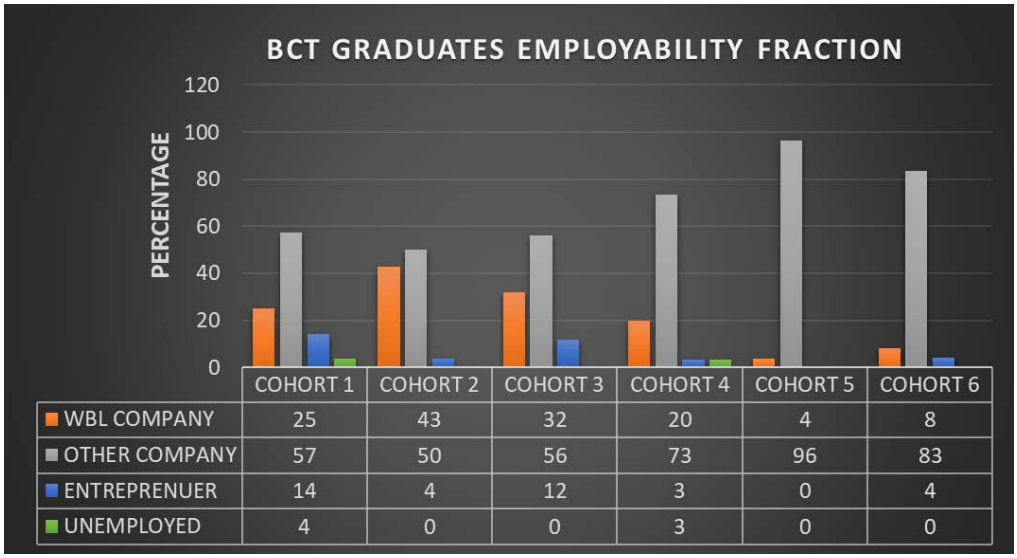


Figure 5. Student placement data at MBAM participating companies

The PUO-BCT WBL program provides a significant opportunity for industry to collaborate with the polytechnic in enhancing competencies and relevant skills among civil engineering technology degree graduates so that they are able to excel in the workplace. Trend analysis of six (6) WBL cohorts had been analysed to display data over time of graduate employability rate. Trend analysis involves collecting the information from multiple periods and plotting the collected information on the horizontal line with the objective of finding actionable patterns from the given information. Trend charts are also known as run charts and are used to show trends in data over time. Displaying data over time increases understanding of the real performance of a process, particularly with regard to an established target or goal. The findings strongly validate the adoption of WBL curriculum for civil engineering technology degree graduates in enhancing graduate employability



	COHORT 1	COHORT 2	COHORT 3	COHORT 4	COHORT 5	COHORT 6
WBL COMPANY	25	43	32	20	4	8
OTHER COMPANY	57	50	56	73	96	83
ENTREPRENUER	14	4	12	3	0	4
UNEMPLOYED	4	0	0	3	0	0

Figure 6. BCT graduates employability fraction percentage

As shown in Figure 6, the percentage of graduates employed by the companies during WBL attachment varies by cohort. However, most of the BCT graduate were employed by other companies as they have completed their WBL. It can be seen that starting from the third cohort, WBL company has employed less graduates rapidly causing other company hiring more BCT graduates. This proves that the collaboration has significant impact on the BCT graduates' marketability outside of the MBAM participating companies' bubble.

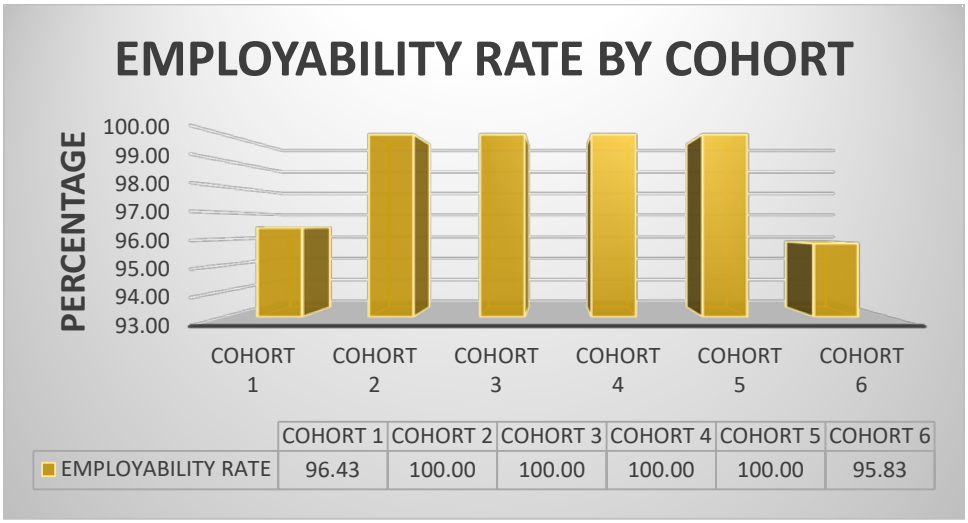


Figure 7. WBL graduate employability rate

The collaboration between PUO and Malaysia leading construction industry, MBAM, has gained a positive impact on BCT graduates' employability. Total time spent at the workplace through WBL (40 weeks) enabled the students to be trained and exposed with real work environment. Students become more competent in both technical and non-technical skills such as personal and inter-personal skills in communication, teamwork, leadership, critical thinking and problem solving. PUO WBL participating companies has given full commitment and they are basically satisfied with the graduates. To date, the BCT programme has had produced 6 cohorts of graduates and all have an outstanding employment rate record. The BCT employability rates are summarized in Figure 7.

4. Conclusion

Overall, it can be concluded that various contexts of real-time work experience enriched through the WBL implementation can provide opportunities for students to develop their early career. In addition to undergoing WBL, students will also be given the opportunity by the industry to undergo industrial certification such as OSH Safety Training and Hazard Identification, Risk Assessment and Risk Control (HIRARC) Training Course, and QLASSIC Training. Furthermore, students will have a good resume record based on the working experience they had acquired from WBL for two semesters. Students are also able to build networking with the people from the companies involved in their WBL projects. Through this networking, students have a better outlook on their career development upon graduation.

The impact of the collaboration had been established an Industry-Academia Centre or Teaching Factory in the Institution and which is capable of functioning as a Technology Enabled Collaborative Centre (TECC) actively implemented the Industrial Visiting Lecturer (PPI) programme on a regular basis through technical talks by industrial experts, employability training, technical training and technical visits. Hence; it can also function as a resource centre for lecturers, students, and industry in conducting of reskilling and upskilling programmes and also encouraging the technology transfer. Impact from the collaboration transferring is the technology from industry to academia from TRC specialization of project management and

sustainable construction technology. It can be simplifying that a conducive environment for knowledge sharing sessions with the Faculty's CEO & Enhancements of Active Learning for PUO students. Tan Sri Sufri bin Mohd Zain as PUO CEO Faculty give impressed speech for all bachelor students from semester 6 and semester 8, regarding soft skill and attitude of fresh graduates to explore construction industry.

The empowerment of BCT graduates marketability by engaging industry collaboration accordingly to be implemented by higher education institutions and industries as Work-Based Learning (WBL) programme to increase the Graduate Employability (GE) as a potential labour in job market with further deepen their competencies in employability skills in real working environment and hence develop their 21st-century skills of communication, collaboration, critical thinking and creativity**.** Therefore; the lack of the requisite knowledge, skills, and attitudes will be trained by implementing the Work-Based Learning (WBL) to provide the students' learning experience by extending the industry's collaboration in the design and delivery of the technical education programmes in the curriculum enhance accelerated students' employability rates. Finally, the PUO-Industry strategic collaboration for Work-Based Learning (WBL) for undergraduate students via structured on job training (OJT) for a period of 10 months is a great contributor to the employability rate of PUO degree graduates and can be achieved by establishing strategic collaboration with construction industries thus enhancing graduate employability (GE).

Acknowledgments

First and foremost, all praises belong to The Almighty The Most Gracious and The Most Merciful.

The researchers would like to extend immeasurable appreciation and gratitude to the BCT lecturers, students, industrial mentors and MBAM for their full commitment throughout the year. God blessed.

References

Biggs, J. (2003). *Teaching for quality learning at university: What the student does*. 2nd edn. Birkshire: SHRE and Open University Press

Board of Engineers Malaysia (2020). Engineering Technology Programme Accreditation Standard 2020

Board of Engineers Malaysia (2020). Engineering Technology Programme Accreditation Standard 2020

Buckley, F.J. (2000). *Team teaching: What, why and how?*. California: Sage, Thousand Oaks.Crawley, E.F., Malmqvist, J., Östlund, S., Brodeur, D.R. (2007). *Rethinking engineering education: The CDIO approach.* New York: Springer.

Fink, K.F, Rokkjaer, O & Schrey, K. (2007). Work Based Learning and Facilitated Work Based Learning. *Teaching and Research in Engineering in Europe (TREE).* Aalborg.

Fink, K.F, Rokkjaer, O & Schrey, K. (2007). Work Based Learning and Facilitated Work Based Learning. *Teaching and Research in Engineering in Europe (TREE).* Aalborg.

Hillage, J. & Pollard, E. (1998). Employability: Developing a framework for policy analysis. EFEE Research Briefing 85

Jabatan Pendidikan Politeknik dan Kolej Komuniti (2018). Pelan Strategik Politeknik dan Kolej Komuniti (2018-2025), *Jabatan Pendidikan Politeknik dan Kolej Komuniti, Kementerian Pendidikan Malaysia.* ISBN 978-967-2243-49-6.

Jabatan Pendidikan Politeknik dan Kolej Komuniti (2018). Pelan Strategik Politeknik dan Kolej Komuniti (2018-2025), *Jabatan Pendidikan Politeknik dan Kolej Komuniti, Kementerian Pendidikan Malaysia.* ISBN 978-967-2243-49-6.

Kamin, Y., Cartledge,D., & Simikin,K (2010) Work-based Learning in Malaysia's Community Colleges Perceptions from students, Lecturers, Training Partners and Employers

Malaysian Qualifications Agency (2016) Guidelines to Good Practice: Work-Based Learning (GGP: WBL).

Mat Tuselim, Y.R., Muhammad, S. & Chau Mai, R. (2020). Integrated Curriculum Approach in Developing 21st Century Industry-Ready Graduates. *Proceedings of the 16th International CDIO Conference, hosted on-line by Chalmers University of Technology, Gothenburg, Sweden, 9-11 June 2020*

Mat Tuselim, Y.R., Muhammad, S. & Chau Mai, R. (2020). Integrated Curriculum Approach in Developing 21st Century Industry-Ready Graduates. *Proceedings of the 16th International CDIO Conference, hosted on-line by Chalmers University of Technology, Gothenburg, Sweden, 9-11 June 2020*

Mohammad Sattar, R., Mohd Yusof, I., Napisah, I., Muhammad Rashid, R., & Rose Amnah, A.R. (2010). Development of employability skills assessment tool for manufacturing industry. Journal Mechanical

Mohamad Sattar, R., Rose Amah, A.R., Azlin Norhaini, M., & Puvanasvaran, A.P. (2012). Employability skills assessment tool development. International Education Studies,

Mohamad Sattar, R., Rose Amah, A.R., & Ahmad Rosli, M.N. (2014). Future employability skills set for manufacturing industries. International Education Studies, 7(10)

Naddhirah, M.A., Salleh, A., & Ame Husna, K. (2014). Kebolehpasaran graduan suatu analisa literatur. Persidangan Antarabangsa Pendidikan dan Kaunseling

Yelsmanchili, R.K. (2018). Relationship between leader behaviour and subordinate intensive to remain: Mediating role of critical thinking and empowerment. Academy of Strategic Management Journal, 17(8)

STUDY ON THE EFFECT OF THE USE OF FREQUENTLY ASKED QUESTION (FAQ) TEMPLATES IN MANAGING AUCTION PROCESS

Husni Nazra Abu Bakar[1], Aida Tukiran[2] and Muhammad Nazmi Isa[3]

[1,2,3]Mechanical Engineering Department,
Ungku Omar
Polytechnic, Ipoh,
Perak, Malaysia
[1]husninazra@polycc.edu.my
[2]aidatukiran595@gmail.com
[3]muhdnazmi9505@gmail.com

Abstract: In the present days, Frequently Asked Question (FAQ) templates are almost vital and essential for every service and product websites. It operates as automated customer support personnel where potential clients may acquire substantial information on the services and products offered in these websites. Administrators for companies' auction websites have been used to be posed with the same questions repeatedly from the joining parties about theprocess and procedures of the auction. Thus, the administrators need to spend hours to answer these typical queries. The FAQ templates have been developed to overcome this problem. This study is to determine the effect of the use of FAQ templates on both the Administrators of the auction websites ("the Purchaser") and on the parties offering their products ("the supplier") in such auction. The survey is conducted by providing questionnaires to both the administrator and the supplier before and after incorporating the FAQ templates. The result shows the level of agreement from the administration is at 4.88/5.00 and from the suppliers is at 4.62/5.00 in favour of the usage of FAQ templates. Hence, it may be concluded that most respondents are more inclined that the use of FAQ templates are helpful in the conduct of the auction.

Keywords*: frequently asked question; auction process; questionnaire; suppliers; purchaser*

1. Introduction

The Question Answering (QA) system using either a pre-structured database or a compilation of natural language documents is evolved as a powerful platform for automatically answering questions asked by people in normal language (Ansari et al., 2016). In other words, QA systems may be considered as an advanced form of Information Retrieval (IR) (Cao et al., 2010) since the system make a potential asking questions and save the answers using normal language queries (Abdi et al., 2018). A wide-ranging attempt to resolve open-domain questions depend on the direct extraction of answers from respondents through the web or document compilations, but the assortment of the final answer(s) is regard as a ranking drawback that gains from the redundancy of the data sources employed (Calijorne Soares & Parreiras, 2020; Mendes & Coheur, 2013). As said by (Raazaghi, 2015; Karan and Snajder, 2018) FAQ remarkably two purposes which is firstly is to provide users with an easy access to search the

important information in resolving problems, and secondly is to support the person or group which accountable for frequently answering the similar questions from persons concerned in the same issue. The target of FAQ creation for the researchers is to have a list of questions and answers for FAQ sheets automatically or semi-automatically. The possibility of the problems that appear in automatic FAQ creation is very wide. Such problems include extracting and determining the same or repetitive questions, designing of answers, knowledge base construction, and further challenges in automatic content creation (Raazaghi, 2015). Consequently, for much faster and more efficient alternative, users can use FAQ collections themselves, by means of FAQ retrieval system. An FAQ retrieval system offers a normal language interface for querying the FAQ compilation by referring to questions from the clients, then the system generates a list of FAQ sets ordered by the importance of questions (Mass et al., 2020; Sakata et al., 2019; Karan and Snajder, 2018). Numerous places in the customer service system can applied the FAQ retrieval system since it can offer clients with useful access to information concerning company's products and services. Furthermore, it affords customer service agents with rapid access to internal FAQ collections, increasing the quality and efficiency of customer service. Additionally, it permits partial automation of some client service tasks, such as sending answers to the most typical user queries via automated e-mail (Sneiders, 2010). The most reason why FAQ template need to be established is due to meet the clients' demand by directing them directly to the FAQ template to get information about the products and services (Cappel & Huang, 2007).

One of the departments in the company related of using FAQ template basically is for auction process. There are many advantages if administrator in any companies implement FAQ template during especially for auction process. One of them is to eliminate client service calls experience if the answers for the questions are readily available in the FAQ template. Further, it can also offer a quick answer to the issues need to know by clients. To achieve that, the answers for all the questions that might be asked by client should be readily available. Other than that, FAQ template help in increasing the competence of work for both administrators and clients where they can focus on the auction process without facing any problems and can save time. The statement was supported by the research done by (Mittal et al., 2021) which stated that the proposed system is a better solution for data extraction which functioning as a decent communication network for both users and administrators and beneficial in reducing the crowd. It was also encouraged by (Dutta et al., 2021) which proposes TI-S2S, a novel learning framework linking TF-IDF based keyword removal and Word2Vec embeddings for preparing a Sequence-to-Sequence (Seq2Seq) construction. With that, it accomplishes great accuracy for FAQ retrieval by improve knowledge on the fundamental intent of a customer request obtained via the representative keywords.

In the company being selected in the research which is under Sourcing & Procurement Department, which located in Shah Alam, Selangor, Malaysia, a lot of auctions need to be done. Such categories include project, service, purchase, supply, delivery, and installation that provided by suppliers or clients. During the auction process, there are three documents that need to be submitted to suppliers after they accept the condition of auction. The documents consist of Terms and Condition (T&C), Step of Bidding and Event Information. Suppliers that join auction need to stamp the T&C, then revert to the administrator or purchaser before they can focus on auction process if the process is approved. During the period of auctioning, many suppliers will enquire about the auction especially for the new suppliers that never join the auction process earlier. The purchaser will always receive the same queries repeatedly from

various suppliers where quick response is required by suppliers. Therefore, the FAQ templatehad been developed to overcome this problem in the company which was chosen in this research which is under Sourcing & Procurement department. With the developed FAQ template, hence the study is to determine the effect of the use of FAQ templates on both the administrators of the auctions which is call as purchaser and, on the parties, offering their products, called the supplier in such auction.

2. Materials and Methods

A questionnaire is a valuable research instrument that consists of a series of questions or other types of prompts asked to a large number of individuals, often referred to as respondents with the aim is to collect statistically wide range of information. Questionnaires are frequently used in quantitative marketing research and social research. When properly created and appropriately administered, questionnaires become a dynamic mechanism by which statements can be made about particular groups or people or entire populations (Ikart, 2019; Roopa & Rani, 2012). In this research, questionnaire was distributed to clients known as suppliers and administrators known as purchasers in obtaining data before and after implementing the FAQ templates during the auction process.

2.1 Before Implementing FAQ Template

The questionnaire was categorized into two categories, namely suppliers and purchasers which both categories consists of 7 different questions. For supplier side, 100 people of suppliers were selected to answer the survey while on the purchasers side, only 7 people were chosen. All selected purchasers were staffs who are working under the auction team in Sourcing & Procurement department, in the company being selected in this research. The questions was designed as in the form of close-ended and open-ended questions. According to (Roopa & Rani, 2012; Jenn, 2006), close-ended questions provide options to the respondents and require them to choose one or more items from the list while open ended questions allow the respondent to express their opinions freely and they are not restricted by the options. The survey was conducted using Google Form created and the respondent need to answer the survey regarding to the step below:

1. Open the Google Form software;
2. Click on the plus icon – untitled form will be display;
3. Fill in the title and description to let the respondent know what is the objective of this survey;
4. Fill in the questions with the choices of answers;
5. Data collection - this is the data before FAQ template development;
6. Implement the FAQ template during the auction process;
7. Conduct another survey to suppliers and purchasers on customer's satisfaction - to collect data after the implementation of FAQ template

2.2 Evaluating the Effectiveness of FAQ Templates After Implementation

When designing a questionnaire, it is crucial to pre-empt what kind of method will be used to investigate the data collected. One practical way to do that is to draw up a question-analysis table (Jenn, 2006). Thus, Table 1 was created and outline the data distribution of the mean score used to represent the level of agreement of respondents on the development of FAQ templates.

Table 1. Distribution of mean score (Agreement Level) Source: Jenn, 2006

Mean score	Representation of Mean Score
4.20 – 5.00	Very High
3.40 - 4.19	High
2.60 - 3.39	Medium
1.80 - 5.59	Low
1.00 - 1.79	Very Low

3. Results

3.1 Before developing the FAQ template

The questionnaire was distributed to suppliers and purchasers before developing the FAQ template to gain some feedback from them towards the importance of necessitating on development of FAQ template. With the questionnaires distributed to 100 suppliers, a total of 51 suppliers had respond within the time provided. Currently over 98% of respondent had deal a business with the companies' auction websites selected in the research. Most associated type of business is supply goods and delivery jobs. 90.2% of respondent had participated in an auction with the company, previously. Majority of respondents always have inquiries during the auction process and 98% of them will contact the purchasers back to solve the related problem. More than 95% of respondent agreed that if purchasers can compile all the questions with answers within one template, then it will be more helpful and convenient to them.

A total of 7 purchasers had been responded to the questionnaire given who 42% of respondent had been working in purchasing department for more than a year. All the purchasers totally agreed that the supplier frequently contact them to inquire about the auction and that they repeatedly confront the same questions. Hence, with the existence of FAQ template, it may ease the auction process between the suppliers and the purchasers. Through the data that had been analysed, all purchasers which is 100% of them were totally agreed with the development and implementing the FAQ template.

3.2 Effectiveness of FAQ templates on supplier side after implementation

Figure 1 illustrates the level of mean score on supplier after implementing the templates during the auction process for each question on FAQ template.

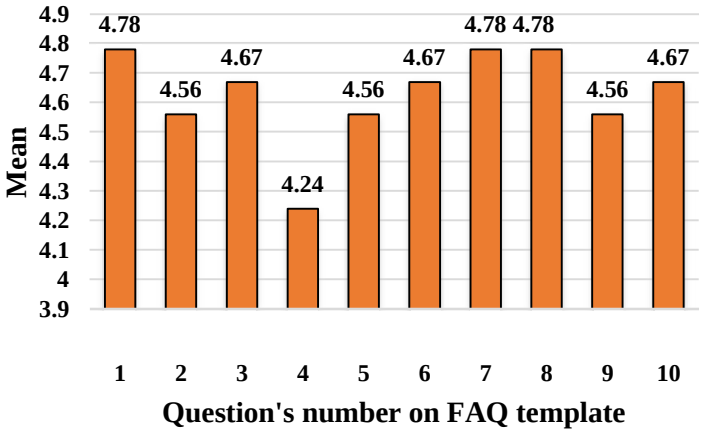


Figure 1. Level of mean score on each question after implementing FAQ template on supplier.

Table 2 displays level of mean score on each question after implementing FAQ templates which distributed to the supplier. With an average data of 4.63, the data analysis supports the assertion that all the suppliers entirely agreed and satisfied with the FAQ document implementation as it may ease the flow for the auction procedure.

Table 2. Level of mean score on each question after implement FAQ documentation for supplier

No	Effectiveness of the FAQ Template	Mean	Level
1	Satisfaction usage of FAQ document during auction process	4.78	Very High
2	FAQ document is helpful for auction process	4.56	Very High
3	FAQ document is simple to use.	4.67	Very High
4	The FAQ document very user friendly	4.24	Very High
5	The FAQ document is easy to understand	4.56	Very High
6	The FAQ document very useful	4.67	Very High
7	The FAQ document helps to avoid the problem and mistake during auction process	4.78	Very High
8	The FAQ document was straightforward	4.78	Very High
9	The FAQ document provided clear guidance in many ways	4.56	Very High
10	Rate of FAQ documentation	4.67	Very High
	Average:	4.63	Very High

3.3 Effectiveness of FAQ templates on purchaser side after implementation

Figure 2 shows the bar chart of level mean score for purchaser on each question after the FAQ template has been applied during the auction process.

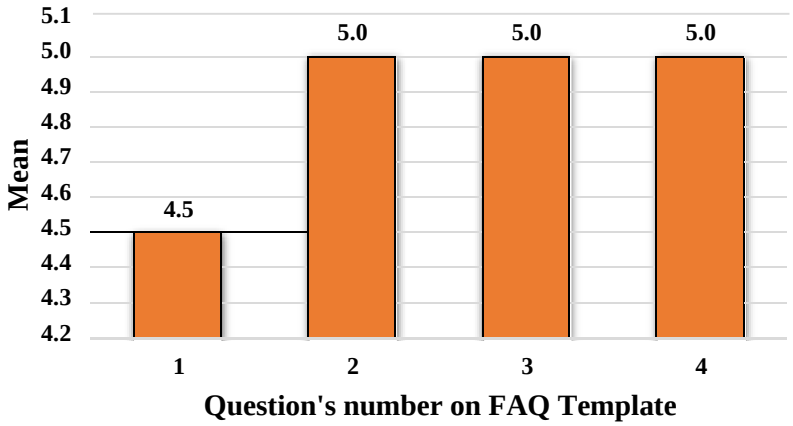


Figure 2. Bar chart of level of mean score on each question after implementing FAQ template on purchaser.

According to Table 3, all purchasers with 7 of them had answered the questionnaire given. Question number 1 with the very high value mean which is 4.5 shows that the supplier seldomly find or contact the purchaser after implementing the FAQ template. Meanwhile, the other statement, which is statement number 2, 3 and 4 with the mean value of 5.0 demonstrated that

everyone strongly agreed with it. To summarise, the efficacy of this implementation was successfully achieved by looking through the feedback given by purchasers. This is a good sign to express that FAQ template used is very helpful and beneficial for supplier in getting information that they needed regarding auction process without wasting time.

Table 3. Level of mean score on each question after implementing FAQ template on purchaser.

No	Effectiveness of the FAQ documentation	Mean	Level
1	Supplier did not find or contact purchaser if they got problem during auction process	4.5	Very High
2	Supplier satisfied to refer FAQ document during auction process instead of contact purchaser.	5	Very High
3	FAQ document helpful during auction process	5	Very High
4	Rate for the FAQ document?	5	Very High
	Average:	4.88	Very High

4. Discussion

The responses given by the respondents show that they agree that the FAQ template is effective and helpful if used during the auction process. It is a good method on both supplier and purchaser in increasing the efficiency of working during the auction process. More than 90% respondents from supplier side and 100% respondents from purchaser side give high rate on the FAQ template created since it is a friendly user template and contains enough information regarding the auction process, thus can avoid wasting time for both parties, suppliers, and purchasers, hence highly recommended to be used at any time for assisting the suppliers to answer their enquiries during the auction process. The FAQ template developed in the company being selected in this research is highly recommended to be used continuously and permanently in assisting the suppliers in an easy way.

5. Conclusion

The research was done in one of the companies under Sourcing & Procurement Department, located in Shah Alam, Selangor, Malaysia, which previously having some difficulties on suppliers and purchasers regarding giving or getting information in auction process. Suppliers will keep asking purchasers while purchasers always getting the same enquiries from various suppliers, which interferes a lot with the purchaser's time to perform other work. Therefore, FAQ template was developed to resolve the problem, hence increase the efficiency of process during the auction with supplier and purchaser. The aim of the study is to investigate the effectiveness of the template created after the implementation was performed. The data was verified by conducting a survey before and after incorporating the FAQ templates to supplier and purchaser by providing the questionnaires. The respondents agreed that all issues arise regarding auction in Sourcing & Procurement Department had an impact on their work. The result shows the level of agreement from the administration is at 4.88/5.00 and from the suppliers is at 4.62/5.00 in favors of the usage of FAQ templates. Hence, it may be concluded that most respondents are more inclined that the use of FAQ templates are helpful and beneficial as well as more reliable in the conduct of the auction.

Acknowledgments

The author would like to express gratitude to all the people who contributing to this research until it can be successfully done.

References

Abdi, A., Idris, N. & Ahmad, Z. (2018). QAPD: an ontology-based question answering system in the physics domain. *Soft Comput 22*, 213–230. **https://doi.org/10.1007/s00500-016-**2328-2

Ansari, A., Maknojia, M., & Shaikh, A. (2016). Intelligent question answering system based on artificial neural network. *IEEE International Conference on Engineering and Technology(ICETECH),IEEE,*758-763.**https://doi.org/10.1109/icetech.2016.7569350**

Calijorne Soares, M. A. & Parreiras, F. S. (2020). A literature review on question answering techniques, paradigms and systems. Journal of King Saud University – Computer and Information Sciences 32, 635-646. **https://doi.org/10.1016/j.jksuci.2018.08.005**

Cao, Y.-G., Cimino, J.J., Ely, J. & Yu, H. (2010). Automatically extracting information needs from complex clinical questions. *Journal of Biomedical Informatics, 43*(6) (2010), 962-971. **https://doi.org/10.1016/j.jbi.2010.07.007**

Cappel, J.J., & Huang, Z. (2007). A usability analysis of company websites. *Journal of Computer Information Systems*, *48*(1), 117-123. **10.1080/08874417.2007.11646000**

Dutta, S., Assem, H., & Burgin, E. (2021). Sequence-to-Sequence Learning on Keywords for Efficient FAQ Retrieval. IJCAI 2021 Workshop on Applied Semantics Extraction and Analytics (ASEA), 1-6. **https://doi.org/10.48550/arXiv.2108.10019**

Ikart, E. M. (2019). Survey questionnaire survey pretesting method: An evaluation of survey questionnaire via expert reviews technique. *Asian Journal of Social Science Studies*, *4*(2), 1. **https://doi.org/10.20849/ajsss.v4i2.565**

Jenn, N. C. (2006). Designing a questionnaire. Malaysian family physician: the official journal of the Academy of Family Physicians of Malaysia, 1(1), 32.

Karan, M. & Snajder, J. (2017). Paraphrase-focused learning to rank for domain-specific frequently asked questions retrieval, Expert Systems with Applications (2017), https://doi.org/10.1016/j.eswa.2017.09.031

Mass, Y., Carmeli, B., Roitman, H., & Konopnicki, D. (2020). Unsupervised FAQ Retrieval with Question Generation and BERT. *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics*, 807-812. **10.18653/v1/2020.acl-main.74**

Mendes, A.C. & Coheur, L. (2013). When the answer comes into question in question-answering: survey and open issues. Natural Language Engineering 19(1), 1–32. https://doi.org/10.1017/S1351324911000350

Mittal, M., Battineni, G.,Singh, D., & Yadav, P. (2021). Web-based chatbot for Frequently Asked Queries (FAQ) in Hospitals. Journal of Taibah University Medical Sciences 16(5), 740-746. **https://doi.org/10.1016/j.jtumed.2021.06.002**

Raazaghi, F. (2015). Auto-FAQ-Gen: Automatic frequently asked questions generation. *Proceedings of the 28th Canadian Conference on Artificial Intelligence*, 334-337. https://doi.org/10.1007/978-3-319-18356-5

Roopa, S., & Rani, M.S. (2012). Questionnaire Designing for a Survey. Journal of Indian Orthodontic Society, 46(4), 273-277.

Sakata, W., Shibata, T., Tanaka, R., & Kurohashi, S. (2019). FAQ retrieval using query question similarity and bert-based query-answer relevance. *Proceedings of the 42nd International ACM SIGIR Conference on Research and Development in Information Retrieval*, 1113- 1116. **https://dl.acm.org/doi/10.1145/3331184.3331326**

Sneiders, E. (2002). Automated question answering using question templates that cover the conceptual model of the database. *International Conference on Application of Natural Language to Information Systems*, 235–239**.** **https://doi.org/10.1007/3-540-36271- 1_24**

SWIMMING POOL WATER QUALITY: A CASE STUDY FOR CHLORINE ALTERNATIVE SWIMMING POOL

Joan Wang Yee Juen[1], Jason William Vitales[2], Nicole Audrey[3], Suhanida Ladah[4], and Mohd Khairul Ikhwan[5]

[1,2,3,4,5]Politeknik Kota Kinabalu, Malaysia
[1]joan@polikk.edu.my
[2]jason@polikk.edu.my

Abstract: Public swimming pool users are susceptible to infection by various disease-causing organisms. The most popular pool disinfection is the element chlorine, in the form of a chemical compound such as calcium hypochlorite (a solid) or sodium hypochlorite (a liquid). Chlorine however can accumulate in chlorine swimming pool water. There are several risks of health disorders that can arise from exposure including skin irritation, eye irritation, and respiratory disorders. Ultra-violet (UV) is considered some of the best technology on the market today for disinfecting swimming pools. This study aims to (1) compare the water quality of public swimming pools (chlorine) and Chlorine Alternative Swimming Pool (UV light plus organic Filter), (2) test the swimming pool water quality parameters, which are the (i) chlorine residue, (ii) turbidity, (iii) pH, (iv) temperature and (v) E-coli, and finally (3) to evaluate and analyse the water quality of chlorine alternative swimming pool. All parameters and standard values are subject to the latest Swimming Pool Water Quality Monitoring Guidelines issued by the Ministry of Health Malaysia. Based on the finding of the 5 parameters testing results, the water quality for the Theme Park1, Theme Park2 and the Chlorine Alternative Swimming Pool (CASP) (UV light plus Organic Filter) is in complying with the Water Quality Standard for the swimming pool issued by the Ministry of Health Malaysia. Further investigation is needed to ensure that CASP is sustainable and cost-effective before it could be implemented.

Keywords*: swimming pool; chlorine; disinfection: chlorine alternative; UV light*

1. Introduction

A public swimming pool and theme park are one of the recreational locations for people of all ages. However, swimming pool users are susceptible to infection by a diversity of disease-causing organisms. Bathers in public swimming pools are more likely to be exposed to disease-causing organisms compared to bathers in domestic or private pools because public pools are subjected to contamination from a wider community. Disease-causing organisms may be introduced from many sources but are mainly associated with bathers. These organisms may be brought into a pool from the bathers' skin, their saliva, urine and unintentional faecal discharge. These organisms may also be introduced from dust, bird droppings, make-up water as well as soil carried on bathers' feet.

Some of these disease-causing organisms live and may even grow in pool water unless the pool water is disinfected effectively and efficiently in a concontinuouslyry of Health Malaysia, 2017). Chlorine is a chemical that is often used as a disinfectant (Galal-Gorchev, 1996). Chlorine is available in solid, liquid, or generous forms. Chlorine is used to sterilise drinking water and disinfect swimming pools, as well as in the production of a variety of everyday items such as paper, textiles, medications, paints, and plastic, particularly PVC (Koch, 1946; Clark, 2019). Chlorine can accumulate in chlorine swimming pool water. There are several risks of health disorders that can arise from exposure including skin irritation, eye irritation, and respiratory disorders. Pool users often mistakenly think that the familiar smell in the pool is too much chlorine in the pool. The odour actually comes from the chloramines in the pool. It is an undesirable by-product of chemical oxidation in water. Airborne chloramines accelerate pool corrosion such as lifeguard stands, handrails, starting blocks, diving board rails, and stainless-steel deck equipment. It can also shorten your life (Psaroudis, Banker & Kershner, 2013).

The chlorine level should stay between 1.0 and 3.0 parts per million (ppm) to maintain a healthy pool. Pool operators, therefore, are subject to the Swimming Pool Water Quality Monitoring Guidelines issued by the Ministry of Health Malaysia (2017) to ensure that the water that comes into contact with bathers is in safe and pleasant condition. Over the years chemical disinfection has been used within the swimming pool environments, but with changing technology other safer disinfections are starting to take place. UV disinfection is much safer for both people swimming and the environment. According to Gobulukoglu, (2010, pp3) a Chief Scientist in Trojan Technologies Company, "*the UV light is claimed capable of reducing the level of chloramine in the water. A properly sized UV system could control chloramines; increases comfort and health for swimmers and staff; eliminates the need for dilution and super chlorination; reduces corrosion and, most importantly, protects against Cryptosporidium and Giardian*".

While UV technology for swimming pools has been used widely in other industries for many years, the emergence of UV for swimming pools in Malaysia has been more recent and uncommon. This study, therefore, aims to investigate the alternative pool disinfection system to replace the excessive use of chlorine in swimming pools in most theme parks swimming pool in Malaysia, specifically in Kota Kinabalu. UV pool disinfection systems harness the power of UV light to help pool owners reduce the use of chemicals and chlorine in their pools, making their pools safer, healthier and easier to maintain. UV pool disinfectants emit powerful germicidal rays that alter or destroy the DNA or RNA of target organisms such as algae, bacteria, viruses, cysts and protozoa. The highly concentrated electromagnetic energy also destroys organic matter, eliminating the formation of dangerous chlorine by-products (Gobulukoglu, 2010). A prototype consisting of a swimming pool, UV-light and organic filters (to replace sand filters) is then proposed. The objectives of the study are, (1) to compare the water quality of the public swimming pool (chlorine) and Alternative Chlorine Swimming Pool (UV light plus organic filter), (2) to test the swimming pool water quality parameters, which are the (i) chlorine residue, (ii) turbidity, (iii) pH, (iv) temperature and (v) E-coli and finally (3) to evaluate and analyse the water quality of alternative chlorine swimming pool.

2. Materials and Methods

Figure 1 shows the summarized flow chart of the research methodology. This study discusses in detail the four (4) important phases in the methodology and strategies used in completing this study:

1) Prototype Development
2) Filter Development
3) Data collection procedures
4) Data analyses techniques

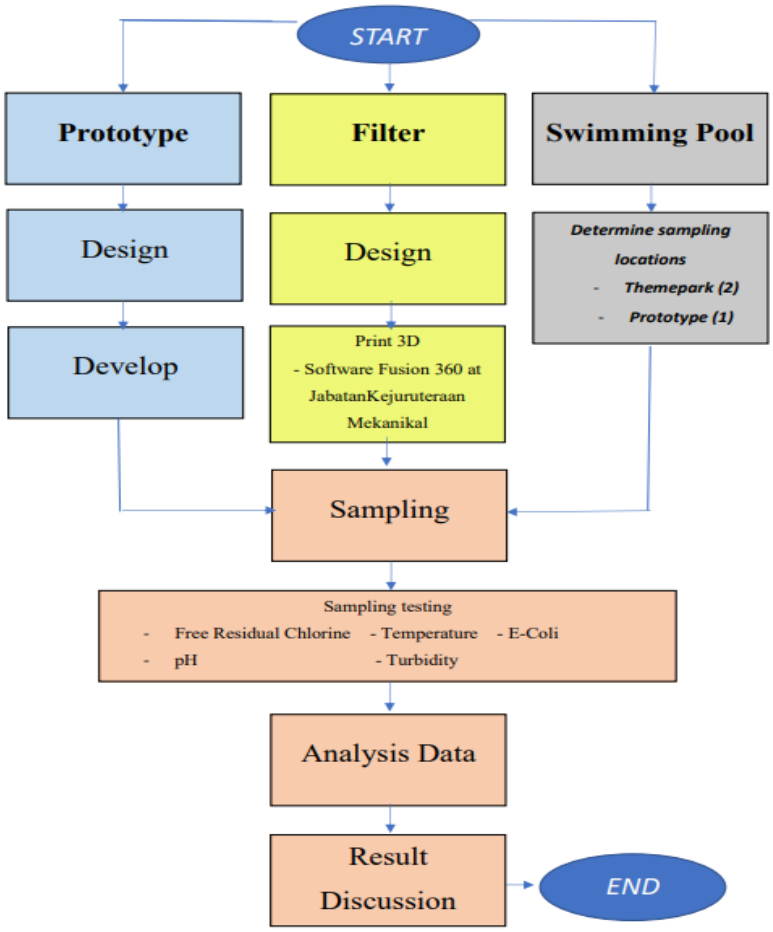


Figure 1: Research Methodology Flow Chart

[redacted]Chlorine Alternative Swimming Pool (CASP) Prototype Development

The ideal design for an alternative chlorine swimming pool (see Figure 2) consists of (1) a swimming pool, (2) a balance tank, (3) UV light and (4) an organic filter. The water from the main pipe or balance tank will go through the organic filter before being sanitized using UV light. Water that has been disinfected will be sent to the swimming pool and the cycle repeat continuously.

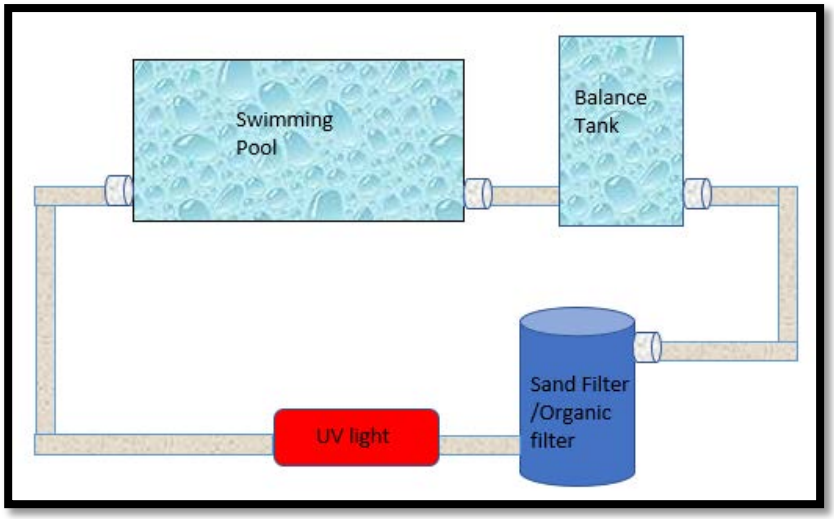


Figure 2: Chlorine Alternative Swimming Pool (CASP) Design

Filter Development

The organic filter was adopted from H_2O Organic Purifier developed by Ismil (2021). Figure 3 shows the CASP prototype. The filter has six (6) layers of filters:

i. Fine Sand – retains fine sediments on the surface of the water
ii. Coarse Sand – has a high and strong density and filters solid impurities in water
iii. Rock – facilities filtered water through channels
iv. Charcoal – has a very large surface area and purifies water eliminates odours
v. Petola Coir– reducing ammonia nitrogen levels and water pH levels
vi. Filter-paper/Sponge – used as water filter passing through all the materials

Figure 3: Chlorine Alternative Swimming Pool (CASP) Prototype

Pool Water Quality Standard

The acceptable standard values for parameters to be monitored are listed in Table 1. These standard values apply to treated pool waters. In this study, due to the limitation of resources and time constraints, there are only 5 parameters; (a) free residual chlorine, (b) pH, (c) turbidity, (d) temperature and (e) E-coli, to be tested given to these parameters have a direct or close association with the disinfection process (Ministry of Health Malaysia, 2017).

Table 1: Water Quality Standards Monitoring Guidelines
(Ministry of Health Malaysia, 2017)

No.	Parameters	Unit	Standard Values
1	Free residual chlorine	mg/I	0.5-3.0
2	pH	-	7.0-7.8
3	Turbidity	NTU	≤ 5.0
4	Temperature	°C	21.2-32.2
5	Escherichia coli (E.coli)	-	Absent in 100ml
6	Total Alkalinity (as CaCO3)	mg/I	80-200
7	Hardness (as CaCO3)	mg/I	75-250
8	Total Dissolved Solids	mg/I	≤ 1000
9	Cyanuric acid	mg/I	≤ 50
10	Nitrate (as NO3 – N)	mg/I	≤ 10

Data Collection procedures and Data Analyses techniques

Theme Park 1, Theme Park 2, and Chlorine Alternative Swimming Pool (CASP) are the identified location for this study. Based on the size of the pool, there are two (2) positions (Point 1 and Point 2) taken not less than 2 meters away from the water inlet (chlorination location). While the water samples are taken at a depth of between 5 to 30 cm from the water surface and 50 cm from the pond's edge (Ministry of Health Malaysia, 2017). The UV light plus Organic Filter is the chlorine alternative disinfection system used in the third location namely, Chlorine Alternative Swimming Pool (CASP) proposed in this study. The total sample to be taken is five (5), and each sample will be tested for (i) free residual chlorine, (ii) pH, (iii) turbidity, (iv) temperature and (v) E-coli. For free residual chlorine samples taken are tested at Chemsain Consultant, Water Quality Laboratory, while the E-Coli and turbidity samples are tested at Jabatan Kimia Malaysia, Water Quality Laboratory, and the rest are tested in the field using portable testing equipment.

3. Results and Discussion

In this section, data or results of water quality testing of each location parameter are presented and compared to the Swimming Pool water quality standard.

a) Free Residual Chlorine

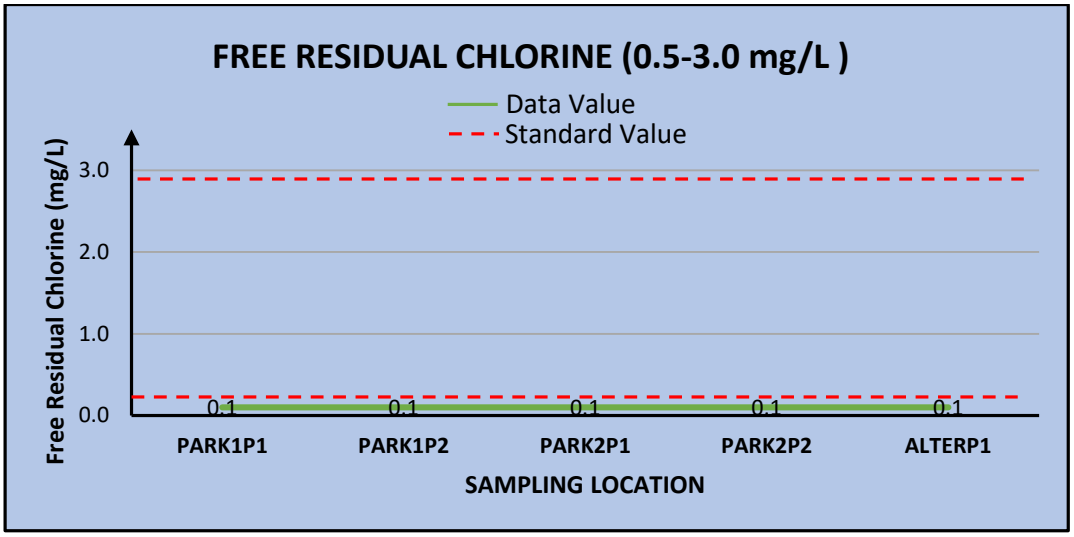


Figure 4: Free Residual Chlorine Data Result

The presence of free chlorine in the water is correlated with the absence of most disease-causing organisms, and thus is a measure of the potability of water. Based on the result obtained in Figure 4, chlorine residue is less than 0.1mg/l, which could indicate that the chlorine residual is a low level of chlorine remaining in water after its initial application. The low level of free chlorine residual in Theme Park 1 and Theme Park 2 swimming pools indicates that an insufficient amount of chlorine was added initially to the water to inactivate the bacteria and some viruses that cause diarrheal disease and to protect the water from recontamination during storage. As for the CASP (ALTERP1), the low chlorine residual level is due to no initial chlorine being added to the water tank.

b) pH

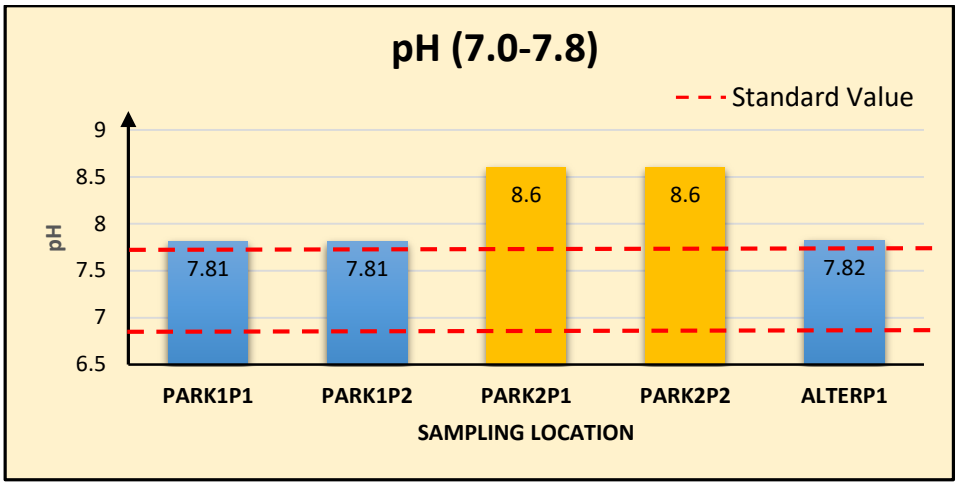


Figure 5: pH Data Result

Figure 5 shows that the pH level for PARK1P1 and ALTERPI are slightly higher by 0.01 than the allowable range for pH standards. However, the pH for PARK2P1 and PARK2P2 is higher by 0.8 than the allowable standard. pH above 8 can cause swimmers to have inflammation skin, while a pH less than 7 can cause inflammation of the swimmer's eyes. Several factors that can affect the pH level are chemical level in pool water, density number of swimmers, and rain density. In addition, when CO_2 off-gases due to splashing or aeration that agitates water causing bubbles to escape would also raise the pH of water.

c) Turbidity

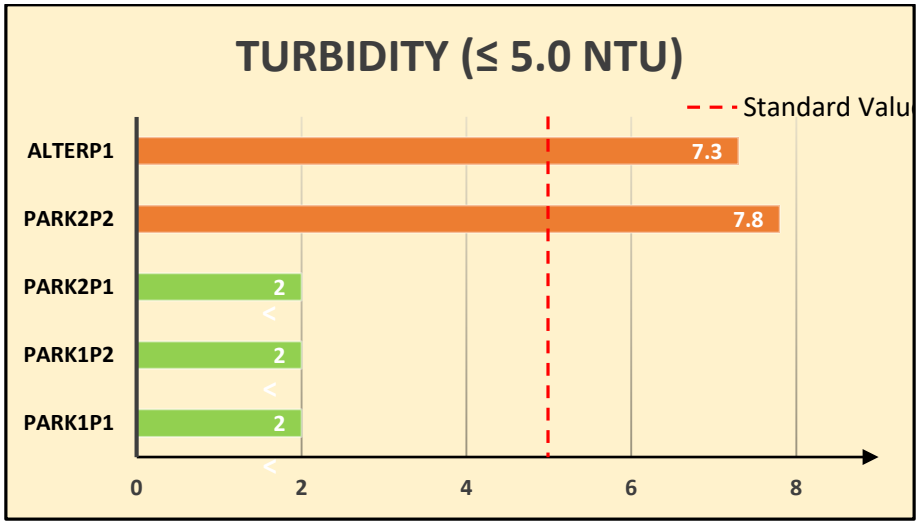


Figure 6: Turbidity Data Result

Based on Figure 6, both ALTERP1 and PARK2P2 exceeded the NTU for swimming pool turbidity standards. While PARK1P1, PARK1P2 and PARK2P1 are within the allowable NTU. As for the Turbidity, the turbidity result for Theme Park2 second point (7.8 NTU) and the CASP (7.3 NTU) is slightly higher than the allowed standard (≤5NTU) for turbidity. However, it could be caused by the water samples being taken too close to the surface of the pool and the depth of the water basin for CASP being too shallow.

d) Temperature

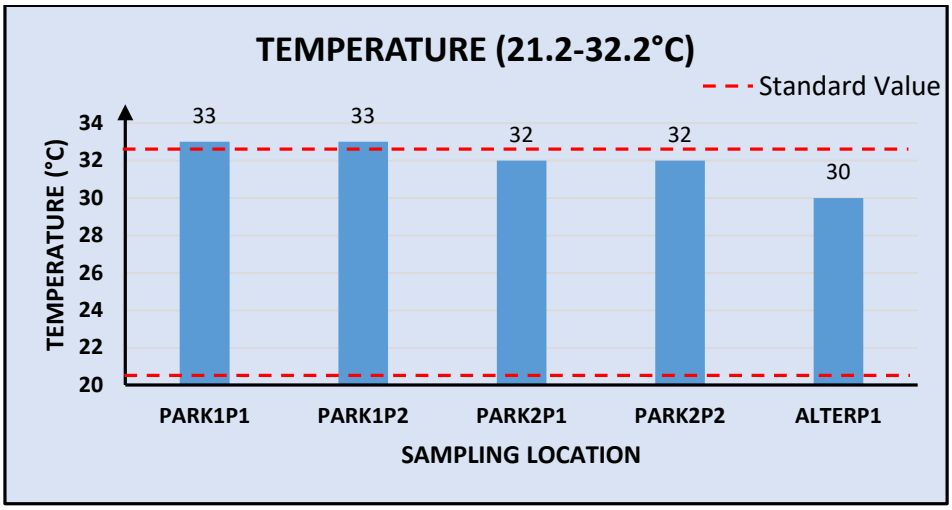


Figure 7: Temperature Data Result

Generally, the most common pool temperature for a residential pool used for leisure is between 21.2°C – 32.2°C. Figure 7 shows that all the swimming pool temperature is within the standard with PARK1P1 and PARK2P2 both recording slightly higher temperature.

e) E-Coli

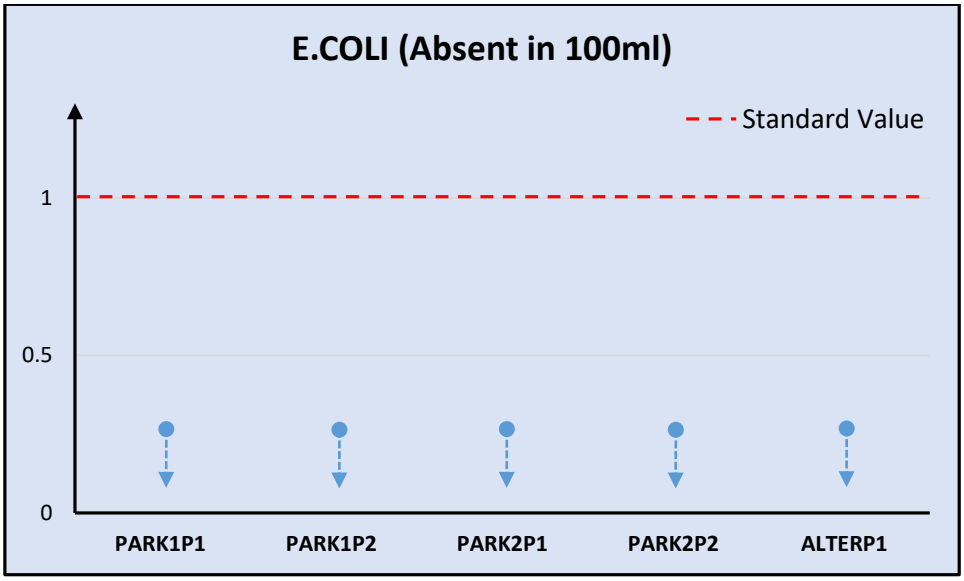


Figure 8: E-Coli Data Result

Figure 8 shows all the samples showing less than 1 (almost absent) E-coli in every 100ml of water sampling. According to the World Health Organization, a level of E. coli bacteria in the water that falls below 1 per 100 ml is considered low risk.

4. Conclusion

Table 2: The Summary of Water Quality Parameters

No	Parameter	PARK1P1	PARK1P2	PARK2P1	PARK2P2	ALTERP1
		Recorded Time				
		3.15 pm	3.15 pm	5.40 pm	5.40 pm	2.00 pm
1	Free Residual Chlorine	<0.1	<0.1	<0.1	<0.1	<0.1
2	pH	7.81	7.81	8.6	8.6	7.82
3	Turbidity	<2	<2	<2	7.8	7.3
4	Temperature	33°C	33°C	32°C	32°C	30°C
5	E-Coli	<1	<1	<1	<1	<1

Based on the finding of the 5 parameters discussed above, the water quality for the Theme Park1, Theme Park2 and the Chlorine Alternative Swimming Pool (CASP) (UV light plus Organic Filter) is partially complying with the Water Quality Standard for the swimming pool issued by the Ministry of Health Malaysia. There was not much difference in the water quality of the water Theme park's swimming pool and the CASP. All the water sampling for three identified locations has been tested and the result is summarized in Table 2. In conclusion, the

Chlorine Alternative Swimming Pool, CASP's water quality is considered safe for swimmers as it is free from microorganisms and residual chlorine. A further investigation needed to be conducted for commercial-size swimming pools, and to ensure that CASP is sustainable and cost-effective before it could be implemented.

Acknowledgements

We would like to express our gratitude to Jabatan Kesihatan Negeri Sabah (JKNS), Jabatan Kimia Malaysia, Negeri Sabah (JKM), Jabatan Kejuruteraan Mekanikal (JKM), Politeknik Kota Kinabalu and Chemsain Consultant Sdn. Bhd for their assistance and collaboration in generating data to complete the project.

References

Clark, J. (2019, June 5). The Manufacture of Chlorine. Retrieved from Chemistry LibreTexts.

Galal-Gorchev, H. (1996). Chlorine in Water Disinfection. *Pure and Applied Chemistry*, *68*(9), 1731-1735. https://doi.org/10.1351/pac199668091731

Gobulukoglu, I. (2010). Swimming Pools and Water Parks. UV Solution Magazine. https://www.americanairandwater.com/water/UV-Pools&WaterParks.pdf

Ismil, A.S. (2021). H_2O Organic Purifier. CEDIX 8, Jabatan Kejuruteraan Awam.

Koch, W. H. (1946). Facts about Chlorine. *Sewage Works Journal*, *18*(6), 1194–1198. http://www.jstor.org/stable/25030379

Ministry of Health Malaysia (2017). Swimming Pool Water Quality Standard and Monitoring Guidelines (for Public Pool Operators), Engineering Services Division, Ministry of Health Malaysia.

Psaroudis, J.C., Banker, R.S., and Kershner, K. (2013). An Insider's Guide to UV Treatment for Swimming Pools and Spray Pads – Regulations, Technologies, and Configurations. IUVA NEWS / Vol. 14 No. 3. https://uvsolutionsmag.com/stories/pdf/archives/150304PsaroudisEtAl_Article_2013.pdf

LOW THERMAL CONCRETE

Abdull Sulaiman Ismil[1] and Mohd Isa Jaffar[2]

[1,2]Polytechnic of Kota Kinabalu, Malaysia
[1]abdullsulaiman@polikk.edu.my
[2]mohdisa@polikk.edu.my

Abstract: The weather in Malaysia is getting hotter by the day and the issue of affected foundation concrete in structures leads to thermal cracking. Concrete members will expand and contract when exposed to hot and cold ambient temperatures, respectively. Cracking will occur if bulk volume charge resulting from temperature variations. Concrete will hit to a certain degree of temperature which is 75°C to 80°C and the dehydration takes place where the process of thermal cracking occurs. The objective of this study are (i) To invent a new low thermal concrete with optimum ratio. (ii) To determine low thermal concrete able to withstand thermal cracking. (iii) To achieve a concrete mixture at 23ºC temperature. The mixture of low temperature concrete is cement, aggregate, sand and ice. 1:3:6 mixture ratio is the optimum based on prior experiment for the foundation concreting. The temperature test and workability test are conducted. The normal temperature for a concrete is 34ºC. The target concrete temperature of the study is 23ºC. The findings show the target concrete temperature achieved at 23.04ºC. The content of ice and water combined in the concrete are 100% (186kg). The optimum ice content in the concrete is 41.4% (77kg), water content in the concrete is 58.6% (109kg). This research has successfully achieved the target concrete temperature 23ºC which is below the normal concrete temperature 34ºC to prevent thermal cracking from occurring. A further investigation and test are needed to ensure low thermal concrete is relevant to apply in construction.

Keywords*: low thermal concrete; thermal cracking; ice: temperature*

1. Introduction

Thermal cracking occurs due to excessive temperature differences causes the cooler portion to contract more than the warmer portion, which restrains the contraction. Thermal cracks appear when the restrain results in tensile stresses that exceed the in-place concrete tensile strength. The key to reducing thermal or temperature-related cracking is to recognize when it might occur and to take steps to minimize it. Surface contraction due to cooling restrained by the hotter interior concrete that doesn't contract as rapidly as the surface. This restraint creates tensile stresses that can crack the surface concrete as a result of this uncontrolled temperature difference across the cross section. In most cases thermal cracking occurs at early ages. In rare instances thermal cracking can occur when concrete surfaces are exposed to extreme temperature rapidly. Concrete members will expand and contract when exposed to hot and cold ambient temperatures, respectively. Cracking will occur if this bulk volume change resulting from temperature variations is restrained. This is sometimes called temperature cracking and is a later age and longer term issue.

2. Materials and Methods

The mixture of the concrete is cement, fly ash, aggregate, sand, water, additive/adhesive (hardener) and ice. The aggregate grade is 20mm (35°c), cement type is OPC (60°c), and the ice was chilled (10°c) with 1:3:6 (cement: sand: aggregate) concrete mixture ratio for the foundation concrete. The total weight of concrete every mixture is 2390.48 kg/m^3. Testing that has been conducted are slump test and cube test with size of cube 150mm x 150mm x 150mm. 20 trials have been done to achieved concrete mixture at temperature 23°C. However, testing data are only state of 4th trial to show the different of trial mixture. Temperature reading using formula of ice/water factor calculation, material heat unit calculation, and achieved temperature calculation. Other than that, temperature difference formula also has been used to calculate the value for ice needed for next trial.

- Equation 1: Achieved temperature $= \frac{\text{Total Heat}}{\text{Total unit heat}}$
- Equation 2: Ice/water Factor $= \frac{\text{Ice Weight}}{\text{Water weight}}$
- Equation 3: Required Ice $= \frac{\text{Temp.Difference}}{\text{Specific heat of ice}} \div 186 \times 100$
- Equation 4: Materials Total Heat $= \text{Material heat unit} \times \text{Material Temperature}$
- Equation 5:
  Temp. Difference $= \frac{(\text{Target concrete temperature} - \text{Achieved temperature})}{\text{Total Heat unit}}$
- Equation 6: $\sum$ Materials Heat Unit = $\sum$ (Material weight × Specific heat)
- Equation 7: Total heat $= \sum$ Material total heat

3. Results

All mixture and testing are conducted at the Laboratory of Research and Development Lafarge, Petaling Jaya, Kuala Lumpur. The data below shows 4th trial of concrete mixture.

3.1 First Trial Mix Design

Table 1. First Trial achieving normal concrete temperature

Materials	**Mat. Wt -** kg/m^3	**Specific Heat** kj/(kg/c^0)	**Unit heat** kj/(m^{3}c^0)	**Mat. temp**	**Total Heat** kj	
Cement - OPC	315	0.92	289.8	60	17388	
Fly Ash	135	0.92	124.2	35	4347	
Ice	**0**	-335			0	
Water - Chilled	**186**	4.184	778.224	10	7782.24	
Aggregate	1748	0.92	1608.16	35	56285.6	
Additive (Hardener)	6.48	4.184	27.112	35	948.9	Achieved Temperature
Total Mat.	2390.48			**Total heat**	86751.8	30.68
		Total unit heat	2827.496			

The total weight of water and ice for the first trial is 186 kg/m^3. On the first trial, concrete is excluded ice to obtain normal concrete mixture temperature. The unit heat of chilled water for first is 778.224 kj/(m^3c^0), the heat unit for aggregate is 1608.16 kj/(m^3c^0). The heat unit for cement is 289.8 kj/(m^3c^0), heat unit for fly ash is 124.2 kj/(m^3c^0), and the heat unit for adhesive (Rapid Hardener) is 27.11232 kj/(m^3c^0). The total heat for water is 7782.24, and the total heat for aggregate is 56285.6. The total heat for cement is 17388, fly ash 4347, additive 948.9. Total heat unit for first trial is 2827.50. The achieved concrete mixture temperature for this trial is 30.68ºC.

3.2 Second Trial Mix Design

Table 2. Second Trial achieving concrete temperature

Materials	**Mat. Wt -** kg/m^3	**Specific Heat** kj/(kg/c^0)	**unit heat** kj/(m^3c^0)	**Mat. Temp**	**Total Heat** kj	
Cement - OPC	315	0.92	289.8	60	17388	
Fly Ash	135	0.92	124.2	35	4347	
Ice	**65**	-335			-21719.36	
Water - Chilled	**121.2**	4.184	506.96	10	5069.59	
Aggregate	1748	0.92	1608.16	35	**56285.6**	
Additive (Hardener)	6.48	4.184	27.112	35	948.9	Achieved Temperature
Total Mat.	2390.48			**Total heat**	62319.77	24.38
		Total unit heat	2556.231			

The total weight of water and ice for the second trial is 186 kg/m^3. On the second trial, researcher mix ice as to obtain targeted concrete mixture temperature. The unit heat of chilled water for second trial is 506.96 kj/(m^3c^0), the total heat of water is 5069.59. The specific heat of ice is -335, the total heat is -21719.36, the total unit heat for second trial is 2556.23kj/(m^3c^0). The achieved concrete mixture temperature for this trial is 24.38ºC.

3.3 Third Trial Mix Design

Table 3. Third Trial achieving concrete temperature

Materials	**Mat. Wt** - kg/m^3	**Specific Heat** kj/(kg/c^0)	**Unit heat** kj/(m^3c^0)	**Mat. Temp**	**Total Heat** kj	
Cement - OPC	315	0.92	289.8	60	17388	
Fly Ash	135	0.92	124.2	35	4347	
Ice	**75**	-335			-25245.8	
Water - Chilled	**111**	4.184	462.92	10	4629.15	
Aggregate	1748	0.92	1608.16	35	**56285.6**	
Additive (Hardener)	6.48	4.184	27.112	35	948.9	Achieved Temperature
Total Mat.	2390.48			**total heat**	58352.88	23.23
		Total unit heat	2512.187			

The total weight of water and ice for the third trial is also186 kg/m^3. On the third trial, researcher mix ice as to obtain targeted concrete mixture temperature. The unit heat of chilled water for second trial is 462.92 kj/(m^3c^0), the total heat of water is 4629.15. The specific heat of ice is -335, the total heat is -25245.8, the total unit heat for third trial is 2512.19 kj/(m^3c^0). The achieved concrete mixture temperature for this trial is 23.23ºC.

3.4 Fourth Trial Mix Design

Table 4. Fourth Trial achieving concrete temperature

Materials	**Mat. Wt -** kg/m^3	**Specific Heat** kj/(kg/c^0)	**Unit heat** kj/(m^3c^0)	**Mat. Temp**	**Total Heat** kj	
Cement - OPC	315	0.92	289.8	60	17388	
Fly Ash	135	0.92	124.2	35	4347	
Ice	**77**	-335			-25818.37	
Water - Chilled	**109**	4.184	455.76	10	4557.64	
Aggregate	1748	0.92	1608.16	35	**56285.6**	
Additive (Hardener)	6.48	4.184	27.112	35	948.9	Achieved Temperature
Total Mat.	2390.48			**Total heat**	57708.8	23.04
		Total unit heat	2505.036			

The total weight of water and ice for the fourth trial is also186 kg/m^3. On the Fourth trial, researcher mix ice as to obtain targeted concrete mixture temperature. The unit heat of chilled water for second trial is 455.76 kj/(m^3c^0), the total heat of water is 4557.64. The specific heat of ice is -335, the total heat is -25818.37, the total unit heat for fourth trial is 2505.04 kj/(m^3c^0). The achieved concrete mixture temperature for this trial is 23.04ºC. This mixture is the best optimum mixture that achieved target concrete temperature.

3.5 Mix Design summary for Low Thermal Concrete

Table 4. Mix design summary

Materials	Material Weight	Material Temp.	1st Trial	2nd trial	3rd trial	4th Trial	Final quantities
Cement	315 kg/m^3	60ºc					315 kg/m^3
Fly Ash	135 kg/m^3	35ºc					135 kg/m^3
Ice (added)			0	65	75	77	77 kg/m^3
Chilled Water	186 kg/m^3	10ºc	186	121	111	109	109 kg/m^3
Aggregate	1748 kg/m^3	35ºc					1748 kg/m^3
Adhesive (Hardener)	6.48 kg/m^3	35ºc					6.48 kg/m^3
Concrete Temp.			30.68ºc	24.38ºc	23.23ºc	23.04ºc	23.04ºc

Material temperatures of fly ashes, aggregate and adhesive are 35°c, Water is chilled until its temperature drop to 10°c; and the highest temperature among the material used is Ordinary Portland Cement 60°c. The material weight of cement is 315 kg/m^3, and fly ash weight is 135 kg/m^3. Cement and fly ash combined must be total of 100%. Fly ash 30% and Cement 70%. The total weight of water and ice must be 186 kg/m^{3}as for ice act as substitution for water.

3.6 Ice/Water Factor Calculation

Formula to get ice/water factor value:

Ice/water Factor $= \frac{\text{Ice Weight}}{\text{Water weight}}$

$= \frac{77}{186}$

$= 0.414$ kg/m^3

3.7 Materials Heat Unit Calculation

Formula to get materials heat unit value (kj) is Material weight × Specific heat:

Materials Heat Unit (Fly ash) = Fly ash weight × Fly ash specific heat
= 135 × 0.92
= 124.2

Materials Heat Unit (agg.) = Aggregate weight × aggregate specific heat
= 1748 × 0.92
= 1608.16

Materials Heat Unit (Additive)= Adhesive weight × adhesive specific heat
= 6.48 × 4.184
= 27.11232

Materials Heat Unit (Cement)= Cement weight × Cement specific heat
= 315 × 0.92
= 289.8

3.8 Materials Total Heat Calculation

Formula to get materials total heat value (kj) is Heat unit × Material Temperature :

Materials Total Heat (Fly ash) = 124.20 × 35
= 4347

Materials Total Heat (Aggregate) = 1748 × 35

= 56285.6

Materials Total Heat (Additive) = 6.48×4.184
= 948.9

Materials Total Heat (Cement) = 315×60
= 17388

3.9 Achieved Temperature Calculation

Formula to get achieved temperature value:

Achieved temperature (1st trial) $= \frac{\text{Total Heat}}{\text{Total unit heat}}$
$= \frac{86751.8}{2827.49632}$
= 30.68°c

Achieved temperature (2nd trial) $= \frac{62319.77}{2556.231291}$
= 24.38°c

Achieved temperature (3rd trial) $= \frac{58352.88}{2512.187567}$
= 23.23°c

Achieved temperature (4th trial) $= \frac{57708.80}{2505.036444}$
= 23.04°c

3.10 Temperature Difference Calculation

Formula to get temperature difference value:

Temp. Difference (1st trial)$= \frac{(\text{Target concrete temperature} - \text{Achieved temperature})}{\text{Total Heat unit}}$
$= \frac{(23.00-30.68)}{2827.49632}$
= -21719.4

Temp. Difference (2nd trial)$= \frac{(23.00-24.38)}{2556.231291}$
= -3526.45

Temp. Difference (3rd trial) $= \frac{(23.00-23.23)}{2512.187567}$
= -572.57

Temp. Difference (4th trial)= $\frac{(23.00-23.04)}{2505.036444}$

= -92.26

3.11 Temperature Difference Calculation

Formula to get value for ice need for next trial:

Required Ice (1st trial) = $\frac{\text{Temp.Difference}}{\text{Specific heat of ice}}$

= $\frac{-21719.4}{-355}$

= 61.18 = 65

Required Ice (2nd trial) = $\frac{-3526.45}{-355}$

= 9.934 = 10

Required Ice (3rd trial) = $\frac{-572.57}{-355}$

= 1.61 = 2

Required Ice (4th trial) = $\frac{-92.96}{-355}$

3.12 Concrete Temperature

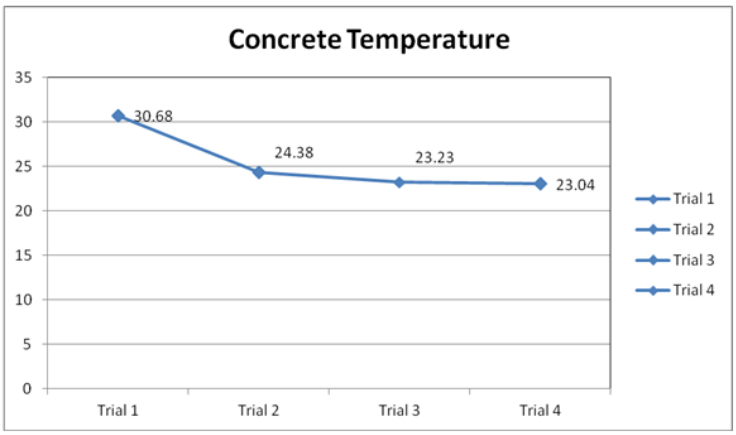


Figure 1. Concrete Temperature

3.13 Ice Factor Against Ice Weight and Water Weight

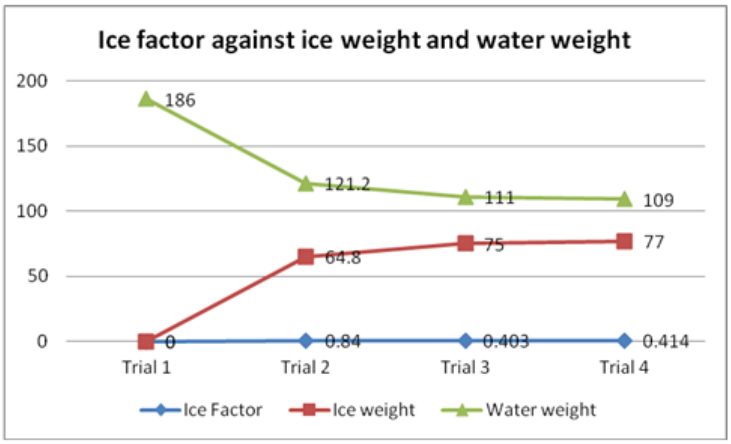


Figure 2. Ice factor against ice weight and water weight

3.14 Ice Percentage and Water Percentage Against Achieved Temperature

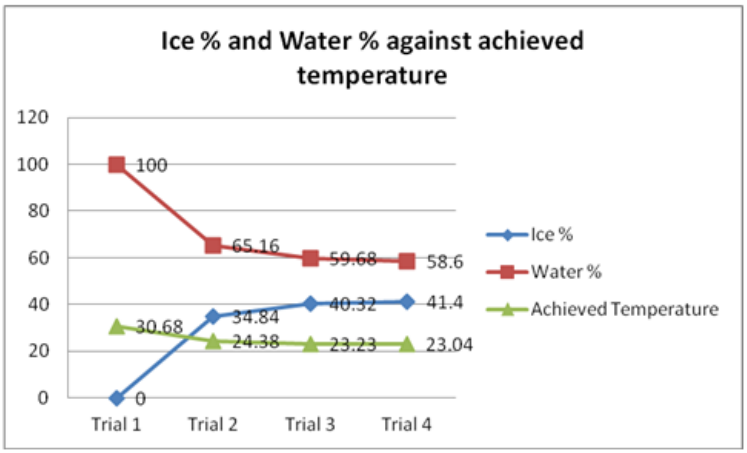


Figure 3. Ice Percentage and water percentage against achieved temperature

3.15 Total Heat of Ice And Water Against Temperature Achieved

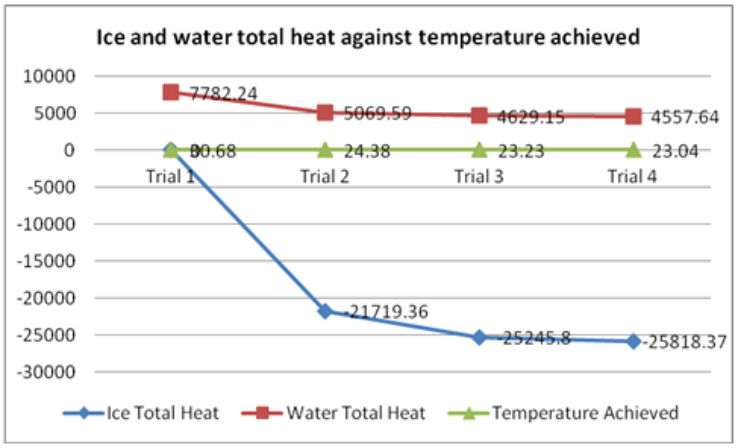


Figure 4. Ice and water total heat against temperature achieved

3.16 Temperature Difference and Total Heat Unit

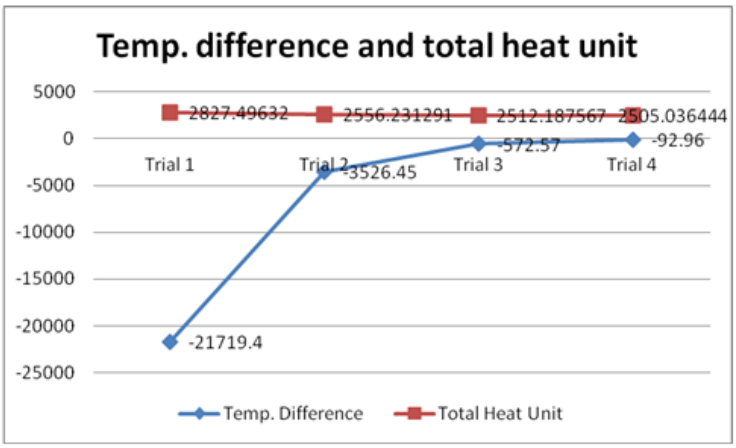


Figure 5. Temperature differences and total heat unit

3.17 Total Heat for Every Trial

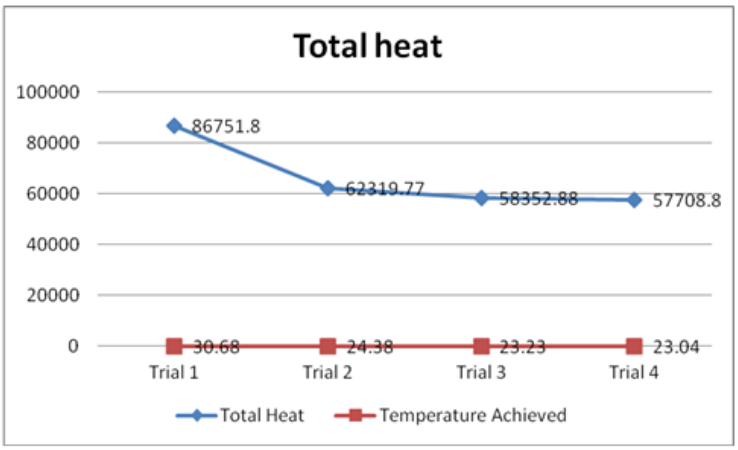


Figure 6. Total heat

4. Discussion

Based on the data analysis, the concrete temperature is achieved based on the weight of material and its temperature. From the material weight and its temperature, researchers can get the formula to obtain the heat unit, total heat of material, ice weight needed and the temperature difference between target concrete temperature and achieved concrete temperature. It is also related to each other; researchers finds that all the elements are need to get the concrete mixture temperature. The normal concrete mixture temperature is 34 degrees Celsius. On 1st trial researchers achieved concrete mixture with temperature of 30.68 degree Celsius, this trial is conducted with 0kg of ice and 186kg of water in the mixture. On 2nd trial researchers achieved concrete mixture with temperature of 24.38 degree Celsius, this trial is conducted with 64.8kg of ice and 121.2kg of water. On 3rd trial researchers achieved concrete mixture with temperature of 23.23 degree Celsius, in this trial the concrete mixture consists of 75kg of ice and 111kg of water to achieve the mentioned temperature. On 4th trial researchers achieved concrete mixture with temperature of 23.04 degree Celsius, on this last trial the concrete mixture consists of 77kg of ice and 108kg of water. Based on the trials conducted, the lower the material temperature, the lower the concrete mixture temperature can be mixed. The researchers obtained 23.04^{o}c concrete, this reduces the probability of the concrete reaching thermal cracking temperature during hydration process (75-80^{o}c). Also, researchers find that the lower the total heat unit, the lower the concrete mixture temperature can be obtained. After the data is analysed, the researchers highly recommend to chill materials that have the highest weight used in concrete mixture which is aggregate. By chilling highest weight material, the ice weight used to mix 23 degrees Celsius or lower can be significantly lessen. It also recommended that the concrete mixing can be conducted in a cold temperature room, to maintain the material temperature affected by atmospheric temperature.

Acknowledgments

Alhamdulillah. Thanks to Allah S.W.T, whom with his willing giving us the opportunity to complete this research. We would like to express our deepest thanks to Laboratory of Research and Development Lafarge staff who guide and support us in laboratory test. Deepest thanks and appreciation to our family, friends, and others for their cooperation, encouragement, constructive suggestion and support for the report completion, from the beginning till the end.

References

Kosmatka, Steven H., and Panarese, William C. (1988) *Design and Control of Concrete Mixtures*, (13th edition) : Portland Cement Association

Lancaster, Lynne. (2005) *Concrete Vaulted Construction in Imperial Rome. Innovations in Context* : Cambridge University Press

BigRentz (2020, January 09). *The History of Concrete*. Retrieved from https://www.bigrentz.com/blog/the-history-of-concrete

Dept. of Materials Science and Engineering, University of Illinois, Urbana-Champaign (2013, January 08). *The History of Concrete.* Retrieved from https://www.academia.edu/34427188/CONCRETE

Nick Gromicko and Kenton Shepard (2013) *the History of Concrete*. Retrieved from https://www.nachi.org/history-of-concrete.htm#ixzz31V47Zuuj

John Gajda and Martha VanGeem (2002). *Controlling Temperatures in Mass Concrete,* : Concrete International, pp. 59-62.

Jan P. Skalny (1989). *Materials Science of Concrete (I, II, III)*. Westerville, OH: American Ceramic Society Inc

Bruce A. Suprenant and Ward R. Malisch (2008). *Contractor's Guide to Mass Concrete* : Concrete International

John Gajda and Martha VanGeem (2002). *Controlling Temperatures in Mass Concrete* : Concrete International

Moon, H.Y.; Shin, D.G. & Choi, D.S. (2007). *Evaluation of the durability of mortar and concrete applied with inorganic coating material and surface treatment system* (Vol. 21): Construction and Building Materials

DETERMINANT OF EMPLOYEE'S RETIREMENT PLANNING: A LITERATURE REVIEW

Norashikin bt Rosli

Politeknik Ungku Omar, Malaysia
norashikin.ros@puo.edu.my

Abstract: The world is going into ageing population and Malaysia is also experiencing the same situation. A good retirement plan is needed to continue decent life in older age. To enjoy this, there is a need to pre-plan retirement since early working days. Monthly budget should not only involve current expenditure but also savings for the future. However, do Malaysian really do plan for their retirement? This study attempts to investigate the issue by reviewing literatures that dominates retirement planning research. This is a conceptual paper that identified factors that can give influence towards retirement planning. The findings showed mixed results and three independent variables have been identified in retirement planning literature including demographic factors, social influence and financial literacy. Based on previous research, most Malaysians are not ready for retirement. Those who are not prepared early for retirement might not be able to achieve their retirement goal. Therefore, findings in this review will be beneficial not only to employees in arranging proper retirement plan but as well as to policy makers as they can arrange a better plan in supporting employee's retirement planning.

Keywords*: Retirement Planning; Demographic Factors; Social Influences; Financial Literacy*

1. Introduction

The age distribution of the world's population is continuously changing, which is unprecedented. This is brought on by rising life expectancy and falling fertility rates. It demonstrates that individuals are living longer and that the proportion of older people in the population as a whole is steadily increasing. A demographic phenomenon known as population ageing is when the median age of a nation or region rises. This will also introduce changes in terms of population requirements and capabilities and will have a considerable effect on employment, consumption of savings, economic growth and asset value.

There were 727 million people who were age 65 above in 2020. (United Nations Department of Economic and Social Affairs/Population Division). Women make up the bulk of older people, especially at advanced ages, as they typically outlive men. In Malaysia, the proportion of people aged 65 and above rose from 7.0% in 2020 to 7.4% in 2021. (Department of Statistics Malaysia, 2021). With the 7.5% of the population aged 65 and above, it made Malaysia an officially aged nation. It is predicted that Malaysia will become an older society by 2044. This is when 14% of the population would be 65 years or older. According to the World Bank's

Malaysia Economic Monitor Report, (2019) Malaysia's population will age at a rate that is significantly faster than that of some European nations and Australia, but about as quickly as that of other nations in East Asia and the Pacific, including China, Japan, Singapore, and Thailand. However, despite the increasing number of older people, research shows that only 24.8% of individuals worldwide save for old age (Demirguc-Kunt et al., 2016). (Farrar et al., 2019) states that this lack of savings and the ageing of the population place heavy burdens on pension system would result in the retirees having insufficient financial means to support themselves during retirement.

In addition to being in excellent health and leading a fulfilling life, the Employees Provident Fund (EPF) Board highlighted financial stability as one of the three prerequisite factors for a comfortable retirement in its Annual Report 2016 (EPF Report, 2016). Nevertheless, the report also revealed that over half of households do not possess any financial assets, and that one-third of Malaysians do not have a savings account. In addition to this, out of 14 million EPF members, only 7 million members that are regularly and actively make contribution to their retirement (EPF Report, 2018). Moreover, 50% of EPF members have used up their retirement savings in just five years, and 52% of Malaysians only start saving for retirement when they are 40 years old. But, due to the delayed in the retirement planning, the savings are insufficient (Kenanga Investor,2015). According to global research on the future of retirement conducted by HSBC (2016), one in four persons of working age had not yet started saving for retirement or obtaining any guidance on retirement planning. It's noteworthy that the same survey also found that nearly two-thirds of Malaysian retirees regretted waiting too long to begin saving for their retirement. The majority of working individuals (84%) in this research are still of the opinion that saving for retirement is not a top priority. To them funding here and now become their priorities which include paying off other debts (19%), investing for their children's education (22%), and paying off their home (41%). The situation is made worse by the COVID-19 outbreak with the government's decision to permit withdrawals has had an impact on EPF (Employees Provident Fund) savings. Less than RM10,000 is currently in the accounts of nearly 50% of EPF members. Due to withdrawals under i-Citra and i-Lestari, 46% of EPF members under the age of 45 had savings totaling less than RM10,000.

The Minimum Retirement Age Act of 2012 went into effect in 2013, which set a minimum retirement age of 60 for the active labour force across all industries (Malaysia, 2012). A person that joins the workforce at the age of 25 will have to work for at least 35 years before retiring at the age of 60, which is the legal retirement age. In order to have enough money to support your living expenditures and healthcare needs for the ensuing 20 to 35 years, it is critical to start saving for retirement early and throughout the normal 30- 35 years of employment. There are different pension and retirement plans are offered in Malaysia as a component of individual retirement plans. If you are a government servant then you can choose pension plan and if you are working in private sector you are under EPF Scheme. Malaysians have the option to voluntarily make their own contributions to the EPF in order to save money for retirement, regardless of whether they are self -employed or work in the unorganized sector.

As Malaysia's elder population grows inevitably, more people will probably confront more difficulties and demands to secure a decent retirement life as they enter their golden years. Even after reaching retirement age, an unprepared retiree must continue working because their standard of living will be the same as it was when they were younger (Lee and Law, 2004). Because of this, having a proper retirement planning is essential to support their living. To further understand the issue, this study review retirement planning literature by identifying

determinants that influence employees' retirement planning in Malaysia as well as providing recommendations to improve retirement planning among employees. It is very important to review this as Malaysia is approaching an ageing population where the needs and welfare of older people need to be taken care of as this will give impact to our country as a whole.

2. Literature Review

Retirement Planning

Coverage and adequacy are two crucial components of retirement support. Employees in the formal sector are more protected, yet the majority of them have relatively little saved up. As the cost of living and health care services are rising, the system needs to be improved in order to accommodate an ageing population. According to a study done by Le Grand & Robinson (2017) people do not save enough money for retirement. Furthermore, Park and Estrada (2013) states that the pension plan accessible to Malaysian civil servants does not actually guarantee its beneficiaries a secure retirement. Moreover, Suhaimi and Norma (2013) states that Malaysians find it difficult to have enough funds for retirement. The environment, the person, and the psychology have all been found to have an effect on how employees behave with regard to retirement planning (Engel, Blackwell, and Miniard,1990). The same elements that have an impact on retirement planning are also the subject of other studies. They include demographics like age, gender, education, and income levels (Mansor et al, 2015; Shariff & Isah, 2019 and Noar,2017). Despite being more financially precarious, there is evidence to suggest in terms of financial preparation for retirement, women are less engaged (Burn, Button, Figinski, & McLaughlin, 2020). In other research done by (Hoffmann et al., 2021) they found that women are more likely to be in a condition of high financial vulnerability than men.

While there are a number of factors that affect how people plan for their retirement, other research indicates that financial literacy is the key component and that it positively corresponds with educational level (Van Rooij, Lusardi, & Alessie, 2011). In research done between 2015-2018 by OECD International Network on Financial Education, AKPK, and the Malaysian Financial Planning Council (2018), Malaysians have not yet attained a satisfactory standard of financial literacy.

Social pressure may also have an effect on people's motivation to save more. Highly social individuals are more inclined to invest in their future savings (Ibrahim et al,2012). This is supported by Beshears et al. (2015), who found that the availability of peer information can affect a working person's decision to save for retirement. Additionally, Dalen (2010) noted that social effects had a favorable impact on retirement planning. Family roles influence young minds significantly and encourage autonomous participation in money management. During this stage, people acquire and develop their own knowledge and ideas that affect how they handle their finances. These behaviours were developed by their family and may be useful in the future (Bakar & Bakar, 2020).

Based on the AKPK Financial Behaviour Survey (2018), which examined the spending, saving, and debt management practices of Malaysian working adults, there are still some areas that need to be improved for the financial wellbeing of Malaysian. Based on BNM's findings on long-term financial planning, the majority of Malaysians lack long-term financial planning, and only 40% of them are financially prepared for retirement. Retirement planning should

ideally begin as soon as someone enters the workforce and be handled accordingly. From the beginning of your career, proper money management is crucial. The majority of Malaysians are aware of the need to budget, manage their finances, and lead disciplined lives, yet some just do not able to do so due to the current economic climate. But still, the need to have retirement planning should start once the working life start not when the retirement age come close.

3. Methods

Several electronic databases available such as Emerald, SAGE, Science Direct and Google Scholar were used to search for resources. Literature reviews indicate important issues, explain findings and valuable information. To conduct this literature search, several keywords have been identified such as retirement planning, financial literacy, demographic factors, social influence, Malaysia, and savings decisions. This search resulted in 15 papers that are deemed to be relevant for this study. The research paper is retrieved and reviewed. Each paper was analyzed and categories into content themes.

4. Findings

The result summarized showed mixed findings on the variables influencing the retirement planning of an individual (Table 1).

Table 1: Summary of Literature Considering Factors influencing Employee Retirement lanning

No	Title Research	Author	Findings
1	Factors affecting Retirement Planning of Gen Y workers in Klang Valley	Hafinaz Hasniyanti Hassan, Muhammad Amirul Masran	Financial education & Retirement Planning - It shows that financial education is significant factor and affects the retirement planning of Gen Y workers in private sector. - Additional info from Asian Institute of Finance (AIF)(2015) on Gen Y in Malaysia found that millennials in Malaysia have poor financial education as 58% from the surveys said they are having average financial knowledge.
2	Statistical Analysis on factors affecting retirement saving decisions	Nurul Sima Mohamad Shariff, Waznatul Widad Mohamad Ishak	Age and retirement savings - the result indicated that those who were either in the younger group or older age groups might have different ways in planning for

			retirement. As the age increased, the probability to have a bad bahvioral on retirement savings decreases, which means that the people are more inclined to have a good savings decision. Financial knowledge andretirement savings - Increase in the lack of financial knowledge and management dan future expectation leads to the increase of the bad retirement behavior Social influences and retirement savings - It shows negative relationship indicating that as the level of social influence increases, the probability to have a bad decision on retirement savings decreases.
3	Demographic Factors associated with retirement planning: a study of employees in Malaysia Health Sectors	Mohd Fitri Mansor, Chor Choon Hong, Noor Hidayah Abu, MohdShahidan Shaari	Demographic factors & retirement planning - The result shows that age, education level & income have relationship with retirement planning while gender did not influence retirement planning
4	Empirical study on the determinants of retirement savings attitude in Malaysia	NSM Shariff and NAM Isah	Demographic factor, social influences and retirement savings attitude - Demographic factors (income,education level) relationship are positive. - Social influence also have positive impact towards retirement savings.
5	Parents influence on Retirement planning in Malaysia	Fatemeh Kimiyaghalam, Shaheen Mansori, Meysam safari and stanleyyap	Parents influence and retirementplanning - The results indicated that parents had a significant effect on retirement planning.
6	Psychological process, social and	Jais,J and Asokumar,A2019	Financial literacy, employer education & retirement

	environmental influences on Retirement Planning: Malaysian Energy Industry Perspective		planning - The research results shows that there is a positive effect between financial literacy & retirement planning Social influences & retirement planning - Result shows that there isa strong socialization aspect exists in employee retirement planning.
7	Retirement Planning Among Primary School Teachers In Selangor	Nor Azilah Husin , Norasiah Abdullah2 , Mohamad Johari Abd Aziz3 , Rewathi Athinari4 , Ameera Syuhada Mohd Shukri 2021	Financial literacy and Retirement planning - The results shows that financial literacy have positive impact towards retirement planning. Teachers are indicated to be wise individuals who foresee that they need tobe well-prepared financially for their retirement.
8	The Awareness of Retirement Planning :A case with International Islamic University Malaysia Employees	Noar, 2017	Demographic factor and retirement planning - Age, gender, educational level and financial education have positive influence on retirement planning. However peer effect is not positively related.
9	Factors influencing retirement planning behaviour of lecturersin Polytechnics	Aziam,Siti, Ainiza,Rohayah and Nor,2017	Financial knowledge andretiremen planning - Results shows that there isa significant influences on retirement planning behavior Social influences Results shows that it did not have significant influences on retirement planning
10	Retirement planning: Young Professionals in Private Sectors	Zazili,Ghazali,Bakar,Ayob and Samad, 2017	The findings shows that job satisfaction, financial literacy andsavings behaviour have a significant relationship on retirement planning.

11	Retirement palnning behaviour among employess's Provident Fund staffs	Faezah and Talib, 2017	Demographic factors & retirement planning behavior - The results shows that age group, education level, job position and self awareness among staff does not significant effecting retirement planning behavior.
12	Retirement confidence and preparedness:A study among working adults in northern statein Malaysia	Shanmugam and Zainal Abidin, 2013	Financial literacy and retirementplanning - The results shows that financial literacy did not significant towards retirement planning
13	Framing the retirement planning behavior model towards sustainable wellbeing among youth: the moderating effect of public profiles	Asyraf Afthanorhan,Abdullah Al Mamun,Noor Raihani Zainol,Hazimi Foziah and Zainudin Awang,2020	Financial literacy , social influence and retirement planning - The result shows that financial literacy, saving attitude, goal clarity andsocial influence have a positive and significant effect on retirement planning.
14	Analysis the effect of financial literacy on financial planning for retirement	Agung Satria Setyawan Hutabarat & Chandra Wijaya	Financial literacy and Financial planning retirement - Results shows that financial literacy did have positive impact towards financial planning retirement.
15	Financial literacy and personal retirement planning: a socioeconomic approach.	Kulondwa Safari, Charity Njoka & Mughisho Guershom Munkwa	Financial literacy and personal retirement planning - Results shows that financial literacy have positive impact towards personal financial planning.

5. Discussion and Recommendation

First factor is demographic factors. According to United Nations Statistics Division (2014), description of people is literally called demography. These factors usually include age, gender, education level, and income. Study done by (Mansor et al., 2015) shows that education level, age and household income did influence retirement planning whereas gender did not. The findings also supported by (Sharif and Isah,2019) where income and education level did have positive relationship towards retirement savings. Another study found that different retirement planning strategies may be used by people who fall into the younger or older age groups. People are more likely to make wise financial decisions as they get older since the likelihood of engaging in inappropriate retirement savings behaviour declines (Nurul et al, 2021). Ismat (2011) also revealed that age, gender, incomes and education level were significantly correlated with retirement planning. Similarly, Noar (2017) also summarized that age, gender, educational

level and financial education have positive influence on retirement planning. This, however, is in contrast to research by (Faezah et al., 2017) which found that staff members' personal age groups and educational levels did not have a favourable association with retirement planning.

Second factors that has been highlighted in this literature review is financial literacy. In research done by (Zazili et el,2017) showed that there is a significant relationship between financial literacy and retirement planning. In a similar manner, research by Masran & Hassan, (2017) found that financial education is an important factor that influences how Gen Y workers in the private sector plan for retirement, and research by Nurul Sima Mohamad Shariff & Ishak (2021) found that an increase in the lack of financial knowledge and management combined with an increase in future expectations leads to an increase in unfavourable retirement behaviour. Since employees are not prepared to retire, this could lead to poor retirement planning. On the other hand, study done by (Jais & Asokumar, 2020; Afthanorhan et al., 2020) found positive effect between financial literacy and retirement planning. This is also again supported by (Husin et al., 2021) where the results shows that financial literacy has positive impact towards retirement planning. Teachers are indicated to be wise individuals who foresee that they need to be well-prepared financially for their retirement. (Safari et al., 2021) also found in their research that financial literacy have positive impact towards personal retirement planning. In another research done by (Hutabarat & Wijaya, 2020) they found that financial literacy variable has a significant positive effect on pension financial planning of lecturers and administrative staffs at the Universitas Indonesia. However, they only have a basic understanding of the organisations, goods, and services associated with the financial sector but they do not comprehend the specifics of product benefits, dangers, and rights, or the obligations that come with using financial products and services. Nolan and Doorley (2019) state that financial literacy is knowledge of basic economic concepts. Doing simple financial calculations is a vital skill required to ensure adequate financial safeguard during older age. Nevertheless, this study did not correlate with the above research as financial literacy is insignificant towards retirement planning (Shanmugam and Zainal Abidin,2013).

Third factors are social influence which was found to be insignificant towards employee’s retirement planning (Aziam et al.,2017; Noar 2017). Here, it is recommended that organization should encourage social connection between employees which ought to set them up for the retirement life. Research by (Nurul Sima Mohamad Shariff & Ishak, 2021) also reveals a negative relationship, showing that the likelihood of making a poor decision about retirement funds lowers as the level of social influence rises. This could be as a result of friends and social media, that could change people's ideas, attitudes, or lifestyle choices towards retirement savings. However, there are research that show positive relationship between social influence and retirement planning. As such (Jais.J and Asokumar,2019) where result shows that there is a strong socialization aspect exists in employee retirement planning and (Afthanorhan et al., 2020) that discovered social influence have a positive and significant effect on retirement planning. When examining societal influences on retirement planning, it is discovered that married women between the ages of 31 and 40 who have a high level of education and a low income exhibit these impacts more pronouncedly. Shariff & Isah (2019) also found that social influence has positive impact towards retirement savings. People frequently take the advice of others, particularly family and friends, and given the development of social media and technology today, it's feasible that this could have an impact on retirement planning. This is also support by (Kimiyaghalam et al., 2017) where they found that parents have significant effect on retirement planning where financial behavior of the parents influenced their children attitude toward saving.

According to a review of the literature, there has been little research conducted in Malaysia and conflicting outcomes among studies. Only a small number of studies have identified social impact, financial literacy, and demographic characteristics as influences on retirement planning, particularly in Malaysia. These elements may aid employees in making better retirement plans, which will enable them to live comfortably in retirement. It has been determined that retirement planning is crucial because Malaysia will have an ageing population by 2044. By acknowledge that Malaysia will turn an aging society, the government should a developmental approach by taking an active role into integrate ageing issues and concerns. In a World Bank Report (2020), it is recommended that the Malaysia's minimum retirement age need to be gradually raised from the current 60 years old to 65 years old. With the employment of individuals aged 50 and above, it can help to mitigate the growth effects of an aging population. With an ageing society, Malaysians will have no choice but to work longer. Longer working life will increase the financial sustainability of pensioners. However, this recommendation needs to be analyses before any final decision to be made. The government may want to consider gradually increase the retirement age while looking into other factors that might affected when the retirement age is increase. An aged employee is an asset for the corporation or country, which they possess expertise, skills and full of experiences that could help the country into greater level as well as meeting national goals in delivering a pool of talented workforces (Yusoff and Zulkifli,2014). Government might also want to consider establishing incentives for private savings because doing so might motivate people to save more money (Kimiyaghalam et al., 2017). Tax incentives may be the foundation of a larger campaign to persuade workers to begin saving for retirement even if there is no clear proof of their efficacy. In addition, the government or others in charge of making policy may want to take measures to ensure that parents have appropriate financial information and to encourage them to educate their kids. According to earlier studies, parents' financial habits influenced their kids' attitudes on saving, which in turn influenced how they manage their retirement planning. Parents, especially new parents, need to learn about personal finance. To assist parents in educating their children about money matters and the advantages of personal finance, the use of newsletters or media messaging can be very helpful. Children should be encouraged to preserve their pocket money, and parents should consider including them in financial decision-making when appropriate. Early financial planning education can be highly beneficial for youngsters as it will help them handle their money sensibly once they start working.

Other than roles of government, employers and society can also play a role in employees retirement planning. According to Ramely et al. (2016), holistic assistance should be seriously considered in empowering and promoting the responsibilities of employers and society in enticing and catalysing older individuals to participate in the labour market. By providing a retirement education programme, employers should raise staff understanding of the importance of early retirement planning. Additionally, workers must realise that retiring is a process they should begin before reaching retirement age rather than waiting until they do. The job of the human resources department must go beyond the working day since they must also help employees decide on retirement decisions. Companies' HR policies should adopt appropriate solutions and mechanisms to guarantee that older workers' knowledge and experience is not lost to the organisation in light of the ageing workforce and predicted skilled labour shortage (Rau and Adams,2012).

6. Conclusion

The retirement plan has been a long-term project, and it did not materialise overnight. Individuals are making an effort to make sure they have a good life after retirement and make use of benefits like a pension plan or the EPF. When developing financial plans, Malaysian workers and especially young people should show greater attention and be initiative. Every financial choice people make has an impact on how they live in retirement age. They must therefore be informed, educated, and ready for the future. Given that Malaysia's life expectancy is rising, planning for retirement from their earliest working years can assist them have a comfortable retirement. The objective of this research is to identify the factors that influence retirement planning and three main factors has been identified which are demographic factors, financial literacy and social influence. Future researcher who are interested in retirement planning should compare the factors that effects retirement planning between low, medium and high-income groups of people. Furthermore, future researchers should consider investigating these three factors among self- employed workers. This is because not much research has been done focusing on self-employed workers when it comes to retirement planning. In conclusion, issues on retirement planning should be taken seriously as we approaching ageing population. Many aspects need to be improved to ensure that these older population would have a comfortable retirement life without worrying much about money.

References

Afthanorhan, A., Mamun, A. Al, Zainol, N. R., Foziah, H., & Awang, Z. (2020). Framing the retirement planning behavior model towards sustainable wellbeing among youth: The moderating effect of public profiles. Sustainability (Switzerland), 12(21), 1–24. https://doi.org/10.3390/su12218879

Bakar,M.Z.A, & Bakar, S.A. (2020). Prudent Financial Management practices among Malaysian Youth: The Moderating Roles of Financial Education. The Journal of Asian Finance, Economics and Business, 7 (6), 525-535. https://doi.org/10.13106/JAFEB.2020.VOL7.NO6.525

Beshears, J., Choi, J. J., Laibson, D., Madrian, B. C., & Milkman, K. L. (2015). The effect of providing peer information on retirement savings decisions. The Journal of finance, 70(3), 1161-1201.

Burn, I., Button, P., Figinski, T. F., & McLaughlin, J. S. (2020). Why retirement, Social Security, and age discrimination policies need to consider the intersectional experiences of older women. Public Policy & Aging Report, 30(3), 101–106. https:// doi.org/10.1093/ppar/praa017.

Demirgüç-Kunt, A., Klapper, L. & Panos, G. A. (2016). Saving for old age. The World Bank Policy Research Working Paper No. 7693. Washington, DC: The World Bank. http://documents.worldbank.org/curated/en/896441468196731606/Saving-forold-age

Department of Statistics of Malaysia.(2021) Current Population Estimates, Malaysia, 2021

Employees' Provident Fund. (2016). Annual report 2016.

Employees's Provident Fund (2018).Annual report 2018

Engel, J. F., Blackwell, R. D. and Miniard, P. W. (1990). Consumer behavior. Orlando: Dryden Press

Faezah, N., Talib, M., & Manaf, H. A. (2017). Attitude towards Retirement Planning Behaviour among Employee's. Journal of Business and Management, 1(1), 15–21.

Farrar, S., Moizer, J., Lean, J., & Hyde, M. (2019). Gender, financial literacy, and preretirement planning in the UK. Journal of Women & Aging, 31(4), 319–339. https://doi.org/10.1080/08952841.2018.1510246.

Financial Behaviour and State of Financial Well-being of Malaysian Working Adults, AKPK Financial Behaviour Survey 2018. Retrieved from https://www.akpk.org.my/content/1259-research-and-publications

Hershey, D. A., Henkens, K., & Van Dalen, H. P. (2010). Aging and financial planning for retirement: Interdisciplinary influences viewed through a cross-cultural lens. The International Journal of Aging and Human Development, 70(1), 1-38.

Hoffmann, A., McNair, S., & Pallant, J. (2021). The financial vulnerability trap: using latent transition analysis to explore the dynamics of consumers' financial vulnerability over time. European Journal of Marketing.

HSBC Global Report. (2016). The Future of Retirement: Generations and Journeys. London, UK: HSBC Holdings Plc

Husin, N. A., Abdullah, N., Abd Aziz, M. J., Athinari, R., & Mohd Shukri, A. S. (2021). Retirement planning among primary school teachers in Selangor. Selangor Business Review, 6(2), 58–69.

Ibrahim, D., Isa, Z. M., & Ali, N. (2012, January). Malaysian savings behavior towards retirement planning. In Proceedings of 2012 International Conference on Economics Marketing and Management (Vol. 28, pp. 102-105).

Ismat, N. (2011). The influence of demographic factors on retirement planning among teachers in the district of Beaufort. (Doctoral dissertation), Universiti Malaysia Sabah.

Jais, J. B., & Asokumar, A. (2020). Psychological Process, Social and Environmental Influence on Retirement Planning: Malaysian Energy Industry Perspective. Management and Marketing, 15(2), 134–153. https://doi.org/10.2478/mmcks-2020-0009

Kimiyaghalam, F., Mansori, S., Safari, M., & Yap, S. (2017). Parents' Influence on Retirement Planning in Malaysia. Family and Consumer Sciences Research Journal, 45(3), 315–325. https://doi.org/10.1111/fcsr.12203

Le Grand, J., & Robinson, R. (2017). The economics of social problems. Basingstoke, UK: Macmillan

Lee, W. K. M. and Law, K. W.-K. (2004). Retirement planning and retirement satisfaction: The need for a national retirement program and policy in Hong Kong. Journal of Applied Gerontology, 23(3), 212-233.

Malaysia. (2012). Minimum retirement age Act 2012 (Act 753) s.4.1 (MYS).

Mansor, M. F., Hong, C. C., Abu, N. H., & Shaari, M. S. (2015). Demographic Factors Associated with Retirement Planning: A Study of Employees in Malaysian Health Sectors. Asian Social Science, 11(13), 108–116. https://doi.org/10.5539/ass.v11n13p108

Masran, M. A., & Hassan, H. H. (2017). Factors affecting retirement planning of Gen-Y workers in Klang Valley private sectors, Malaysia. International Journal of Advanced Research and Publications (IJARP), 1(4), 246-260.

Mustafa, A., Yusof, S. K., Silim, A., Adiman, R., & Hassan, N. L. (2017). Factors influencing retirement planning behaviour of lecturers in Polytechnics. Advanced Journal of Technical and Vocational Education, 1(4), 9-13.

Noar, N. Z. H. M. (2017). The awareness of retirement planning: A case with International Islamic University Malaysia employees. Revelation and Science, 7(02), 18-23.

Nolan, A., & Doorley, K. (2019). Financial literacy and preparation for retirement. OECD (2014) PISA 2012 results: students and money (Volume VI): financial literacy skills for the twenty-first century.

Park, D., & Estrada, G. B. (2013). Emerging Asia's public pension systems: Challenges and reform efforts.

Ramely, A., Ahmad, Y. and Harith, N. H. M. (2016). Productive ageing: The opportunities and challenges faced by the labour workforce in Malaysia. International Journal of Business, Economics and Law, 11(3).

Rau, B. L., & Adams, G. A. (2012). Aging, Retirement, and Human Resources Management: A Strategic. The Oxford handbook of retirement, 117.

Safari, K., Njoka, C. and Munkwa, M.G. (2021), "Financial literacy and personal retirement planning: a socioeconomic approach", Journal of Business and Socio-economic Development, Vol. 1 No. 2, pp. 121-134. https://doi.org/10.1108/JBSED-04-2021-0052

Satria, A. and Hutabarat, S. (2020), "Analysis the effect of financial literacy on financial planning for retirement (Case study lecturers and administrative staffs in universitas Indonesia)", Vol. 11 No. 5, pp. 741-750, doi: 10.34218/IJM.11.5.2020.066.

Schmillen,Achim Daniel Wang,Dewen Yap,Wei Aun Bandaogo,Mahama Abdel Samir Sidbewende Simler,Kenneth Binti Ali Ahmad,Zainab Abdur Rahman,Amanina Binti (2020) A Silver Lining - Productive and Inclusive Aging for Malaysia (English). The Malaysia Development Experience Series Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/287981606116408851/A-Silver-Lining-Productive-and-Inclusive-Aging-for-Malaysia

Shanmugam, A., & Zainal Abidin, F. (2013). Retirement confidence and preparedness: A study among working adults in a northern state in Malaysia.

Shariff, N. S. B. M., & Ishak, W. W. M. (2021). Statistical Analyses on Factors Affecting Retirement Savings Decision in Malaysia. Mathematics and Statistics.

Shariff, N. S. M., & Isah, N. A. M. (2019). An empirical study on the determinants of retirement savings attitude in Malaysia! Journal of Physics: Conference Series, 1366(1). https://doi.org/10.1088/1742-6596/1366/1/012110

Suhaimi abd Samad & Norma Mansor (2013). Population ageing and social protection in Malaysia. Malaysian Jaournal of Economis Studies, 50 (2) 139 -156. Retrived from https://mjes.um.edu.my/index.php/MJES/article/view/2873/1047.

United Nations Department of Economic and Social Affairs/ Population Division. (2020).

Van Rooij, M., Lusardi, A., & Alessie, R. (2011). Financial literacy, retirement planning and household wealth. De Nederlandsche Bank Working Paper, No. 313/2011.World population ageing highlight.

Yusoff, S. N. and Zulkifli, Z. (2014). Rethinking of old age: the emerging challenge for Malaysia. International Proceedings of Economics Development and Research, 71, 69.

Zazili, A. S. A., Ghazali, M. F. B., Bakar, N. T. B. A., Ayob, M. B., & Abd Samad, I. H. B. (2017). Retirement planning: Young professionals in private sector. In SHS Web of Conferences (Vol. 36, p. 00024). EDP Sciences.

INTELLIGENT RAILWAY SAFETY DETECTION DEVICE AT RAILWAY PLATFORM

Sunitha V. Doraisamy[1] and Izwah Ismail[2]

[1,2]Politeknik Ungku Omar, Malaysia
[1]suni7624@yahoo.com
[2]izwahismail@gmail.com

Abstract: Railway stations are often linked with accidents and have safety issues at the track or platform edge. The number of passengers usually rises during the peak hours which causes the railway platform to be packed and crowded. People with disabilities who use commuter as their basic mode of transport are also at risk for accidents at the platform edge. To prevent any accidents or hazards from happening, an improvement method was identified to improvise the safety at the railway platform. The objective of this study is to develop a detection device which is able to alert passengers at the platform edge of the railway station. Once the prototype of the intended device was developed, it is further validated with experts. The study has led to the development of a railway safety detection device which uses a type of sensor called ultrasonic sensor. The instruments used to develop the sensor are Arduino UNO R3, male to male dupont cable, buzzer, LED light, USB cable, breadboard, 220K ohm resistor and battery connector. The end result shows that the desired objectives for this study has been achieved. The development of this railway safety detection device contributes towards the safety at the platform edge of the railway station. Such device gives more safety awareness to public where this is able to reduce accidents.

Keywords: *platform edge; commuter; detection device; Arduino*

1. Introduction

The rail transport system in Malaysian includes the monorail transport network, light rail transit (LRT) and commuter train (KTM) which provides routes to travel within a metropolitan area, connecting commuters to a central city from adjacent suburbs or commuter towns (Ahmed et al., 2016). Generally, commuter rail systems are considered heavy rail, using electrified or diesel trains. KTM commuter is a S-train, commuter rail system in Malaysia operated by Keretapi Tanah Melayu (KTM). It was introduced in 1995 to provide local rail services in Kuala Lumpur and the surrounding Klang Valley suburban areas. Services were later expanded to other parts of Malaysia with the introduction of the Northern and Southern sectors. KTMB accepts many commuter users to this date (Ahmed et al., 2016). The number of passengers usually rises at peak hours resulting to crowded situations at the railway platform. People with disabilities also tend to use the commuter as their basic mode of transport. The overcrowding of commuter users at the railways platform contributes towards the risk of accidents to happen (Hirsch et al., 2018). This is mainly due to the overstepping of the yellow safety line at the

platform. Therefore, as a solution, railway safety detection device is developed for the safety at the platform edge and in the commuter coach (Lawson, 2015).

The yellow safety line or also known as tactile paving at the platform edge was first developed by a Japanese engineer and inventor in 1967 (Bosso, 2018). Following a few years later, the tactile paving was highly used in all countries. Tactile paving is classified into two types. One type has small, round bumps upon the surface of the block, which could be felt through the sole, meanwhile the second type is a directional aid with long slender bumps that are being installed on the surface (Yamada, 2014). The tactile that is usually used for platform edge is offset blister tactile which known as platform edge warning surface (Hamid, 2015).

Over the past years, the number of commuter passengers have rised which substantially have led to the overcrowding at the railway platform (Hunter-Zaworski, 2017). This situation effects the safety of the people where they tend to ignore the safety line at the railway platform. The current safety measure instilled at the railway platform is a yellow safety line situated 1 metre from the platform edge. When people tend to overstep the safety yellow line it is not easy to detect and alert them especially when the platform is overcrowded with people. Any alert regarding the overstepping of the yellow safety line is made through an announcement using the PA system by the railway workers who observes through a booth which seems to be ineffective. This definitely does not help either for people with hearing and visual impairment. This situation is hazardous to commuter passengers waiting to commute the train at the railway platform as this sort of situation is able to cause accidents at any time (Coffey, 2018) due to the lack of awareness and disregard on the existence of the yellow safety line at the platform edge.

2. Materials and Methods

In this study, the methodological process that was carried out were the system study, problem identification, design, model development, testing prototype and improvisation of the ultrasonic sensor that is to be installed at the platform edge. This process led towards achieving the aim of the study which is to develop a detection device that alerts passengers at the platform edge of the railway station.

A detailed study was conducted on the existing warning sign for safety that is tactile paving at the platform edge. The tactile paving is analysed to know how far it is helpful in giving clear sign to the passengers at the railway platform. The issues surrounding the platform edge of the train station was identified in order to find solutions. The best method that was though off was innovating an intelligent safety device at the railway platform to overcome and as well as increase the level of safety and awareness among passengers waiting at the platform edge.

The prototype design of the intelligent railway safety detection device was made by using the AutoCadd application. Figure 1 shows the sketching of the ultrasonic sensor circuit that was later developed.

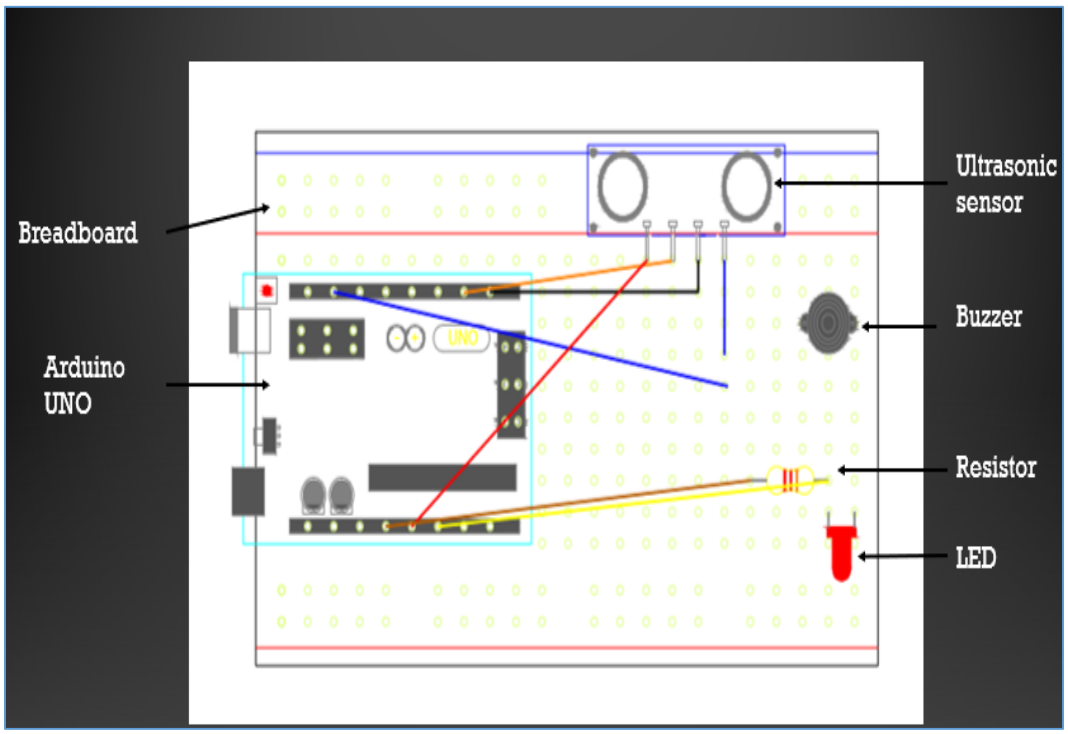


Figure 1. Ultrasonic Sensor Circuit.

Instruments applied for the development of the Railway Safety Detection Device are ultrasonic sensor, Arduino Uno R3, Breadboard, USB Cable Type A/B, Resistor, LED Light, Buzzer and Male to Male Dupont Cable.

For the testing of the prototype, the ultrasonic sensor was switched on to test the yellow line at the platform edge. The installed ultrasonic sensor device works by detecting the situation where it produces lights that blink through the installation of LED and as well as noise through the installation of buzzer, which is an immediate warning to the passengers who crosses over the safety yellow line at the railway platform.

Once the test-run was completed, the prototype was validated by the experts from *Keretapi Tanah Melayu Berhad* (KTMB). Based on the outcome of the validation by the experts from KTMB, the function of the prototype towards enhancing the safety level and as well as the level of awareness was mostly agreeable by them. Their advice and guidance on the part of improvisation of the innovation was further given by them which is discussed in the conclusion and recommendation section.

3. Results and Discussion

The effectiveness of this study is to ascertain whether a security system that uses ultrasonic sensors is effective in improving the safety level at the platform edge. In addition, safety systems are influenced by several factors such as passenger capacity, physical characteristics of passengers, type of devices and physical features of the commuter itself. An ultrasonic sensor is chosen to for this innovation due to its' many advantages. The ultrasonic sensor contains high frequency and high sensitivity level which means its' ability to detect external or deep

objects easily. It also has greater accuracy level compared to the other types of sensors (Baldwin, 2011). They are also convenient to use and are not harmful when using during the operation of the sensor for nearby objects, person, equipment and as well as materials. An obstruction detection system for a vehicle generally employs sensors such as ultrasonic sensors mounted on the vehicle body for detecting surrounding obstacles using ultrasonic waves. Conventionally, the ultrasonic sensors transmit sound waves around the vehicle and sense an obstacle through waves reflected by the obstacle (Erick, 2014). Figure 2 shows the current position of the yellow safety line at the railway platform.

Figure 2. The Yellow Safety Line (KTM Rawang, 2019)

Figure 3 shows the proposed situation on how the sensor is installed at the yellow line with the distance of 1 meter from the railway track.

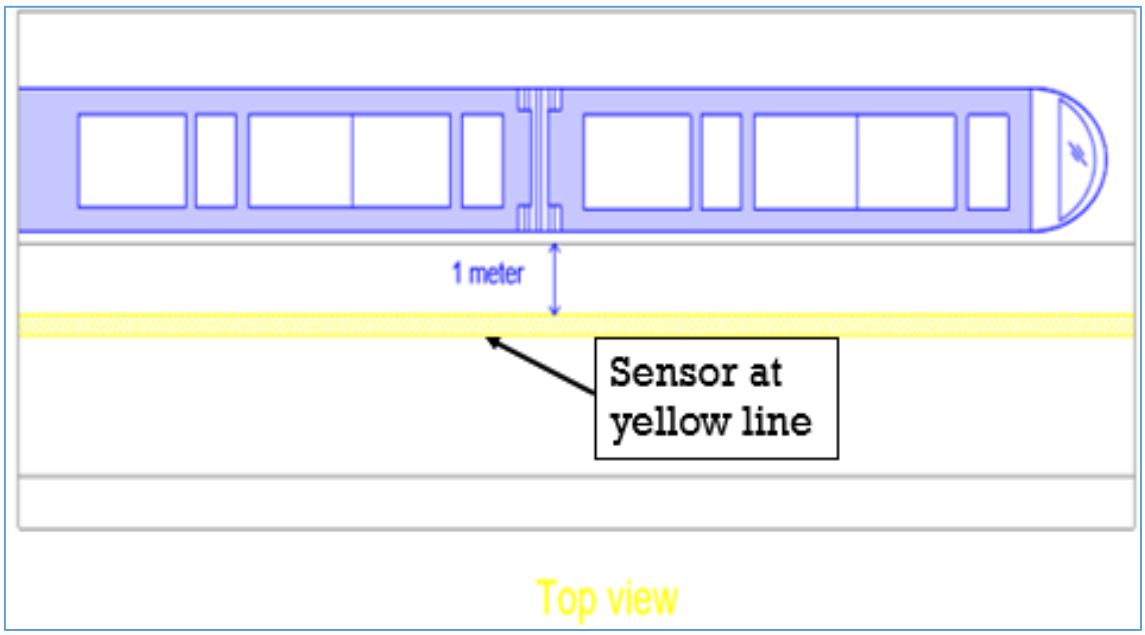


Figure 3. Top view of sensor at yellow line

As a result of the study, there are various things that was learnt, such as information and knowledge regarding the railway system, the length and width of yellow line at platform edge, the current safety measures at the platform edge, current issues that related to railway system and methods to resolve the problem/issue that occurs at the railway station.

In terms of knowledge and learning, the knowledge gained is about the various components of the material used to make the Arduino, which is the detection device and the methods and process to make the Arduino's coding so that the detection device is able to work successfully. The detection device development contributes to the use of KTM authorities. The detection device developed for the platform edge contributes to the public, especially those who are visually and as well hearing impaired, where the device is equipped with LED and buzzer sound. Here, the device works for the visually impaired people with the buzzer sound, while those with hearing impairment are alerted with the LED light. Figure 4 shows the completed railway safety detection device prototype which functioned successfully after several trials.

Figure 4. The developed railway safety detection device prototype

This study at the end found the railway safety detection device developed for the platform edge at the railway station is effective and important. This is because the development of the railway safety detection device helps to ensure the safety at the platform edge of the railway station. With this, the accident at platform edge's rate could be controlled and reduced. The passengers could be more aware and alert on the safety at the platform edge when they are waiting for the arrival of the train.

However, there were some recommendations from the experts in KTMB Ipoh after the intelligent railway safety detection device was validated by them. It is suggested that the intelligent railway safety detection device should be added with a voice over announcement right after the buzzer goes off detecting cross over the safety yellow line. It is also suggested that the device should be specially alerted to KTM staff so that they staff are able to receive the information that happens at the platform edge. This enables the situation at the platform edge to be more secured and controlled.

4. Conclusion

As a conclusion, the development of the intelligent railway safety detection device at railway platform have been educational as where the civil engineering knowledge was applied and played an important role towards developing the safety railway detection device. The objectives of this study are achieved, where firstly, to design an intelligent railway safety detection device at the platform edge, secondly to develop it. Both of the objectives were successful because the detection device that was developed works well as planned. The last objective was also successfully achieved where the detection device was validated with experts from KTM.

Overall, the railway safety detection device contributes to the transportation field, especially the railway system. It is hoped through this innovative study and idea could be an effort towards improvising the safety and awareness level at the railway platform.

Acknowledgments

The author would like to convey her gratitude to experts from KTMB, Perak, Malaysia, for their support, guidance and advice throughout this study.

References

Ahmed, M.M et al., (2016). A New Approach to Solve Transportation Problems. *Open Journal of Optimization*. DOI: 10.4236/ojop.2016.51003. No. 5, pp. 22-30, 4th March, 2016.

Baldwin, D.E, (2011). Priority Claims and Cross-Reference. *Vehicle Detection and Compass Applica tions using AMR Magnetic Sensors*,pp. 29.

Bosso, N. et al., (2018). Design and Simulation of a Railway Vehicle for the Transport of People with Reduced Mobility. *Department of Mechanical and Aerospace Engineering, Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino, Italy*, pp. 14.

Coffey H (2018). One in Four Disabled People Don't Use Public Transport Due to Negative Attitudes from Other Passengers, New Research Finds. (Independent) Retrieved April 25, 2020, from https://www.independent.co.uk/travel/news-and-advice/uk-disabledtravel-accessibi.

Erick, M. L. (2014). Method and system for compensation of ultrasonic sensor. *Ford Global Technologies* , pp. 6.

Hamid, N. A. et al., (2015). Safety and Security Need of Commuter Rail Service. *Journal of the Eastern Asia Society for Transportation Studie.* Vol. 11, pp. 2-12.

Hirsch, J.A. et al., (2018). Impact of New Rapid Transit on Physical Activity: A Meta Analysis. Elsevier. https://doi.org/10.1016/j.pmedr.2018.03.008. Vol. 10, pp. 184-190, June 2018.

Hunter-Zaworski, K. (2017). Analysis of Passenger Incident Data from 5 Railway Transit System School of Civil and Construction Engineering, Oregon State University, Corvallis, OR 97331, USA. https://doi.org/10.3390/safety3030021. No. 3, vol. 3, pp. 21. 12th. September, 2017.

Lawson, N. (2015). Step change: Network Rail's Neal Lawson talks platform safety https://www.railway-technology.com/features/featurestep-change-network-rails-neal-lawson-talks-platform-train-interface-strategy-4557886/. 27th April, 2015. (Retrieved on the 25th. August, 2019).

Yamada, (2014). Safety Performance Measures for Railway Stations. Transportation Research Board 93rd. Annual Meeting, Washington DC. No. 14-1868. 27th January, 2014.

REKABENTUK PENUTUP LONGKANG KONKRIT MESRA ALAM

Nur Hanani Daud[1], Saiful Hazman Mokhtar[2] dan Ernie Kulian @ Abd Karim[3]

[1,2,3]Politeknik Sultan Haji Ahmad Shah, Malaysia
[1]hanani.daud@polisas.edu.my
[2]saiful@polisas.edu.my
[3]ernie@polisas.edu.my

Abstrak: Tempurung kelapa adalah salah satu bahagian dari kelapa yang mempunyai pelbagai kebaikan. Menurut Amiruddin (2017), penggunaan tempurung kelapa sebagai bahan ganti agregat bersaiz 10 mm memberi kesan positif terhadap kekuatan di dalam ujian tegangan. Oleh itu, satu kajian yang menggunakan tempurung kelapa sebagai bahan ganti di dalam pembuatan penutup longkang yang telah dijalankan. Tujuan kajian ini adalah untuk merekabentuk satu penutup longkang mesra alam yang menggunakan bahan buangan. Tempurung kelapa digunakan sebagai bahan tambah agregat kasar iaitu sebanyak 30, 50 dan 70 peratus. Dari analisa kajian mendapati bahawa penambahan tempurung kelapa sebanyak 30% memberikan kekuatan yang tinggi berbanding konkrit biasa setelah di awet selama 7 hari. Nisbah untuk menghasilkan konkrit poros juga berjaya direkabentuk iaitu 3:1 iaitu agregat kasar dan simen manakala air sebanyak 0.5% dari simen. Peratus keporosan yang didapati adalah 60% yang mana bagus untuk pengaliran air ke longkang. Kekuatan beban yang mampu ditampung adalah 100kg. Secara kesimpulannya, objektif dicapai dengan jaya dan kajian ini perlu diteruskan bagi menambah baik dari segi kekuatan beban yang mampu ditanggung, kemasan dan peratus keporosan air.

***Kata kunci**: Tempurung kelapa; Penutup Longkang; Mesra Alam*

1. Pengenalan

Dewasa ini, penggunaan bahan binaan amat dititik beratkan terutama dari segi kesan terhadap alam sekitar. Terdapat banyak sisa buangan yang boleh dikitar semula dalam menangani isu pemanasan bumi dan pembaziran sumber. Penggunaan bahan buangan pertanian sebagai pengganti agregat telah menjadi perkara biasa dalam industri pembinaan. Penggunaan bahan buangan dapat memulihara sumber asli dan bahan buangan di samping turut membantu dalam pemeliharaan alam sekitar.

Menggunakan konkrit yang diperbuat daripada tempurung kelapa mempunyai lebih banyak kelebihan daripada agregat kasar. Konkrit menggunakan agregat tempurung kelapa mencapai konkrit syarat asas. Tempurung kelapa mempunyai pengekalan lembapan dan keupayaan penyerapan air yang lebih tinggi daripada agregat konvensional, (Sonawane, 2016)

Selain dari menggunakan bahan kitar semula, kajian ini juga dijalankan sebagai satu alternatif

menggantikan penutup longkang besi yang selalu di curi penduduk setempat. Masalah kecurian penutup longkang adalah satu perkara yang sering berlaku di kediaman komuniti. Ini kerana besi buruk mempunyai nilai di dalam pasaran. Selain dari itu, sejak akhir-akhir ini banyak juga kes banjir kilat di kawasan perumahan akibat longkang tersumbat dan sampah yang tersekat di dalam longkang. Mengikut laporan akhbar Berita Harian pada April, 2016 terdapat juga kes seorang kanak-kanak tertusuk besi dari longkang keluli ketika berjalan.

Mengikut Vani (2021) konkrit dengan penggantian separa agregat kasar dengan agregat tempurung kelapa dan simen dengan abu terbang adalah lebih sesuai untuk lantai, jalan raya dan turapan daripada konkrit berstruktur. Ini kerana beban dan kekuatan yang boleh ditampung adalah tidak sekuat konkrit bertetulang.

Kajian dari Noorasmawanty dan Norfaniza (2022) ciri mikrostruktur tempurung kelapa dalam konkrit juga memberi pengaruh positif dalam konkrit dan menjadikan tempurung kelapa sesuai sebagai agregat kasar dalam konkrit. Selepas mempertimbangkan semua faktor berdasarkan analisis, kira-kira 20% hingga 25% penggantian adalah sesuai untuk menggantikan agregat kasar.

Terdapat 3 objektif utama kajian inovasi ini dijalankan iaitu merekabentuk penutup longkang mesra alam, menguji keberkesanan penutup longkang mesra alam dan mengkaji kos pembuatan penutup longkang mesra alam.

Kepentingan inovasi ini adalah untuk mengekalkan kebersihan longkang dan dapat mengelakkan longkang tersumbat kerana penutup longkang mesra alam ini boleh menghalang sebarang sampah atau dedaun memasuki salur longkang. Ini telah dibuktikan rekabentuk yang telah dibuat dan hasil ujian terhadap penutup longkang yang telah direkabentuk.

Inovasi ini juga adalah mesra alam kerana menggunakan bahan yang boleh dikitar semula dan mudah didapati. Mengikut kajian terdahulu, tempurung kelapa boleh menggantikan batu baur dan mampu memberi kekuatan kepada konkrit dan asfat. Selain itu, batu sungai yang di letakkan di atas penutup longkang dapat membantu pengguna untuk melakukan refleksologi. Ianya juga secara tidak langsung akan melengkapkan landskap di sekitar bangunan.

2. Bahan dan Kaedah

Langkah pertama dalam mencapai objektif kajian ini adalah mereka bentuk lakaran produk dan kemudian mencipta nisbah konkrit poros berdasarkan kajian lepas. Produk yang di hasilkan adalah bersaiz 2x1 kaki seperti Rajah 1. Bahan yang digunakan adalah batu baur, simen, air, tempurung, batu sungai dan kasa dawai sebagai pengukuh produk.

Nisbah tempurung kelapa digunakan sebagai bahan tambah agregat kasar iaitu sebanyak 30, 50 dan 70% dari jisim agregat kasar.

Rajah 1: Lakaran Awal Penutup Longkang Mesra Alam

Rajah 2 menunjukkan produk yang telah dihasilkan setelah beberapa sampel yang dibuat menjalani ujian kekuatan dan keporosan air. Oleh kerana ini adalah kajian pertama, maka terdapat banyak juga sampel yang mengalami kegagalan.

Rajah 2: Penghasilan Penutup Longkang Mesra Alam

2.1 Ujian Kebolehkerjaan

Terdapat beberapa ujian yang dilakukan dalam menguji kebolehkerjaan produk iaitu ujian mampatan, ujian beban dan ujian keporosan. Rajah 3 di bawah menunjukkan ujian keporosan yang dijalankan secara manual. 1000 ml air telah dicurahkan dari atas penutup longkang ini dan ditadah dengan bekas di bawahnya. Hasil dari ujian di dapati 60% daripada kesuluruhan air berjaya melepasi penutup longkang ini. Ujian mampatan pula di lakukan di makmal konkrit di Global Lab, Kuantan.

Rajah 3: Ujian Keporosan Air

3. Keputusan

Jadual 1 berikut adalah hasil keputusan ujian mampatan setelah 7 hari pengawetan.

Jadual 1. : Ujian Kekuatan Mampatan

Nilai Tempurung Kelapa	Masa Proses Awetan	Nilai kekuatan Mampatan(N/mm²)
0.3	7 Hari	13.38
0.5	7Hari	3.91
0.7	7 Hari	3.08

Dari analisa data, didapati kandungan tempurung kelapa yang mewakili 0.3 adalah paling optimum dengan nilai kekuatan sebanyak 13.38 N/mm^2 melebihi tahap piawai konkrit biasa gred M10 iaitu 10 N/mm^2.

Dari segi ujian beban pula produk ini mampu menanggung sehingga 100kg dalam bagi 2 kaki x1 kaki dalam sesuatu masa. Namun nilai ini boleh diperbaiki dengan menggantikan besi yang lebih besar saiz berbanding dengan dawai exmet yang digunakan.

Ujian keporosan air yang telah dijalankan mendapati bahawa 60% daripada air yang dicurahkan di atas penutup longkang mesra alam ini mengalami keporosan. Peratus yang agak tinggi dan boleh ditingkatkan lagi dengan mengelakkan ralat yg berlaku sebelum ini.

Dalam pengiraan kos yang terlibat pula, produk ini hanya menelan belanja sebanyak rm 6.80 untuk saiz 2 kaki persegi. Harga yang dikira hanya melibatkan untuk satu bancuhan konkrit bersaiz 2 kaki x 1 kaki sahaja.

Jadual 2: Kos bahan yang digunakan

Bahan	**Kuantiti**	**Harga**
Simen	1kg	Rm 1.50
Batu Baur	3kg	Rm 3.00
Tempurung	0.3kg	-
Batu sungai	1 kg	Rm 1.30
Dawai *Exmet*	2x1 kaki^2	Rm 1.50
Jumlah		**Rm 6.80**

Dapat dilihat dari Rajah 4, adalah penutup longkang konkrit yang telah siap dan diletakkan di atas longkang kecil. Didapati penutup longkang ini berhasil untuk menghalang sampah sarap dari jatuh terus ke dalam longkang. Batu sungai di atasnya juga berfungsi untuk tujuan refleksologi serta landskap yang cantic menutupi bahagian longkang.

Rajah 4: Penutup Longkang Mesra Alam Dapat Menghalang Sampah Dari Memasuki Longkang

4. Perbincangan

Daripada keputusan dan data analisis didapati bahawa produk ini harus ditambah baik lagi untuk kegunaan masa hadapan kerana mungkin terdapat banyak ralat yang berlaku kerana ini adalah kajian pertama bagi menghasilkan produk ini.

Gred konkrit yang dihasilkan melebihi dari gred M10 untuk 7 hari pengawetan. Daripada kerja eksperimen jelas bahawa dengan peningkatan peritus tempurung kelapa meningkatkan kekuatan 7 hari dan kekuatan pengawetan 28 hari yang sepadan. Kebolehkerjaan konkrit meningkat selari penggantian bertambah (Shrikant ,2017). Oleh itu untuk kajian lanjut, kajian ini perlu juga di buat untuk pengawetan 14 hari dan 28 hari.

Keputusan menunjukkan bahawa kebolehkerjaan konkrit di dapati berkurangan dengan kenaikan peratusan penggantian. Sementara itu, kekuatan mampatan hasil konkrit menunjukkan penurunan yang stabil untuk pengawetan selama 7 hari.

Oleh itu, untuk kajian akan datang peratusan tempurung kelapa harus dikurangkan lagi dari segi peratusannya untuk memastikan kekuatan mampatan lebih tinggi dan beban yang boleh ditampung semakin meningkat. Dalam kajian Deni Irawan(2021) juga menyatakan bahawa nilai 10% tempurung kelapa adalah paling kuat berbanding dengan konkrit asal.

Menurut Ravi (2019), tempurung kelapa berpotensi sebagai agregat ringan dalam konkrit. Dengan menggunakan tempurung kelapa sebagai agregat dalam konkrit boleh mengurangkan kos bahan dalam pembinaan kerana kos yang rendah dan banyak sisa pertanian.

Konkrit tempurung kelapa juga dikelaskan sebagai struktur ringan konkrit. Ianya lebih banyak sesuai sebagai agregat ringan pemberi kekuatan rendah apabila digunakan untuk menggantikan agregat kasar biasa dalam pengeluaran konkrit (Maninder,2012)

Konkrit tempurung kelapa boleh digunakan dalam kawasan luar bandar dan tempat kelapa yang banyak serta boleh juga digunakan di mana agregat konvensional mahal. Konkrit tempurung kelapa juga dikelaskan sebagai struktur konkrit ringan.

5. Penutup

Secara keseluruhan, kajian ini telah berjaya mencapai objektif utamanya iaitu mereka bentuk penutup longkang mesra alam yang mana menggunakan tempurung kelapa menggantikan agregat kasar, menguji keberkesanan penutup longkang mesra alam dari segi kekuatan mampatan dan keporosan air serta mengkaji kos pembuatan penutup longkang mesra alam.

Kesimpulannya penutup longkang mesra alam ini selamat digunakan dan dapat membantu meningkatkan kelestarian produk binaan. Penutup longkang ini juga berhasil mengasingkan sampah dari memasuki longkang yang akan menyebabkan longkang tersumbat dan menyebabkan longkang berbau.

Hal ini kerana, penutup longkang mesra alam ini adalah satu penutup longkang yang direka supaya menjadi poros dan juga dapat mengalirkan air. Selain itu, penutup longkang mesra alam ini juga membantu pengguna menjaga kesihatan dengan adanya batu sungai sebagai fungsi refleksologi pada kaki yang dapat melancarkan peredaran darah di dalam badan manusia.

Penutup longkang ini juga boleh dipasarkan kerana harga yang lebih murah berbanding penutup longkang besi yang sering digunakan. Tuntasnya, projek ini telah mencapai objektif kajian rekabentuk penutup longkang mesra alam dan kebolehkerjaannya.

Namun terdapat beberapa cadangan untuk kajian lanjutan bagi inovasi penutup longkang ini antaranya menggunakan peratusan yang berbeza dan jurang peratusan tidak terlalu ketara untuk mengkaji berapakan peratusan yang paling optimum.

Oleh kerana kajian ini, tidak menggunakan pasir sebagai aggregate halus, ia sebenarnya tidak boleh dibandingkan dengan kekuatan konkrit yang lain. Rekebentuk ini hanya untuk konkrit yang poros sahaja.

Ujian mampatan untuk 14 hari dan juga 28 hari perlu dijalankan bagi menguji kekuatan sebenar produk ini walaupun ianya tidak digunakan sebagai papak utama dalam sesebuah bangunan. Ini kerana ianya juga menanggung beban manusia ketika mereka menggunkannya semasa refleksologi. Saiz besi juga perlu dikaji lagi demi memastikan konkrit dapat menampung beban yang berat.

Kemasan untuk rekabentuk penutup longkang mesra alam ini juga perlu diperhalusi agar ianya mempunyai nilai komersial yang tinggi.

Penghargaan

Terima kasih tidak terhingga kepada pelajar-pelajar yang membantu dalam menyiapkan inovasi ini serta rakan-rakan yang banyak menyumbang idea dan memberi semangat. Terima kasih juga kepada Jawatan Kuasa Innoplen kerana projek ini telah dianugerahkan pingat gangsa di dalam pertandingan inovasi peringkat kebangsaan pada tahun 2022.

Rujukan

Amiruddin.I dan Nazieha M.I. (2017). Potensi PenggantianTempurung Kelapa sebagai Agregat Kasar dalam Campuran Asfalt Panas. *Jurnal Kejuruteraan - Isu Khas 1 (Special Issue 1)* : 77-81

Deni, I dan Utari, K (2021). Substitusi Agregat Kasar Menggunakan Pecahan Tempurung Kelapa Pada Campuran Beton Normal. *Jurnal Rekayasa dan Manajemen Konstruksi Vol. 9* :61-70

Hariyadi dan Hiroki. T (2015). Enhancing the performance of porous concrete by utilizing the pumice aggregate. *The 5th International Conference of Euro Asia Civil Engineering Forum (EACEF-5)*: 732-738

Jeschke, A. M., de Lange, A. M. M., Withagen, R., & Caljouw, S. R. (2020). Crossing the Gap: Older Adults Do Not Create Less Challenging Stepping Stone Configurations Than Young Adults. *Frontiers in Psychology, 11*, [1657].

Jonathan.A and Erik.L (2017). *Porous Concrete Design*. Civil Engineering Senior Theses, Santa Clara University

Kamarudin. M.Y (2011) Mekanisma Aliran Lembapan dalam Konkrit Keras. *Jurnal Kejuruteraan* 37-49

Maninder.K and Manpreet.K (2012). Utilization of Coconut Shell as Coarse Aggregates in Mass Concrete. *International Journal of Applied Engineering Research, ISSN 0973-4562 Vol. 7 No.11*

Maswira.M, Rahayu. H dan Mai Azuna. M.Y (2019). Keberkesanan Penggunaan Tempurungkelapa Sawit Dalam Pembuatan Bata Simen. *Green Technology & Engineering Seminar 2019* : 41-48

Noorasmawanty. D dan Norfaniza.M (2022). A Study Review of Coconut Shells as Replacement for Coarse Aggregate. *Recent Trends in Civil Engineering and Built Environment Vol. 3 No. 1 (2022)*: 042-048

Ravi. P (2019). Coconut Shell as Course Aggregate in Conventional Concrete. *International Journal of Engineering Research And Management (IJERM) ISSN* : 2349- 2058, Volume-06, Issue-11, November 2019 : 8-12

Suzianah Jiffar, (2016). Igauan anak tertusuk besi penutup longkang dari https://www.bharian.com.my/bhplus-old/2016/04/142883/ingauananak- tertusuk-besi-penutup-longkang pada 12 April 2021

Shrikant M. H (2017). Partial Replacement Of Coarse Aggregate With Coconut Shell In The Concrete. *Journal of Research in Engineering and Applied Sciences Vol. 2, Issue 01* : 23-28

Sonawane, Y. N., & Chitte, C. J. (2016). Waste of coconut shell as a partial replacement of coarse aggregate in concrete mix-An experimental study. *International Journal of Science and Research*, 5(4), 649-651.

Yakang. Z et. al (2018). Design Of A New Type Of Automatic Drain Cover. *International Journal of Mechatronics and Applied Mechanics, 2018, Issue 3*: 37-44

Vani.Kdan Niyaz,A.S.D (2021). Performance of Light Weight Concrete with Coconut Shell and Fly Ash. *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*: 1119-1127

Wan Abdullah B. Ali (2013). Konkrit ringan. Sumber dari http://pkbtechinfo.blogspot.com/p/unit8-konkrit-ringan-objektif-am.html. pada 1 Julai2021.

Zuraidah. B. "Projek Pembinaan Bangunan". http://zuraidahabakar07.blogspot.com/2014/08/ujian-kuib-konkrit.html pada 13 April 2021

EVALUATION OF PROGRAMME EDUCATIONAL OBJECTIVES FOR CIVIL ENGINEERING TECHNOLOGY PROGRAMME WITH WORK-BASED LEARNING APPROACH

Yong Rashidah Mat Tuselim[1], Azuin Ramli[2] and Rufaizal Che Mamat[3]

[1,2,3]Politeknik Ungku Omar, Malaysia
yongrashidah@polycc.edu.my

Abstract: Politeknik Ungku Omar (PUO) offers an undergraduate degree programme in Civil Engineering Technology with Work-Based Learning (WBL) approach in 2013. The Bachelor of Civil Engineering Technology (BCT) programme is considered as the pioneer engineering degree programme in Malaysia to implement this collaborative approach with the industry. This study is to evaluate BCT graduates' career progression, and hence the achievement of the Programme Educational Objectives (PEOs) which are monitored by indirect assessments through surveys to the alumni and employers, as well as the WBL participating companies. The scores used for the surveys are on a scale of 1 to 4, with 1 being poor and 4 being outstanding. The results for PEOs from the surveys indicated ratings between 3 and 4. This is an indication that the PEOs specified for the programme have been achieved. Generally, and overall, the WBL in the BCT programme are found to be effective in enhancing the programme's relevance for industry, as well as the graduates' career progression.

Keywords: *Programme Educational Objectives, Bachelor of Civil Engineering Technology Programme; Work-Based Learning*

1. Introduction

The rapid and continuous development of international engagement among higher education institutions (HEIs) had encouraged the HEIs to offer a more competitive and internationally recognised programmes. Furthermore, interrelated factors such as stakeholders demand for profitable and sustainable academic programmes, institutional recognition and industry demand had also influenced the HEI efforts (Basir et al., 2019). Thus, in line with the Ministry of Higher Education of Malaysia's Polytechnics Transformation Road Map 2010 - 2020, Politeknik Ungku Omar (PUO) was given the task to offer a hands-on degree programme in Civil Engineering Technology with Work-Based Learning (WBL) approach starting September 2013. This programme called Bachelor of Civil Engineering Technology with Honours (BCT) is considered as the pioneering undergraduate engineering programme in Malaysia to implement a collaborative approach with the industries through Work-Based Learning. BCT programme offered by PUO emphasizes on the building of a strong foundation in civil engineering fundamentals, the application of technology to reach sustainability and an understanding of the principles of project management and finance. The Civil Engineering Technology degree programme is structured to be more practical based than the conventional science-based Civil Engineering degree programme. In order to keep abreast with the rapid

technological advancements and evolving requirements in industries today, students will undergo two semesters of experiential learning by a structured on-the-job-training or Work-Based Learning (WBL) with the nation's key industry players.

The competitiveness demands to raise the academic standards has brought on the system of Outcome-based Education (OBE) to be the most accepted approach in higher education where decisions about the curriculum are driven by the outcomes the students should display by the end of the courses (Nakkeeran et al., 2018; Asim et al., 2021). It is based on professional knowledge, skills, abilities, values and attitudes rather than on the educational process (Hussain et al., 2021). With the increasingly global marketplace for higher education, OBE has been adopted at a fast pace in engineering education programmes to ensure the degrees granted to students are competitive and accredited internationally, and the graduates are competent in practicing engineering (Davis et al., 2006). One of the first elements that are required to be developed in the implementation of OBE is the Programme Educational Objectives (PEOs). PEOs are a set of specific goals or targets which describe the expected achievement of graduates in their career and professional life a few years after graduation (Faiz & Almutairi, 2021). These specific goals must be aligned with the vision and mission of the academic institution and are defined in collaboration with the relevant stakeholders to the programme (Zaitseva & Quadrado, 2019). Students, alumni, staff, community groups, industry partners, and professions (employers) as well as the government are the stakeholders in higher education.

The PEOs of BCT programme are in accordance with the polytechnic's transformation agenda to produce knowledgeable, highly skilled, and competent human capital to drive the knowledge and skills-based economy as required by the developed countries. The PEOs are determined by incorporating the vision and mission of the Department of Polytechnic and Community College Education (DPCCE) and Politeknik Ungku Omar (PUO) as well as the stakeholders' expectations. All the stakeholders had been involved through varied degree of participation in the development and review process of the PEOs. Stakeholders' participation is often through the attendance of meetings, workshops, questionnaire surveys, focus group dialogues or forums to ensure that the programme objectives are consistent with the institution's vision and mission (Fitzpatrick et al., 2009; Pramono et al., 2020). Throughout the processes, the feedbacks, comments, and recommendations from the various stakeholders were solicited and consolidated. The process of reviewing and revising the PEOs requires two types of stakeholder feedbacks which are the stakeholders-initiated input and alumni attainment assessment. Stakeholders initiated input occurs when there is a need for change triggered by any of the major stakeholders. The major stakeholders for BCT programme are the Ministry of Higher Education (MOHE) and the industries.

Therefore, the objectives of this study are to assess the PEOs attainment from stakeholders' feedbacks which are the alumni and employers. The study offers some important insights into the continuous quality improvement process of BCT programme.

2. Background of Study

The PEOs are initially formulated with reference to the guidelines produced by the Malaysian Qualifications Agency (MQA) and the Board of Engineers Malaysia's (BEM) Engineering Technology Programme Accreditation Standard (ETAC). Realising the needs and requirements of the stakeholders, BCT programme have underlined long-term objectives to be achieved by graduates within 3 to 5 years upon graduation. The PEOs statements for BCT are as follows:

PEO1: *Become technically competent Civil Engineering Technologists and engaged responsibly in activities in line with the technological challenges of civil engineering industrial development.*

PEO2: *Be committed to practice Civil Engineering Technology and act on the basis of professional conduct to promote sustainable development for the advancement of society and nation.*

At the institutional level, the Academic Council will monitor the attainments of PEO of the programmes offered. According to (Zaitseva & Quadrado, 2019)(Chan et al., 2020), the council is responsible to continuously improve the PEO instruments by:

i. coordinating the item of PEO achievement instrument
ii. obtaining the information of alumni; distribute and collect the PEO instrument from the alumni
iii. analysing the PEO data findings
iv. producing a research report on PEO achievement
v. keeping the research report for audit purposes
vi. managing curriculum quality improvement process

The council holds meetings to discuss and decide the matters pertaining to PEOs within the institution. Figure 1 shows the implementation of PEO achievement research and the use of its findings to improve BCT programme.

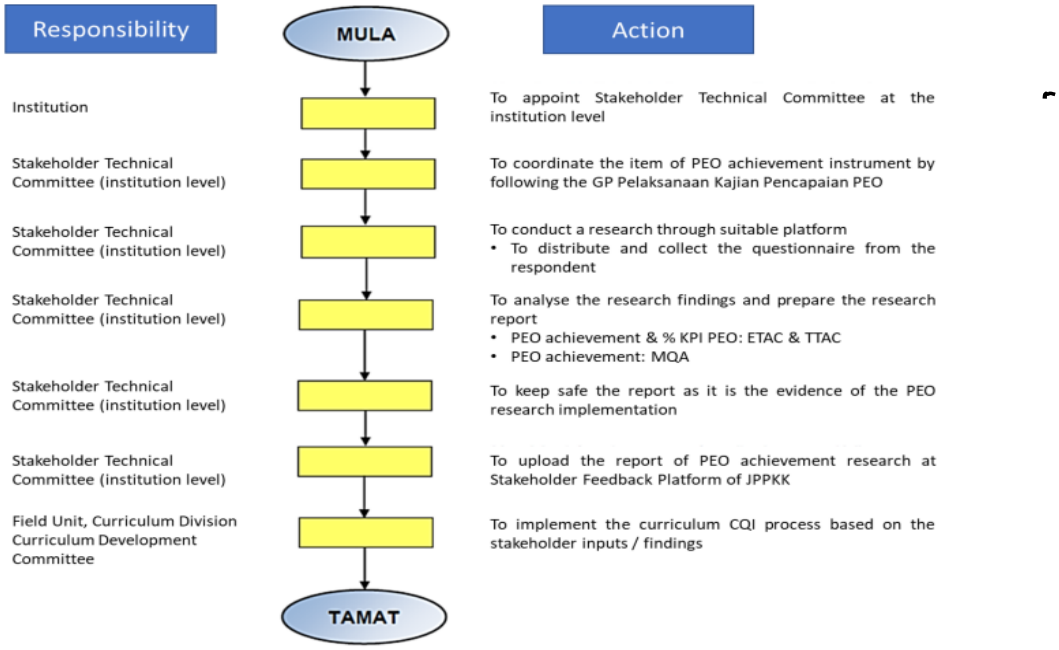


Figure 1. Flowchart of the Implementation of PEO Achievement Research and the Use of Its Findings as Programme Improvement

3. Methodology

This section explains the methodology and research strategy used to collect opinions from a target audience through a questionnaire survey. Descriptive analysis was used to analyse the data. PEOs are directly assessed through the questionnaires distributed to the employers and alumni. Until November 2020, there were about 254 total graduates from the five cohorts of BCT programme, with the first cohort (2013 intake) graduated in year 2016 as presented in Figure 2. Since the performance of PEOs that will be considered are for graduates with 3 to 5 years of working experience after graduation, thus data from the 1st, 2nd, and 3rd cohorts of BCT students that graduated in year 2016, 2017 and 2018, respectively are considered for the evaluation of the PEOs achievement. In total, there are about 80 graduates or alumni who are expected to have working experience in the engineering field and all the graduates have responded to the survey. The Performance Indicators (PI) of each PEO are provided as the achievement criteria with a target performance in percentage.

In addition to conducting surveys on alumni, surveys were also conducted to the companies that employed the graduates of cohort 1, cohort 2 and cohort 3. The objective of the survey was to obtain the employers' opinion regarding the quality of graduates. Among a list of 50 possible contacts, 36 responded to the survey. The sample consisted of a variety of companies including contractors, developers, and engineering consulting firms. Most of the companies have experience in managing BCT students during their participation in the WBL stint.

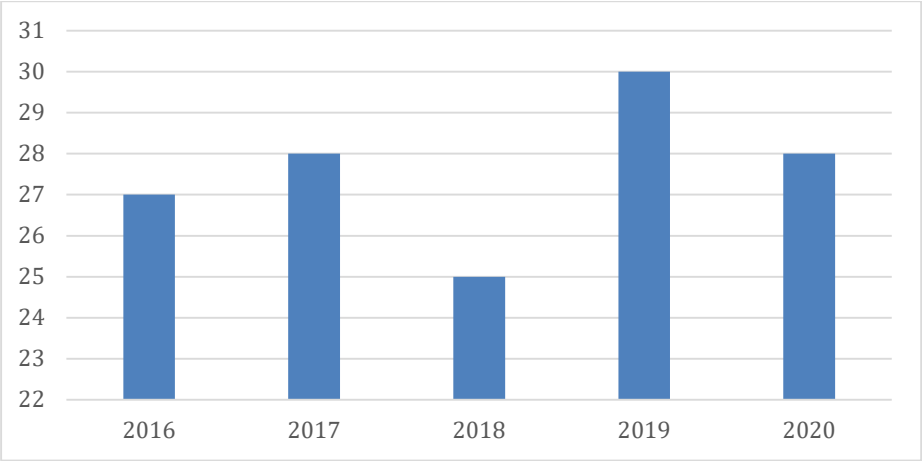


Figure 2. Number of BCT graduates for five cohorts

4. Findings and Discussion

4.1 Respondents' Agreement on PEO 1: Become technically competent Civil Engineering Technologists and engaged responsibly in activities in line with the technological challenges of civil engineering industrial development.

The indicators to measure the success of BCT programme in preparing graduates to become technically competent Civil Engineering Technologists and engaged responsibly in activities in line with the technological challenges of civil engineering industrial development were evaluated. Based on the collected data as shown in Table 1, the achievement of the PEOs were based on the key performance indicator for the 1st, 2nd and 3rd cohorts of BCT graduates. Overall, the percentage achievement has met the indicator which is more than the expectation. It is found that 74% (cohort 1), 89% (cohort 2) and 88% (cohort 3) of the graduates are employed in the professional engineering technologist related industries.

Figure 3 showed that the highest professional engineering technologist career are those who work as site engineers (cohort 1 and cohort 3) and civil engineering technologist (cohort 2). The findings in 'others' also indicates 26% (cohort 1) graduates work in non-engineering technology field and the percent was reduced to 11% and 12 % for cohort 2 and cohort 3, respectively. From the employment point of view (Figure 4), about 23% (cohort 1) of the graduates are now working with government sector, 29% (cohort 2) working with multi-national companies (MNC) and 36% (cohort 3) of the graduates are now working with small and medium enterprises (SME). This survey proves that the programme designed has successfully groomed them for better employability and have high competency in professional engineering technology field.

Figure 5 illustrates the distribution of multi-disciplinary project involved by the BCT graduates, which include management, architecture, electrical, mechanical, quantity surveyor and IT fields. The results indicate the strength of PEO 1, in which the programme has successfully produced professional technically competent civil engineering technologists working not only at national but also at international levels in line with the technological challenges of civil engineering industrial development.

Table 1. PEOs Indicators and Achievement as Perceived by Alumni

Performance Indicators	**Score**		
PEO 1	**1st Cohort**	**2ndCohort**	**3rdCohort**
1. Working towards a professional engineering technologist (70%)	74%	89%	88%
2. A team member in a multi-disciplinary project (50%)	84%	98%	95%
PEO 2	**1st Cohort**	**2ndCohort**	**3rdCohort**
1. Involvement in Civil Engineering Technology professional development activity/courses (50%)	63%	64%	63%
2. Participated in activities organised by learned societies or community service organisations (10%)	11%	32%	12%

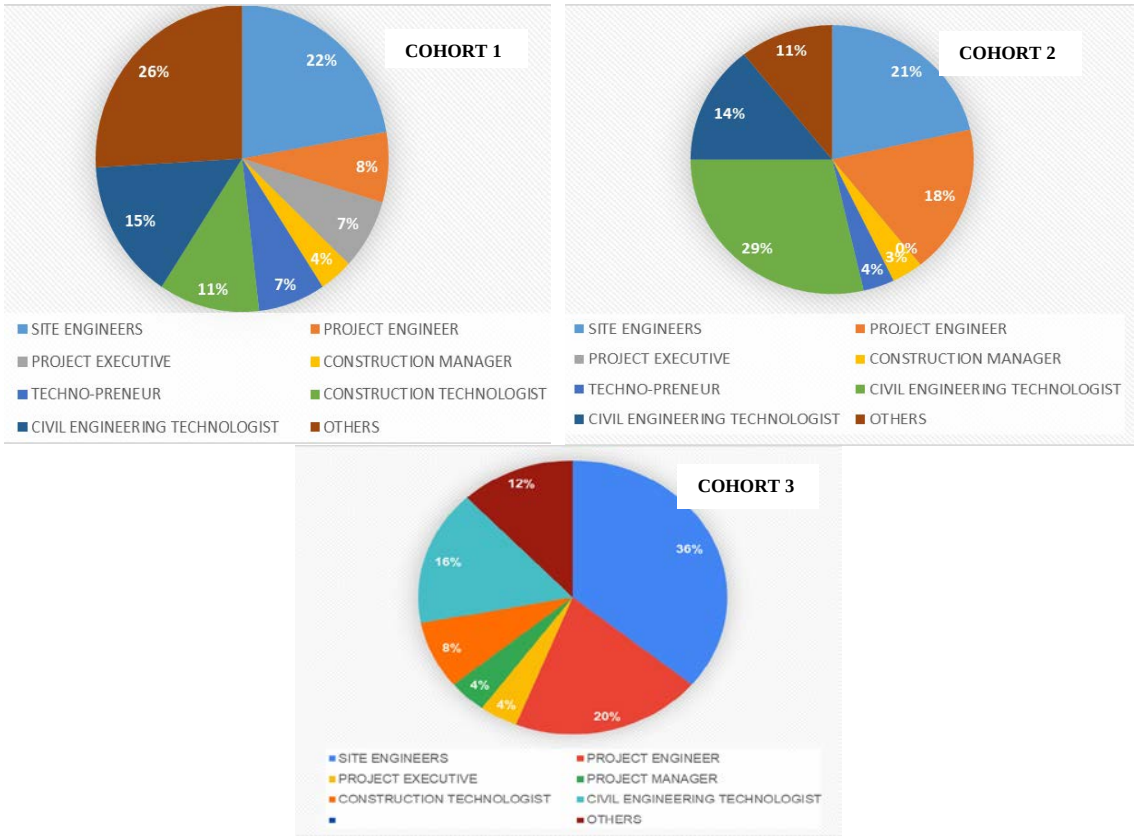


Figure 3. Working towards a professional engineering technologist

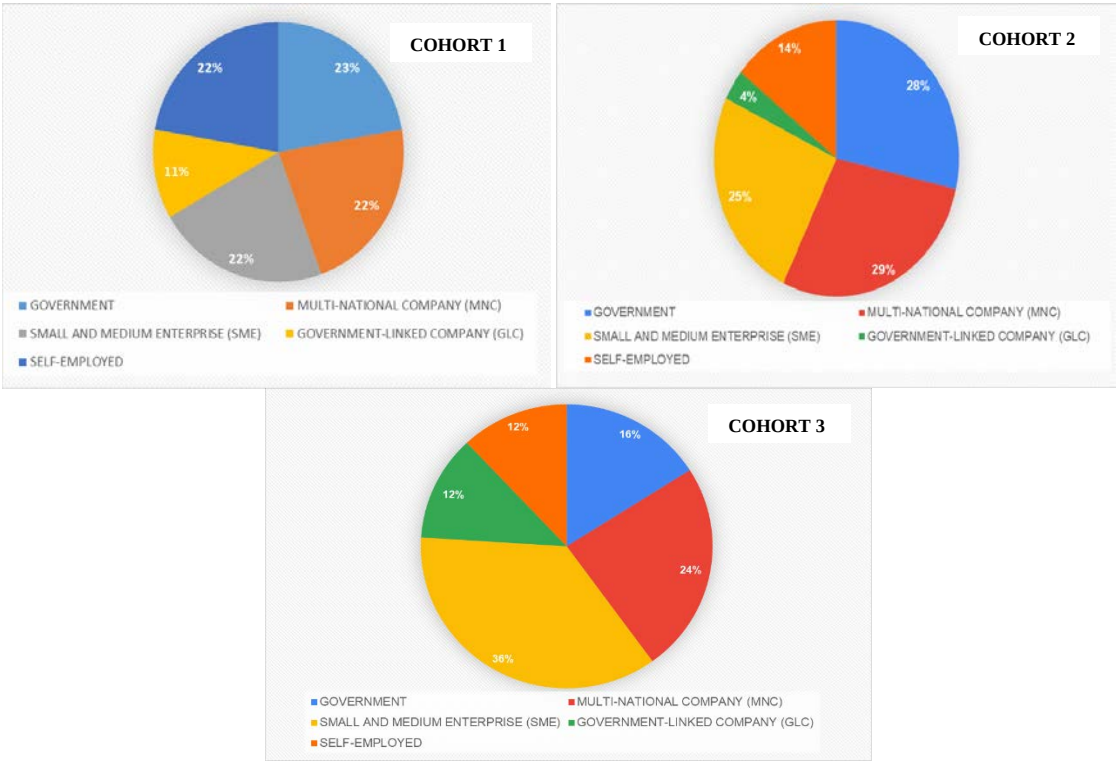


Figure 4. Types of organisation involved

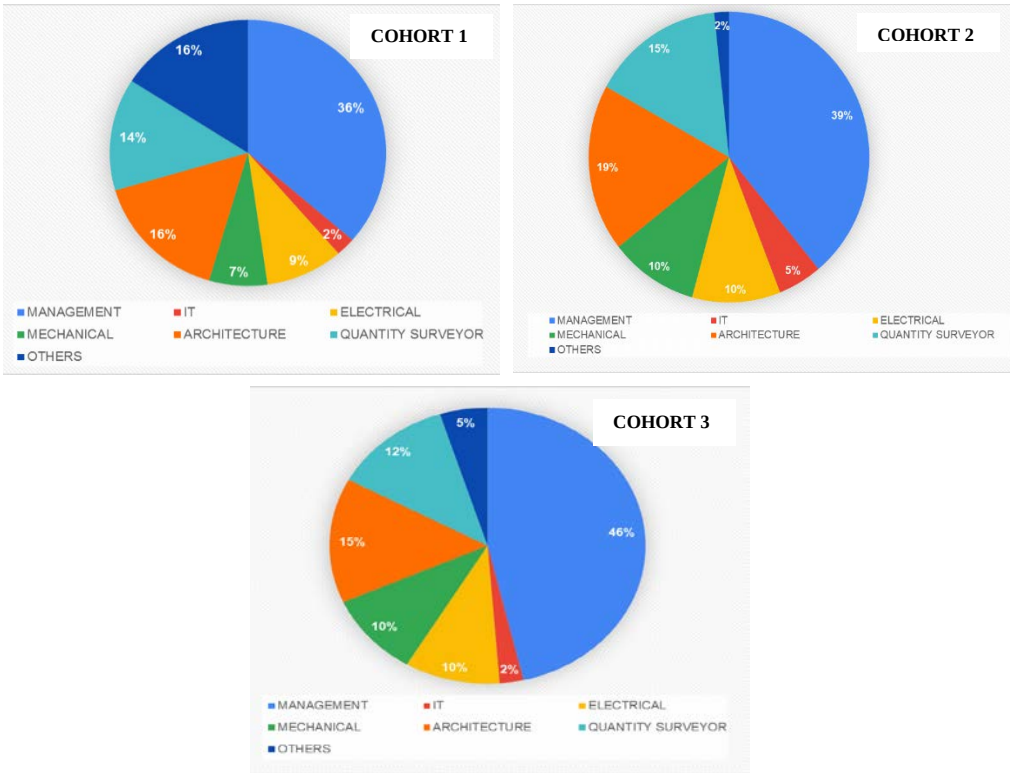


Figure 5. A team member in a multi-disciplinary project

4.2 Respondents' Agreement on PEO 2: Be committed to practice Civil Engineering Technology and act on the basis of professional conduct to promote sustainable development for the advancement of society and nation.

There are 2 indicators designed to address PEO 2 which include the involvement of Civil Engineering Technology professional development activities/courses as well as participation in social responsibility activities. The scorings based on these indicators are higher than the minimum target (Table 2). The findings also indicate 63% (cohort 1), 64% (cohort 2) and 63% (cohort 3) of the graduates have attended Civil Engineering Technology professional development activities/courses such as workshop, seminar, course, conference, talk, training, project site visit, study visit, technical visit, annual general meeting and others (Figure 6).

In addition, Table 2 also shows, about 11% (cohort 1), 32% (cohort 2) and 12% (cohort 3) of the graduates shared their social responsibility through engagement with the community service organisations. Although their involvement in community services organisation are just above the minimum target, nonetheless, there are still room for improvement. It is an essential skill which must be acquired by the graduates during their career life. It is heartening to find out the graduates are aware of their responsibilities to the professional development towards advancement of the society and nation, which attributed to the success of PEO 2.

Table 2. PEOs Indicators and Achievement as Perceived by Alumni

PEO 2: Performance Indicators	Score		
	1st Cohort	2ndCohort	3rdCohort
1. Involvement in Civil Engineering Technology professional development activity/courses (50%)	63%	64%	63%
2. Participated in activities organised by learned societies or community service organisations (10%)	11%	32%	12%

4.3 Employer Survey

The achievement of PEO 1 is evaluated through several attributes namely knowledge in civil engineering technology, technical competency, critical thinking, communication skills, and practical skills. The achievement of PEO 2 is evaluated through several attributes namely problem solving, professionalism and ethical responsibility, self-learning and motivation, entrepreneurship and leadership. The results of the survey indicated that the employers are satisfied with the graduates. All respondents rated the quality of BCT graduates as above the average with a rating of 3 to 4, on a scale of 1 to 4, with 1 being poor and 4 being outstanding. The survey results are shown in Table 3.

Table 3. PEOs Indicators and Achievement as Perceived by Employers

Performance Indicators	**Score/Rating**		
PEO 1	**1st Cohort**	**2ndCohort**	**3rdCohort**
1. Knowledge in Civil Engineering Technolog			
2. Technical competency			
3. Critical Thinking	3.29	3.50	3.43
4. Communication Skills			
5. Practical Skills			
PEO 2	**1st Cohort**	**2ndCohort**	**3rdCohort**
1. Problem solving			
2. Professionalism & ethical responsibility			
3. Self-learning and motivation	3.57	3.67	3.71
4. Entrepreneurship			
5. Leadership			

5. Conclusion

Findings from the study on employers supported the findings of the PEOs achievement as perceived by the alumni. Both findings indicate that PEOs performance is at a good level. This is an indication that the PEOs specified for the programme have been achieved. PEOs attainment results have been presented in meetings with the academic management council of PUO, and the Industrial Advisory Panels (IAP) of BCT programme. Feedbacks, comments, and suggestions are gathered to be used for BCT's Continuous Quality Improvements (CQI). Based on these feedbacks, the BCT programme would be able to determine whether the strategies adopted by BCT in fulfilling the requirements of the regulators (e.g. BEM-ETAC) and keeping up with the current needs of the industry are on the right track and producing the right results. The curriculum structure of BCT programme includes courses supporting the attainment of the Programme Learning Outcomes (PLO) of students upon graduation to achieve the PEOs while working in the civil engineering technology field. Table 4 outlines the CQI strategies with action plans. The PEOs attainments have been analysed to drive the continual improvement for ETAC curriculum implementation.

Table 4. PEOs Attainment and Initiatives for Continuous Quality Improvement

Findings from PEOs attainment	**Actions/Activities for Continuous Quality Improvement**
Students need to improve in technical competencies (PEO1)	1. Encourage participation in national competitions. 2. Industrial linkage activities must be frequently conducted to expose students to the actual practice in civil engineering. 3. Enhance industry experts' involvement in teaching, learning and assessment activities.
Students need to improve on professional activities and engagement with the community (PEO 2)	1. Enhance sharing sessions with successful professional engineers. 2. Encourage more social activities and engagement with the communities. 3. Enhance participation of students in community-industrial engagements.

To date, all the initiatives for continuous quality improvement for BCT programme have been implemented for the following cohorts of students in order to enhance the quality of learning and teaching environment, and thus, improving the achievement of PEOs.

References

Asim, H. M., Vaz, A., Ahmed, A., & Sadiq, S. (2021). A Review on Outcome Based Education and Factors That Impact Student Learning Outcomes in Tertiary Education System. *International Education Studies*, *14*(2), 1. https://doi.org/10.5539/ies.v14n2p1

Basir, N., Lian, O. C., Salmizi, J. M., & Shaharin, H. (2019). Assessment of outcome-based integrated design project. *Journal of Technology and Science Education*, *9*(1), 77–84. https://doi.org/10.3926/jotse.541

Chan, C. M., A. S., M. K., H., H. N., P., A., M., Y. T., F. Mustafa, & I., B. (2020). Bachelor of Civil Engineering Technology: Alignment of Program Educational Objectives with the Learning Outcomes in Accordance With Sydney Accord. *International Journal of Acdemic Research in Progressive Education and Development*, *9*(1), 39–52. https://doi.org/10.6007/IJARPED/v9-i1/6882

Davis, D. C., Beyerlein, S. W., & Davis, I. T. (2006). Deriving design course learning outcomes from a professional profile. *International Journal of Engineering Education*, *22*(3), 439–446.

Faiz, M. M. U., & Almutairi, M. S. (2021). Assessment of student outcomes of an electrical and electronics engineering technology programme: A case study. *Global Journal of Engineering Education*, *23*(3), 231–239.

Fitzpatrick, J. J., Byrne, E. P., & Kennedy, D. (2009). Making programme learning outcomes explicit for students of process and chemical engineering. *Education for Chemical Engineers*, *4*(2), 21–28. https://doi.org/10.1016/j.ece.2009.07.001

Hussain, W., Spady, W. G., Khan, S. Z., Khawaja, B. A., Naqash, T., & Conner, L. (2021). Impact Evaluations of Engineering Programs Using Abet Student Outcomes. *IEEE Access*, *9*, 46166–46190. https://doi.org/10.1109/ACCESS.2021.3066921

Nakkeeran, R., Babu, R., Manimaran, R., & Gnanasivam, P. (2018). Importance of Outcome Based Education (OBE) to Advance Educational Quality and enhance Global Mobility. *International Journal of Pure and Applied Mathematics*, *119*(17), 1483–1492. http://www.acadpubl.eu/hub/

Pramono, B. N. S. R., Mansor, W., Latip, M. F., Mohamad, H., & Abdullah, S. A. C. (2020). Analysis of Graduates Performance Based on Programme Educational Objective Assessment for an Electrical Engineering Degree. *Asian Journal of University Education*, *16*(3), 303–309. https://doi.org/10.24191/ajue.v16i3.10224

Zaitseva, K., & Quadrado, J. C. (2019). Learning outcomes for engineering education programs. *ASEE Annual Conference and Exposition, Conference Proceedings*, *December 2020*. https://doi.org/10.18260/1-2--33054

ANALISIS KUALITI AIR MENGGUNAKAN PENAPIS EASY MICRON WATER FILTER

Ernie Kulian @ Abd Karim[1], Saiful Hazman Mokhtar[2] and Nasriah Ashikin Mat Nadzir[3]

[1,2,3]Politeknik Sultan Haji Ahmad Shah, Malaysia

[1]ernie@polisas.edu.my
[2]saiful@polisas.edu.my
[3]nasriah@polisas.edu.my

Abstrak: Penapis air biasanya bertujuan untuk menyaring air mentah supaya kualiti air bertukar menjadi bersih dan selamat untuk digunakan. Oleh itu, objektif kajian ini dijalankan untuk membantu menyelesaikan masalah sisa buangan plastik seperti botol mineral yang selalu ditinggalkan oleh pengunjung yang mendaki, berkhemah atau menjelajah hutan di sekitar Sungai Lembing. Iaitu melalui penghasilan *Easy Micron Water Filter* (EMF) yang berciri mudah alih, mampu menyaring air mentah menjadi air bersih dan selamat untuk diminum serta boleh digunakan oleh para pengunjung yang datang dengan tanpa perlu membeli botol mineral diharapkan mampu membantu menyelesaikan masalah yang dihadapi oleh para pengusaha rekreasi di sekitar Sungai Lembing. Sebanyak 6 sampel air sungai dari Sungai Lembing diuji iaitu 3 sampel tanpa menggunakan EMF dan 3 sampel lagi dengan menggunakan EMF. Hasil ujian, didapati air mentah tanpa menggunakan EMF diklasifikasikan dalam Kelas II dan air mentah setelah menggunakan EMF diklasifikasikan sebagai Kelas I. Ini menunjukkan bahawa EMF mampu menyaring air berdasarkan Piawaian Kualiti Air Kebangsaan dan boleh digunakan oleh setiap pengunjung yang datang bagi membantu mengurangkan sisa botol mineral yang selalu ditinggalkan di sepanjang Sungai Lembing.

***Kata kunci**: Penapis air; air sungai; kelas air*

1. Pengenalan

Di Malaysia, setiap hari penjanaan sampah dalam kalangan individu di negara ini direkodkan meningkat kepada kadar 100.75% dengan 38,142 tan pada 2018, berbeza dengan 19,000 tan pada 2005. Berdasarkan angka yang disampaikan oleh Perbadanan Pengurusan Sisa Pepejal dan Pembersihan Awam (SWCorp), seorang penduduk dianggarkan menghasilkan lebih 1.17Kg sisa setiap hari pada 2018, berbeza dengan 0.8Kg pada 2005. Berdasarkan laporan yang sama, tahap sisa plastik direkodkan meningkat sebanyak 20% pada 2018, berbeza dengan 44.5% daripada sisa mutlak iaitu sisa makanan manakala sisa plastik 13.2% dan lampin boleh buang sebanyak 12.1% pada tahun 2005. Ini menyebabkan pelbagai kempen kesedaran banyak dijalankan untuk memberi kesedaran kepada rakyat Malaysia mengenai kepentingan kitar semula demi masa depan generasi akan datang. Sungai Lembing yang merupakan kawasan tarikan pelancong yang turut terjejas dengan masalah sampah terutamanya botol mineral di sekitar kawasan tersebut.

Tinjauan tapak, mendapati kebanyakan botol mineral dibuang begitu sahaja oleh pelancong

semasa dalam perjalanan di sepanjang Sungai Lembing walaupun tong sampah telah disediakan. Oleh itu, tujuan kajian ini dijalankan adalah untuk membantu menyelesaikan masalah pembuangan botol mineral yang berlaku di sepanjang Sungai Lembing yang mencemarkan suasana pemandangan sepanjang perjalanan. Iaitu melalui penghasilan penapis air yang mudah alih, ringan, mesra pengguna dan tidak terlalu mahal. Penapis air berfungsi menapis air mentah dengan membuang kekotoran serta mengurangkan pencemaran air melalui penghalang fizikal yang halus, proses kimia atau proses biologi. Terdapat banyak kaedah untuk menapis air tetapi ianya tidak mudah alih, rumit, berat dan mahal. Easy Micron Water Filter boleh digunakan terus untuk minum air di aliran sungai yang berada dalam Kelas 1. Penapis ini diuji untuk memastikan ianya mampu menapis air mentah supaya selamat untuk digunakan oleh pelancong. Melalui penggunaan Easy Micron Water Filter, diharapkan dapat membantu menyelesaikan masalah sisa botol mineral dan menjadikan penapis air sebagai pilihan utama kepada pelancong yang datang berkunjung.

2. Bahan dan Kaedah

Penapis air yang direka ini mengabungkan beberapa bahagian yang mudah untuk dipasang, dibawa dan digunakan. Terdapat 7 bahan yang digunakan untuk menghasilkan reka bentuk yang mudah dipasang, digunakan dan tidak memerlukan banyak pengetahuan teknikal. Penapis air ini hanya memerlukan paip hos kecil, penapis dan pam manual kepada penapis. Ianya mudah digunakan tanpa memerlukan bantuan profesional dengan reka bentuk yang menjimatkan dan mampu dimiliki oleh orang biasa.

- Membran UF

Membran UF sering digunakan sebagai prarawatan kepada osmosis terbalik (OT). Ia mampu membuang kebanyakan zarah yang mengotori OT seperti koloid, bakteria berbahaya, kebanyakan virus dan parasit seperti cryptosporidium dan giardia. OT membuang baki bakteria dan virus, garam terlarut, organik terlarut, warna, rasa dan bau.

- Penapis gentian karbon

Penapis karbon mengeluarkan sedimen, tetapi ia juga mengeluarkan klorin, sebatian organik meruap (VOC), bau dan rasa yang tidak menyenangkan daripada air. Penapis karbon mengandungi karbon teraktif, yang dibuat melalui proses pembuatan khas yang menghasilkan lebih banyak tapak ikatan.

- Penapis UF

Ultrafiltration (UF) menggunakan tekanan untuk menolak air melalui membran separa telap dan membuang sebarang bahan cemar. Tidak seperti osmosis terbalik, ultrafiltrasi mengekalkan mineral dalam air, sambil menapis bakteria, virus dan parasit.

- Hos paip kecil

Hos ialah tiub berongga fleksibel yang direka untuk membawa cecair dari satu lokasi ke lokasi lain.

- Pam tangan kecil

Pam tangan ialah pam yang dikendalikan secara manual, ia menggunakan kuasa manusia untuk memindahkan cecair dari satu tempat ke tempat yang lain.

- O – Cincin

Fungsi cincin O adalah untuk menutup penyambungan dua permukaan untuk memastikan tiada udara, gas atau cecair boleh melaluinya. Biasanya, ia dipasang ke dalam alur dan direka bentuk untuk menahan tekanan. Rintangan adalah bagi menghalang udara atau cecair daripada keluar atau memasuki penyambung.

- Bekas EMF

Mengabungkan semua bahagian bersama-sama dan menjadikannya berfungsi sebagai Easy Micron Water Filter (EMF).

Rajah 1. Membran UF di sebelah kiri EMF.

Terdapat pelbagai parameter yang digunakan dalam menentukan kualiti air. Walau bagaimanapun, keutamaan kepada enam ujikaji utama telah ditetapkan oleh Jabatan Alam Sekitar, Malaysia perlu diketahui bagi menentukan kualiti air seperti permintaan oksigen biokimia (BOD), permintaan oksigen kimia (COD), oksigen yang terlarut (DO), jumlah pepejal terampai (TSS), tahap pH dan kandungan ammonia. Kesemua enam ujikaji ini mesti dilakukan dan akan diwakili dengan satu nilai nombor sahaja bagi mendapatkan nilai Indeks Kualiti Air (IKA). Berdasarkan nilai IKA, kualiti air dapat dikelaskan dan ditentukan kepelbagaian penggunaannya mengikut Piawaian Interim Kualiti Air Kebangsaan (INWQS) sebagaimana yang dipaparkan di dalam Jadual 1. Dapatan kajian dilakukan dengan membandingkan keputusan yang direkodkan bagi tujuan perbandingan kualiti air sebelum penggunaan EMF dan selepas penggunaan EMF.

Jadual 1. Pengelasan kualiti air berdasarkan INWQS (JAS 2000).

PARAMETER	**KELAS**						
	Unit	**I**	**IIA**	**IIB**	**III**	**IV**	**V**
BOD	**mg/L**	1	3	3	6	12	>12
COD	**mg/L**	10	25	25	50	100	>100
DO	**mg/L**	7	5-7	5-7	3-5	<3	<1
TSS	**mg/L**	25	50	50	150	300	300
pH	**mg/L**	6.5-8.5	6-9	6-9	5-9	5-9	-
Ammonia	**mg/L**	0.1	0.3	0.3	0.9	27	>2.7
IKA	**-**	>92.7	76.5-92.7	51.9-76.5	31.0-51.9	<31.0	>92.7
PETUNJUK							
Kelas I:	Pemeliharaan untuk persekitaran semulajadi						
	Bekalan air I: secara pratiknya tidak memerlukan rawatan Perikanan I: untuk spesis akuatik yang sangat sensitif						

Kelas IIA:	Bekalan air II: memerlukan rawatan konvensional Perikanan II: untuk spesis yang sensitif
Kelas IIB:	Sesuai untuk aktiviti rekreasi yang melibatkan sentuhan badan
Kelas III:	Bekalan air III: memerlukan rawatan yang intensif Perikanan III: untuk minuman binatang ternakan
Kelas IV:	Pengairan
Kelas V:	Selain daripada aktiviti di atas

Sebanyak 6 botol sampel air disediakan iaitu 3 botol sampel air tanpa menggunakan EMF dan 3 botol lagi dengan menggunakan EMF. Kesemua sampel air ini disimpan di dalam bekas kedap yang mengandungi ais bersuhu -20°C dan perlu dibawa terus ke makmal untuk dilakukan ujikaji seterusnya. Ujikaji BOD dan COD ditentukan berdasarkan kepada kaedah 127 piawai (APHA, 1995). Umumnya, nilai DO sebelum dan selepas sampel diinkubasikan dalam inkubator pada suhu 20°C dapat menentukan nilai BOD manakala nilai COD pula adalah berdasarkan kaedah refluks terbuka. Fakulti Teknologi Kejuruteraan Awam, Universiti Malaysia Pahang telah dipilih sebagai tempat untuk ujikaji dilaksanakan. Sampel yang diambil dibawa terus ke makmal FTKA, UMP.

Rajah 2. Sampel air yang diambil.

3. Dapatan

Peralatan ujian yang digunakan ialah, bagi ujian pH menggunakan APHA 4500H+B, ujian *Biochemical Oxygen Demand* (BOD) menggunakan *In House* CELS/STP/003 berdasarkan APHA 5210B, ujian *Chemical Oxygen Demand* (COD) adalah *In House* CELS/STP/004 berdasarkan HACH 8000, ujian *Total Suspended Solid* (TSS) ialah APHA 2540D, Ujian Oksigen Terlarut (DO) adalah kaedah *In house* menggunakan YSI 5100 DO Meter dan ujian Ammonia Nitrogen ialah HACH 8155. Selepas ujian dijalankan, keputusan yang telah diperolehi adalah seperti dalam Jadual 2 berdasarkan sampel air sebelum dan selepas menggunakan EMF.

Jadual 2. Keputusan Sampel Air (Sebelum dan Selepas menggunakan EMF).

No	Sampel	Sampel air 1		Sampel air 2		Sampel air 3	
		Sebelum EMF	**Selepas EMF**	**Sebelum EMF**	**Selepas EMF**	**Sebelum EMF**	**Selepas EMF**
1	pH	6.60@ 22.6 °C	6.52@ 22.7 °C	6.61@ 23.1 °C	6.61@ 22.2 °C	6.66@ 20.1 °C	7.03@ 20.1 °C
2	BOD (mg/L)	2.8	2.25	1.7	1.95	2.75	1.8
3	COD (mg/L)	<3	<3	<3	<3	<3	<3
4	TSS (mg/L)	17	2	13	1	13	1
5	DO (mg/L)	10.91	10.86	10.71	10.46	10.32	10.06
6	Ammonia Nitrogen (mg/L)	0.08	0.07	0.09	0.08	0.11	0.08

Jadual 3 di bawah menunjukkan kelas sampel air sebelum dan selepas menggunakan EMF dengan berpandukan kepada nilai Indeks Kualiti Air yang menunjukkan terdapat perubahan terhadap kualiti sampel air.

Jadual 3. Penentuan kelas dengan menggunakan pengiraan Indeks Kualiti Air.

No	Sampel	Sampel air 1		Sampel air 2		Sampel air 3	
		Sebelum EMF	**Selepas EMF**	**Sebelum EMF**	**Selepas EMF**	**Sebelum EMF**	**Selepas EMF**
1	SIpH	97.75	96.12	97.83	97.83	98.18	99.28
2	SIBOD	88.56	90.88	93.21	92.15	88.77	92.79
3	SICOD	95.11	95.11	95.11	95.11	95.11	95.11
4	SISS	75.68	94.61	80.29	96.04	80.29	96.04
5	SIDO	100	100	100	100	100	100
6	SIAN	92.1	93.15	91.05	92.1	88.95	92.1
4	WQI	91.7	95.13	93.17	95.65	92.05	95.94
5	KELAS	II	I	I	I	II	I

Dapatan melalui pengiraan purata bagi sampel sebelum dan selepas menggunakan EMF dengan menggunakan Indeks Kualiti Air adalah seperti berikut:

IKA sebelum menggunakan EMF = $\frac{91.7+93.17+92.05}{3}$ = *92.31* @ KELAS II

IKA selepas menggunakan EMF = $\frac{95.13+95.65+95.94}{3}$ = *95.57* @ KELAS I

4. Perbincangan dan Kesimpulan

Berdasarkan analisis dapatan, Easy Micron Water Filter (EMF) mampu menapis air sehingga ia selamat untuk digunakan dan ini membuktikan EMF berpotensi digunakan oleh para pelacong yang datang serta dapat membantu mengurangkan sisa botol mineral disepanjang Sungai Lembing. Walaubagaimanapun, kajian lanjutan dan penambahbaikan masih boleh dilakukan iaitu:

- Menambahkan tempoh penggunaan bahan penapis air dalam EMF dengan mengadakan fungsi tambahan iaitu *backflush* yang berfungsi membersihkan bahagian dalam EMF. Ini dapat meningkatkan kadar tapisan air melebihi 1000 Liter.
- Merekabentuk penutup EMF dengan bentuk seperti cawan supaya pengguna boleh terus minum selepas menapis air.
- Membuat kajian mengenai penambahan bahan antimikrob dalam penapis air.
- Penambahbaikan tambahan juga boleh ditambah pada penapis dengan mengambil kira kenaikan harga bahan penapis.

Penghargaan

Penulis ingin merakamkan setinggi-tinggi penghargaan kepada Ketua Kampung Sungai Lembing Encik Rizal Bin Sukimi yang juga merupakan pengusaha pusat pelancongan Rizqi Pelangi Enterprise Sdn Bhd. dan semua pemandu pelancong ke Air Terjun Pelangi di atas sokongan dan dorongan yang berterusan dalam membantu kami menyelesaikan projek ini.

Rujukan

APHA 1995. *Standard Methods for the Examination of Water and Wastewater*. Edisi ke 19. APHA, AWWA and AWPFC. Washington.

Enas Muhi Hadi dan Safa Luay Jasim (2021). *Production of Water Filter from Porcelanite by Dry pressing*; Diyala Journal for Pure Science.

Hoek JP, Bertelkamp C, Verliefde ARD dan Signhal N (2013) *Drinking Water Treatment Technologies in Europe: state of the art-challenges-research need*; Journal of Water Supply: Research and Technology-AQUA. 63 (2), pp. 124-130.

Jishan Wu, Miao Cao, Draco Tong. et al. (2021). *A critical review of point-of-use drinking water treatment in the United States*; npj Clean Water 4, 40.

Johnathon Gagnon Nathan Calvert dan Quamrul Mazumder. (2016). *Design and Development of a Portable Water Filtration System*; Proceedings of the 2016 ASEE North Central Section Conference.

Konstantinos Azis, Zografina Mavriou, Dimitrios G. Karpouzas. et al. (2021). *Evaluation of Sand Filtration and Activated Carbon Adsorption for the Post-Treatment of a Secondary Biologically-Treated Fungicide-Containing Wastewater from Fruit-Packing Industries*; Journal of Food Quailty. (MDPI) Processes 2021, 9, 1223.

Malaysia Environmental Quality Report 2000. Kuala Lumpur: Kementerian Sains, Teknologi dan Alam Sekitar.

McBean E. dan Farrow C., (2021). *Design and Performance for A Novel Low-Tech Water Filter System*; Journal of Environmental Informatics Letters.

Nazira Sulaiman, Saiful Irwan Zubairi, Norrakiah Abdullah Sani. et al. (2020). *The Efficacy of Treated Water from Water Filtration Machines for Safe Drinking Water Supply in Bandar Baru Bangi and Kajang, Selangor*; Journal of Food Quailty.

Ofri B. Zusman, Mario L. Kummel, Jose De la Rosa, et al. (2020) *Dissolved Organic Matter Adsorption From Surface Waters By Granular Composites Versus Granular Activated Carbon Columns: An applicable approach*; Water Research. 181. 115920.

Peramanan A, Willy bald AA, Arunkumar P, Naveenkumar G dan Veerasekar (2014) *A Fabrication of Human Powered Reverse Osmosis Water Purification Process*; International Journal of Research in Aeronautical and Mechanical Engineering. 2 (3), pp. 90-95.

Shivani Batra, Priyanka Adhikari, Anchit Ghai, et al. (2017). *Study And Design Of Portable Antimicrobial Water Filter*; Asian Journal of Pharmaceutical and Clinical Research. Vol 10.

WHO 1984 Guidelines for Drinking-Water Quality, Volume 2, Health Criteria and Other Supporting Information. World Health Organization, Geneva.

WHO 1993 Guidelines for Drinking-Water Quality, Volume 1, Recommendations. 2nd edition, World Health Organization, Geneva.

WHO 1996 Guidelines for Drinking-Water Quality, Volume 2, Recommendations. 2nd edition, World Health Organization, Geneva.

REALITI MAYA INTERAKTIF (VRi) DI LOJI RAWATAN AIR

Saiful Hazman Mokhtar[1], Ernie Kulian @ Abd Karim[2] dan Wan Nurul Hasinah Wan Kamarudin[3]

[1,2,3]Politeknik Sultan Haji Ahmad Shah, Malaysia
[1]saiful@polisas.edu.my
[2]ernie@polisas.edu.my
[3]hasinah@polisas.edu.my

Abstrak: Penggunaan realiti maya dalam proses pengajaran dan pembelajaran (PdP) menyediakan pengalaman imersif kepada pelajar demi memperkukuhkan pemahaman berkaitan perkara yang dipelajari. Pembelajaran lmersif merujuk kepada suasana pembelajaran bermakna yang mana pelajar terlibat secara aktif dan menghayati kandungan yang dipelajari dalam konteks keadaan sebenar. Oleh demikian objektif kajian inovasi ini dijalankan bagi menilai persepsi pelajar berkaitan penggunaan realiti maya interaktif (VRi) sebagai alternatif baru bahan PdP bagi kursus *Water Supply & Waste Water Engineering*. Pemahaman terhadap proses rawatan air sukar dicapai melalui pembacaan dan pembelajaran teori di dalam kelas sahaja. Pelajar perlu dibawa ke tapak bagi mempelajari proses tersebut. Kadangkala lawatan tidak dapat dilaksanakan disebabkan kekangan kewangan, masa dan pendamik Covid-19. Pembangunan bahan VRi proses rawatan air ini terdiri daripada beberapa peringkat dimana ia melibatkan proses reka bentuk, pemilihan lokasi, penggambaran, pembangunan VRi proses rawatan air dan penilaian keberkesanan. Melalui penilaian, didapati tahap keberkesanan penggunaan VRi dalam PdP adalah tinggi. Aplikasi ini dapat meningkatkan pemahaman pelajar terhadap proses rawatan air. Pembangunan VRi ini merupakan salah satu strategi KPI JPPKK di bawah KPI strategi meningkatkan mekanisma penyampaian berkesan dan pelaksanaan pembelajaran teradun

***Kata kunci**: Realiti maya interaktif (VRi) & Proses rawatan air.*

1. Pengenalan

Teknologi yang berkembang dengan pesat membawa perubahan dalam pelbagai aspek termasuk bidang pendidikan. Memasuki alaf baru, sistem pendidikan perlu berubah mengikut kemajuan teknologi seiring pemikiran generasi baru. Pembelajaran abad ke-21 didefinisikan sebagai proses pembelajaran yang berpusatkan pelajar berteraskan elemen komunikasi, kolaboratif, pemikiran kritis, kreativiti serta aplikasi nilai murni dan etika. Teknologi imersif merupakan salah satu kaedah pembelajaran abad ke-21 di mana ia melibatkan penggunaan teknologi secara maya serta mampu merasakan interaksi secara langsung dengan menggunakan komputer. Menurut Muhammad Jamil (2018) dan Rafidah Daud et.al (2020), imersif merupakan keadaan hadir secara fizikal di dunia bukan fizikal di mana pengguna akan merasakan seperti berada di lokasi nyata. Antara teknologi yang menggunakan konsep imersif adalah vitual realiti (VR) dan *augmented reality* (AR). Teknologi ini mula mendapat tempat dalam sektor penerbangan, kedoktoran, ketenteraan, pembinaan dan lain-lain. Dalam bidang

pendidikan, teknologi ini diaplikasikan semasa proses pengajaran dan pembelajaran (PdP) dimana antara kelebihan penggunaannya, para pelajar dapat meningkatkan kefahaman terhadap topik yang sukar difahami (Johar & Abdullah, 2018) dan (Gonz, 2020). Selain itu ia mampu memberi pengalaman baru kepada pelajar dan pendidik. Menurut Salbiah et.al (2021) proses interaksi dalam PdP menjadi lebih unit serta menarik minat pelajar mendalami topik yang sedang dipelajari. Berdasarkan Kamus Oxford pula, realiti maya didefinisikan sebagai imej simulasi melalui komputer atau imej persekitaran tiga dimensi yang kelihatan seperti alam nyata atau kaedah fizikal oleh individu yang menggunakan peralatan khas seperti topi keledar yang mempunyai skrin didalamnya. Secara umum realiti maya boleh ditakrifkan sebagai interaksi simulasi interaktif yang boleh mempengaruhi deria pengguna sehingga pengguna merasai sepenuhnya dalam lingkungan persekitaran simulasi yang dihasilkan oleh komputer. Pengguna berupaya memanipulasi apa yang dilihat sebagai objek “sebenar” seperti yang ada di dalam dunia nyata (Putro, 2015).

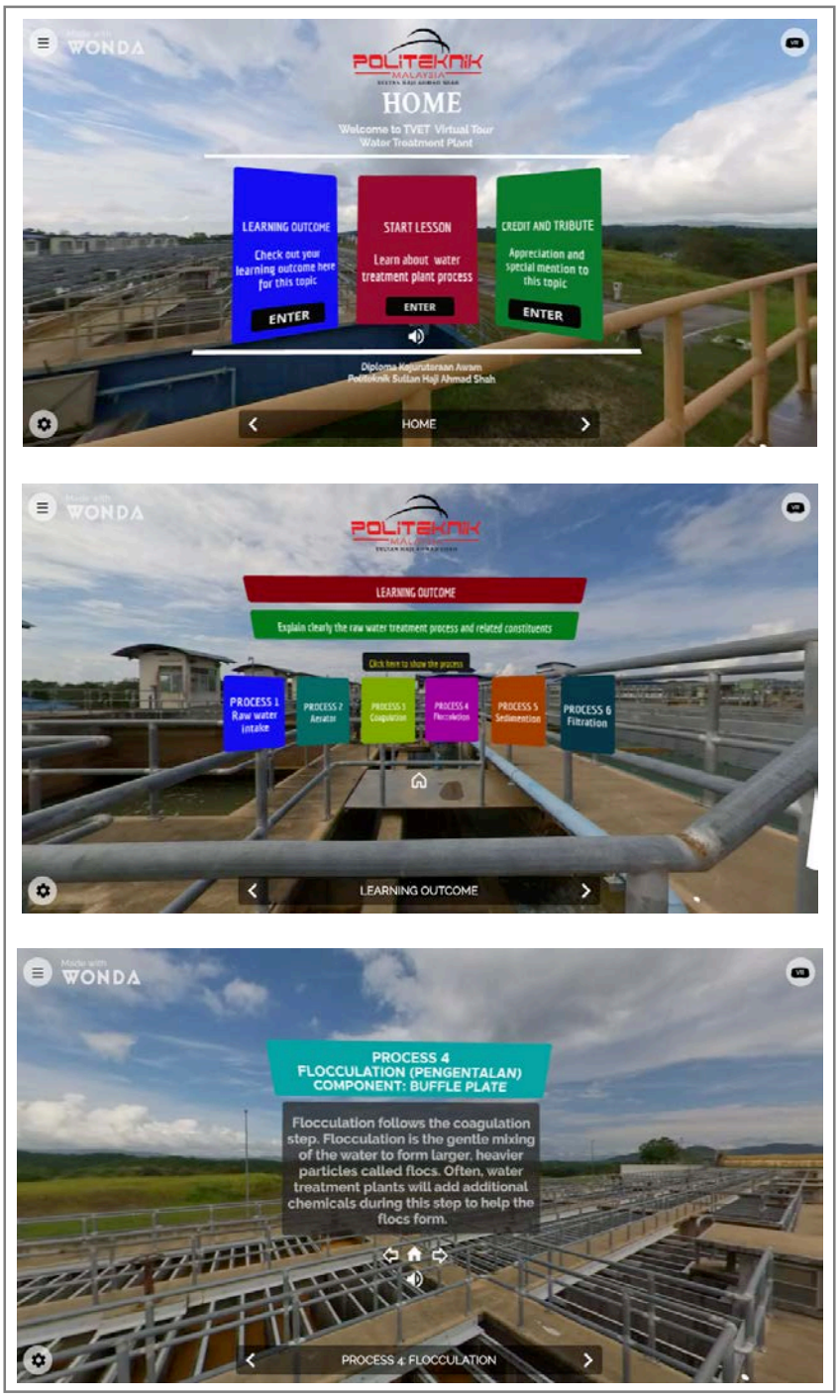
Menurut Laura & Michele (2015) kelebihan penggunaan realiti maya adalah ia memberi peluang kepada pengguna untuk mencapai kepada situasi yang tidak boleh dicapai secara fizikal. Situasi yang tidak dapat dicapai ini disebabkan oleh beberapa faktor seperti masa, ketidakupayaan fizikal dan keadaan yang melibatkan situasi merbahaya. Seringkali pelajar mengalami kesukaran memahami sesuatu teori atau konsep yang dipelajarinya melalui penerangan di kelas. Menurut Ismail et al., (2019) pelajar mengalami masalah menyelesaikan tugasan praktikal kerana kurangnya kemahiran visualisasi. Ini mengakibatkan pelajar menghadapi kesukaran dalam mengaplikasikan teori yang telah dipelajari dalam kelas. Objektif penyediaan aplikasi realiti maya berbentuk interaktif ini terdiri daripada, mereka bentuk seterusnya mambangunkan bahan pembelajaran proses rawatan air di loji rawatan air. Seterusnya penggunaan bahan tersebut akan dinilai oleh pelajar kejuruteraan awam yang sedang mengikuti kursus atau mata pelajaran terbabit. Diharap, pembangunan aplikasi ini dapat membantu pelajar memahami lebih mendalam berkaitan topik yang sedang dipelajari.

2. Bahan dan Kaedah

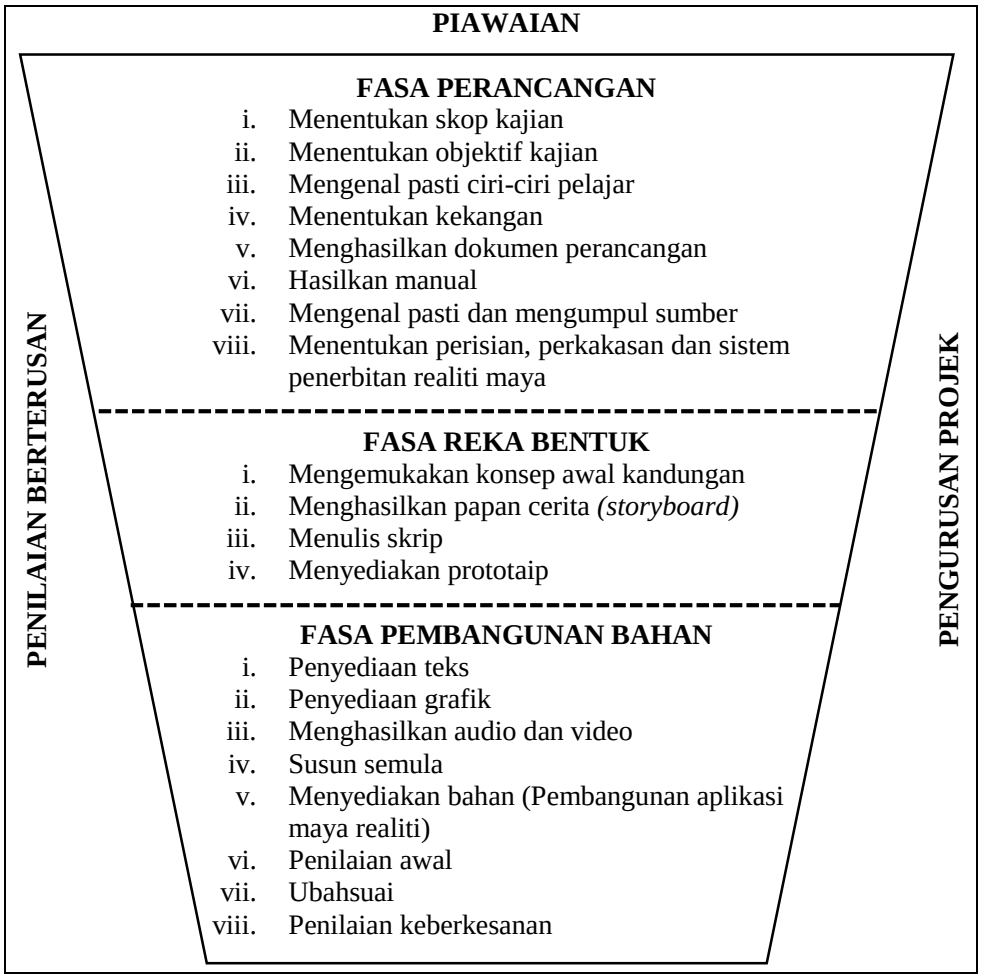
Aplikasi realiti maya berbentuk interaktif ini dibangunkan khusus bagi pelajar yang mengikuti Program Diploma Kejuruteraan Awam bagi kursus *Water Supply And Waste Water Engineering*. Topik yang dipilih adalah *water treatment plant*. Penggambaran dan rakaman video proses rawatan air berbentuk panorama 360^0 dilaksanakan di Loji Rawatan Air Panching, Pahang. Rajah 1 merupakan kamera *Insta 360 One-X* yang digunakan dalam proses rakaman.

Rajah 1. Kamera Insta 360 One-X

Setelah proses penggambaran selesai, bahan tersebut disunting dengan menggunakan aplikasi *Wonder VR* seperti Rajah 2. Suara, muzik latar, teks, elemen interaktif, navigasi dan penilaian turut dimasukkan semasa bahan ini dibangunkan. Seterusnya bahan ini diberikan kepada pelajar yang sedang mengikuti kursus terbabit. Penilaian keberkesanan VRi oleh pelajar dilaksanakan setelah aplikasi ini selesai digunapakai di kelas. Rajah 3 menunjukkan model pembangunan dalam penyediaan aplikasi VRi ini. Pembangunan merangkumi tiga fasa kerja iaitu perancangan, proses reka bentuk dan pembangunan.



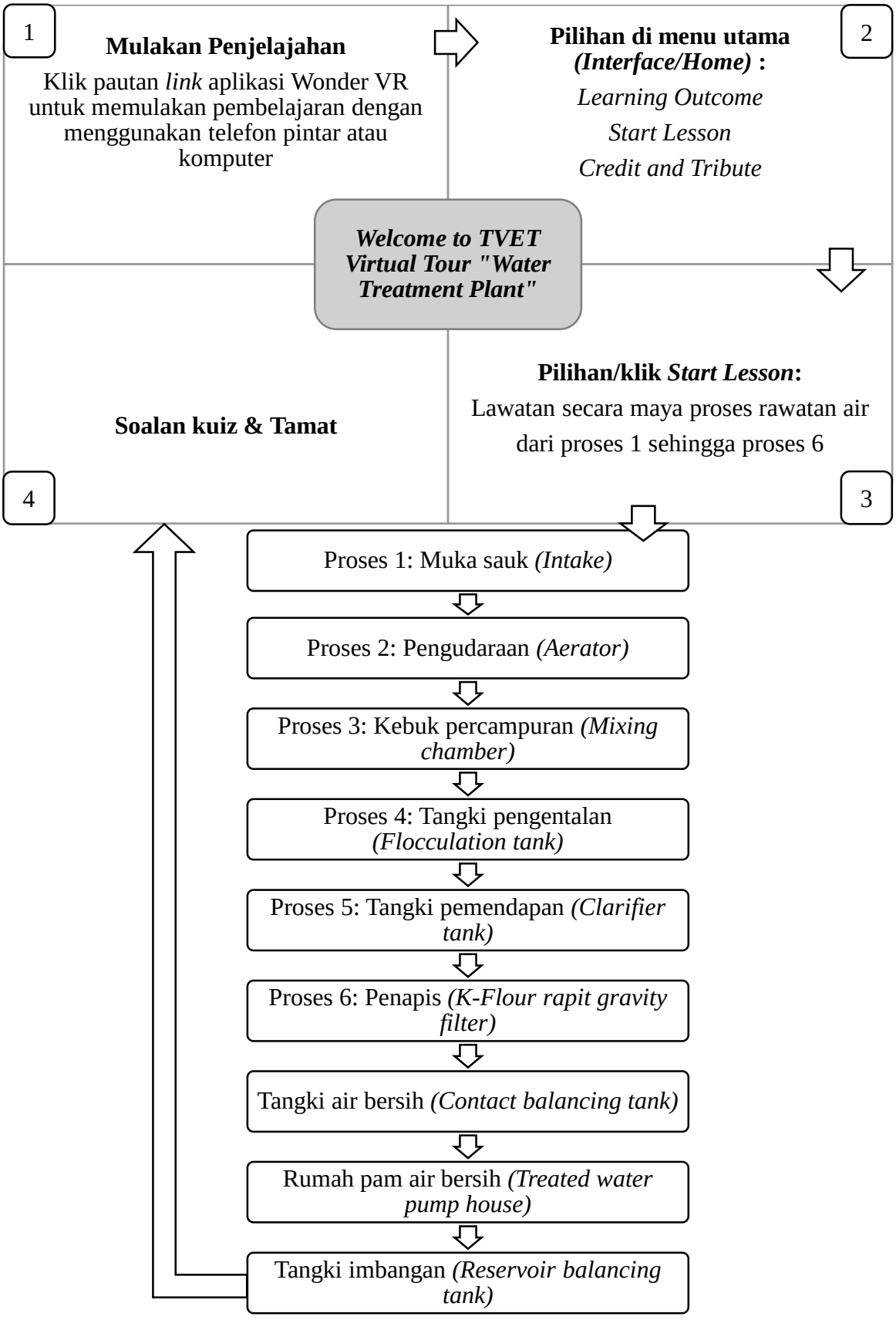
Rajah 2. Paparan aplikasi VRi proses rawatan air



Rajah 3. Model reka bentuk pembangunan VRi (Allessi & Trollip, 2001)

Rajah 4 menunjukan konsep penyediaan realiti maya proses rawatan air. Bagi memulakan penjelajahan secara maya, pelajar perlu klik pada *link* yang diberikan samada melalui telefon pintar atau komputer. Setelah klik, pelajar akan terus memasuki paparan utama dimana pelajar dibenarkan membuat pilihan *learning outcome*, *start lesson* atau *credit*. Bagi tujuan meningkatkan kefahaman serta menggalakkan pembelajaran secara aktif ikon-ikon *hotspot* dan navigasi turut disediakan. Pelajar boleh menjelajahi proses rawatan air berpanduan arahan-arahan yang diberikan. Setelah selesai, pelajar perlu menjawab soalan kuiz yang telah disediakan.

Penilaian dilaksanakan setelah pelajar selesai menjelajahi aplikasi VRi ini. Borang soal selidik diedarkan kepada 30 responden yang terdiri daripada pelajar Diploma Kejuteraan Awam Politeknik Sultan Haji Ahmad Shah yang sedang mengikuti kursus *Water Supply and Waste Water Engineering* pada sesi 2020/2021. Borang soal selidik tersebut mengandungi 14 item. Skala Likert digunakan dalam soal selidik ini dimana petunjuk adalah; 1= Sangat tidak setuju, 2= Tidak setuju, 3= Tidak pasti, 4= Setuju dan 5= Sangat Setuju bagi menilai keberkesanan penggunaan aplikasi tersebut seperti Jadual 1.



Rajah 4. Konsep penyediaan bahan realiti maya

Jadual 1. Skor skala Likert dan tahap keberkesanan

Penilaian	Skor	Tahap Keberkesanan Min Skor
Sangat Tidak Setuju	1	1.00 – 2.39 (Rendah) 2.40 – 3.79 (Sederhana) 3.80 – 5.00 (Tinggi)
Tidak Setuju	2	
Tidak Pasti	3	
Setuju	4	
Sangat Setuju	5	

Tahap keberkesanan bagi menilai 14 item soal selidik dibahagi kepada 3 peringkat. Menurut Lendal (2007) tahap keberkesanan yang rendah dengan min skor 1.00 hingga 2.39, tahap keberkesanan sederhana dengan min skor 2.40 hingga 3.79 dan tahap keberkesanan yang tinggi dengan min skor antara 3.80 hingga 5.00.

3. Dapatan

Aplikasi realiti maya yang mengandungi gambar dan video panorama 360 darjah adalah simulasi audiovisual yang membolehkan pelajar melihat sekeliling melalui skrin telefon pintar atau komputer ke semua arah, sama seperti mereka lihat dalam kehidupan nyata. Ia juga mengandungi butang antara muka interaktif yang dapat menghubungkan pengguna ke video bagi mendorong pergerakan satu tempat ke satu tempat bagi mendapat gambaran atau informasi yang lebih jelas berkaitan proses rawatan air.

Jadual 2 menunjukkan penilaian keberkesanan penggunaan aplikasi realiti maya proses rawatan air. Purata min tertinggi merujuk item no.6, no.11 dan no.12 dengan purata min masing-masing 4.97, 4.93 dan 4.90. Setelah menggunakan aplikasi tersebut pelajar bersetuju antara muka (*Interface*) dan navigasi yang disediakan dalam aplikasi ini adalah jelas dan mudah difahami. Pelajar turut bersetuju aplikasi realiti maya interaktif ini mampu menarik minat untuk mendalami topik proses rawatan air. Pelajar juga menyatakan kecenderungan sentiasa bersikap positif bagi menerima kaedah pembelajaran menggunakan teknologi terkini. Ini bertepatan kajian yang dilaksanakan oleh Ryan Yovanda et.al (2020), Yusof et.al (2017) dan Daud et.al (2015) dimana teknologi imersif realiti maya yang diterapkan mempunyai banyak manfaat dan sangat membantu pelajarnya terutama beroleh pengalaman dalam mempersiapkan kemampuan diri terhadap topik yang diikuti. Menurut Muhamad Nazrul et.al (2021) penggunaan reality maya bakal menawarkan nilai pendidikan yang tinggi dalam proses penyebaran maklumat secara interaktif.

Manakala purata min terendah pula merujuk kepada item no.3 (2.67) iaitu berkaitan pernyataan “saya pernah guna aplikasi realiti maya interaktif”. Melalui dapatan ini pelajar masih lagi belum terdedah sepenuhnya penggunaan teknologi realiti maya. Ini mungkin disebabkan oleh bahan itu sendiri yang masih kurang di negara kita. Purata min kedua terendah pula merujuk kepada item no. 2 (3.47) iaitu berkaitan pertanyaan “saya mengetahui kaedah pembelajaran secara realiti maya interaktif”. Walaupun teknologi ini telah lama berkembang, sebahagian pelajar masih belum mengetahui kewujudannya. Oleh demikian, pembangunan dan penggunaan teknologi ini amat penting bagi mengelakkan pelajar ketinggalan. Para pendidik harus diberi pendedahan dan latihan bagi tujuan penggunaan dan penyediaan bahan seperti ini. Melalui analisis yang dijalankan, didapati purata min keseluruhan keberkesanan penggunaan aplikasi realiti maya terhadap proses rawatan air adalah tinggi dengan min skor 4.51. Berdasarkan keputusan yang diperolehi, dapat dirumuskan kebanyakan pelajar menunjukkan maklum balas yang positif. Pelajar turut menyatakan minat yang tinggi semasa menggunakan

aplikasi realiti maya proses rawatan air ini. Walaupun hanya berada di kelas, pelajar turut merasakan seperti berada di lokasi sebenar. Sebahagian daripada pelajar turut menyatakan ia merupakan kali pertama mereka menggunakan aplikasi tersebut, sama ada secara langsung atau tidak langsung. Menurut Salbiah et.al (2021), inovasi VR ini merupakan satu inovasi masa depan yang dijangka memberi impak yang efektif kepada dunia pendidikan.

Jadual 2. Penilaian aplikasi realiti maya proses rawatan air

No	Item	Purata Min	Tahap
1	Saya pernah mendengar kaedah pembelajaran secara imersif realiti maya interaktif	3.53	Sederhana
2	Saya mengetahui kaedah pembelajaran secara realiti maya interaktif	3.47	Sederhana
3	Saya pernah guna aplikasi realiti maya interaktif	2.67	Sederhana
4	Kandungan aplikasi realiti maya interaktif ini sangat baik dan menarik	4.90	Tinggi
5	Aplikasi realiti maya interaktif ini mudah untuk digunakan dalam pembelajaran	4.80	Tinggi
6	Antaramuka (*Interface*) dan navigasi yang disediakan dalam aplikasi ini adalah jelas dan mudah difahami	4.97	Tinggi
7	Saya memahami dengan jelas topik yang dipelajari melalui aplikasi ini	4.87	Tinggi
8	Realiti maya interaktif ini membantu meningkatkan pemahaman saya berkaitan topik proses rawatan air	4.80	Tinggi
9	Persembahan maklumat yang disediakan melalui aplikasi realiti maya ini mudah diikuti	4.80	Tinggi
10	Aplikasi realiti maya interaktif ini meningkatkan kaedah pembelajaran secara kendiri	4.90	Tinggi
11	Aplikasi realiti maya interaktif ini mampu menarik minat untuk mendalami topik proses rawatan air	4.93	Tinggi
12	Saya bersikap positif menerima kaedah pembelajaran yang menggunakan teknologi imersif realiti maya ini	4.90	Tinggi
13	Kualiti audio dan video yang dipaparkan dalam aplikasi ini jelas dan sangat baik	4.83	Tinggi
14	Kualiti grafik yang digunakan dalam aplikasi ini adalah sangat baik	4.83	Tinggi
Purata skor min keseluruhan Tahap keberkesanan penggunaan aplikasi yang telah dibangunkan terhadap oleh pelajar yang mengambil kursus *water supply and waste water engineering* , Program Diploma Kejuruteraan Awam.		**4.51**	**Tinggi**

4. Perbincangan dan Kesimpulan

Teknologi realiti maya mampu membantu dalam proses pengajaran dan pembelajaran, lebih-lebih lagi dalam era pembelajaran abad ke-21. Secara keseluruhan, tahap keberkesanan penggunaan aplikasi realiti maya proses rawatan air oleh pelajar berada pada tahap tinggi. Farhana & Noor Azah (2021) turut menyatakan dalam kajiannya virtual reality yang digunakan dalam kelas menunjukkan peningkatan dalam hasil akademik pelajar. Walau bagaimanapun bahan ini perlu ditambah baik mengikut teknologi semasa bagi membolehkan penggunaannya mudah dicapai. Antara penambahbaikan yang boleh dilaksanakan bagi meningkatkan penggunaan bahan ini dalam sektor pendidikan adalah seperti berikut:

1. Menambahbaik kurikulum dan silibus dengan menerapkan elemen teknologi imersif dan kaedah pembelajaran abad ke 21;
2. Mengenal pasti kursus dan topik yang sesuai bagi pembangunan realiti maya berdasarkan silibus semasa;
3. Memberi pendedahan dan latihan pembangunan bahan realiti maya kepada tenaga pengajar;
4. Menggalakkan pelajar menggunakan teknologi imersif realiti maya dalam pembelajaran.

Realiti maya adalah antara teknologi yang boleh diterokai secara berterusan dan semakin mendapat tempat dalam bidang pendidikan. Sekiranya teknologi realiti maya dapat digunakan dengan sewajarnya, ia mampu membantu mengekalkan perhatian dan minat pelajar di dalam kelas. Selain itu, kualiti pengajaran dan pembelajaran yang dilaksanakan menjadi lebih bermakna. Aplikasi realiti maya juga dapat menjadikan proses pengajaran dan pembelajaran lebih aktif serta mewujudkan suasana pembelajaran yang menyeronokkan. Melalui penggunaan teknologi ini, pensyarah dapat menjelaskan kepada pelajar dengan lebih terperinci berkaitan topik dipelajari seterusnya kualiti pengajaran dan pembelajaran akan lebih berkesan. Kajian lanjut amat diperlukan bagi membantu usaha untuk memastikan teknologi realiti maya ini boleh digunakan dengan jayanya pada masa depan.

Penghargaan

Penulis ingin merakamkan setinggi-tinggi penghargaan kepada Encik Aminuddin Bin Mesir, Pengurus Daerah Pengurusan Air Pahang Berhad Kuantan dan Encik Mohd Rizwan Bin Hamid, Pengurus Loji Rawatan Air Panching, Kuantan atas kerjasama, sokongan dan dorongan yang berterusan dalam membantu kami menyelesaikan projek ini.

Rujukan

Allessi, S. & Trollip, M. (2001). Multimedia for learning. Boston, MA: Allyn & Bacon Publishers

Daud, R., Ab. Jalil, Z. & M.Gunawan, M.N. (2015). Community College Students' Perception Towards Digital Learning In Malaysia. Procedia Social and Behavioral Sciences, 195, 1798–1802

Farhana F. & Noor Azah A.R (2021). Pendidikan Interaktif: Penerokaan Virtual Reality (VR) Dalam Visualisasi Model Seni Bina. ANP Journal of Social Science and Humanities. Vol.2 No2 (2021) Page 26-38

Gonz, M. (2020). Implications of Virtual Reality in Arts Education : Research Analysis in the Context of Higher Education. Education Science 10(225): 1–19

Ismail, M.I, Zakaria, A.F, Ismail, I.M., Othman, H., & Samsudin, M.A. (2019). Design and Development of Augmented Reality Teaching Kit: In TVET Learning Context. International Journal of Engineering & Technology, 8(1), 129–34

Johar, S.H. & Abdullah, N.S. (2018). A Concept Of Augmented Reality Module For Electronic Subject. Online Journal for TVET Practioners, UTHM

Lendal H.K & Diane W. (2007). Management by Menu, 4th Edition. London, Hoboken, N.J: John Wiley & Son Inco.

Muhamad Nazrul Z.A, Muhammad Helmi N. & Noorhayati M.N (2021). Keberkesanan Penggunaan Realitu Maya dalam Kurikulum Pendidikan Malaysia. Jurnal Dunia Pendidikan. Vol. 3, No. 1, 729-737, 2021. *http://myjms.mohe.gov.my/index.php/jdpd*

Muhammad Jamil (2018). Pemanfaatan Teknologi Virtual Reality (VR) di perpustakaan. Buletin Perpustaan Universiti Islam Indonesia, 9(1) 2018, 99-113

Putro, H. T. (2015). Makalah Studi Mandiri: Kajian Virtual Reality. Makalah Studi Mandiri Program Pascasarjana Teknik Arsitektur Universitas Gadjah Mada, Yogyakarta

Rafidah Daud, Noor Azah Abd Raman & Zarulrizam Ab. Jalil (2020). Penggunaan Augmented Reality Video Di dalam Pendidikan TVET. In IJEAP International Journal of Education and Pedagogy, Vol. 2, No. 1, 253-263 2020

Ryn Yovanda, Gege Mulyani & Nuriska Garnitasi (2020). Penerapan teknologi imersif pada Axia Class program di jenjang SMK. Inovasi Kurikulum, 17(2)(2020) 87-97. https://ejournal.upi.edu/index.php/JIK/issue/view/2210

Salbiah M.S, Ahmad Sahli M.H, Norasma M.S, Nur Shliza S.,Nur Hazelen M.R, Mohd Zafian M.Z (2021). Teknologi Virtual Reality Amali Haji: Satu Inovasi Masa Hadapan: Jurnal Islam dan Masyarakat Kontemporari Vol 22 No 2 (2021). https://journal.unisza.edu.my/jimk/index.php/jimk/article/view/577

Yusof M.S, Said C.S, Mohd Nasir M.R & Rozali A. (2017). Aplikasi Teknologi Realiti Maya dalam Pembangunan Koswer Rumah Tradisional Melayu Terengganu. Kupas Seni: Jurnal Seni dan Pendidikan Seni, Vol. 5 (2017) / (76-86). https://ejournal.upsi.edu.my/index.php/JSPS/article/view/2273

KURIKULUM PENGAJIAN ISLAM DAN PENDIDIKAN MORAL DALAM PEMBENTUKAN SAHSIAH BERKUALITI: SATU KAJIAN DI POLTEKNIK MUKAH

Fatin Faqeriah Hamsah[1], Termimi Hidayat Mahyan[2] dan Farah Hanan Abu Bakar[3]

[1]Politeknik Mukah 1 Sarawak
faqeriah@pmu.edu.my
termimi@pmu.edu.my
farah@pmu.edu.my

Abstrak: Pendidikan merupakan elemen utama dalam mendidik generasi cemerlang serta membentuk sahsiah peribadi yang berkualiti. Masalah sosial dan salah laku pelajar semakin membimbangkan telah memberi impak negatif dalam kehidupan. Justeru, kajian ini dijalankan bertujuan untuk mengenal pasti tahap pemahaman pelajar terhadap kurikulum Pengajian Islam dan Pendidikan Moral, mengetahui tahap penghayatan pelajar terhadap sahsiah berkualiti dan mengkaji hubungan di antara kurikulum Pengajian Islam dan Pendidikan Moral dengan pembentukan sahsiah pelajar. Responden kajian ini adalah pelajar semester dua sesi 2: 2021/2022 yang mengambil kursus Pengajian Islam dan Pendidikan moral terdiri daripada dua jabatan iaitu Jabatan Teknologi, Maklumat dan Komunikasi (JTMK) dan Jabatan Perdagangan (JP) iaitu seramai 137 orang. Satu set soal selidik yang mengandungi 24 item telah diedarkan kepada responden. Analisis deskriptif dijalankan untuk mendapatkan nilai kekerapan, peratusan dan min dengan menggunakan perisian *Statistical Package for Social Science Version 26*. Analisis secara inferensi juga dijalankan dengan menggunakan korelasi *Pearson* untuk mengkaji hubungan antara kurikulum Pengajian Islam dan Pendidikan Moral dengan pembentukan sahsiah pelajar. Hasil kajian menunjukkan tahap pemahaman pelajar terhadap kurikulum Pengajian Islam dan Pendidikan Moral dan tahap penghayatan pelajar terhadap pembentukan sahsiah berkualiti berada pada tahap nilai min yang tinggi iaitu masing-masing 4.52 dan 4.34. Dapatan juga menunjukkan terdapat hubungan yang signifikan antara kurikulum Pengajian Islam dan Pendidikan Moral dengan pembentukan sahsiah pelajar iaitu r = 0.585. Kesimpulannya, kurikulum Pengajian Islam dan Pendidikan Moral di Politeknik adalah salah satu saluran dalam membentuk sahsiah dan peribadi yang unggul.

***Kata Kunci**: kurikulum Pengajian Islam; kurikulum Pendidikan Moral; pembentukan; sahsiah; berkualiti; Politeknik Mukah*

1. Pengenalan

Pendidikan merupakan elemen dan tunjang utama dalam mendidik generasi yang cemerlang serta penting dalam pembangunan sesebuah negara. Pendidikan di Malaysia bertujuan membentuk insan yang mampu memajukan potensi diri secara menyeluruh dalam pelbagai aspek kehidupan serta membangunkan insan yang mencakupi aspek intelek, rohani, emosi dan jasmani sepertimana dalam Falsafah Pendidikan Kebangsaan. Menurut Mazarul Hasan et al. (2020), pembelajaran dunia globalisasi masa kini yang berkonsepkan kemahiran telah diterima kebanyakkan negara dengan memasukkan konsep tersebut ke dalam kurikulum program pendidikan. Menurut Ahmad Sahlan et al. (2020), sistem pendidikan di Malaysia sangat

memberi fokus dalam melahirkan insan yang memiliki sahsiah yang berkualiti serta berilmu pengetahuan.

Sebagai persediaan menghadapi cabaran masa depan, seorang pelajar perlu berusaha memperbaiki dan membentuk sahsiah dan peribadi yang berkualiti bagi melahirkan insan yang unggul dalam pelbagai aspek. Kecemerlangan akademik pelajar yang seimbang dengan pembangunan sahsiah yang berkualiti sangat dituntut agama dalam menuju kemajuan sesuatu negara. Menurut Noraini Harun et al. (2021), sistem Penasihat Akademik berkesan dalam membantu proses pendidikan akhlak bagi mencapai kecemerlangan akademik yang dipacu dengan akhlak dan nilai yang murni sebagai persediaan di alam pekerjaan. Menurut Khadijah Alavi et al. (2012), kejayaan seorang pelajar bukanlah dinilai berdasarkan cemerlang akademik semata-mata, tetapi haruslah dinilai dari semua aspek terutamanya kecemerlangan sahsiah. Menurut Asmawati Suhid et al. (2018), Pelan Pembangunan Pendidikan Malaysia 2013-2025 telah menggariskan pembentukan sahsiah dan penerapan nilai murni dalam sistem pendidikan agar mampu melahirkan generasi yang memiliki penghayatan jati diri yang mulia pada diri pelajar. Menurut Hasbullah Mat Daud et al. (2020), melalui penerapan akhlak murni, seseorang mampu membentuk sahsiah diri yang luhur. Pembelajaran sosial perlu diberi perhatian kerana ianya penting dalam proses pembentukan jati diri pelajar. Sistem pendidikan di Malaysia turut memberi penekanan terhadap pembelajaran sosial dengan menerapkan nilai-nilai murni.

Era globalisasi hari ini dipenuhi pelbagai gaya kehidupan baru memberi kesan dan cabaran kepada masyarakat. Masyarakat berdepan dengan pelbagai isu keruntuhan sahsiah dan akhlak manusia yang sangat membimbangkan. Menurut Roshadah Abu Bakar et al. (2020), isu masalah sosial dalam kalangan pelajar menjadi perhatian serius oleh masyarakat. Peningkatan kejadian salah laku, masalah sosial serta jenayah dalam kalangan pelajar seperti ponteng sekolah, pergaduhan, buli, jenayah siber, seks bebas, penyalahgunaan dadah dan pengaruh alkohol bukan sahaja memberi kesan negatif kepada prestasi akademik tetapi turut menjejaskan pembentukan modal insan yang mempunyai sahsiah yang unggul. Menurut kenyataan Media Statistik Jenayah, Malaysia (2021) melaporkan bahawa, jenayah siber adalah penggunaan kemudahan teknologi maklumat yang disalah guna menyebabkan ramai remaja terjebak dalam aktiviti tidak bermoral. Ianya meningkat sebanyak 99.5 peratus pada tahun 2020 berbanding tahun 2019. Menurut Khuldiah Iman dan Hilwa Abdullah (2019), seseorang yang terjebak dengan jenayah seksual adalah disebabkan kurangnya ilmu pengetahuan tentang pendidikan akhlak serta tiada keharmonian dalam keluarga. Menurut Adibah Bahori dan Siti Zubaidah Ismail (2018) pula, walaupun pelbagai program telah dilaksanakan namun jenayah pembuangan bayi masih terus berleluasa. Menurut Rosni Wazir et al. (2020), isu penyalahgunaan dadah dalam kalangan remaja, menunjukkan peningkatan yang sangat membimbangkan. Isu ini mempunyai kaitan rapat dengan masalah keruntuhan akhlak dan nilai akidah yang perlu diberi perhatian. Penyalahgunaan dadah kini berleluasa melibatkan semua golongan usia tidak kira dewasa, remaja dan pelajar sekolah. Menurut Mohamed Hamdan Abdullah et al. (2018), isu masalah sosial yang bertentangan dengan nilai sahsiah yang murni sering dilaporkan dalam media massa terutamanya golongan remaja dan pelajar sekolah. Pembentukan sahsiah yang unggul dalam diri pelajar sangat penting bagi mengatasi masalah sosial dan salahlaku terus menular.

Dalam konteks politeknik, Jabatan Pendidikan Politeknik dan Kolej Komuniti telah mengemaskini kurikulum yang sedia ada untuk memastikan pelajar memiliki keupayaan berfikir dan sahsiah yang tinggi. Di Politeknik perlaksanaan kursus Pengajian Islam dan

Pendidikan Moral merupakan salah satu pengajaran terpenting dalam pembentukan sahsiah pelajar agar salaras dengan nilai-nilai murni. Menurut Shahidan Shafie dan Ying-Leh Ling (2017), kurikulum Pengajian Islam dan Pendidikan Moral diperkenalkan selari dengan matlamat menerapkan nilai dan sahsiah yang murni dalam diri pelajar sebagai persediaan ke alam pekerjaan. Oleh itu, pengkaji merasakan perlunya dibuat satu kajian bagi meninjau kemampuan kurikulum Pengajian Islam dan Pendidikan Moral dalam membentuk sahsiah pelajar yang berkualiti.

Tujuan kajian ini dijalankan adalah untuk:

1. Mengenal pasti tahap pemahaman pelajar terhadap kurikulum pengajian Islam dan pendidikan Moral.
2. Mengetahui tahap penghayatan pelajar terhadap sahsiah berkualiti setelah mengikuti kurikulum pengajian Islam dan pendidikan Moral.
3. Mengkaji hubungan di antara kurikulum pengajian Islam dan pendidikan Moral dengan pembentukan sahsiah pelajar.

2. Tinjauan Literatur

2.1 Sahsiah Menurut Islam

Makna sahsiah adalah sifat-sifat yang membezakan peribadi seseorang individu dengan individu yang lain. Sahsiah juga digunakan dalam bahasa Melayu yang membawa maksud akhlak dan keperibadian. Menurut Ibn Manzur (2005), menjelaskan istilah sahsiah adalah daripada perkataan bahasa Arab iaitu *shikhas*, *shakhus*, *shaskhas*, *shukhus*, *shakhis* yang membawa makna seseorang memiliki akhlak mulia. Menurut Shahabuddin Hashim et al. (2014), sahsiah juga merupakan perkataan daripada bahasa Arab yang membawa erti keperibadian atau peribadi. Makna peribadi pula merujuk pada sifat- sifat yang telah sebati pada dirinya dan membentuk watak dalam diri seseorang. Menurut Asming Yalawae dan Ahmad Farid (2007), sahsiah adalah akhlak yang mulia dijadikan asas kepada pembentukan peribadi, adab dan perangai diri seseorang. Menurut Ibrahim et al. (2012), sahsiah yang baik mempunyai tabiat fitrah semula jadi seseorang iaitu senyum, marah, ketawa dan sebagainya. Sahsiah adalah suatu sifat yang unik dapat membezakan diri seseorang dengan individu lain. Berdasarkan definisi yang dikemukakan tersebut, pengkaji merumuskan dan merangkumkan ciri-ciri pengertian sahsiah yang saling melengkapi dalam makna sebenar sahsiah. Sahsiah merupakan terjemahan tingkah laku dan perwatakan hasil daripada penghayatan pendidikan sosial yang diperolehi melalui gambaran peribadi luar seseorang.

2.2 Pembentukan Sahsiah

Pembentukan sahsiah adalah proses membentuk sikap seseorang individu ke arah lebih baik dan bertanggungjawab seterusnya menjadi kebiasaan dan tabiat. Menurut Aimi Khairunnisa (2020), pembentukan sahsiah memerlukan sokongan dan kerjasama pelabagai pihak untuk membentuk perubahan perbuatan dan sikap seseorang individu. Pembentukan perilaku sahsiah merupakan akhlak, tingkah laku atau keperibadian yang lahir daripada pembentukan psikologi manusia dalam membentuk akhlak atau sahsiah seseorang yang membezakan seseorang dengan seseorang yang lain.

2.3 Pemahaman Kurikulum Pengajian Islam

Pendidikan Islam merupakan saluran dalam membentuk pemikiran serta peribadi muslim. Menurut Supyan Husin (2014), Pendidikan Islam adalah salah satu kaedah menyalurkan ilmu pengetahuan dan penerapan akhlak Islam berteraskan al-Quran dan as-Sunnah untuk kemaslahatan di dunia dan akhirat. Kurikulum Pengajian Islam adalah salah satu kurikulum yang ditawarkan di Politeknik, mencakupi semua aspek kehidupan. Dalam kurikulum tersebut, ada empat topik utama. Pada topik pertama iaitu Islam sebagai ad-din menerangkan tentang Islam, iman dan ihsan. Seterusnya topik kedua iaitu Islam dan asas Syariah pula membincangkan tentang sumber ilmu Islam dan asas Syariah. Bagi topik ketiga iaitu institusi Islam pula membincangkan tentang institusi keluarga dan masyarakat, ekonomi, pendidikan dan siasah. Manakala topik keempat pula iaitu Islam dan cabaran semasa membincangkan tentang isu semasa seperti keruntuhan akhlak, globalisasi, sains, teknologi, *Information and Communication Technology* (ICT), pembangunan alam sekitar, dialog peradaban, salah faham terhadap Islam, extremisme dalam beragama dan radikalisme. Kurikulum Pengajian Islam adalah berasaskan konsep tauhid dengan mengakui kebesaran dan keesaan Allah SWT dalam memupuk akhlak pelajar muslim agar taat dan patuh pada tuntutan syarak. Menurut Hamidah Sulaiman et al. (2013), ilmu pengajian Islam haruslah diterapkan dari rumah agar mampu melahirkan kekuatan rohani seterusnya dapat diamalkan dalam kehidupan seharian.

2.4 Pemahaman Kurikulum Pendidikan Moral

Menurut Fatimah Ibda (2012), Pendidikan Moral adalah pendidikan akhlak yang merangkumi pendekatan dan kaedah mengajar pelajar tentang pengetahuan, sikap, kepercayaan, kemahiran dan tingkah laku moral baik, betul, adil serta mengambil berat terhadap orang lain. Pendidikan Moral bertujuan melahirkan individu yang mempunyai keperibadian yang tinggi serta memupuk dan mengamalkan nilai moral dalam kehidupan. Pendidikan Moral juga bertujuan melahirkan insan yang konsisten melaksanakan tingkahlaku sesuai dengan konsep moral dengan berlandaskan agama, budaya dan tradiri moral dalam masyarakat. Menurut kenyataan Kurikulum Bersepadu Sekolah Menengah (KBSM) (1988), Pendidikan Moral dapat membentuk seseorang dengan peribadi dan akhlak yang mempunyai nilai murni dalam diri bagi menyumbang ke arah pembangunan dan perpaduan negara.

Kurikulum Pendidikan Moral mempunyai lima topik utama iaitu pengenalan Pendidikan Moral, konsep dan teori moral, nilai-nilai etika agama, sosialisasi dan pembentukan tabiat moral dan peranan individu terhadap masyarakat serta negara. Dalam topik pertama iaitu pengenalan Pendidikan Moral membincangkan tentang pengenalan dan amalan Pendidikan Moral dalam kehidupan. Bagi topik kedua pula iaitu konsep dan teori moral membincangkan tentang dimensi dan teori-teori moral. Seterusnya topik ketiga iaitu nilai-nilai etika agama membincangkan tentang etika dari perspektif agama, perbezaan di antara moral, agama, adat dan undang-undang dan sifat-sifat seorang individu yang bermoral. Bagi topik keempat iaitu sosialisasi dan pembentukan tabiat moral pula membincangkan tentang norma- norma sosial dan kawalan sosial serta peranan agen-agen sosialisasi seperti keluarga, pendidikan, media massa dan kelompok main. Manakala topik kelima iaitu peranan individu terhadap masyarakat serta negara membincangkan tentang peranan dan tanggungjawab indivudu terhadap diri sendiri, keluarga, warga tua, budaya ikram, kejiranan, elemen-elemen yang mencabar nilai- nilai moral serta isu-isu semasa di kalangan remaja.

3. Metodologi Kajian

3.1 Populasi dan Kaedah Persampelan

Menurut Mohamad Najib (1999), populasi kajian adalah terdiri daripada semua ahli dalam kelompok kajian. Populasi kajian ini adalah pelajar semester dua sesi 2: 2021/2022 yang didedahkan dengan kurikulum Pengajian Islam dan Pendidikan Moral. Sampel diambil daripada keseluruhan populasi. Jumlah responden adalah seramai 137 orang. Seramai 87 orang pelajar yang mengambil kursus Pengajian Islam dan 50 orang adalah pelajar kursus Pendidikan Moral.

3.2 Instrumen Kajian

Kaedah kuantitatif digunakan untuk menghasilkan data kajian ini dengan membangunkan set soal selidik menggunakan *google form*. Terdapat 3 bahagian utama dalam set soal selidik tersebut. Bahagian A adalah berkaitan latar belakang responden, Bahagian B pula adalah tahap pemahaman pelajar terhadap kurikulum Pengajian Islam dan Pendidikan Moral dan Bahagian C adalah berkaitan tahap penghayatan pelajar terhadap sahsiah berkualiti. Analisis data dalam bahagian B dan C adalah berdasarkan Skala Likert 5 iaitu Sangat Tidak Setuju, Tidak Setuju, Kurang Setuju, Setuju dan Sangat Setuju. Menurut Lukman Hakim (2014), set soal selidik boleh diadaptasikan daripada kajian yang telah dijalan oleh pengkaji-pengkaji lain.

3.3 Analisis Data

Analisis data adalah secara deskritif dan inferensi. Kadangkala pengkaji boleh menggunakan pelbagai teori dan formula sendiri bagi menghasilkan satu indeks tersendiri berdasarkan objektif kajian (Mohamad Najib Abdul Ghafar, 2003). Oleh itu, hasil analisa dalam bahagian B, C, D, E dan F dianalisis berdasarkan kepada nilai skor min kepada tiga tahap iaitu:

Jadual 1. Nilai skor min.

Nilai Skor Min	Tahap
1.00 – 2.33	Rendah
2.34 – 3.67	Sederhana
3.68 – 5.00	Tinggi

Jadual 1 adalah nilai skor min dikelaskan kepada 3 tahap iaitu tahap rendah nilai min 1.00 – 2.33, tahap sederhana nilai min 2.34 – 3.67 dan tahap tinggi nilai min 3.68 – 5.00. Bagi analisis inferensi pula, pengkaji menggunakan kaedah *Pearson Coefficient Of Correlation*. Analisis korelasi dihasilkan adalah untuk mengetahui hubung kait antara dua pemboleh ubah (Mohamad Najib Abdul Ghafar, 1999). Pengkaji menggunakan cadangan Davis (1971) dalam menentukan tahap kekuatan korelasi.

Jadual 2. Klasifikasi kekuatan korelasi.

Julat (+ atau -)	Kekuatan
0.01 hingga 0.09	diabaikan
0.10 hingga 0.29	rendah
0.30 hingga 0.49	Sederhana kuat
0.50 hingga 0.69	kuat
0.70 atau lebih	Sangat kuat

Jadual 2 adalah klasifikasi kekuatan korelasi mengikut tahap kekuatan. Julat 0.01 – 0.09 tahap kekuatan diabaikan, 0.10 – 0.29 tahap rendah, 0.30 – 0.49 tahap sederhana kuat, 0.50 – 0.69 tahap kuat dan 0.70 atau lebih tahap sangat kuat.

4. Dapatan Kajian dan Perbincangan

4.1 Latar Belakang Responden

Jadual 3. Jantina.

Jantina	Kekerapan	Peratus
Lelaki	55	40.1
Perempuan	82	59.9
Jumlah	**137**	**100**

Jadual 3 menunjukkan jantina responden. Jumlah responden adalah 137 orang. Pelajar lelaki adalah 55 orang (40.1%) manakala perempuan adalah 82 orang (59.9%).

Jadual 4. Agama.

Agama	Kekerapan	Peratus
Islam	98	71.5
Bukan Islam	39	28.5
Jumlah	**137**	**100**

Jadual 4 menunjukkan agama responden. Pelajar beragama Islam adalah seramai 98 orang (71.5%). Manakala bukan beragama Islam adalah seramai 39 orang (28.5%). Majoriti responden adalah beragama Islam kerana pelajar yang mengambil kursus Pengajian Islam melibat dua jabatan iaitu JTMK dan JP manakala selebihnya adalah responden bukan Islam yang mengambil kursus Pendidikan Moral hanya melibatkan pelajar dari jabatan JTMK sahaja.

Jadual 5. Bangsa.

Agama	Kekerapan	Peratus
Melayu	46	33.6
Cina	7	5.1
India	1	0.7
Iban	25	18.2
Melanau	44	32.1
Bidayuh	1	0.7
Lain-lain	13	9.5
Jumlah	**137**	**100**

Jadual 5 adalah dapatan kajian bangsa responden. Sejumlah 46 orang (33.6%) responden berbangsa Melayu, 7 orang (5.1%) berbangsa Cina, seorang (0.7%) berbangsa India, 25 orang (18.2%) berbangsa Iban, 44 orang (32.1%) berbangsa Melanau, seorang (0.7%) berbangsa bidayuh dan 13 orang (9.5%) berbangsa lain-lain. Ini menunjukkan pelajar terdiri daripada pelbagai bangsa dan etnik di Politeknik Mukah.

Jadual 6. Gred SPM.

Gred	Kekerapan	Peratus
A	21	15.3
A-	22	16.1
B+	39	28.5
B	26	19.0
B-	1	0.7
C+	20	14.6
C	6	4.4
> C	2	1.5
Jumlah	**137**	**100**

Jadual 6 menunjukkan taburan responden mengikut gred yang diperolehi dalam SPM untuk subjek Pendidikan Islam dan Pendidikan Moral pula, seramai 21 orang (15.3%) mendapat A, 22 orang (16.1%) mendapat A-, 39 orang (28.5%) mendapat B+, 26 orang (19.0%) mendapat B, seorang (0.7%) mendapat B-, 20 orang (14.6%) mendapat C+, 6 orang (4.4%) mendapat C dan 2 orang (1.5%) mendapat di bawah gred C. Ini menunjukkan majoriti responden mendapat gred yang baik dalam Pendidikan Islam dan pendidikam Moral di peringkat SPM.

4.2 Tahap Pemahaman Pelajar Terhadap Kurikulum Pengajian Islam dan Pendidikan Moral

Jadual 7. Tahap pemahaman pelajar terhadap kurikulum Pengajian Islam dan Pendidikan Moral.

No. Item	Item	Skor Min	Sisihan Piawai	Tahap Interprestasi
B1	Kurikulum Pengajian Islam/Pendidikan Moral berkesan dalam membentuk pelajar saling hormat menghormati kepada guru dan rakan	4.60	.600	Tinggi
B2	Kurikulum Pengajian Islam/Pendidikan Moral berkesan dalam membentuk pelajar yang mematuhi peraturan-peraturan disiplin di Politeknik	4.44	.674	Tinggi
B3	Kurikulum Pengajian Islam /Pendidikan Moral berkesan dalam membentuk pelajar yang sentiasa menghargai jasa	4.51	.608	Tinggi
B4	Kurikulum Pengajian Islam/Pendidikan Moral berkesan dalam membentuk pelajar yang menggunakan bahasa sopan ketika berkomunikasi dengan kawan dan pensyarah	4.61	.586	Tinggi

B5	Kurikulum Pengajian Islam/Pendidikan Moral berkesan dalam membentuk pelajar yang berpewatakan baik dan mulia	4.56	.640	Tinggi
B6	Kurikulum Pengajian Islam/Pendidikan Moral berkesan dalam membentuk pelajar yang bersikap positif dan proaktif dalam kelas	4.50	.643	Tinggi
B7	Kurikulum Pengajian Islam/Pendidikan Moral berkesan dalam membentuk pelajar yang berkeyakinan dan tidak mudah terpengaruh dengan budaya Barat yang bertentangan dengan agama	4.48	.718	Tinggi
B8	Kurikulum Pengajian Islam/Pendidikan Moral berkesan dalam membentuk pelajar yang sentiasa mengamalkan nilai-nilai murni dalam kehidupan harian	4.50	.666	Tinggi
B9	Kurikulum Pengajian Islam/Pendidikan Moral berkesan dalam membentuk pelajar yang tetap pendirian dalam mempertahankan keputusan yang berlandaskan kepada agama	4.55	.568	Tinggi
B10	Kurikulum Pengajian Islam/Pendidikan Moral berkesan dalam membentuk pelajar yang mempunyai semangat juang yang tinggi	4.47	.643	Tinggi

Objektif pertama kajian ini adalah mengenal pasti tahap pemahaman pelajar terhadap kurikulum Pengajian Islam dan Pendidikan Moral. Item 4 pada bahagian B iaitu “Kurikulum pengajian Islam/pendidikan Moral berkesan dalam membentuk pelajar yang menggunakan bahasa sopan ketika berkomunikasi dengan kawan dan pensyarah” menunjukkan skor min yang tertinggi pada bahagian ini. Min item 4 adalah min = 4.61, sisihan piawai = 0.586 iaitu berada pada tahap tinggi. Kenyataan kajian Abu Dzar Ahmad et al. (2021) menyokong dapatan ini, bahawa dalam percakapan dan menyampaikan mesej seseorang individu perlu menggunakan kesantunan berbahasa dalam komunikasi. Penggunaan bahasa yang sopan dapat mencerminkan seseorang ke arah kebaikan. Menurut kenyataan Ahmad Fuad et al. (2020), penggunaan bahasa yang sopan adalah perkara asas dan penting dalam berkomunikasi dan ianya menggambarkan ketinggian adab, akhlak dan sahsiah dalam sesebuah masyarakat. Min keseluruhan pada bahagian B ialah min = 4.52, sisihan piawai = 0.539 iaitu berada pada tahap yang tinggi.

4.3 Tahap Penghayatan Pelajar Terhadap Sahsiah Berkualiti

Jadual 8. Tahap pemahaman pelajar terhadap kurikulum Pengajian Islam dan Pendidikan Moral.

No. Item	Item	Skor Min	Sisihan Piawai	Tahap Interprestasi
C1	Saya beramal dengan sifat sabar dalam menjalankan tugasan yang diberikan oleh para pensyarah	4.29	.644	Tinggi
C2	Bersikap jujur menjadi amalan saya dalam pergaulan	4.28	.639	Tinggi
C3	Saya sentiasa bekerjasama dengan kawan-kawan dalam menyiapkan kerja kursus yang diberikan oleh pensyarah	4.47	.595	Tinggi
C4	Saya sentiasa menepati janji	4.02	.762	Tinggi
C5	Saya sentiasa bersifat rendah diri terhadap rakan sebaya	4.26	.699	Tinggi
C6	Saya sangat bersimpati kepada rakan sekiranya mereka berdepan dengan masalah	4.51	.557	Tinggi
C7	Saya sentiasa patuh kepada arahan pensyarah	4.40	.624	Tinggi
C8	Saya sentiasa menjaga bahasa dan tutur kata di Politeknik	4.23	.728	Tinggi
C9	Saya sentiasa menjaga adab dan batas pergaulan saya di Politeknik	4.36	.617	Tinggi
C10	Saya mengamalkan kebersihan diri di dalam kehidupan saya di Politeknik	4.59	.550	Tinggi

Hasil dapatan kajian item 10 pada bahagian ini iaitu “Saya mengamalkan kebersihan diri di dalam kehidupan saya di Politeknik” menunjukkan skor min yang paling tinggi untuk bahagian C. Nilai min item ini berada pada tahap tinggi iaitu min = 4.59, sisihan piawai = 0.550. Menurut Shahzad Bashir dan Sarfraz Masih (2018), amalan kebersihan adalah perkara yang utama agar dapat menikmati gaya hidup yang sihat dan baik. Kebersihan berkait rapat dengan sikap individu. Dapatan kajian ini didapati turut selari kajian Hasbullah Mat Daud et al. (2020), bahawa melalui pembelajaran sosial, ianya dapat mempengaruhi pembentukan sahsiah pelajar. Min keseluruhan bagi bahagian C ialah min = 4.34, sisihan piawai = 0.480 iaitu berada pada tahap yang tinggi.

4.4 Hubungan Antara Kurikulum Pengajian Islam dan Pendidikan Moral dengan Pembentukan Sahsiah Pelajar

Jadual 9. Hubungan antara kurikulum Pengajian Islam dan Pendidikan Moral dengan pembentukan sahsiah pelajar.

		Pemahaman Kurikulum Pengajian Islam dan Pendidikan Moral	Pembentukan Sahsiah Pelajar
Pemahaman Kurikulum Pengajian Islam dan Pendidikan Moral	Korelasi Person	1	0.585**
	Sig. (1-tailed)		0.000
	N	137	137

** Signifikan pada aras keyakinan 0.01 (1-tailed).

Jadual 9 menunjukkan terdapat hubungan signifikan yang kuat antara pemboleh ubah pemahaman pelajar terhadap kurikulum Pengajian Islam dan Pendidikan Moral dengan tahap penghayatan pelajar terhadap sahsiah berkualiti iaitu (r=0.585**, p=<0.05). Menurut Sh. Noohidayah Syed Aziz et al. (2022), dalam menjayakan peribadi sahsiah yang murni, pembelajaran yang mantap dan berterusan oleh semua pihak sangat diperlukan. Dapatan ini turut disokong dengan kenyataan Hasbullah Mat Daud et al. (2020), bahawa pendidikan adalah elemen utama dalam pembentukan sahsiah yang berkualtiti dalam diri pelajar. Tujuan pendidikan akhlak dalam pembelajaran sosial adalah berperanan melahirkan masyarakat yang dilengkapi budi pekerti yang tinggi dengan nilai-nilai keagamaan. Pendidikan akhlak adalah wajib dipelajari bagi semua lapisan masyarakat terutamanya golongan remaja dan pelajar.

5. Kesimpulan

Kajian ini menjelaskan bahawa pelajar dapat dipengaruhi oleh kurikulum Pengajian Islam dan Pendidikan Moral dalam membentuk peribadi sahsiah yang lebih sempurna. Hasil dapatan menunjukkan kurikulum Pengajian Islam dan Pendidikan Moral adalah salah satu teras utama dalam pembentukan sahsiah pelajar. Seorang pensyarah juga berperanan penting membimbing pelajar dalam memberi kefahaman tentang pendidikan akhlak agar nilai murni dapat diamalkan dalam kehidupan, seterusnya diterjemahkan dalam perbuatan seharian pelajar. Pelajar perlulah didedahkan dengan ilmu-ilmu dan konsep-konsep pendidikan akhlak dan sahsiah seperti yang terkandung dalam kursus Pengajian Islam dan Pendidikan Moral. Pengkaji mengharapkan kajian ini dapat dijadikan garis panduan dan sumber rujukan dalam meningkatkan lagi kesedaran pelajar dalam penghayatan pembentukan sahsiah yang berkualiti. Selain itu, pelajar juga diharapkan dapat mengamalkan ilmu asas pendidikan akhlak dalam kurikulum Pengajian Islam dan Pendidikan Moral seterusnya menyumbang ke arah pembentukan sahsiah pelajar yang berkualiti.

Penghargaan

Setinggi-tinggi penghargaan kepada semua responden kerana telah meluangkan masa, melengkapkan semua soalan dalam borang soal selidik yang diberikan. Terima kasih diucapkan kepada International Conference on Research and Innovation in Sustainable Cities (ICRISC 2022) anjuran Politeknik Ungku Omar dan Universiti Kebangsaan Malaysia dengan kerjasama Universitas Muhammadiyah Yogyakarta, Indonesia kerana menyediakan platform ini sehingga berjaya dibentang dan diterbitkan. Penghargaan juga diucapkan kepada semua pensyarah kursus Unit Pendidikan Islam, Politeknik Mukah yang terlibat sehingga terhasilnya kertas kajian ini.

Rujukan

Abu Dzar Ahmad, Mohammad Haafiz Aminuddin Mohd Azmi, Muhamad Fairuz Ali. (2021). Elemen kesantunan bahasa dalam cara Rasulullah SAW berinteraksi. *Jurnal Al-Sirat*. 2(19),112-120. **https://ejournal.kuipsas.edu.my/index.php/qwefqwefq/article/view/138/111**

Adibah Bahori, Siti Zubaidah Ismail. (2018). Pencegahan dan hukuman perbuatan buang bayi menurut perundangan syariah dan sivil di Malaysia: Cukupkah undang-undang yang ada? *Kanun Jurnal Undang-Undang Malaysia*. [S.l.], v. 30, n. 2, p. 339-362, july 2018. ISSN 2682-8057. **http://jurnal.dbp.my/index.php/Kanun/article/view/1370**

Ahmad Fuad Mat Hassan, Khairul Faiz Alimi, Hishamudin Isam, Mashetoh Abd. Mutalib. (2020). Amalan kesantunan berbahasa dalam komunikasi formal dan tidak formal dalam kalangan pelajar universiti. *Jurnal Komunikasi ; Malaysian Journal of Communication*. 36 (4). pp. 410-427. ISSN 0128-1496.

http://journalarticle.ukm.my/16127/1/44906-144500-1-PB.pdf

Ahmad Sahlan Abdul Hatim, Mohd Nizam Sahad, Rosmawati Mohamad Rasit. (2020). Persepsi pelajar terhadap pembentukan akhlak melalui penerapan nilai murni dalam aktiviti dakwah kesenian di smka negeri kedah (Student's Perception Towards Formation of Morals (Akhlaq) by Inculcating Noble Values in the Art Da'wah Activity in SMKA of Kedah). UMRAN - *International Journal of Islamic and Civilizational Studies*, 7(2), 1–16. **https://doi.org/10.11113/umran2020.7n2.398**

Aimi Khairunnisa binti Abdul Karim, Nurliana Suhaimi. (2020). Kepentingan teori dan ilmu sosiologi dalam konteks pendidikan menurut perspektif Ibnu Khaldun. *Jurnal Tuah @ JTuah*(e-ISSN:2756-8350).Vol.12020 :41-53.

file:///C:/Users/LENOVO/Downloads/687-1196-1-SM.pdf

Asmawati Suhid, Fathiyah Fakhruddin, Lukman Abdul Mutalib, & Abd. Muhsin Awang. (2018). Amalan pengajaran guru pendidikan Islam dalam menerapkan nilai akhlak murid banduan muda: satu tinjauan awal. *International Journal of Education, Psychology and Counseling*. 3(9), 17–29. **https://oarep.usim.edu.my/jspui/bitstream/123456789/12382/1/Amalan%20Penga**

jaran%20Guru%20Pendidikan%20Islam%20Dalam%20Menerapkan%20Nilai %20Akhlak%20Murid%20Banduan%20Muda%3B%20Satu%20Tinjauan%20 Awal.pdf

Asming Yalawae, Ahmad Farid Ibrahim. (2007). Akhlak warisan Rasulullah SAW membawa kemuliaan umat. *Jurnal Usuluddin. Vol. 26 (2007).* **https://ejournal.um.edu.my/index.php/JUD/article/view/5420/3201**

Davis, J. A. (1971). Elementary survev analysis. Englewood cliffs, New Jersey: *Prentice-Hall*

Fatimah Ibda. (2012). Pendidikan Moral anak melalui pengajaran bidang studi PPKn dan pendidikan Agama. *Jurnal Ilmiah DIDAKTIKA*. VOL. XII NO. 2, 338-347. **file:///C:/Users/LENOVO/Downloads/457-845-1-SM.pdf**

Fauziah Ibrahim, Norulhuda Sarnon, Khadijah Alavi, Mohd Suhaimi Mohamad, Noremy Md Akhir, Salina Nen. (2012). Memperkasakan pengetahuan agama dalam kalangan remaja bermasalah tingkah laku: ke arah pembentukan akhlak remaja sejahtera. *Journal of Social Sciences and Humanities*. Volume 7, Number 1, 084-093, ISSN: 1823-884x. **https://myjurnal.mohe.gov.my/filebank/published_article/20151/e_bangi_7_12_8.pdf**

Hamidah Sulaiman, Zawawi Ismail, Rorlinda Yusof. (2013). Kecerdasan emosi menurut al-Quran dan al-Sunnah: Aplikasinya dalam membentuk akhlak remaja. *The Online Journal of Islamic Education*. Vol. 1 Issue 2. **https://www.researchgate.net/publication/297909078**

Hasbullah Mat Daud, and Ahmad Yussuf, and Fakhrul Adabi Abdul Kadir, (2020) Pembentukan akhlak dan sahsiah pelajar melalui pembelajaran sosial menurut perspektif Islam. *e-BANGI: Jurnal Sains Sosial dan Kemanusiaan*. 17 (9). pp. 75-89. ISSN 1823-884x **http://journalarticle.ukm.my/17017/1/44628-143588-1-SM.pdf**

Ibn Manzur, Muhammad Ibn Mukarram. (2005). Lisan al-Arab. Beirut: *Dar Sadir*

Kenyataan Media Statistik Jenayah, Jabatan Perdana Menteri, Jabatan Perangkaan Malaysia. (2021). **https://www.dosm.gov.my/v1/uploads/files/5_Gallery/2_Media/4_Stats%40media/4Press_Statement/2021/11%20Nov/JENAYAH%2C%20MALAYSIA%2C%202021.pdf**

Khadijah Alavi, Rahim M. Sail, Lukman Abdul Mutalib, Anwar Ahmad, Shamsul Shah Trajo, Nor Ellina Abdul Razak. (2012). Kecerdasan sosial dan emosi guru cemerlang Pendidikan Islam dalam meningkatkan prestasi pelajar. *Journal of Social Sciences and Humanities*. Volume 7, Number 1, 094-104. ISSN: 1823-884x. **http://journalarticle.ukm.my/5016/1/khadijah012.pdf**

Khuldiah Iman Mohd Ghazali, Hilwa Abdullah. (2019). Sejauh manakah ketagihan seksual didorong oleh kebimbangan dan cinta berahi dalam kalangan mahasiswa lelaki di Malaysia. *Jurnal Wacana Sarjana*. Vol. 3(1) Mac 2019: 1-11. **https://spaj.ukm.my/jws/index.php/jws/article/view/202/170**

Lukman Hakim Ahmad (2014). Persepsi pelajar terhadap kurikulum pendidikan Islam Politeknik dalam pembentukan sahsiah muslim. Selangor: *Jurnal Pendidikan Malaysia*

Mazarul Hasan Mohamad Hanapi, Maizura Komari, Norazimah Zakaria. (2020). Kesediaan guru pendidikan islam dalam pelaksanaan pembelajaran abad ke-21. *International Journal of Education and Pedagogy*, [S.l.], v. 2, n. 2, p. 9-17, may 2020. ISSN 2682-8464. **https://myjms.mohe.gov.my/index.php/ijeap/article/view/9167**

Mohamad Najib Abdul Ghafar (1999). Penyelidikan pendidikan. Johor: *Penerbit Universiti Teknologi Malaysia*

Mohamad Najib Abdul Ghafar (2003). Reka bentuk tinjauan soal selidik pendidikan. Johor: *Penerbit Universiti Teknologi Malaysia*

Mohamed Hamdan Abdullah, Fariza Md Sham, A'dawiyah Ismail. (2018). Pendekatan motivasi dalam dakwah remaja. Sains Malaysiana. *Jurnal Hadhari* 10 (1). pp. 77-92. ISSN 1985-6830 eISSN 2550-2271. **http://journalarticle.ukm.my/12103/1/25682- 76637-1-SM.pdf**

Noraini Harun, Mohd Khuzairy Mohd Yusof, Rosmawati Jalal. (2021). Analisis penilaian keberkesanan sistem penasihat akademik di Politeknik Tun Syed Nasir Syed Ismail. *Persidangan Antarabangsa Sains Sosial dan Kemanusiaan*. e-ISSN2811-4051. **http://conference.kuis.edu.my/pasak/images/pasak6/eprosiding2021/e-proceeding_pasak2021_034.pdf**

Roshadah Abu Bakar, Suhaila Mustaffa, Solhal Huda Sahidan. (2020). Persepsi pelajar terhadap program pemantauan sahsiah dan tahap pengetahuan serta amalan asas islam dalam kalangan pelajar politeknik tuanku syed sirajuddin. *Proceeding International Multidisciplinary Conference (IMC 2020).* **https://penerbit.unimap.edu.my/images/pdf/IMC%202020/345-358.pdf**

Rosni Wazir, Abur Hamli Usman, Norsaleha Mohd Salleh, Suriani Sudi, Abdul Hadi Awang, Syamim Zakwan Rosman. (2020). Pencegahan dadah dalam kalangan belia berisiko melalui elemen penghayatan akidah. *comprehension. Al-Irsyad: Journal of Islamic and Contemporary Issues*, 5(2), 415-424. **http://al-irsyad.kuis.edu.my/index.php/alirsyad/article/view/95/73**

Sh. Noohidayah Syed Aziz, Khairul Anwar Mastor, Hasnan Kasan. (2022). Faktor-faktor yang mempengaruhi pembentukan sahsiah pelajar tahfiz. *Jurnal Pengajian Islam*. 15(1), 259-271. **https://jpi.kuis.edu.my/index.php/jpi/article/view/169**

Shahabuddin Hashim, Noor Shafrin Ahmad, Haslinda Yusof. (2014). Modul memperkasa sahsiah waja diri pelajar abad ke-21. Selangor: *PTS Akademia*. **https://books.google.com.my/books?id=7CWfngEACAAJ&printsec=frontcover& source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false**

Shahidan Bin Shafie, Ying-Leh Ling. (2017). Pembentukan sahsiah berkualiti melalui penghayatan kurikulum pengajian Islam: satu kajian korelasi di Politeknik. *Conference: National Conference on Thinking Culture (NCTC).* **https://www.researchgate.net/publication/325140627_Pembentukan_Sahsiah_Berkualiti_melalui_Penghayatan_Kurikulum_Pengajian_Islam_Satu_Kajian_Korelasi_di_Politeknik**

Shahzad Bashir, Sarfraz Masih. (2018). School Health Services Project on Personal Hygiene among School Children of Age 12–15 in Underprivileged Community in Karachi. *Biomedical Journal of Scientific & Technical Research* 7(4)- 2018. BJSTR. MS.ID.001531.DOI:10.26717/BJSTR.2018.07.001531. **https://biomedres.us/pdfs/BJSTR.MS.ID.001531.pdf**

Supyan Husin. (2014). Definisi Falsafah Pendidikan Islam Dan Falsafah Pendidikan Di Malaysia. **http://supyanhussin.wordpress.com/2014/01/16/definisi-falsafah-pendidikan-islam/**

PENGUASAAN KEMAHIRAN BERFIKIR ARAS TINGGI (KBAT) PELAJAR DALAM PEMBELAJARAN BERASASKAN PROJEK

Farah Hanan Abu Bakar[1], Fatin Faqeriah Hamsah[2] dan Lezawati Seron[3]

[1,2,3]Politeknik Mukah, Sarawak
[1]farah@pmu.edu.my
[2]faqeriah@pmu.edu.my
[3]lezawati@pmu.edu.my

Abstrak: Dalam pelaksanaan Pelan Pembangunan Pendidikan Malaysia (PPPM) 2013-2025 menekankan aspek kemahiran berfikir aras tinggi (KBAT) sebagai pembaharuan sistem sistem pendidikan di Malaysia. Seperti yang kita sedia maklum KBAT merupakan elemen penting diterapkan oleh pensyarah di dalam kelas bagi melahirkan generasi yang dapat merangsang pemikiran aras tinggi. Setiap pelajar haruslah menguasai KBAT dalam meningkatkan aras pengetahuan, menyelesaikan masalah seperti mana keadaan yang sebenar. Dengan adanya KBAT mendorong pelajar didedahkan untuk menghasilkan daya cipta yang kreatif serta didedahkan dengan pengajaran yang boleh merangsang pemikiran pelajar berfikir secara luar kotak. Pelajar menyelesaikan masalah yang telah diberikan kepada pelajar melalui pertukaran idea di dalam kumpulan untuk menghasilkan satu produk yang baharu. Pendekatan pembelajaran berasaskan projek dapat meransang kemahiran KBAT pelajar dalam menyelesaikan masalah dalam satu kumpulan. Kajian ini bertujuan untuk mengkaji sejauh mana penguasaan KBAT dalam pembelajaran berasaskan projek melalui kursus Penghayatan Etika dan Peradaban di Politeknik Mukah. Dalam kajian ini menggunakan metodologi kajian berbentuk kuantitatif yang menggunakan borang soal selidik. Borang soal selidik diisi melalui perisian google form untuk dijawab oleh responden kajian. Responden kajian ini terdiri daripada 159 orang pelajar yang mengambil kursus Penghayatan Etika dan Peradaban di Politeknik Mukah. Persampelan rawak mudah telah digunakan untuk pemilihan responden kajian ini. Data kajian ini menggunakan perisian *Statistical Package for Social Science (SPSS) versi 26.0*. untuk menganalisis data. Penguasaan KBAT pelajar dalam pembelajaran berasaskan projek dalam kajian ini mencapai min tinggi. Oleh itu, pensyarah diharap dapat mempelbagaikan kaedah pengajaran dan pembelajaran dalam penguasaan KBAT pelajar khususnya dalam pembelajaran berasaskan projek.

***Keywords**: kemahiran berfikir aras tinggi ; pembelajaran berasaskan projek ; Politeknik Mukah*

1. Pengenalan

Kemahiran berfikir adalah satu aspek yang mempengaruhi dalam sistem pendidikan pada masa kini. Dalam Falsafah Pendidikan Negara (FPK) kemahiran berfikir ditekankan selaras dengan kurikulum Pendidikan dengan perkembangan pembelajaran abad ke-21.KBAT digunakan untuk meningkatkan kemahiran berfikir pada pelajar untuk bersaing ke peringkat global pada

masa kini. Manusia dikurniakan akal berbeza dengan makhluk lain supaya dapat berfikir tentang kehidupan di muka bumi ini. Sehubungan dengan itu, manusia digalakkan berfikir untuk mengkaji ciptaan Allah di muka bumi ini selaras dengan pendidikan pada masa kini. Dalam pendidikan alaf baharu 21 dan industri 4.0 pelajar diberi pendedahan merangkumi aspek pengetahuan, kemahiran berfikir secara kritis dan boleh menguasai kemahiran komunikasi antara pelajar dengan pelajar yang lain. (W. Setya at al 2021). KBAT diperkenalkan dalam Kurikulum pendidikan supaya dapat melahirkan pelajar yang berkualiti selaras dengan kehendak Pendidikan abad ke-21 supaya mereka dapat menguasai kemahiran selaras dengan kehendak pendidikan pada masa kini.(Norizzathy Agir dan Mohd Effendi 2022). KBAT harus dipupuk dan didedahkan kepada pelajar supaya mereka boleh mempelajari menyelesaikan masalah dengan baik melalui lontaran idea yang pelbagai dalam kumpulan dalam pengajaran dan pembelajaran.

Kepentingan Pendidikan dan latihan teknikal dan vokasional (TVET) adalah untuk melengkapkan pelajar dari sudut kemahiran teknikal di samping dapat membentuk jati diri seseorang pelajar. Dengan adanya KBAT dapat membantu pelajar sebagai pekerja mahir kerana mereka telaah didedahkan dengan KBAT dalam pengajaran dan pembelajaran. Kemahiran utama bagi pelajar TVET supaya memberi peluang pekerjaan kepada mereka. (Norizzathy Agir dan Mohd Effendi (2022). Menurut (Talhah, Aminudin & Ahmad 2019) mengatakan KBAT dapat melahirkan pelajar yang berdaya saing dan menciptakan sesuatu yang baharu. Melalui KBAT dapat melahirkan seseorang pelajar yang boleh memenuhi kehendak pendidikan TVET pada masa kini.

Dalam kajian ini masih terdapat perbezaan yang perlu yang perlu diketengahkan bagi meningkatkan penguasaan KBAT dalam kalangan pelajar melalui pembelajaran berasaskan projek dalam Kursus Umum khususnya di Politeknik. Justeru, kajian penguasaan kemahiran KBAT terhadap penguasaan kemahiran berfikir (PBP) dalam kursus Penghayatan Etika dan Peradaban dapat melihat penambahbaikan kepada pengajaran dan pembelajaran di dalam kelas hasil daripada kajian ini. Selain itu dapat memberi manfaat kepada pensyarah yang mengajar kursus ini dalam mempelbagaikan penilaian kerja kursus pelajar melalui PBP. Kertas kajian ini bertujuan adalah untuk mengenalpasti penguasaan KBAT pelajar melalui pembelajaran berasaskan projek dalam Kursus Penghayatan Etika dan Peradaban di Politeknik, mengenalpasti kesediaan pelajar dalam melaksanakan KBAT dalam pembelajaran berasaskan projek serta mengenalpasti hubungan KBAT dengan kesediaan melaksanakan KBAT dalam pembelajaran berasaskan projek.

Objektif Kajian

1. Mengenal pasti penguasaan kemahiran berfikir aras tinggi (KBAT) pelajar dalam Pembelajaran berasaskan projek
2. Meninjau kesediaan pelajar dalam melaksanakan KBAT dalam pembelajaran berasaskan projek
3. Mengkaji hubungan penguasaan KBAT dengan kesediaan melaksanakan KBAT dalam pembelajaran berasaskan projek.

2. Tinjauan Literatur

2.1 Konsep Kemahiran berfikir Aras Tinggi

Dalam kajian Faizah et al. (2021) hasil kajian menunjukkan faktor jantina mempengaruhi pencapaian yang baik terhadap pencapaian dalam di dalam kelas. Ini disokong oleh Nasyimah Ismail and Zamri Mahamod (2016) mengatakan guru mempengaruhi yang tinggi dalam proses interkasi dengan pelajar melalui pembelajaran kolaboratif. KBAT dapat meningkat kefahaman pelajar dan pengukuhan penguasaan pembelajaran dengan menggunakan pemikiran yang lebih tinggi. Mohd Syaubari et al. (2022) guru boleh mempelbagaikan kaedah pedadogi untuk meningkatkan kemahiran KBAT guru dan menaplikasi dalam pengajaran utk pelajar. Ini disokong oleh Mohd Syaubari, Mazarul, Mohd Ridhuan (2022) pengajaran guru mengunakan *virtual learning* dapat memberi kefahaman kepada pelajar sekaligus dapat mencuba pembelajaran yang baharu serta memberi motivasi Oleh itu, pelbagai kaedah yang boleh digunakan oleh guru di kalangan pelajar di dalam kelas supaya pelajar dapat mencuba sesuatu yang baharu untuk mereka menerokai dengan lebih mendalam. Dengan itu, pelajar berani mencuba sesuatu yang baharu untuk menghasilkan sesuatu yang lebih kreatif dan inovatif.

2.2 Konsep Pembelajaran Berasaskan Projek (PBP)

Pembelajaran berasaskan projek dapat mendedahkan pelajar kepada dunia luar dan mencari pengalaman sebenar dan merangsang pemikiran pelajar serta berfikir ke hadapan. Suppiah, Irna Patricia, Norazilawati et al. (2019). Perkongsian lontaran pelbagai idea dan pendapat masing-masing dalam kumpulan secara “hands on” melalui pembelajaran berasaskan projek bagi memupuk KBAT melalui kaedah pengajaran dan pembelajaran oleh guru. Kaedah PBP memberi hubungan yang sangat baik kepada pelajar yang merangkumi sikap yang positif dalam menyelesaikan masalah (Noor Erma dan Kwan 2017). Ini disokong oleh Chong Oi Min dan Mohammad Tahir (2021) menunjukkan bahawa penggunaan kaedah PBP dapat memberi impak yang baik kepada pelajar kerana mereka dapat menjayakan sesuatu projek dengan berkesan. Oleh itu, KBAT dalam PBP mendedahkan pelajar tentang pengalaman untuk mereka menerokai sesuatu yang baharu.

3. Metodologi Kajian

Reka bentuk kajian yang digunakan adalah berbentuk kuantitatif yang melibatkan 159 orang pelajar semester satu sesi 2:2021/2022 yang mengambil kursus Penghayatan Etika dan Peradaban di Politeknik Mukah, Sarawak menggunakan borang soal selidik melalui perisian google form sebagai intrumen kajian. Othman Lebar (2009) menyatakan kajian kuantitatif ialah kajian seseorang untuk mengetahui sesuatu hasil kajian. Borang soal selidik ini telah diadaptasi daripada kajian Fatin Izati (2022) dan Tuan Rahayu, Mohd Aderi, Mohd Isa (2017) serta diubahsuai bersesuaian dengan tajuk kajian. Soal selidik ini terdiri daripada empat bahagian iaitu Bahagian A berkaitan latar belakang responden, Bahagian B Penguasaan KBAT pelajar dalam PBP dan Bahagian C-Kesediaan pelajar dalam. Dalam kajian ini, penyelidik

menggunakan Skala Likert Lima Mata yang diberi nilai 1 hingga 5 iaitu 1=Sangat Tidak Setuju, 2= Tidak setuju, 3= Kurang Setuju, 4= Setuju dan 5=Sangat setuju

Pekali Alpha Cronbach telah digunakan bagi mengukur kebolehpercayaan kajian ini yang diperoleh ialah 0.961.Mengikut Mohd Konting (1993) nilai pekali 0.70-0.99 adalah nilai Cronbach Alpha tahap yang terbaik. Dalam kajian ini menggunakan borang soal selidik yang menggunakan *Statistical Package for Social Science (SPSS) versi 26.0.* Dalam bahagian demografi responden kajian ini menggunakan deskriptif untuk bagi menerangkan demografi sampel kajian seperti peratus dan frekuensi pelajar yang terlibat dalam kajian. Dalam kajian ini juga menggunakan skor min dalam bahagian B dan C. Manakala untuk bahagian hubungan menggunakan korelasi pearson. Berikut merupakan nilai skor min kepada tiga tahap.

Jadual 1. Nilai skor min

Nilai Skor Min	Tahap
1.00-2.33	Rendah
2.34-3.67	Sederhana
3.68-5.00	Tinggi

4. Dapatan Kajian

4.1 Demografi Responden

Seramai 159 pelajar yang menjadi responden serta mengambil kursus Penghayatan Etika dan Peradaban dalam kajian ini. Lima jabatan akademik yang terpilih merangkumi iaitu Jabatan Perdagangan, Jabatan Kejuruteraan Awam, Jabatan Kejuruteraan Elektrik, Jabatan Kejuruteraan Mekanikal dan Jabatan Teknologi Maklumat dan Komunikasi bagi sesi 2:2021/2022. Kaedah persampelan rawak digunakan dalam pemilihan responden dari kelima-lima jabatan yang ditawarkan di Politeknik Mukah, Sarawak. Berikut merupakan taburan kekerapan responden dari segi demografi.

Jadual 2: Taburan Kekerapan Responden

Ciri Demografi		N	Peratus%
Jantina	Lelaki	64	40.3
	Perempuan	95	59.7
Bidang Pengajian	Jabatan Perdagangan	61	38.4
	Jabatan Kejuruteraan Awam	25	15.7
	Jabatan Kejuruteraan Elektrik	31	19.5
	Jabatan Kejuruteraan Mekanikal	14	8.8
	Jabatan Teknologi Maklumat dan Komunikasi	28	17.6

Hasil data ini responden ini telah didominasi oleh responden perempuan iaitu sebanyak 59.7% (95) berbanding responden lelaki iaitu 40.3% (64). Majoriti responden dalam kajian ini adalah pelajar daripada Jabatan Perdagangan iaitu sebanyak 38.4% (61). Seterusnya pelajar daripada Jabatan Kejuruteraan Elektrik iaitu 19.5% (31). Diikuti responden daripada Jabatan Teknologi

Maklumat dan Komunikasi sebanyak 17.6% (28). Seterusnya daripada Jabatan Kejuruteraan Awam sebanyak 15.7% (25) dan akhir sekali yang terakhir daripada responden Jabatan Kejuruteraan Mekanikal iaitu 8.8% (8).

4.2 Penguasaan KBAT pelajar dalam pembelajaran berasaskan projek bagi kursus Penghayatan Etika dan Peradaban

Dalam kajian ini analisis deskriptif yang menggunakan min dan sisihan piawai bagi menentukan penguasaan KBAT pelajar dalam pembelajaran berasaskan projek seperti Jadual 2. Hasil kajian terhadap 10 item bahagian B memperolehi min di antara 4.01 sehingga 5.00. Min yang paling tertinggi berkaitan dengan saya dapat menyelesaikan tugasan dalam pembelajaran berasaskan projek melalui kerjasama antara dalam kumpulan dengan skor (min = 4.48, sp = 0.604). Bagi item kedua yang tertinggi adalah berkaitan saya melibatkan diri secara aktif dalam kumpulan pembelajaran semasa pembelajaran berasaskan projek dengan skor (min = 4.45, sp = 0.559) dan item ketiga tertiinggi adalah berkaitan saya memberi sumbangan pendapat dan idea dalam kumpulan semasa pembelajaran berasaskan projek dengan skor (min = 4.44, sp = 0.558).

Min yang terendah berkaitan “saya akan mengemukakan soalan yang meminta penjelasan terhadap sesuatu yang kurang difahami dalam PBP dengan nilai (min = 4.06, sp = 0.748). Bagi skor kedua terendah adalah item B6 iaitu “saya boleh mengemukan pendapat tentang projek yang telah diberikan” dengan nilai (min = 4.18, sp = 0.634). Item B5 berkaitan saya berkeyakinan ketika mengemukan pendapat dalam pembelajaran berasaskan projek dengan nilai (min = 4.20, sp = 0.644). Dengan ini menunjukkan bahawa penguasaan KBAT pelajar dalam pembelajaran berasaskan projek mencapai min tinggi. Keseluruhan min bagi bahagian B mencapai (min = 4.32, sp 0.487).

Jadual 3: Penguasaan KBAT melalui pembelajaran berasaskan projek

Bil.	Pernyataan	Min	SP	Tahap Interprestasi
B1	Saya melibatkan diri secara aktif dalam kumpulan pembelajaran semasa pembelajaran berasaskan projek	4.45	0.559	Tinggi
B2	Saya memberi sumbangan pendapat dan idea dalam kumpulan semasa pembelajaran berasaskan projek	4.44	0.558	Tinggi
B3	Saya berusaha untuk menghasilkan video persembahan projek yang kreatif dan menarik	4.40	0.616	Tinggi
B4	Saya berani mengemukan idea-idea baharu dalam pembelajaran berasaskan projek	4.26	0.660	Tinggi
B5	Saya berkeyakinan ketika mengemukan pendapat dalam pembelajaran berasaskan projek	4.20	0.644	Tinggi
B6	Saya boleh mengemukan pendapat tentang projek yang telah diberikan	4.18	0.634	Tinggi
B7	Saya berjaya meluahkan idea saya berkaitan pembelajaran berasaskan projek	4.28	0.618	Tinggi
B8	Saya akan mengemukan soalan yang meminta penjelasan terhadap sesuatu yang kurang difahami dalam PBP	4.06	0.748	Tinggi

B9	Saya berkongsi pendapat dan idea bersama kawan sekumpulan yang lain dalam penghasilan projek	4.43	0.641	Tinggi
B10	Saya dapat menyelesaikan tugasan dalam pembelajaran berasaskan projek melalui kerjasama antara dalam kumpulan	4.48	0.604	Tinggi
	Purata Min	**4.32**	**0.487**	**Tinggi**

4.3 Kesediaan pelajar dalam melaksanakan KBAT dalam pembelajaran berasaskan projek

Analisis deskriptif yang melibatkan min dan sisihan piawai dijalankan untuk menentukan tahap penguasaan KBAT pelajar dalam pembelajaran berasaskan projek seperti Jadual 2. Jadual 3 menunjukkan kesediaan pelajar dalam melaksanakan KBAT dalam pembelajaran berasakan projek mencapai purata min yang tinggi iaitu mencapai nilai min = 4.173, sp = 0.538. Aspek saya bersedia untuk mengemukakan soalan ketika sesi pembelajaran menggunakan KBAT dalam pembelajaran berasaskan projek menunjukkan nilai min yang paling rendah iaitu 4.09, sp = 0.664. Seterusnya item C2 mencapai nilai min yang kedua rendah iaitu (min = 4.11, sp = 0.646) yang berkaitan dengan saya sedia mengambil bahagian semasa sesi soal jawab menggunakan KBAT dalam pembelajaran berasaskan projek. Item C9 berkaitan saya bersedia menggunakan KBAT untuk meningkatkan kefahaman saya dalam pembelajaran berasaskan projek mencapai nilai min yang tertinggi dengan nilai (min = 4.25, sp = 0.571). Diikuti item C10 yang mencapai nilai min kedua tertinggi iaitu berkaitan saya bersedia untuk mencuba tugasan yang diberikan oleh pensyarah dengan menggunakan KBAT dalam pembelajaran berasaskan projek dengan nilai (min = 4.23, sp 0.646). Ini menunjukkan bahawa pelajar-pelajar mempunyai kesediaan dalam melaksanakan KBAT dalam pembelajaran berasaskan projek.

Jadual 4: Penguasaan KBAT melalui pembelajaran berasaskan projek

Bil.	Pernyataan	Min	SP	Tahap Interprestasi
C1	Saya bersedia mengambil bahagian menggunakan KBAT dalam pembelajaran berasaskan projek	4.16	0.632	Tingi
C2	Saya sedia mengambil bahagian semasa sesi soal jawab menggunakan KBAT dalam pembelajaran berasaskan projek	4.11	0.646	Tinggi
C3	Saya bersedia mengambil bahagian dalam kumpulan menggunakan KBAT dalam pembelajaran berasaskan projek	4.18	0.645	Tinggi
C4	Saya bersedia untuk mengemukakan soalan ketika sesi pembelajaran menggunakan KBAT dalam pembelajaran berasaskan projek	4.09	0.664	Tinggi
C5	Saya bersedia menggunakan KBAT dalam pembelajaran berasaskan projek	4.17	0.598	Tinggi

C6	Saya bersedia menjawab soalan pengukuhan menggunakan KBAT hasil pembelajaran berasaskan projek	4.18	0.635	Tinggi
C7	Saya bersedia menggunakan KBAT dalam kerja kumpulan	4.19	0.608	Tinggi
C8	Saya bersedia menggunakan KBAT untuk menyelesaikan tugasan dalam pembelajaran berasaskan projek	4.17	0.576	Tinggi
C9	Saya bersedia menggunakan KBAT untuk meningkatkan kefahaman saya dalam pembelajaran berasaskan projek	4.25	0.571	Tinggi
C10	Saya bersedia untuk mencuba tugasan yang diberikan oleh pensyarah dengan menggunakan KBAT dalam pembelajaran berasaskan projek	4.23	0.646	Tinggi
	Purata Min	**4.73**	**0.538**	**Tinggi**

4.4 Hubungan antara Penguasaan KBAT dan kesediaan melaksanakan KBAT dalam pembelajaran berasaskan projek

Jadual 3. Hubungan antara Penguasaan KBAT dan kesediaan melaksanakan KBAT dalam pembelajaran berasaskan projek

Dimensi		Penguasaan KBAT	Kesediaan melaksanakan KBAT
Penguasan KBAT	Korelasi Person	1	0.728**
	Sig. (1-tailed)		0.000
	N	159	159
Kesediaan melaksanakan KBAT	Korelasi Person	0.728**	1
	Sig. (1-tailed)	0.000	
	N	159	159

** Signifikan pada aras keyakinan 0.01 (1-tailed).

Jadual 3 menunjukkan hasil analisis korelasi yang menyatakan bahawa terdapat hubungan yang kukuh di antara pembolehubah penguasaan KBAT dengan pembolehubah kesediaan melaksanakan KBAT nilai pekali korelasinya ialah r = 0.728**, p < .000. Ini bermakna penguasaan KBAT mempunyai hubungan yang kuat dengan kesediaan dalam melaksanakan KBAT dalam pembelajaran berasaskan projek. Pelajar dapat mencapai penguasaan KBAT dengan kesediaan melaksanakan KBAT. Pensyarah boleh mempelbagaikan kaedah pengajaran dan pembelajaran di dalam kelas supaya pelajar dalam keadaan bersedia dalam melaksanakan KBAT dalam pembelajaran berasaskan projek. Hubungan yang positif ini memberi impak yang besar kepada pelajar dalam melahirkan pelajar yang kreatif, inovatif selaras dengan pembelajaran abad ke-21 pada masa kini.

5. Perbincangan Dapatan Kajian

Hasil kajian yang berkaitan penguasaan KBAT pelajar dalam pembelajaran berasaskan projek menunjukkan min pada tahap tinggi. Ini dapat dibuktikan min keseluruhan adalah mencapai 4.32 bagi penguasaan KBAT pelajar dalam pembelajaran berasaskan projek. Ini bertepatan dengan kajian Mohd Syaubari (2018) KBAT perlu digunakan untuk menghasilkan pengajaran dan pembelajaran yang berkesan. Melalui kajian Nur Athirah Ariffin dan Faridah Yunus (2017) pengajaran dan pembelajaran seiring dengan KBAT sekaligus dapat meningkat kemahiran berfikir pelajar. Berdasarkan analisis yang dijalankan penglibatan pelajar dengan ahli-ahli kumpulan yang lain membantu dalam penguasaan KBAT kerana mereka mereka dapat bekerjasama dalam satu kumpulan dengan memberi sumbangan dan idea yang pelbagai dalam satu kumpulan. Menurut Hima et al. (2019) pelajar lebih mudah memahami dengan adanya pembelajaran secara kumpulan kerana dapat bertukar-tukar idea serta dapat menerima pandangan yang berbeza di antara satu sama lain. Sehubungan dengan itu, pembelajaran berasaskan projek ini dapat memberi manfaat kepada dunia pendidikan dengan mendedahkan pengajaran dan pembelajaran secara kolaboratif dan teknik “hands on” dapat memberi pelajar didedahkan KBAT di kalangan pelajar.
Seterusnya aspek kesediaan melaksanakan KBAT menunjukkan pengaruh yang tinggi. Nilai min keseluruhan bagi aspek kesediaan melaksanakan KBAT mencapai (min 4.73, sp .538). Ini mengambarkan pelajar perlu diberi perhatian terhadap persediaan melaksanakan KBAT dalam pembelajaran berasaskan projek. Apabila pelajar bersedia dalam pelaksanaan mereka berminat untuk bergiat aktif dalam pembelajaran oleh pensyarah. Hal ini disokong Tuan Rahayu, Mohd Aderi, Mohd Isa Hamsah (2017) Perilaku dan pengetahuan sedia ada mempengaruhi persediaan pelajar sebelum memulakan pembelajaran. Sehubungan dengan itu juga, amalan kreativiti guru secara tidak langsung dapat membangunkan prestasi pencapaian pelajar dengan lebih berkesan. Ini disokong dalam kajian oleh Razila Kasmin et al. (2019) guru mempunyai pengaruh dan peranan penting dalam meningkatkan komitmen murid terhadap pelajaran mereka. Tajularipin Sulaiman et al. (2017) menunjukkan bahawa guru harus menerapkan amalan pengajaran yang kreatif supaya dapat meningkatkan mutu dan kualiti pembelajaran kepada pelajar.

Dari aspek hubungan penguasaan KBAT dan persediaan pelaksanaan KBAT hasil kajian menjelaskan bahawa ianya saling mempengaruhi antara satu sama lain. Kajian ini membuktikan terdapat wujudnya hubungan signifikan yang kuat mempengaruhi penguasaan pelaksanaan KBAT pelajar. Hubungan korelasi ini dapat dilihat sama ada ianya dapat mempengaruhi kesan dalam kajian yang dijalankan.

<u>Cadangan Kajian Lanjutan</u>

Penyelidik mencadangkan beberapa kajian yang boleh dikaji pada masa akan datang. Antara cadangan tersebut ialah:

i. Kajian berbentuk kualitatif ini boleh dijalankan melibatkan pelajar-pelajar di Politeknik Mukah. Pada masa akan datang kajian ini boleh diperluaskan melibatkan Politeknik-Politeknik lain.

ii. Kajian tinjauan ini tentang penguasaan KBAT pelajar dalam pembelajaran berasaskan

projek hanya melibatkan pelajar sahaja. Kajian melibatkan pensyarah Politeknik juga boleh dilaksanakan.

iii. Kajian mix method iaitu kajian berbentuk kualitatif dan kuantitatif. Data boleh diperoleh melalui borang soal selidik dan temubual pelajar.

iv. Selain itu, pengkaji berikut juga boleh mengkaji kursus-kursus yang lain supaya dapat mengetahui data penguasaan KBAT dari pelbagai kursus yang berlainan di Politeknik.

6. Kesimpulan

Secara umumnya, kajian ini meninjau penguasaan KBAT pelajar dalam pembelajaran berasaskan projek. Penguasaan pelajar ditinjau dari aspek penguasaan dan kesediaan pelaksanaan KBAT dalam pembelajaran berasaskan projek mencapai min tinggi. Hubungan penguasaan KBAT dan kesediaan dalam melaksanakan KBAT adalah positif. Kedua-dua aspek ini penting dalam menjayakan penguasaan KBAT terhadap pelajar. Elemen KBAT perlu diterapkan semasa proses pengajaran dan pembelajaras di dalam. Ini selaras dengan penekanan KPM bagi melahirkan pelajar yang dapat berdikari dan berdaya saing di peringkat global. Semua pihak perlu bekerjasama bagi memastikan KBAT berjaya dilaksanakan dengan baik supaya teknik pengajaran dan pembelajaran KBAT selari dengan objektif kebangsaan untuk melahirkan generasi muda yang berfikiran kreatif dan kritis akan tercapai. Secara keseluruhannya pembelajaran berasaskan projek memberi peluang kepada pelajar secara aktif di dalam pembelajaran dan dapat menguasai KBAT dalam kursus yang dipelajari. Pendekatan pembelajaran berasaskan projek amat bersesuai dilaksanakan kepada pelajar supaya diberi pendedahan secara meluas bagi manfaat dan pecapaian pelajar. Oleh itu, dalam persediaan melaksanakan KBAT para pendidik memainkan peranan yang penting dalam menjayakan pengajaran dan pembelajaran yang berkesan di dalam kelas dengan amalan kreativiti dalam di dalam kelas. Seterus itu dapat

Penghargaan

Penghargaan terima kasih buat responden yang terlibat secara langsung dalam menjayakan kajian ini. Tidak lupa juga buat penganjur International Conference on Research and Innovation in Sustainable Cities 2022 (ICRISC 2022) kerana memberi peluang kepada kami untuk membentangkan kajian yang dihasilkan. Moga kajian ini dapat memberi manfaat kepada penyelidik-penyelidik yang lain dalam menghasilkan kajian seperti ini.

Rujukan

Chong Oi Min, Mohammad Tahir Mapa (2021). Pembelajaran berasaskan projek dalam mata pelajaran geografi. GEOGRAFIA OnlineTM Malaysian Journal of Society and Space 17 issue 1 (268-282) © 2021, e-ISSN 2682-7727 **https://doi.org/10.17576/geo-2021-1701-20**

Faizah, M. R. A. Taqwa, E. Istiyono, and Ikhsanudin, "Senior high school student's higher order thinking skills based on gender and grade," in Journal of Physics: Conference Series, 2021, vol. 1918, no. 2, **http://doi: 10.1088/1742-6596/1918/2/022031.**

Fatin Izati Mohd Taher, Khadijah Abdul Razak (2022). Penguasaan Kemahiran Komunikasi Pelajar Melalui Pembelajaran Berasaskan Projek berorinetasikan animasi.International Journal of Education, Pssychology and Counselling (IJEPC). Volume 7 Issue 45 (March 2022)PP. 501-515, **http://DOI 10.356331/IJEPC.745038**

Hima, L. R., Nusantara, T., Hidayanto, E. & Rahardjo, S. (2019). Changing in mathematical identify of elementary school students through learning activities. International Electronics Journal of Elementary Education, 11(5), 461-469. **htpp://Doi 10.26822/iejee.2019553342**

Othman Lebar (2006). Penyelidikan Kualitatif :Pengenalan kepada Teori dan Metod.Tanjung Malim, Malaysia:Penerbit Universiti Pendidikan Sultan Idris

Mohd Majid Konting (1993). Kaedah Penyelidikan Pendidikan, 2nd ed, Kuala Lumpur: Dewan Bahasa dan Pustaka. **file:///C:/Users/user/Downloads/294-527-1-SM.pdf**

Mohd Syaubari, Mazarul Hassan, Mohd Ridhuan (2022). Penggunaan Virtual Learning Sebagai Bahan Untuk Pdp Pendidikan Islam Berdasarkan Kemahiran Berfikir Aras Tinggi (Kbat) Di Dalam Kalangan Guru Pendidikan Islam. International Conference on Research and Innovation in Sustainable Cities 2022

Mohd Syaubari, Mohd Ridhuan, Mazarul Hassan, Mohd Afifi, Kama Shafeei (2022). Pengaruh Kompenan Bahasa Terhadap pelaksanaan Pengajaran Guru Bahasa Arab (GPI) dalam mengintregasikan Kemahiran Berfikir Aras Tinggi (KBAT). E-Jurnal Bahasa dan Linguistik. **http://ejbl.kuis.edu.my/**

Mohd Syauri bin Othman (2018). Kepentingan Pelaksanaan Pedagogi Pendidikan Islam Melalui Kemahiran Berfikir Aras Tinggi (Kbat) Dapat Memenuhi Aspirasi Falsafah Pendidikan Islam. Jurnal Akademi Pengajian Islam Kolej Universiti Islam Melaka

Muhammad Talhah Ajmain@Jima'ain, Aminudin Hehsan & Ahmad Marzuki Mohamad. (2019). Learning and facilitation (PdPc) Islamic Education in Industrial Revolution 4.0. Journal of Research in Psychology 1(3): 13-17. **https://www.readersinsight.net/jrp/article/view/975/764 [18 Disember 2020].**

Nasyimah Ismail and Zamri Mahamod (2017). Sikap Dan Kesediaan Pelajar Sekolah Menengah Terhadap Kemahiran Berfikir Aras Tinggi Dalam Pembelajaran Komsas Bahasa Melayu, J. Pendidik. Bhs. Melayu, vol. 6, no. 2, pp. 2180–4842, 2016

Noor Erma, A. N., & Kwan, E. L. (2017). Hubungan antara sikap, minat, pengajaran guru dan pengaruh rakan sebaya terhadap pencapaian matematik tambahan tingkatan 4. Jurnal Kurikulum dan Pengajaran Asia Pasifik, 2(1), 1-10.

Norizzathy Agir dan Mohd Effendi (2022). Amalan Kemahiran Berfikir Aras Tinggi (KBAT): Satu TinjauanTerhadap pelajar Kolej Vokasional.Internatonal Conference on Business and Education (ICBE). e-ISSN: 2785-9479

Nur Athirah Ariffin dan Faridah Yunus (2017). Kesediaan Guru Prasekolah Dalam Melaksanakan Kbat Dalam Pengajaran Dan Pembelajaran. Bangi: Universiti Kebangsaan Malaysia

Razila Kasmin, Mohd Faiz Baharan, Noraizan Mohsin, Norliza Kila dan Mashita Abu Hassan (2019). Amalan Kualiti Guru dalam Kalangan Guru Pendidikan Islam di Sekolah Kebangsaan. Journal of Management and Operation Research JoMOR 2019, 1(4), 1-23

Suppiah, Irna Patricia, Norazilawati et al. (2019). Pelaksanaan Kemahiran Berfikir Aras Tinggi Oleh Guru Dalam Pengajaran Dan Pembelajaran Di Tadika. Jurnal Pendidikan Awal Kanak-kanak Kebangsaan, Vol. 8, 2019 (24-32)ISSN 2289-3032 / eISSN 2550-178X **http://ejournal.upsi.edu.my/index.php/JPAK**

Tajularipin Sulaiman, Vickneswary Muniyan, DiwiyahMadhvan, Raidah Hasan & Suzieleez Syrene aaBDUL Rahim (2017). Implementation of Higher Order Thingking Skills IN Teaching of Science: A Case Study in Malaysia. International Research Journal of Education and Sciences (IRJES), 1(1)

Tuan Rahayu Tuan Lasan, Mohd Aderi, Mohd Isa Hamzah (2017). Pengetahuan, Sikap dan Kesediaan Murid Terhadap Kemahiran Berfikir Aras Tinggi (KBAT) dalam Mata Pelajaran Islam. Tinta Artikulasi Membina Ummah 3(1), 2017 15-28, e-ISSN:2289-960X

Turner, RmM. & Grizzaffi, K. (2003). Creative Learning for Service Learning: A ProjectBased Approach. Kertas kerja dibentangkan di Annual Meeting of the Campus Compact National Centre for Community Collages. 12th Scottsdale. Az. 21-23 Mei 2003.

W. Setya et al.(2021), “Implementation of higher order thinking laboratory (HOTLAB) on magnetic field with real blended virtual laboratory to improve students critical thinking skills,” in Journal of Physics: Conference Series, 2021, vol. 2098, no. 1, **http://doi: 10.1088/1742-6596/2098/1/012019.**

KAJIAN LITERATUR TAHAP KESEDIAAN PENGAJARAN DAN PEMBELAJARAN DI RUMAH (PdPR) DI KALANGAN PELAJAR, TENAGA PENGAJAR DAN IBU BAPA

Fadilah Ahmad[1] dan Nor Aqilah Abdul Hamid[2]

[1]Politeknik Ungku Omar,
Ipoh, Perak, Malaysia
[1]dilahmad@puo.edu.my
[2]aqilah9780@gmail.com

Abstrak: Sejak penularan wabak Covid-19, pengajaran dan pembelajaran di rumah (PdPR) bukanlah perkara yang asing lagi. Kaedah pengajaran dan pembelajaran secara norma baharu telah diadaptasikan dalam dunia pendidikan bagi memastkan pelajar tidak ketinggalan menguasai ilmu pengetahuan. PdPR atau dikenali dengan istilah pembelajaran secara dalam talian adalah satu bentuk pendidikan di mana elemen utamanya merangkumi pengasingan secara fizikal guru dan pelajar semasa sesi pengajaran serta penggunaan pelbagai teknologi untuk memudahkan komunikasi antara pelajar-guru dan pelajar-pelajar. Kajian ini dibuat bagi merungkai tahap kesediaan pelajar, tenaga pengajar dan ibu bapa terhadap PdPR berdasarkan kepada kajian-kajian yang telah dibuat. Ini bagi membolehkan pihak berkepentingan dapat mengkaji dan menambahbaik PdPR supaya ia menjadi efektif dan dapat mengurangkan isu keciciran murid dalam pelajaran terutamanya di kawasan luar bandar. Sebanyak 31 artikel telah dianalisis bagi mencapai objektif kajian. Hasil daripada kajian mendapati pelajar mempunyai kesediaan terhadap PdPR di tahap yang sederhana manakala tenaga pengajar dan ibu bapa mempunyai tahap kesediaan yang tinggi. Di harapkan penemuan ini akan membantu pihak sekolah dan Institusi Pengajian Tinggi di Malaysia untuk meningkatkan kualiti pendidikan secara norma baharu dan melaksanakan garis panduan yang jelas khususnya kepada tenaga pengajar.

Kata kunci*: *Pembelajaran dalam talian, Kaedah pengajaran dan pembelajaran di rumah (PdPR), Tahap kesediaan pelajar dan guru, Penerimaan pelajar

1. Pengenalan

Semua lapisan masyarakat sering memperkatakan Malaysia menuju wawasan 2020. Tidak kira dikalangan pemimpin mahupun dikalangan yang dipimpin, sejak zaman persekolahan lagi anak-anak akan sentiasa dihujani dengan matlamat serta visi ini. Malaysia pada tahun 2020 memberi gambaran sebagai sebuah negara yang membangun, maju serta boleh berdiri setaraf dengan negara maju lain seperti Sepanyol, Singapura dan Jepun. Pelbagai teknologi yang mampu memacu negara

ke arah yang lebih maju telah digambarkan oleh pihak-pihak tertentu. Namun, 'geruh tidak berbunyi, malang tidak berbau', tahun 2020 yang sepatutnya menjadi mimpi indah kepada rakyat Malaysia telah menjadi mimpi ngeri bagi seluruh penduduk di dunia dengan kemunculan wabak pandemik Covid-19 pada Disember tahun 2019 yang mula dikesan di bandar Wuhan. Wabak Covid-19 yang merebak dengan pantas ini mampu meragut jutaan nyawa manusia. Sehingga ke hari ini, Malaysia mencatatkan 4.56 juta kes positif covid-19 dan 35,758 kematian (Covid-19 Malaysia, 2019).

Bagi mengekang penularan wabak covid-19 ini. Pengumuman Perintah Kawalan Pergerakan (PKP) yang berkuat kuasa pada 18 Mac 2020 oleh Yang Amat Berhormat Tan Sri Muhyiddin Yassin, Perdana Menteri Malaysia ketika itu (Junhairi Alyasa, 2020). Berikutan dengan itu, banyak sektor yang tidak terlibat dengan perkhidmatan penting negara seperti sektor pelancongan, sukan, industri kreatif dan sebarang aktiviti yang menyebabkan pengumpulan orang ramai di suatu tempat perlu dihentikan beroperasi. Impak dari insiden ini telah memberi kesan yang besar kepada ekonomi, sosial dan politik (Leong, 2020). Malahan bidang pendidikan juga turut menerima tempias akibat penularan wabak covid-19 ini. Penutupan institusi pendidikan turut diumumkan yang melibatkan Institusi Pengajian Tinggi (IPT), sekolah menengah dan sekolah rendah serta prasekolah (Syahirah Hani Roslan, 2020).

Susulan penutupan institusi pendidikan, pelajar dan tenaga pengajar perlu mengadptasi norma baharu kaedah pembelajaran iaitu kaedah pengajaran dan pembelajaran di rumah (PdPR). Beberapa istilah lain juga digunakan bagi menerangkan istilah ini termasuklah pengajaran dan pembelajaran dalam talian, pembelajaran maya dan e-pembelajaran yang lazimnya dirujuk kepada penggunaan teknologi maklumat dan komunikasi rangkaian yang digunakan bagi tujuan pengajaran dan pembelajaran. Norma baharu ini membolehkan pelajar untuk belajar dalam persekitaran berbeza mengikut kepada keselesaan mereka sendiri, di samping itu tenaga pengajar juga bebas untuk menyampaikan sesi pengajaran dan pembelajaran di mana-mana sahaja.

Aspek pendidikan menjadi faktor utama yang harus dititikberatkan agar negara dapat melahirkan modal insan yang cemerlang meskipun Malaysia dilanda penyakit wabak. Dalam konteks ini, kajian literatur ini bertujuan mengkaji tahap kesediaan pelajar, tenaga pengajar dan para ibu bapa berkaitan proses PdPR. Ini penting bagi memastikan tiada generasi yang tercicir ekoran penyampaian pendidikan yang dilakukan secara alaf baharu. Bagi menjawab persoalan ini, satu soalan kajian telah dibentuk iaitu Apakah tahap kesediaan pelajar, tenaga pengajar dan ibu bapa terhadap pengajaran dan pembelajaran di rumah (PdPR).

Bagi menjawab persoalan kajian, pencarian literatur telah dijalankan menggunakan pangkalan data jurnal antarabangsa yang dapat diakses secara dalam talian untuk memperoleh data dari pelbagai sumber yang berlainan. pelbagai menangkap potensi terbesar. Antara pangkalan data yang digunakan ialah Google Scholar (www.googlescholar.com), scopus (www.scopus.com) dan, ScienceDirect (www.scienceDirect.com). Kata kunci yang digunakan bagi kajian literatur ini ialah pembelajaran dalam talian, kaedah pengajaran dan pembelajaran di rumah (PdPR), tahap kesediaan pelajar dan guru, penerimaan pelajar, dan lain-lain yang berkaitan.

2. Tahap kesediaan Pdpr di kalangan pelajar

Hasil dari carian yang telah dibuat, untuk mengkaji tahap kesediaan pelajar terhadap pengajaran dan pembelajaran dari rumah terdapat 18 artikel telah berjaya diperolehi. Daripada artikel yang terpilih, 12 kajian telah dijalankan di Malaysia, dan kajian selebihnya dibuat di Indonesia, Qatar, India dan Slovia. Semua artikel yang dipilih diterbitkan dari tahun 2020-2022. Perincian dapatan kajian adalah seperti yang ditunjukkan dalam Jadual 1.

Jadual 1: Dapatan kajian kesediaan pelajar terhadap PdPR

Nama pengkaji	Sampel kajian	Lokasi kajian	Dapatan kajian
Mohalik & Sahoo, 2020	Pelajar Institusi Pengajian Tinggi	India	Tahap kesediaan - tinggi
Poláková & Klímová, 2021	Pelajar sekolah Menengah	Slovakia	Tahap kesediaan - tinggi
Siti Baizura & Nurfaradila, 2020	Pelajar sekolah Menengah	Dungun, Terengganu	Kesediaan pelajar berada pada tahap tinggi
Du et al., 2020	Pelajar Institusi Pengajian Tinggi	Qatar	Tahap kesediaan - tinggi
Mohd Zulhasnan et al., 2019	Pelajar Institusi Pengajian Tinggi	Sabah, Malaysia	Tahap kesediaan (Pengetahuan, kesesuaian dan penerimaan) - Tinggi
Rafique et al., 2021	Pelajar Institusi Pengajian Tinggi	Pakistan	Tahap kesediaan – sederhana Terhadap kemudahan – tinggi
Abdul Aziz Ishak et. al.,2020	Pelajar Institusi Pengajian Tinggi	Pulau pinang, Malaysia	Kesediaan pelajar berada pada tahap sederhana
Nor Aidawati & Mazidah, 2021	Pelajar Institusi Pengajian Tinggi	Terengganu, Malaysia	Tahap kemudahan – tinggi Tahap kesediaan - sederhana
Norasyikin & Mohd Isa, 2016	Pelajar Institusi Pengajian Tinggi	Terengganu, Malaysia	Tahap kesediaan - sederhana
Chung et al., 2019	Pelajar Institusi Pengajian Tinggi	Malaysia	Tahap kesediaan - sederhana
Ranganathan et al., 2021	Pelajar Institusi Pengajian Tinggi	Malaysia	Tahap kesediaan - sederhana
Siti Balqis & Muniroh, 2020	Pelajar Institusi Pengajian Tinggi	Malaysia	Tahap kesediaan - sederhana
Losius, 2020	Pelajar sekolah rendah	Ranau, Sabah	Tahap kesediaan – kurang memuaskan
Magesvaran, 2021	Pelajar sekolah Menengah	Kulim, Kedah	Kesediaan pelajar berada pada tahap rendah
Ahmad Al-Munzir Ridzuan & Nassir, 2020	Pelajar Institusi Pengajian Tinggi	Lahad Datu, Malaysia	Terhadap pengetahuan – rendah Terhadap kemudahan - rendah
Arif Widodo et. al. , 2020	Pelajar Institusi Pengajian Tinggi	Indonesia	Tahap kesediaan - rendah

Widodo et al., 2020	Pelajar Institusi Pengajian Tinggi	Indonesia	Tahap kesediaan - rendah
Agormedah et al., 2020	Pelajar Institusi Pengajian Tinggi	Ghana	Tahap kesediaan - rendah

Setelah meneliti kajian terdahulu yang telah dibuat, hasil kajian mendapati tahap kesediaan pelajar majoritinya di tahap sederhana. Buktinya diperolehi dari hasil kajian dijalankan oleh Siti Balqis & Muniroh, 2020 dimana dapatan kajian menunjukkan ketidaksediaan pelajar dengan kaedah pengajaran dan pembelajaran secara norma baharu disebabkan masalah capaian internet yang kurang memuaskan terutamanya dikawasan luar bandar. Manakala, dapatan kajian yang dibuat oleh Losius, 2020 menunjukkan beberapa isu yang menyebabkan pelajar menghadapi kekangan untuk mengikuti PdPR antaranya, tidak mempunyai sebarang rujukan di rumah, berkongsi telefon pintar (peranti) dengan ibu bapa, tiada kemudahan komputer di rumah, tidak mahir menggunakan peranti, dan masalah capaian internet. Nor Aidawati & Mazidah, 2021 yang menjalankan kajian terhadap tahap kesediaan PdPR dikalangan pelajar Institusi Pengajian Tinggi turut mendapat hasil dapatan yang sama iaitu rata-rata pelajar tidak bersedia disebabkan tidak mempunyai akses data yang mencukupi dan masalah peranti untuk digunakan sepanjang sesi pengajaran dan pembelajaran di rumah. Chung et al., 2019 juga memperoleh hasil dapatan yang sama iaitu rata-rata pelajar menyatakan cabaran yang paling besar dihadapi oleh mereka ketika PdPR ialah masalah jaringan internet, masalah peranti, persekitaran di rumah yang tidak kondusif, dan kurang bermotivasi.

Setelah dianalisa semua kajian yang telah dibuat berkenaan PdPR, masalah capaian internet terutamanya di kawasan luar bandar merupakan faktor yang menyumbang kepada tahap kesediaan pelajar terhadap PdPR. Luqman Arif Abdul Karim (2020) seperti yang dipetik dalam kajian Losius, 2020 menyatakan nisbah jurang internet antara bandar dan luar bandar adalah sebanyak 70:30, menurut Laporan dari Jabatan Statistik Negara pada tahun 2019, tiada penambahbaikan yang dilakukan sepanjang tahun 2014-2016 terhadap jaringan internet dikawasan luar bandar.

3. Tahap kesediaan PdPR di kalangan tenaga pengajar

Hasil dari carian yang telah dibuat, untuk mengkaji tahap kesediaan tenaga pengajar terhadap pengajaran dan pembelajaran dari rumah terdapat 8 artikel telah berjaya diperolehi. Daripada artikel yang terpilih, 4 kajian telah dijalankan di Malaysia, dan tiga (3) kajian selebihnya dibuat di Indonesia, dan satu (1) kajian dibuat di Filipina. Semua artikel yang dipilih diterbitkan dari tahun 2020-2022. Dapatan kajian secara perincian adalah seperti yang ditunjukkan dalam Jadual 2 .

Jadual 2: Dapatan kajian tahap kesediaan tenaga pengajar terhadap PdPR

Nama pengkaji	Sampel kajian	Lokasi kajian	Dapatan kajian
Che Azizan, S.N., & Mohamad Nasri, N. ,2020.	Guru sekolah	Kuala Lumpur, Malaysia	Tahap kesediaan - tinggi
Lapada et al., 2020	Guru sekolah dan IPT	Filipina	Tahap kesediaan - tinggi
Subuh Anggoro, 2021	Guru sekolah	Indonesia	Tahap kesediaan - tinggi
Nornadiba Huda Maat & Shahlan Surat. (2022).	Guru sekolah	Johor, Malaysia	Tahap kesediaan - tinggi
Ling & Suziyani, 2022	Guru sekolah	Seluruh Malaysia	Tahap kesediaan - sederhana
Quah et al., 2021	Pensyarah IPT	Kedah, Malaysia	Tahap kesediaan - sederhana
Irfan & Sastra Khusuma, 2020	Guru sekolah	Indonesia	Tahap kesediaan - rendah
Andarwulan et al., 2021	Guru sekolah	Indonesia	Tahap kesediaan - rendah

Setelah dianalisa semua kajian yang telah dibuat berkenaan PdPR, kebanyakkan faktor yang diperolehi menunjukkan tahap kesediaan tenaga pengajar terhadap PdPR ialah tinggi. Irfan Fauzi dan Iman Hermawan Sastra Khusuma (2020) yang menjalankan kajian di Banten dan Jawa Barat, Indonesia mendapati bahawa bahan pengajaran mudah diberikan kepada pelajar serta proses pengemaskinian bahan tersebut dilakukan dalam talian dengan lebih sistematik. Dalam kajian Noorhadi dan Zurinah (2017) menyatakan bahawa guru-guru perlu menggunakan kaedah pengajaran yang kreatif dan inovatif untuk meningkatkan minat belajar kanak-kanak. Ini merangkumi pengunaan peranti digital oleh guru-guru yang membolehkan mereka menarik minat para pelajar. Yasmin Saw (2020) menyatakan bahawa pembelajaran yang menggunakan komputer riba, telefon bimbit, rangkaian internet setara dengan agenda pembelajaran generasi kanak –kanak sekarang.

Kajian yang dijalankan oleh Irfan Fauzi dan Iman Hermawan Sastra Khusuma (2020), Deepika Nambiar (2020) dan Rasmitadila et al. (2020) pula mendapati bahawa pendekatan pembelajaran dalam talian ini menjadi lebih bermakna apabila dilaksanakan semasa tempoh pandemik Covid-19. Menurut mereka, pendekatan pembelajaran dalam talian yang digunakan sebagai medium penyampaian bahan pembelajaran dalam tempoh pandemik ini mudah dan cepat untuk dilaksanakan, tambahan pula Home Based Learning (HBL).

Dalam kajian Noorhadi dan Zurinah (2017) menyatakan bahawa guru-guru perlu menggunakan kaedah pengajaran yang kreatif dan inovatif untuk meningkatkan minat belajar kanak-kanak. Ini merangkumi pengunaan peranti digital oleh guru yang membolehkan mereka menarik minat para pelajar. Yasmin Saw (2020) menyatakan bahawa pembelajaran yang menggunakan komputer riba, telefon bimbit, rangkaian Internet setara dengan agenda pembelajaran generasi kanak –kanak sekarang.

Hasil kajian daripada Junus, Santoso, Putra, Gandhi, dan Siswantining (2021) telah menunjukkan bahawa pensyarah memerlukan kemahiran teknikal asas untuk menggunakan platform e-pembelajaran supaya dapat melaksanakan e-pembelajaran dengan lebih berkesan. Di samping berkemahiran tinggi dalam memahami kehendak pembelajaran teradun dalam e-pembelajaran.

4. Tahap kesediaan PdPR di kalangan ibu bapa

Hasil dari carian yang telah dibuat, untuk mengkaji tahap kesediaan dari aspek ibu bapa dalam perlaksanaan pengajaran di rumah terdapat 5 artikel telah berjaya diperolehi. Daripada artikel yang terpilih, satu (1) kajian telah dijalankan di Malaysia, dan dua (2) kajian selebihnya dibuat di Indonesia, dan satu (1) kajian dibuat di Afrika serta satu (1) kajian telah dibuat di Rusia. Semua artikel yang dipilih diterbitkan dari tahun 2020-2021. Perincian dapatan kajian adalah seperti yang ditunjukkan dalam Jadual 3.

Jadual 3: Dapatan kajian tahap kesediaan ibu bapa terhadap PdPR

Nama pengkaji	Lokasi kajian	Dapatan kajian
Hanim et al., 2021	Malaysia	Tahap kesediaan - tinggi
Siahaan et al., 2021	Indonesia	Tahap kesediaan - tinggi
Amanor-Mfoafo et al., 2020	Afrika	Status sosio-ekonomi ibu bapa yang tinggi, mempunyai tahap kesediaan yang tinggi
Hafidz et al., 2020	Indonesia	Tahap kesediaan - tinggi
Burmykina et al., 2017	Rusia	Tahap kesediaan - tinggi

Setelah dianalisa semua kajian yang telah dibuat berkenaan PdPR, kebanyakkan faktor yang diperolehi menunjukkan tahap kesediaan ibu bapa terhadap PdPR ialah tinggi. Menurut Hira dan Anderson (2021), pengalaman dan motivasi yang tinggi diperlukan oleh para ibu bapa dalam menguruskan PdPR anak-anak mereka di rumah. Sokongan guru diperlukan kerana semasa proses pengajaran dan pembelajaran sebegini memerlukan tumpuan dari aspek masa dan perhatian sepenuhnya. Manakala menurut Ahsani (2020), kesediaan ibu bapa meliputi strategi mengajar dan mendidik anak-anak belajar semasa pandemik Covid-19 diperlukan dengan gaya pembelajaran yang sesuai, sentiasa memahami dan menemani mereka di rumah. Ini memberi peranan penting dalam membantu proses pengajaran di rumah. Ibu bapa menjadi rujukan anak-anak dalam memahami apa yang dipelajari dalam talian.

Mengenai kesediaan ibu bapa Akrofi (2020) berpendapat bahawa kekurangan sokongan ibu bapa mempunyai pengaruh negatif terhadap prestasi akademik pelajar. Kemahiran keibubapaan yang baik sangat penting apabila kanak-kanak berada di persekitaran rumah yang terkurung. Ibu bapa boleh mengkaji tingkah laku anak-anak untuk mengesan atau mengenal pasti pertumbuhan psikologi dan fizikal mereka serta pencapaian akademik mereka.

Bradley & Corwyn (2002) menyatakan bahawa penglibatan kanak-kanak dalam aktiviti akademik, kualiti hubungan ibu bapa dengan anak dan kebolehcapaian pembelajaran adalah tiga elemen utama suasana pembelajaran di rumah yang membantu meningkatkan pembangunan pendidikan kanak-kanak. Peranan ibu bapa untuk menyokong pembelajaran kanak-kanak adalah penting terutamanya pada usia muda mereka.

5. Kesimpulan

Kesediaan dalam menghadapi norma baharu pembelajaran atas talian adalah penting. Justeru, kajian ini bertujuan meneroka tahap kesediaan pelajar, tenaga pengajar dan ibu bapa menghadapi PdPR. Berdasarkan kepada analisis yang telah dibuat, dapat disimpulkan pelajar mempunyai kesediaan terhadap PdPR di tahap yang sederhana manakala tenaga pengajar dan ibu bapa mempunyai tahap kesediaan yang tinggi. Untuk itu, pihak yang berkepentingan haruslah mencari jalan penyelesaian bagi memastikan tahap kesediaan pelajar dalam menghadapi PdPR berada pada tahap yang tinggi supaya PdPR dapat diaplikasikan tatkala negara berada dalam situasi kecemasan. Tidak dilupakan kesediaan tenaga pengajar dan ibu bapa adalah kunci kejayaan PdPR, tenaga pengajar dan ibu bapa haruslah bekerjasama dengan baik bagi memastikan pelajar khususnya di sekolah rendah dapat menggunakan dan mengakses peranti untuk digunakan sebagai alat perhubungan dengan tenaga pengajar dan rakan-rakan. Oleh itu, peranan ibu bapa diperlukan untuk membimbing anak-anak mereka menggunakan teknologi semasa pembelajaran dalam talian. Selain itu, penggunaan bahan pengajaran dan aplikasi pembelajaran yang interaktif amat penting dalam proses pembelajaran agar ia dapat menarik minat pelajar untuk kekal bersemangat dalam menghadapi pembelajaran di atas talian. Di samping itu, tenaga pengajaran juga harus menitikberatkan beberapa hal dalam menghadapi pembelajaran secara norma baharu iaitu kesiapsiagaan, prestasi dan motivasi pelajar. Oleh yang demikian, penyelidikan ini boleh menyumbang kepada pihak kementerian khususnya dalam menilai tahap kesediaan bagi memastikan keberkesanan pengajaran dan pembelajaran di rumah (PdPR). Selain itu, penyelidikan ini diharap dapat memudahkan pelbagai pihak mengkaji dan menambahbaik pembelajaran dalam talian agar dapat diaplikasikan dalam keadaan kecemasan seperti sekarang.

Rujukan

Ahmad Al-Munzir Ridzuan, & Nassir, M. (2020, October 6). Kajian Tinjauan Impak Pandemik Covid-19 Terhadap Tahap Kesediaan Pelajar Kolej Komuniti Lahad Datu Bagi... ResearchGate; unknown. https://www.researchgate.net/publication/348317544_Kajian_Tinjauan_Impak_Pandemik_Covid-19_Terhadap_Tahap_Kesediaan_Pelajar_Kolej_Komuniti_Lahad_Datu_Bagi_Pembelajaran_Secara_Atas_Talian

Agormedah, E. K., Adu Henaku, E., Ayite, D. M., & APORİ ANSAH, E. (2020). Online learning in higher education during COVID-19 pandemic: A case of Ghana. Journal of Educational Technology and Online Learning. https://doi.org/10.31681/jetol.726441

Amanor-Mfoafo, N. K., Akrofi, O., Edonu, K. K., & Dowuona, E. N. (2020). Investigating The E-Learning Readiness Of Ghanaian Parents During Covid-19. European Journal of Education Studies, 7(10). https://doi.org/10.46827/ejes.v7i10.3275

Andarwulan, T., Al Fajri, T. A., & Damayanti, G. (2021). Elementary Teachers' Readiness toward the Online Learning Policy in the New Normal Era during Covid-19. International Journal of Instruction, 14(3), 771–786. https://doi.org/10.29333/iji.2021.14345a

Burmykina, I. V., Fedina, N. V., Zvezda, L. M., Pikalova, O. S., Skudnev, D. M., & Voronin, I. V. (2017). Study of Educators' and Parents' Readiness to Implement Distance Learning Technologies in Preschool Education in Russia. EURASIA Journal of Mathematics, Science and Technology Education, 13(12). https://doi.org/10.12973/ejmste/80802

Che Azizan, S. N., & Mohamad Nasri, N. (2020). Pandangan Guru Terhadap Pembelajaran dalam Talian melalui pendekatan Home Based Learning (HBL) semasa tempoh Pandemik Covid-19.PENDETA: Journal of Malay Language, Education and Literature,11, 46-57. https://doi.org/10.37134/pendeta.vol11.edisikhas.4.2020

Covid-19 Malaysia. (2019, December 31). COVID-19 Malaysia Updates. COVID-19 MALAYSIA. https://covid-19.moh.gov.my/terkini

Chung, E., Subramaniam, G., & Christ Dass, L. (2019). Online Learning Readiness Among University Students in Malaysia Amidst Covid-19. Mohe.gov.my. https://myjms.mohe.gov.my/index.php/AJUE/article/view/10294/4872

Hafidz, A., Nurhasan, Akh. Muzakki, & M. Sholeh. (2020). Parental Engagement in Children's Online Learning During the Covid-19 Pandemic. ResearchGate; unknown. https://www.researchgate.net/publication/347589954_Parental_Engagement_in_Children's_Online_Learning_During_the_Covid-19_Pandemic

Hanim, Z., Zaleha, Z., Mohamad, D., Zaki, A., Ahmad, A., & Ibrahim, Z. (2021). Jurnal Kesidang Kesidang Journal, 6(2021), 80–95. http://kuim.edu.my/journal/index.php/JK/article/viewFile/972/783

Irfan, F., & Sastra Khusuma, I. H. (2020). Teachers' Elementary School in Online Learning of COVID-19 Pandemic Conditions. Iaimnumetrolampung.ac.id. https://journal.iaimnumetrolampung.ac.id/index.php/ji/article/view/914/512

Junhairi Alyasa. (2020, March 16). *Covid-19: Perintah Kawalan Pergerakan di seluruh negara bermula 18 Mac*. Sinarharian; sinarharian. https://www.sinarharian.com.my/article/74100/KHAS/Covid-19/Covid-19-Perintah-Kawalan-Pergerakan-di-seluruh-negara-bermula-18-Mac

Lapada, A. A., Arthur, D., Frosyl Fabrea Miguel, & Alam, Z. F. (2020, July 16). Teachers' Covid-19 Awareness, Distance Learning Education Experiences and Perceptions towards... ResearchGate; unknown. https://www.researchgate.net/publication/342992348_Teachers'_Covid-19_Awareness_Distance_Learning_Education_Experiences_and_Perceptions_towards_Institutional_Readiness_and_Challenges

Leong, I. (2020). Covid-19: Perintah Kawalan Pergerakan mulai 18 higga 31 Mac - PM. Astroawani.com. https://www.astroawani.com/berita-malaysia/covid19-perintah-kawalan-pergerakan-mulai-18-hingga-31-mac-pm-233914

Ling, T. H., & Suziyani, M. (2022). Kesediaan Guru Bagi Pembelajaran Dalam Talian Semasa Pandemik Covid 19. International Journal of Advanced Research in Islamic Studies and Education. Retrieved July 5, 2022, from file:///C:/Users/OPTIPLEX%205250%20AIO/Downloads/arise-2021-2207-hui.pdf.

Losius, G. (2020). Cabaran Pelaksanaan Pengajaran dan Pembelajaran Jarak Jauh (PDPCJJ) Semasa Perintah Kawalan Pergerakan (PKP). Academia.edu. https://www.academia.edu/43147586/Cabaran_Pelaksanaan_Pengajaran_dan_Pembelajaran_Jarak_Jauh_PDPCJJ_Semasa_Perintah_Kawalan_Pergerakan_PKP

Magesvaran, U. (2021). Tahap Pengetahuan Dan Kekangan Yang Dihadapi Oleh Guru Bahasa Melayu Ketika Menggunakan Aplikasi Google Meet Dalam Pengajaran Dan Pembelajaran Dalam Talian Jurnal Pendidikan Bahasa Melayu -JPBM (Malay Language Education Journal -MyLEJ, 11(2), 39–53. http://journalarticle.ukm.my/17915/1/265-510-1-SM.pdf

Mohd Zulhasnan, M., Fadli, B., & Sharifuddin, R. (2019). Kesediaan Pelajar dalam M-Pembelajaran bagi Pengajaran dan Pembelajaran di Kolej Komuniti Tawau, Sabah. Mohe.gov.my. https://myjms.mohe.gov.my/index.php/PKKJLLL/article/view/7395/3012

Nornadiba Huda Maat & Shahlan Surat. (2022). Kesediaan PdPR dan Kemahiran Mengawal Tekanan Psikologikal Semasa Pandemik Covid-19 dalam Kalangan Guru KAFA. Malaysian Journal of Social Sciences and Humanities (MJSSH), 7(3), e001377.https://doi.org/10.47405/mjssh.v7i3.1377

Nor Aidawati, A., & Mazidah, M. (2021). Kesediaan Pelajar erhadap Proses Pengajaran Dan Pembelajaran (Pdp) Norma Baru Di Jabatan Teknologi Maklumat & Komunikasi (Jtmk), Politeknik Sultan Mizan Zainal Abidin (PSMZA). International Journal of Modern Education, 3(8), 114–124. https://doi.org/10.35631/ijmoe.380010

Norasyikin, O., & Mohd Isa, H. (2016). Hubungan Kesediaan Pelajar Mengikuti Pembelajaran Berasaskan Blended Learning Berdasarkan Jantina Dan Program. Um.edu.my. https://ejournal.um.edu.my/index.php/JUKU/article/view/8194/5667

Poláková, P., & Klímová, B. (2021). The Perception of Slovak Students on Distance Online Learning in the Time of Coronavirus—A Preliminary Study. Education Sciences, 11(2), 81. https://doi.org/10.3390/educsci11020081

Quah, W., Ahmad, R., & Desa, N. (2021). Malaysian Online Journal of Education, 5(1), 46–53. http://journal.kuis.edu.my/attarbawiy/wp-content/uploads/2021/06/46_53.pdf

Rafique, G. M., Mahmood, K., Warraich, N. F., & Rehman, S. U. (2021). Readiness for Online Learning during COVID-19 pandemic: A survey of Pakistani LIS students. The Journal of Academic Librarianship, 47(3), 102346. https://doi.org/10.1016/j.acalib.2021.102346

Ranganathan, H., Singh, D. K. A., Kumar, S., Sharma, S., Chua, S. K., Ahmad, N. B., & Harikrishnan, K. (2021). Readiness towards online learning among physiotherapy undergraduates. BMC Medical Education, 21(1). https://doi.org/10.1186/s12909-021-02803-8

Siahaan, C., Murniarti, E., & Simbolon, K. (2021). Readiness Level of Parents as Student Guide in Online Learning. psychology and education, 58(2), 5995–6007. http://repository.uki.ac.id/3656/1/ReadinessLevelofParentsasStudentGuideinOnlineLearning.pdf

Siti Baizura, C. A., & Nurfaradila, M. N. (2020). *Pandangan Guru Terhadap Pembelajaran dalam Talian melalui pendekatan Home Based Learning (HBL) semasa tempoh Pandemik COVID-19*.Upsi.edu.my. https://ejournal.upsi.edu.my/index.php/PENDETA/article/view/

Siti Balqis, M., & Muniroh, H. (2020). Pengajaran dan Pembelajaran dalam talian semasa Perintah Kawalan Pergerakan. https://appspenang.uitm.edu.my/sigcs/2020-2/Articles/PENGAJARAN%20DAN%20PEMBELAJARAN%20DALAM%20TALIAN%20SEMASA%20PERINTAH%20KAWALAN%20PERGERAKAN.Pdf

Subuh Anggoro. (2021, August 2). Identification Of Readiness For Implementation Of E-Learning On Teachers And Elementary School Students. ResearchGate; unknown. https://www.researchgate.net/publication/353634601_identification_of_readiness_for_implementation_of_e-learning_on_teachers_and_elementary_school_students

Syahirah Hani Roslan. (2020). Covid-19: semua sekolah diarahkan tutup, kebajikan pelajar mesti diambil kira. Astroawani.com. https://www.astroawani.com/berita-malaysia/covid19-semua-sekolah-diarahkan-tutup-kebajikan-pelajar-mesti-diambil-kira-234342

Widodo, A., Nursaptini, N., Novitasari, S., Sutisna, D., & Umar. (2020). From Face-to-Face Learning to Web Base Learning: How Are Student Readiness?, 10(2), 149. https://doi.org/10.25273/pe.v10i2.6801

Widodo, A., Ermiana, I., & Erfan, M. (2020). Emergency online learning: How are students' perceptions? Proceedings of the 4th Sriwijaya University Learning and Education International Conference (SULE-IC 2020). https://doi.org/10.2991/assehr.k.201230.116

EXPERIENTIAL LEARNING IN GREEN BUILDING TECHNOLOGY USING AUGMENTED REALITY

Sharinatol Akmanida Jamaludin

Politeknik Ungku Omar
Ipoh, Perak, Malaysia
akmanida@polycc.edu.my

Abstract: Industry 4.0 hasn't yet done much to promote the use of Augmented Reality (AR) technology in Malaysian education. AR technology is more intriguing when the components are 3D-shaped, such as images or videos. The impact of the Covid-19 pandemic and online learning requires pedagogical adaptation in higher education in line with 21st-century learning skills and industrial revolution 4.0. Most students are still lacking a solid understanding of green building technology. The use of 2D drawings rather than 3D models when explaining to students the structure of buildings sometimes does not achieve the understanding. This project aims to develop AR game applications that will help learners in civil engineering better understand the information on green buildings. This AR application was created using the MAKAR application and designed contents by using Canva, Microsoft Powerpoint, SketchUp Pro 2020, and Revit 2020. The efficacy of the AR application was tested by 30 Polytechnic Ungku Omar Semester 5 students using a Google Form. In this study, the quantitative technique is used to analyse statistical data. The results suggest that the AR application game aids and enhances students' learning of the fundamentals of green building technology through gameplay. The AR applications are compiled with a short video, and evaluation features also generate a visual experience in the learning process that is dynamic and modularly comprehensive.

***Keywords**: Augmented Reality, Green Building Technology, Internet of Things, 21st Century Education*

1. Introduction

The usage of augmented reality (AR) and the internet of things (IoT) in education has been shown to boost student motivation in the teaching and learning process whether interactively or online (Cipresso et al. 2018). AR is now viable for use in higher education because of technological advancements and the availability of hardware and software (Ayer, Messner & Anumba 2016; Kravets, Midak & Kuzyshyn 2017). The Covid-19 epidemic necessitates the development of more innovative and effective virtual teaching approaches (Aziz et al. 2020; Wan Hassan et al. 2020). Furthermore, the implementation of AR as an education model is regarded to better address the demands of 21st-century higher education students (Cipresso et al. 2018; Milovanovic et al. 2017; Rafiq & Hashim 2018). AR in civil engineering education is also not widely used and should be explored as an interactive teaching tool with online student-centred learning (Farshid et al. 2018; Singh et al. 2015; Zhao, Zhang, & de Angelis

2019). As a result, the Augmented Reality Game for Green Building Technology (AReGB Games) application was built to impart green building technology information in virtual reality.

The objective of this innovative product is to create a game application for an early understanding of green building information using AR technology that examines the concept of green building technology, green building assessment tools, and green building elements with a virtual exploration of polytechnic students studying the DCC50232 Engineering in Society course under the topic of Environment and Sustainability in Civil Engineering, as well as evaluating the effectiveness of the game application.

Augmented reality (AR) is a technology that enables humans, computers, smartphones, and reality to connect by allowing digital and actual items to cohabit and giving civil engineering students an intuitive sense of experience in an animated world (Midak et al. 2019). According to (Ayer, Messner & Anumba 2016; Milovanovic et al. 2017), AR can also increase the quality of building-related instruction. To avoid confining AR to specific technologies, AR is described as a system that combines real and virtual; is interactive in real-time and 3-D (Farshid et al. 2018; Zhao, Zhang, & de Angelis 2019). This definition is meant to allow additional technologies, such as mobile technology, to be used in addition to the virtual 2-D overlay on top of the video at an interactive pace, as long as the overlay is not coupled with the video. This concept, however, includes monitor-based interfaces, monocular systems, head-mounted devices, and mobile devices (Kravets, Midak & Kuzyshyn 2017; Midak et al. 2019; Singh et al. 2015).

Green building is a related trend in attaining sustainability in the construction sector following the Sustainable Development Goal 2030 (SDG 2030). Green Buildings aim to improve the efficiency of the use of energy, water, and material resources while reducing the impact of buildings on human health and the environment over the life cycle of the building (Shafiei, Abadi & Osman 2017; Yen et al. 2016). This is accomplished through better design, construction, operation, maintenance, and seat removal. As a result, green buildings are intended to conserve energy and resources, recycle materials, and reduce harmful chemical emissions throughout their entire cycle (Zhao et al. 2019). Its compatibility with climate, tradition, culture, and environment may preserve and increase the quality of human existence while also preserving the capacity of the ecosystem on a local and global scale (Yen et al. 2016). It also uses resources efficiently, saves money on operations, increases productivity, and sends the proper message about being devoted, organised, and responsible for the future (Pandey 2018; Shafiei, Abadi & Osman 2017).

2. Materials and Methods

2.1 AReGB Game Display

Tablets or ordinary smartphones may be used to practise AR, with the device's screen acting as a realistic interface to exhibit, operate with interactive buttons, and play videos, and 3D models. Using a MAKAR application, as seen in figure 1, the AreGB gaming application will generate an augmented reality that displays the application's content, as shown in figure 2. With the aid of a visual display, the game has three key parts: START, QUESTION, and FINISH.

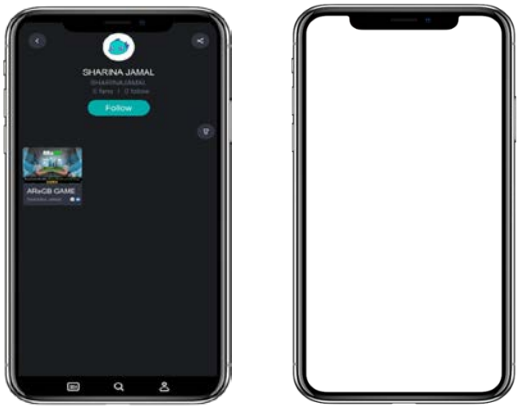


Figure 1. The interface of the MAKAR Application

Figure 2. AReGB Games Content

2.2 Method of Game Production

The AReGB game was created by utilising graphics tools to create the basic model of green buildings and then creating infographics with Ms PowerPoint and Canva.

2.2.1. Software for Designing Green Building Models

The green building sample design was created using two software packages, Revit 2020 and SketchUp Pro 2020. This 3D design of a green building focuses on the fundamental features of a green building as well as a portrayal of the shape of a green building that may be used in the most recent construction planning that stresses green aspects, as seen in figures 3 and 4.

Figure 3. Building a 3D model in Revit 2020.

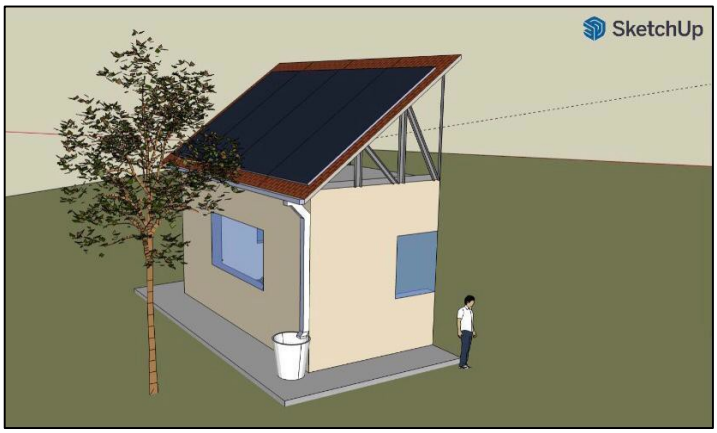


Figure 4. Building a 3D model in SketchUp Pro 2020

2.2.2 Creation of Green Building Technology Question Infographics

This green building technology information infographic was created using Microsoft PowerPoint and Canva, as seen in figures 5 and 6. All of this material is gathered in preparation, and the reliability of the source is ensured for citation, and it fits the standards of the syllabus DCC50232, topic Environment and Sustainability in Civil Engineering.

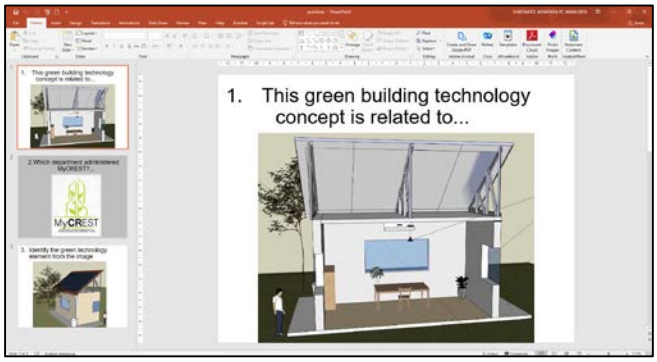


Figure 5. Creating graphical questions in PowerPoint

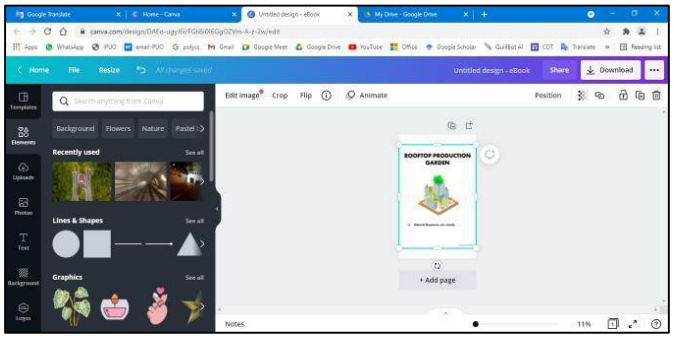


Figure 6. Creating graphical questions in Canva

2.2.3 Developing a Green Building Technology AR Game

The augmented reality game of this green building was created with the open source program MAKAR. The infographic material of questions and 3D videos of green building technology produced was uploaded to this programme and then organised and modified according to the learning outcomes to be reached for the DCC50232 course, as seen in pictures 7 and 8 below.

Figure 7. AReGB game interface development.

Figure 8. MAKAR content display creation

2.2.4 Instrument and sample development

The AReGB games efficacy was evaluated among 30 Ungku Omar Polytechnic (PUO) students who took the DCC50232 course in session 1 2021/2022. Then, with the purposive sampling approach, a sample population of 30 fifth-semester students from two classes of Diploma in Civil Engineering (DKA) as indicated (Hair et al 2006; Cohen, Manion, & Morrison 2011) is adequate. This innovation is validated using a two-part questionnaire instrument, I and II. Part I includes demographic data. Part II includes three items relevant to students' understanding of green building technology and augmented reality in the form of before and post questions, as shown in figure 9.

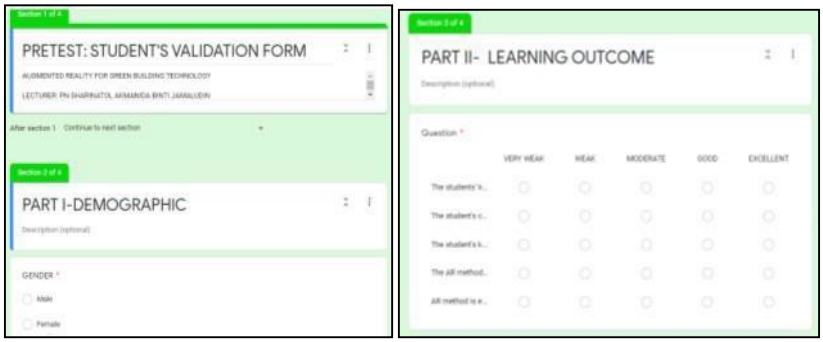


Figure 9. Questionnaire instrument

Alpha Cronchbach is an instrument's reliability index whose value is approved if it surpasses 0.70. Questionnaire development employs a Likert scale, as indicated in Table 1.

Table 1. Likert Scale.

Title 1	Score
Strongly Agree	5
Agree	4
Moderate	3
Disagree	2
Strongly Disagree	1

The questionnaire data was gathered and analysed using Microsoft Excel software for the interpretation of mean score values (as shown in Table 2) and standard deviation values. This means the score level is established by referring to the study by Pallant (2020).

Table 2. Mean Score Level.

Level	Mean Score
High	3.34 - 5.00
Moderate	1.67 – 3.33
Low	1.00 – 1.66

3. Results

The results of this innovative research will be discussed in terms of the efficacy of the AReGB gaming application. Alpha Cronbach's dependability is rated based on the classification index's reliability, which is 0.90-1.00 very high, 0.70-0.89 high, 0.30-0.69 medium, and 0.00-0.30 low, according to Babbie (2010). The analysis findings suggest that Alpha Cronbach's is more than 0.90, as shown in Table 3.

Table 3. Alpha Cronbach's Reliability Value.

Variables	Items	Alpha Cronbach's Value
Learning outcomes	5	0.93

3.1 Student Demographics

As indicated in Table 4, a total of 30 respondents from the two courses of semester 5 completed the questionnaire to measure student comprehension of green building technology and the usage of augmented reality. Overall, 53% of male students responded to the questionnaire, while female students answered up to 47%.

Table 4. Frequency of Student Response to Learning Results.

Course	DKA5A		DKA5B	
Gender	**M**	**F**	**M**	**F**
Frequencies	8	7	8	7
Percentage (%)	53	47	53	47
Total	15 (100%)		15 (100%)	

3.2 Pre and Post Test

A questionnaire was also used to analyse students' perceptions before and after the AReGB game, with pre and post-assessments based on mean interpretation values and standard deviations, as shown in Tables 5 and 6 for the DKA 5A class and Tables 7 and 8 for the DKA 5B class.

Table 5. Pre-test value for DKA 5A related to green technology and AReGB game

ID	Variables (Pre)	Mean	Standard Deviation	Interpretation
A1	The students' knowledge about green building information	2.86	0.36	Moderate
A2	The student's comprehension level of green buildings.	2.79	0.58	Moderate
A3	The student's knowledge level of Augmented Reality (AR)	2.43	0.65	Moderate
A4	The AR game method is effective in attracting students to learning.	3.43	0.85	High
A5	AR method is effective in attracting students to learning.	3.43	0.76	High

The pre-test before utilising the AReGB game reveals a modest interpretation value among DKA 5A students since the student's understanding of green building technology and augmented reality is not yet thorough. Variable P4 and P5 get the high result because some of the students understood the function of AR.

Table 6. Post-test value for DKA 5A related to green technology and AReGB game

ID	Variables (Pre)	Mean	Standard Deviation	Interpretation
PA1	The students' knowledge about green building information	4.43	0.65	High
PA2	The student's comprehension level of green buildings.	4.43	0.65	High
PA3	The student's knowledge level of Augmented Reality (AR)	4.36	0.63	High
PA4	The AR game method is effective in attracting students to learning.	4.64	0.50	High
PA5	AR method is effective in attracting students to learning.	4.71	0.47	High

In comparison to Table 5, student success improves when they experience augmented reality on their smartphones. According to the previous interpretation, this AReGB game boosts the motivation and inventiveness of students' learning about green technology and augmented reality.

Table 7. Pre-test value for DKA 5B related to green technology and AReGB game

ID	Variables (Pre)	Mean	Standard Deviation	Interpretation
B1	The students' knowledge about green building information	2.86	0.36	Moderate
B2	The student's comprehension level of green buildings.	2.79	0.58	Moderate
B3	The student's knowledge level of Augmented Reality (AR)	2.43	0.65	Moderate
B4	The AR game method is effective in attracting students to learning.	3.14	0.82	Moderate
B5	AR method is effective in attracting students to learning.	3.21	0.82	Moderate

Table 7 displays the results of the DKA 5B pre-test. Overall, a moderate interpretation value was achieved since students' knowledge and comprehension of green building technology and augmented reality still need to be enhanced.

Table 8. Post-test value for DKA 5B related to green technology and AReGB game

ID	Variables (Pre)	Mean	Standard Deviation	Interpretation
PB1	The students' knowledge about green building information	4.57	0.51	High
PB2	The student's comprehension level of green buildings.	4.64	0.50	High

PB3	The student's knowledge level of Augmented Reality (AR)	4.43	0.51	High
PB4	The AR game method is effective in attracting students to learning.	4.64	0.50	High
PB5	AR method is effective in attracting students to learning.	4.43	0.51	High

Table 8 displays the post-test for the DKA 5B class, which also has a high interpretation value. It was discovered that students can better grasp and evaluate green building technologies when relativity is used. Overall, this AReGB game is highly successful and valuable in boosting students' knowledge online with augmented reality.

4. Discussion

The findings of this study are discussed in light of the study's two objectives: i) developing green building technology augmented reality game applications (AReGB Games), and ii) acknowledging the effectiveness of the AReGB game among Ungku Omar Polytechnic students enrolled in Engineering in Society course. Based on the data, all students explore augmented reality as a mobile learning access tool. In addition, based on the findings of the study, students gain experience and abilities in using augmented reality through their smart devices. This AReGB gaming application is meant to boost students' skills in studying green technology themes in the Engineering in Society course. In addition to student use, this program may be utilised as a teaching tool for lecturers for Engineering in Society course teaching activities.

Nowadays, the teaching and learning process is not restricted to the lecture halls, but mobile technology aids the learning process as a teaching aid to students (Rafiq& Hashim 2018). As a result, the invention of this augmented reality application game may maximally utilise the aspects of active learning and self-learning of the students.

5. Conclusion

This research addresses the design and development of green building technology augmented reality (AR) game apps (AReGB Games) and learning activities centered on 21st-century teaching and learning. The AReGB game combines fundamental questions on green building technologies to give ordinary polytechnic students a first AR-based learning experience. By introducing augmented reality to the field of civil engineering study, this invention provides a significant contribution to the student community. This innovation's output can pique polytechnic students' interest in green building technology by merging AR experiences and strategic learning, as well as a fundamental framework to facilitate learning in the field. AReGB game innovation not only adds a new application category for mobile AR, but also provides a reference for various technological, logistical, and design issues based on the experience of designing, producing, and assessing AReGB games. This application enables the interchange of context between traditional and virtual learning methods for green building technologies. Finally, polytechnic students were able to utilise the AReGB gaming program intuitively and complete all exercises with ease, and they were enthusiastic about AR technology.

Acknowledgments

The author thanks Allah SWT for the health and well-being that allowed authors to accomplish this effort. The author would like to express his heartfelt gratitude to DKA semester 5 students, BCT students, and DKA and BCT instructors from the Department of Civil Engineering at Polytechnic Ungku Omar for their assistance in implementing and writing this innovation till it was successful.

References

Ayer, S. K., Messner, J. I., & Anumba, C. J. (2016). Augmented reality gaming in sustainable design education. Journal of Architectural Engineering, 22(1), 04015012.

Aziz, A. R. A., Shafie, A. A. H., Lee, U. H. M. S., & Ashaari, R. N. S.
R. (2020). Strategi pembangunan aspek kesejahteraan kendiri bagi mendepani tekanan akademik semasa wabak Covid-19. Malaysian Journal of Social Sciences and Humanities (MJSSH), 5(12), 16-30.

Babbie, E. (2010). The practice of social research. California. USA: Wardsworth, Cengage Learning.

Cipresso, P., Giglioli, I. A. C., Raya, M. A., & Riva, G. (2018). The past, present, and future of virtual and augmented reality research: a network and cluster analysis of the literature. Frontiers in Psychology, 9, 2086.

Farshid, M., Paschen, J., Eriksson, T., & Kietzmann, J. (2018). Go boldly!: Explore augmented reality (AR), virtual reality (VR), and mixed reality (MR) for business. Business Horizons, 61(5), 657-663.

Hair, J., Black, W., Babin, B., Anderson, R., & Tatham, R. (2006). Multivariate data analysis (6th ed.). New Jersey: Pearson Educational International.

Louis Cohen, Lawrence Manion, & Keith Morrison (2011). Research methods in education. New York: Routledge.

Kravets, I., Midak, L., Kuzyshyn, O. (2017). Augmented Reality technology as a means to improve the effectiveness of the study of chemical disciplines. In: Proceedings of the All-Ukrainian scientific-practical conference with international participation “Modern information technologies and innovative teaching methods: experience, trends, perspectives”, Ternopil, 9-10 Nov 2017, pp. 151–154

Midak, L.Ya., Kravets, I.V., Kuzyshyn, O.V., Pahomov, J.D., Lutsyshyn, V.M., Uchitel, A.D. (2019) Augmented reality technology within studying natural subjects in primary school. In: 250 Kiv, A.E., Shyshkina, M.P. (eds.) Proceedings of the 2nd International Workshop on Augmented Reality in Education (AREdu 2019), Kryvyi Rih, Ukraine, March 22, 2019.

Milovanovic, J., Moreau, G., Siret, D., & Miguet, F. (2017). Virtual and augmented reality in

architectural design and education. In 17th International Conference, CAAD Futures 2017.

Pallant, J. (2020). SPSS survival manual: A step-by-step guide to data analysis using IBM SPSS. Routledge.

Pandey, S. (2018). Impact of green building rating systems on the sustainability and efficacy of green buildings: case analysis of green building index, Malaysia. Malaysia. [(accessed on 24 August 2021)].

Rafiq, K. R. M., & Hashim, H. (2018). Augmented Reality Game (ARG), 21st-century skills and ESL classroom. Journal of Educational and Learning Studies, 1(1), 29-34.

Shafiei, M. W. M., Abadi, H., & Osman, W. N. (2017). The indicators of green buildings for Malaysian property development industry. International Journal of Applied Engineering Research, 12(10), 2182- 2189.

Singh, G., Bowman, D. A., Hicks, D., Cline, D., Ogle, J. T., Johnson, A., & Ragan, E. D. (2015). CI-Spy: Designing a mobile augmented reality system for scaffolding historical inquiry learning. In 2015 IEEE international symposium on mixed and augmented reality-media, art, social science, humanities and design (pp. 9-14). IEEE.

Wan Hassan, W. A. S., Ariffin, A., Ahmad, F., Sharberi, S. N. M., Nor Azizi, M. I., & Zulkiflee, S. N. (2020). Covid-19 pandemic: Langkawi vocational college student challenge in using google classroom for teaching and learning (t&l). International Journal, 9(3).

Yen, T. K., Mohammad, I. S., Jalil, R. A., Hakim, A., Mohammed, B., & Estate, R. (2016). Review Human Factors Issues in Malaysian Green Building Development: a Review. Malaysia Journal of Human Factors and Ergonomics, 1(1), 27–32

Zhao, S., Zhang, L., & de Angelis, E. (2019). Using augmented reality and mixed reality to interpret design choices of high-performance buildings.

Zhao, X., Zuo, J., Wu, G., & Huang, C. (2019). A bibliometric review of green building research 2000–2016. Architectural Science Review, 62(1), 74-88.

RESEARCH OF WASTE DISPOSAL PROBLEM IN PANTAI SIRING RESIDENT AREA

Hj. Zamali Omar[1] and Nurul Fatiha Ain Azman Putera[2]

[1,2]Politeknik Merlimau, 77300 Merlimau,
Melaka;
[1]hjzamaliomar71@gmail.com
[2]nurulfatihaazman17@gmail.com

Abstract: The problem of garbage disposal is an issue that is often contagious among the people in this country. The same goes for the problems that occur in Pantai Siring, Merlimau, Melaka, which is a place that attracts visitors and locals. The main objectives of this research are to investigate the causes of garbage problems and the impact of garbage disposal on residents in the Pantai Siring area. Research methods include questionnaires and interviews of residents and visitors at Pantai Siring. The results showed that the garbage problem occurred due to the increase in the number of visitors and the bins provided were insufficient and limited. In addition, this problem also coused from the lack of responsibility of visitors. Based on the results of the study and discussion, it can be concluded that, local authorities need to play an important role to increase the awareness of visitors to dispose of garbage in the places provided in addition to adding garbage bins in the main places around Pantai Siring.

Keywords*: garbage disposal; rubbish; polluted;*

1. Introduction

The problem of waste management is often an issue in this country. This matter becomes more serious with the increase in the number of people, thoughts, and civilizations that greatly influence human attitudes and behavior. This research was carried out to survey and investigate the problem of garbage disposal and waste in the Pantai Siring area, Merlimau, Melaka. The waste or waste consists of solid, liquid or gas, where each has its disposal and management method.

According to the Environmental Quality Act 1974, waste is defined as waste, including all materials that have been designated as scheduled waste, or all materials whether in solid, liquid or gas or vapor form that are released, discharged or placed in the environment that will cause pollution. Meanwhile, waste management can be defined as a scientific discipline related to the control of generation, storage, collection, transfer, transport, processing and disposal of waste at landfill sites with methods that are suitable for the basis of public health, economics, engineering, conservation, aesthetics and environmental considerations [1].

In Malaysia, mainly urban residents contribute at least 1.5 kilograms of garbage disposal per day compared to 0.8 kilograms by rural residents. This number continues to increase with the increase in respondentsand the improvement of people's living standards. Disposing of waste at will not only affects human health but also threatens marine life. Therefore, all parties need to work together to find a solution as soon as possible before this problem becomesmore serious [2].

Media reports on Garbage Collection Generation Data clearly show that there has been a significant increase in the production of waste by the people of this country in the past five years, namely in 2018 as much as 36,843 tons of garbage was produced per day, while in 2019 it increased to 37,462 tons which increased to 38,081 tons in 2020. [3].

"This situation will worsen the existing situation. What's more, the latest data estimates that 14 million tons of garbage per year will be collected throughout 2022 or almost 40,000 tons per day with an estimated 95 percent of the collected solid waste being disposed of at landfills," [4].

Economic growth and respondentsgrowth are two elements that contribute to increasing the quantity of solid waste in each location. This dumping will have a negative impact on the environment, especially in metropolitan areas and residential areas. The current situation shows that the issue of the creation and composition of solid waste is increasingly worrying, especially in developing countries such as Malaysia. Using the method used in Act 672, this study tries to identify the composition of waste in residential areas. [5]
The attitude of a few of our people who ignore the effects of this garbage disposal, not only pollutes the environment, but if it is left, it will cause the environment to smell bad and then attract pests such as rats and flies.

The waste problem can be reduced if the government cooperates with the community and offers a growing segment of the respondentswith the opportunity to participate in waste management. [6]

1.2 Problem Statement

The problem of uncontrolled dumping and piles of garbage in several places around Pantai Siring, Merlimau can have a negative impact on local residents and a negative view by visitors. In addition to affecting the scenery due to the litter scattered in most places around Pantai Siring, residents, traders and visitors are also at risk of dealing with the problem of foul smell, disease, flies, mosquitoes and so on.

The problem of litter that occurs in Pantai Siring, Merlimau, Melaka was identified through observation and interview sessions with residents around the area. The problem faced by the residents around the Pantai Siring area is the problem of garbage disposal which causes the area to smell bad. The garbage house is located across the road next to the stalls and the market through gross observation. Garbage is thrown into the trash can that exceeds the limit that can be held by the trash can, even the waste that is thrown away is collected every day.

Based on the increase in living standards and the number of residents in the Pantai Siring area as well as the increase in the number of visitors especially every weekend, the quantity of waste disposal produced is also increasing. Therefore, systematic waste disposal management needs to be planned so that problems caused by management failure and its effects can be avoided. Failure to manage waste disposal will have unwanted effects and will pollute the environment. Therefore, a study needs to be conducted to see the effectiveness of garbage disposal collection carried out in the Siring Beach area.

In aim of this study is to determine the couses that will be conducted, in addition to examining the cause of the garbage problem that occurs, this study also tries to find some additional alternatives that can be used to solve the problem of garbage disposal in the Siring beach area.

Selamatkan Pantai Siring

Pantai sepanjang tiga kilometer dipenuhi longgokan sampah, MPJ lakukan gotong-royong

SERKAM – Dalam usaha memastikan persekitaran Pantai Siring, Pulai di sini sentiasa bersih dan tidak tercemar, Majlis Perbandaran Jasin (MPJ) mengambil pendekatan menjalankan program gotong-royong di pantai berkenaan.

Yang Dipertuanya, Shadan Othman berkata, inisiatif tersebut diambil selepas mendapati pantai sepanjang tiga kilometer itu dipenuhi longgokan sampah yang mencemarkan ekosistem selain pemandangan sekitarnya.

Menurutnya, tindakan segera dijalankan supaya masalah itu tidak berlarutan dan dapat dikawal.

"Saya berharap selepas ini orangawam khususnya penggunjung tidak membuang sampah sesuka hati. Ia demi menjaga kebersihan pantai dan memelihara keindahan alam semula jadi.

"Masyarakat juga perlu mematikan penanan dan tanggungjawab dalam melaksanakan amalan gotong-royong bersama-sama sebagai usaha mengekalkan kerindahan kawasan pantai dari semasa ke semasa," katanya pada program Sayangkan Pantai Kita.

Jelas Shadan, inisiatif dilakukan itu adalah sebagai salah satu tanggungjawab sosial MPJ dalam usaha memelihara kebersihan dan keindahan pantai dalam Jasin.

"Nama program ini saja sudah memadai menunjukkan matlamat program iaitu sayangi pantai kita. Justeru, saya harap peserta program dapat membantu menyedarkan masyarakat selain, memupuk semangat cinta pantai kita dalam diri masing-masing," katanya.

Shadan berharap, program itu mampu memulihkan hasrat Melaka sebagai sebuah negeri bersih, sekaligus mengekalkan status negeri terbersih di Malaysia.

Seramai 250 wanga kerja MPJ menjayakan program gotong-royong membersihkan Pantai Siring dengan kerjasama kakitangan Pejabat Daerah Dan Tanah Jasin (PDTJ), penuntut Kolej Komuniti Jasin, Institut Kemahiran Mara (IKM) Jasin dan SWCorp.

Hadir sama, Pengerusi JKKK Kampung Pulai, Rizal Ramli.

INFO: 250 warga MPJ menjayakan program gotong-royong membersihkan Pantai Siring dengan kerjasama PDTJ, penuntut Kolej Komuniti Jasin, IKM Jasin dan SWCorp.

Gotong royong dapat mengekalkan keindahan serta mengawal pencemaran yang berlaku di pantai berkenaan.

Figure 1: Pantai Siring article

Figure 2: Waste disposal area around the trash house

1.3 Importance of Research

Through the study, the researchers hope to make recommendations that can solve the problem of waste disposal in the area resident. This result is also expected to help all agencies involved directly or indirectly in this garbage disposal problem. The parties in question are the Southern Waste Management (SWM Environment) Sdn. Bhd. to solve the problem of waste disposal in this resident area. The results of this study can also be used by other parties as a reference when wanting to do further research in the future.

The importance of this research to the public was to instill awareness and the responsibility to the communities in the importance of environmental responsibility is. The role and attitude of this society is very important in ensuring the well -being of the younger generation in the future. This environmental awareness is also expected to have a small impact on non-governmental organizations (NGOs), and the public to join hands in supporting the government's intention to implement efforts to preserve and conserve the environment.

2. Literature Review

Operations under the control of the solid waste management service provider are known as solid waste management operations. The study's highlights comprise numerous factors that will be grouped to reflect the direction of the study's objective and the challenges to be I nvestigated. This is critical in understanding the importance of research based on historical events. The issue

features in the same category, as well as the highlights of this study, have distinct points of view, bringing new insights into the issues being investigated. The classification is based on waste management operations, management service providers, community attitudes, the effects of inadequate waste management, and solutions to the problems that have been identified.

There are various issues that may be recognized to affect the efficiency of the waste management operator in the area of solid waste management, particularly in the operation of waste management. Collection frequency, waste management processes, and labor are all issues. These three issues might reveal whether or not the operation was carried out efficiently. The community is the client who pays for and receives the solid waste management services given in this case. The attitude and involvement of the community must also be considered when evaluating the amount of management effectiveness adopted. This is the group that produces solid waste and requires adequate waste management in order to maintain a comfortable standard of living. The community's attitude must be analyzed and determined, including if the community is prepared to pay for the services supplied and if the community is open to or accepting of the waste management adaptations applied. This is critical in order for trash operations and management to reach ideal levels as a result of the community's response. In other words, the reaction provided enables the management operation to adjust, as well as provide alternate management ways if the existing management is disliked by the inhabitants local.

It is necessary to identify the impacts that arise as a result of improper waste management. This is because, in order to achieve effective management, the impact must be understood so that alternative management strategies may be discovered to reduce the impact. As a result, inadequate waste management will have a negative influence on both the environment and human people. The effect will be further described and linked through these two factors so that an integrated waste management system can be developed to ensure that the resulting effect has a minimal impact in this area. Suitable for current management with impacts in the research area.

3. Methodology of Study

3.1 Sampling Techniques

The primary goal of data and information collection is to achieve the study's objectives (Mohd Majid, 1990). In this study, has use both a quantitative and a qualitative approach to collect data. According to Robinson (1998), combining quantitative and qualitative data can provide more accurate results. The sample is selected randomly in order to obtain a representative sample number of the respondents(Blumetal.1986). A survey and visit to Pantai Siring were also conducted to identify in more detail and learn more about the problem of garbage disposal around the study location.

3.2 Primary Data

Primary data is the original data collected by the researcher during the study, and the data has never been obtained from any previous study (According to Syed Arabi Idid (1992). In the context of this study, primary data was collected using quantitative and qualitative methods. Qualitative data was collected through interviews, while quantitative data was through the

preparation of questionnaires. The total sample was 247 respondents who were involved, consisting of visitors, traders and residents of Pantai Siring.

3.3 Secondary data

Secondary data sources include scholarly books, journals, seminar papers and conferences, websites, newspaper clippings, and related brochures. Readings from secondary materials were conducted by researchers in order to strengthen information and concepts. Content analysis methods include storing and recording all information obtained at the site in a file to make it easier for researchers to re-refer to data. According to Mohd Majid Konting (1990), the content analysis method can categorize documents or data based on identified themes or issues related to the study. Secondary source information or data is critical for supporting and strengthening arguments during the data analysis process.

4. Result and Data Analysis

In order to achieve the research goals, data analysis of relevant information was carried out. To facilitate the analysis process, computer software was used. This software analyzes the collected data statistically. It can also present the analysis results in the form of graphs or charts that are easier to understand and interesting. However, in this study only the frequency method was used. Statistical analysis of frequency generally shows the percentage of frequency for a variable or question when referring to this study.

The data presented in this chapter were acquired as a consequence of a questionnaire distributed throughout the research region. The results from the questionnaire in the study region were evaluated in greater depth in order to make conclusions based on the research's stated goals.

4.1 Analysis of Section A (Demographic Profile)

The data were analyzed using several statistical analyses. Descriptive analysis is used to explain the background of residents, traders and visitors in Pantai Siring. A total of 247 respondents were surveyed for the questionnaire, a total of 51% or 126 of the respondents were males while 49% or 121 were female. The result showed that 95 respondents, or 38% of those aged 20 to 30 years, 49 respondents, or 20% of those aged 41 and over, 65 respondents or 27% were aged between 31 and 40 years and a total of 35 respondents, or 15%, aged between 19 and below. Finally, the results showed that 235 respondents or 95% were Malays, 12 people or 5% were Indians and 0% percent were Chinese.

4.2 Analysis of Section B (The source of this waste problem occurred in the study area)

All the results of Section B are shown in Table 1.

Table 1: The source of this waste problem occurred in the study area

No.	Question	Agree	Unsure	Disagree
1.	Dumpster adequacy chart in the trash house	40%	12%	48%
2.	Did you throw waste at the trash house?	67%	7%	26%
3.	Level of satisfactory on waste management at Pantai Siring, Melaka	63%	9%	28%
4.	The problem of garbage disposal that arises due to the increase in the number of visitors.	90%	3%	7%
5.	Garbage disposal problems that arise due to limited trash bin facilities.	80%	8%	12%
6.	The problem of garbage disposal that arises due to a lack of responsibility among visitors and traders.	68%	5%	27%
7.	Waste problem that has arises because lack of exposure in the importance of environmental care.	70%	5%	25%

Table 1 shows the analysis of source of this waste problem occurred in the study area. From the question, question No. 1, 40% respondent Agree, 12% Unsure and 48% Disagree for dumpster adequacy chart in the trash house. Question No. 2, 67% respondent Agree, 7% Unsure and 26% Disagree for throw waste at the trash house. Question No.3, 63% respondent Agree, 9% Unsure and 28% Disagree for level of satisfactory on waste management. Question No. 4, 90% respondent Agree, 3% Unsure and 7% Disagree, the result shows that most respondent agree the problem of garbage disposal that arises due to the increase in the number of visitors. Question No.5, 80% respondent Agree, 8% Unsure and 12% Disagree for garbage disposal problems that arise due to limited trash bin facilities. Question No. 6, 68% respondent Agree, 5% Unsure and 27% Disagree, the problem of garbage disposal that arises due to a lack of responsibility among visitors and traders. Question No.7, 70% respondent Agree, 5% Unsure and 25% Disagree for Waste problem that has arises because lack of exposure in the importance of environmental care.

Based on the data shown above, the residents and visitor proved that the source of the abundant waste happen in the trash house are because the insufficient waste bins and an increase in population. This is because most residents and sellers dispose waste in trash house. Pantai Siring is the focal point of public so when it is weekend or school holiday, visitors will increase. As the number of visitors increases, the waste generated in the eateries will also increase. Hence, abundant waste will happen when the trash disposed exceeded the limit.

4.3 Analysis of Section C (The impact of the waste disposal towards respondents)

All the results of Section C are shown in Table 2.

Table 2: The impact of the waste disposal towards respondents

No.	Question	Agree	Unsure	Disagree
1	The problem of garbage is disturbing the comfort and enjoyment while on the beach	79%	4%	17%
2	The problem of the smell of waste materials causes displeasure to the respondents	78%	4%	18%
3	The problem of flies, ants, and insects that can disturb respondents	80%	5%	15%
4	The problem of food waste and junk can affect the health of respondents	64%	6%	30%

Table 2 shows analysis of the impact of the waste disposal towards respondents. From the question, question No. 1, 79% respondent Agree, 4% Unsure and 17% Disagree for the problem of garbage is disturbing the comfort and enjoyment while on the beach. Question No. 2, 78% respondent Agree, 4% Unsure and 18% Disagree for the problem of the smell of waste materials causes displeasure to the respondents. Question No.3, 80% respondent Agree, 5% Unsure and 15% Disagree for the problem of flies, ants, and insects that can disturb respondents. Question No. 4, 64% respondent Agree, 6% Unsure and 30% Disagree, for the problem of food waste and junk can affect the health of respondents.

Based on the data shown above, most of the respondents agreed that the problem of garbage disposal at the study site has caused discomfort to visitors, causing an unpleasant smell, interference with insects such as flies, mosquitoes and ants and can cause diseases to visitors.

4.4 Analysis of Section D (Awareness about 3R - Reuse, Reduce, and Recycle)

All the results of Section D are shown in Table 3.

Table 3: Awareness about 3R - Reuse, Reduce, and Recycle

No.	Question	Agree	Unsure	Disagree
1.	Respondents who have heard of this 3R program	98%	2%	0%
2.	Respondents who practice this 3R program	77%	13%	10%
3.	Percentage of the difficulty of practicing this 3R program among respondents	27%	16%	57%
4.	percentage of respondents perspective over implementing this 3R program, the waste problem may be minimized.	83%	10%	7%

Table 3 shows awareness about 3R - Reuse, Reduce, and Recycle. From the question given, question No. 1, 98% respondent Agree, 2% Unsure and 0% Disagree for respondents who have heard of this 3R program. Question No. 2, 77% respondent Agree, 13% Unsure and 10% Disagree for practice this 3R program. Question No.3, 27% respondent Agree, 16% Unsure and 57% Disagree for the difficulty of practicing this 3R program among respondents. Question No

4, 83% respondent Agree, 10% Unsure and 7% Disagree, for respondent perspective over implementing this 3R program, the waste problem may be minimized. From the results of the data analysis, it shows that the majority of respondents know about the 3R program and agree that if this program is implemented, it will reduce the problem of garbage that occurs. The results also show that most respondents find it difficult to practice the 3Rs in their daily lives.

5.0 Conclusion

According to the findings, respondents provided a variety of perspectives or comments for each category. Most respondents felt that the dumpsters provided by SWM were insufficient for the first category, the amount of trash management and creation. The same is true for the second and third categories, namely the element of Pantai littering. Although some people disagreed, the majority agreed based on the evidence that was evaluated. The last goal, which was to assess the level of knowledge of the usage of the 3Rs, was likewise met. Overall, this study was successful in meeting its stated goals.

The study also investigating respondent's awareness of the 3R and review the effective solutions to solve the problem of waste in the study area. One of the questions being asked to the researcher which say does 3R practice is still relevant. 3R practice are still the best method in reducing amount of waste. Due to the circumstances of the problem happen in the study area, 3R practices is the ideal solution in solve the abundant waste at trash house. This is because when the waste can be minimized, the abundant waste would not be likely to be happen.

Based on the data collection, 3R practice is still uncommonly used by the respondents although most of the respondents comprehend about the practice and benefits comes from it. Even so, several of the populations practice 3R. If the numbers of people practice 3R increase, the waste problem at Pantai Siring could be solved. However, from the perspective of the respondents, a large number are unsure that 3R practice could solve the problem.

There are some recommendations given by the respondents. Firstly, is adding more dumpster to accommodate the amount of the waste at the trash house. By doing that, the trash house will look more practical and pleasant to the community especially to the visitors.

Next, the trash house should be maintained by the responsible party. From the observation, the trash house was dirty and emitted a very bad smell. The wall on the trash house was also moldy. The trash house is located near the fish market, food stall, and restaurant where many people would come. It would be discomfort to the residents and visitors.

Moreover, if the trash house is not maintained clean, there will be causing the reproduction of germs and bacteria. It could spread diseases to the community especially elders and children. It could cause dangerous diseases such as Human Immunodeficiency Virus (HIV), hepatitis virus or even common diseases like tuberculosis, pneumonia, and diarrhea. Furthermore, this also causes the reproduction of dengue mosquitoes.

6.0 Recommendations

Based on this effort, researchers investigated a way that can assist people in minimizing the waste problem. Several issues have been identified in order to increase the study's viability. Among the ideas made by respondents are improvements to the dumpsters in the trash house and issue resolution techniques such as the implementation of the 3R programmed for waste reduction in the trash house. Next, expand the size of the dumpster and maintain the dumpster so that there are no pests and the stench of waste is reduced. Finally, one of the responses recommended putting garbage cans in different regions and installing water hoses in the trash house.

References

Nur Ain Binti Abd Muin (2018), Pengurusan Sampah Di Kuala Lumpur, 1974-2004: Peranan Pihak Kerajaan Dan Pihak Awam, *Asian Journal* of Environment, History and Heritage, Published by Malay Arts, Culture and Civilization Research Centre, Institute of the Malay World and Civilization.

Muhamad Fiqrurazi Bin Ahmad Shamsuri, Universiti Teknologi Malaysia (2015). Masalah Longgokan Sampah Kawasan Perumahan Berteres ; Kajian Kes: Taman Universiti, Skudai, Johor. *Thesis* (Sarjana Sains (Pentadbiran dan Pembangunan Tanah)

Muhammad Basir Roslan & Sakini Mohd Said (10 Mac 2022). Anggaran 14 Juta Tan Sampah Akan Dikutip Tahun Ini. **https://www.malaysiakini.com/news/613802**

Prof. Madya Dr. Haliza Abdul Rahman, Institut Pengajian Sains Sosial (IPSAS) UPM Universiti Utara Malaysia (8 Ogos 2022): Amalan Kitar Semula Di Malaysia Masih Rendah: **https://mediapermata.com.bn/amalan-kitar-semula-di-msia-masih-rendah/**

Mohammad Tahir Mapa[1], Lokman Mohd Haris[2], Fionna Geogre[1], Molia Sebi Dinggai[1], Adi Japar[1], Aliakbar Gulasan[1] (2019). Kajian komposisi dan pengasingan sisa pepejal di kawasan perumahan. *Malaysian Journal* of Society and Space 15 issue 2 (117-128)

Hasnah Ali[1] , Dody Dermawan[1] , Noraziah Ali[2] , Maznah Ibrahim[3] , Sarifah Yaacob[4] (2012). Masyarakat dan amalan pengurusan sisa pepejal ke arah kelestarian komuniti: Kes isi rumah wanita di Bandar Baru Bangi. *Malaysia Journal* of Society and Space 8 issue 5 (64 - 75) Themed Issue: Masyarakat, Ruang dan Alam Sekitar (MATRA)

Abas, M. A. (2013). Pelupusan Sisa Pepejal: Kajian Sistem Kitar Semula Satu Aliran Di Pusat Pengajian Sains Matematik Dan Sains Komputer, Bangunan G31. Universiti Sains Malaysia, Pulau Pinang.

Alam Flora Sdn. Bhd. (2012) Services: Collection and Cleansing, Waste Disposal, Waste Minimization, Recycling, Waste Storage and Concession Area **http://www.alamflora.com.my/V3/services.html**.

Azam, N. A. (2016, November 21). Kitar semula sisa pepejal. Retrieved from kosmo.com.my: **http://www.kosmo.com.my/kosmo/content.asp?y=2011&dt=1130&pub=Kosmo&se c=Infiniti&pg=in_01.htm**

Ismail, Hamidi and Yusof, Rohana and Syed Hussain, Tuan Pah Rokiah and Ayob, Wahida (2004). Amalan kitar semula (pengurusan sisa pepejal) penduduk kediaman Majlis Perbandaran Kota Setar. Project Report. Universiti Utara Malaysia.

Mah Hassan, Nurul Adilah and Zulhumadi, Faisal (2017). Kitar semula: Pengetahuan Dan Sikap Mahasiswa Universiti Utara Malaysia Terhadap Pengurusan Sisa Pepejal. *Symposiumon Technology Management & Logistics* (STML–Go Green) 2016.

Masyitah Md Nujid, Nurjuhanah Juhari, Juliana Martin (2011). Kajian penjanaan sisa pepejal dan tahap kesedaran penduduk terhadap kitar semula di seluruh Negeri Perlis. Fakulti Kejuruteraan Awam, Universiti Teknologi Mara, Vol 6, 1. *UiTM Journal* > Jurnal Intelek (JI) page 123-131.

POLITEKNIK MALAYSIA
UNGKU OMAR

Diterbitkan/Published by:

Politeknik Ungku Omar
31400 Ipoh, Perak
05-545 7622/05-545 7656|Faks 05-547 1162
www.puo.edu.my