NATIONAL CREATIVE DESIGN DIGEST

The creative design-innovation, teaching-learning and project-based publication for the professional

th EDITION 2023

Sustainability IR 4.0 Driven by Industry - Polytechnic Synergy

POLITEKNIK MALAYSIA
IBRAHIM SULTAN

KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI

CREATIVE DESIGN CENTRE

UPIK
Unit Penyelidikan Inovasi & Pengkomersialan

CREDITS

National Creative Design Digest is an initiative of Creative Design Centre (CDeC) with Research, Innovation and Commercialization (UPIK), Politeknik Ibrahim Sultan. This Digest consists of a compilation of research papers presented by educators all over Malaysia in the year 2023. A total of 25 articles are presented in this Digest. It is hoped that this compilation will be a valuable reading reference in ensuring educators to be more innovative and creative as well as monitoring lecturers to be more involved in the world of research.

This publication briefly describes the novelty of the products, features, impacts of the products, awards and recognition achieved and their target market.

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PREFACE

Assalamualaikum Warahmatullahi Wabarakatuh
and warm greetings to everyone.

Alhamdulillah, we express gratitude to Allah the Almighty for His grace and blessings as we proudly present the ninth edition of Creative Design Digest. It is a privilege for me to contribute to this publication, and I am honoured by the opportunity.

Politeknik Ibrahim Sultan, a leading Polytechnic, places a strong emphasis on research as an integral part of its educational process. This digest serves as a testament to our unwavering commitment to continuous research, aiming to enhance the quality of education and foster innovation and creativity among our esteemed faculty, students, and lecturers.

Comprising papers from educators in Malaysia, this digest is a direct of diligent research efforts. It provides a comprehensive overview of the institution's research strategy, encompassing various key areas such as design, multimedia, ICT, engineering, tourism and hospitality, social science, entrepreneur, computer science, TVET and others.

Our sincere hope is that this digest becomes a platform for nurturing scholarly writings and research endeavours within the academic community in Malaysia. Through such initiatives, we aspire to elevate the overall quality of education within our system.

A heartfelt appreciation goes to all educators who gave generously contributed their research papers to this digest, as well as to the guest reviewers for their exceptional efforts. Together, we strive to make meaningful contributions to academia and further advance the pursuit of knowledge within the educational institutions.

HJ. ULAIMI BIN YAHYA
Director
Politeknik Ibrahim Sultan, Johor

PREFACE

Assalamualaikum Warahmatullahi Wabarakatuh

First and foremost, Alhamdulillah, expressing the utmost gratitude, the fruition of the Creative Design Digest 9th Edition is a remarkable achievement, marked by the dedication and ideas of all involved. Undoubtedly, it brings joy and fulfilment to the entire team, particularly the authors. Let us extend our appreciation to those who bring happiness into our lives; they are the skilful cultivators who nurture the blossoming of our souls. The realm of possibilities is boundless. Imagination serves as the inception of creation. In the words of George Bernard Shaw, "We imagine what we desire, we will what we imaging, and at last, we create what we will."

Never could we have envisioned the profound changes in our beloved world. The importance of wearables in the latest generation lies in their ability to seamlessly integrate technology into everyday life. Ongoing research focuses on refining wearables to meet evolving needs, ensuring they contribute positively to users' lifestyle and well-being.

Often, when we believe we have reached the conclusion of one chapter, we find ourselves at the inception of another. Life isn't about waiting for storms to pass; it's about mastering the art of dancing in the rain. In times of adversity, one must make the most of what remains. We summon our resilience, adapt to a new normal, and ultimately, we converse about ideas and innovations within the Creative Design Digest 9th Edition 2023.

To the management of Politeknik Ibrahim Sultan, words fall short in qualifying or quantifying the invaluable guidance provided along this journey. I am eternally grateful for your unwavering support. To the committee members and CDeC, the synergy of teamwork transforms aspirations into reality, and the collective effort of every team members turns the vision into a dream realized.

Congratulations Creative Design Digest 9th Edition. Thank you.

ABDUL RAZAK BIN SALIM
Manager
Creative Design Centre (CDeC)
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PREFACE

Assalamualaikum Warahmatullahi Wabarakatuh

The 9th National Creative Design Digest 2023 is a compilation of educators and students research works from education institutions all over Malaysia. This publication will be a continuous effort carried out by Research, Innovation and Commercialization Unit (UPIK), Politeknik Ibrahim Sultan to assist and encourage active research writing activity among lecturers and students. This publication had encompassed the area design, multimedia, ICT, engineering, tourism and hospitality, social science, entrepreneur, computer science, TVET and others disciplines which emphasized on creative design as the niche area.

As preparation to face the challenges of the Fourth Industrial Revolution and the 21st century, PolyCC needs to be highlighted as a respected research and innovation institution. This is in line with PolyCC's transformation aim of cultivating research, innovation and publication among the lecturers and students.

I hope that this publication will be able to showcase the level of professionalism and expertise among lecturers. In addition, it can serve as a valuable source of reference and guidance for future researchers. Lecturers' expertise such as problem-solving skills, streamlining oral communication and writing skills, improving creative intelligence, leveraging opportunities, and other expertise should be shared with students as well as the community.

UPIK welcomes comments, views, suggestions and advice to improve any weaknesses and to enhance the quality of publication of National Creative Design Digest in the future.

Thank you

Ts. DR. SAIPOL HADI BIN HASIM
Head of Unit
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2023

THEME


th NATIONAL
CREATIVE DESIGN
DIGEST
ENGINEERING
SOCIAL SCIENCE
COMPUTER SCIENCE
TVET
TOURISM AND HOSPITALITY
CREATIVE ART AND DESIGN
MULTIMEDIA
ICT
ENTREPRENEUR

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

Pembelajaran melalui Program Simulasi Perniagaan dalam kalangan pelajar Semester 3 Program Sijil Pemprosesan dan Kawalan Mutu Makanan (SPK)

Nur Nafisa binti Shafie @ Mohd Alias [1, a], Norzilahwati binti Md Noh [2, b] dan Latifah binti Mahmood [3, c]

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Abstrak. Kursus Perusahaan Makanan merupakan kursus teras termasuk dalam kandungan kurikulum bagi Program Sijil Pemprosesan dan Kawalan Mutu Makanan (SPK) yang wajib diambil oleh pelajar-pelajar Semester tiga (3). Menerusi kursus ini para pelajar dikehendaki untuk menjalankan aktiviti perniagaan atau menjalankan Program Simulasi Perniagaan secara langsung/ *hands-on*. Kajian ini bertujuan untuk menilai kefahaman pelajar mengenai konsep pengurusan iaitu faedah yang telah diperolehi pelajar melalui aktiviti Program Simulasi Perniagaan. Di samping itu juga dapat mengenal pasti kesan Program Simulasi Perniagaan terhadap kemahiran insaniah pelajar. Sampel kajian terdiri daripada 159 responden pelajar semester 3 Program SPK yang terdiri daripada lapan (8) buah Kolej Komuniti iaitu Arau, Bagan Serai, Jelebu, Jerantut, Lahad Datu, Pasir Salak, Sabak Bernam dan Sik. Kajian ini adalah dengan reka bentuk kuantitatif iaitu menggunakan borang soal selidik sebagai instrumen kajian yang dipindahkan dalam bentuk *Google Form* dan diedarkan secara dalam talian kepada semua responden. Hasil dapatan kajian dianalisis dalam bentuk frekuensi dan peratusan telah menunjukkan keputusan kajian yang mendapati 98% responden bersetuju bahawa kesan Program Simulasi Perniagaan dapat meningkatkan kefahaman pengurusan kewangan. Selain itu juga, kajian ini juga mengkaji daripada aspek faedah Program Simulasi Perniagaan terhadap pelajar. Sebanyak 97% responden bersetetuju bahawa Program Simulasi Perniagaan ini memberi faedah kepada pelajar untuk beroleh kemahiran sosial. Di samping itu juga, Program Simulasi Perniagaan ini wajar diteruskan kerana 97% pelajar bersetuju kerana menerusi program ini pelajar beroleh ilmu pengurusan perniagaan. Kesimpulannya, Program Simulasi Perniagaan yang telah diimplementasikan membolehkan para pelajar untuk lebih memahami aspek pengurusan perniagaan yang telah dipelajari dalam bentuk teori. Melalui kajian ini juga dapat digunakan sebagai dapatan untuk membantu para pensyarah khususnya dan jabatan umumnya dalam merangka strategi pengajaran dan pembelajaran (PdP) yang lebih berkesan serta menerapkan elemen keusahawanan seiring perkembangan arus teknologi semasa kepada pelajar-pelajar.

Kata kunci: Simulasi perniagaan; Aktiviti perniagaan; Pemprosesan dan kawalan mutu makanan; Kolej komuniti.

Pengenalan

Kursus Perusahaan Makanan merupakan kursus teras yang termasuk dalam kandungan kurikulum bagi Program Sijil Pemprosesan dan Kawalan Mutu Makanan (SPK) dan wajib diambil oleh pelajar-pelajar semester tiga (3). Ini bertujuan untuk memberi pengetahuan dan kemahiran memulakan perniagaan dalam usaha memupuk minat pelajar untuk berniaga. Menerusi kursus ini juga, para pelajar dikehendaki untuk menjalankan aktiviti perniagaan atau menjalankan Program Simulasi Perniagaan. Program Simulasi Perniagaan perlu disempurnakan oleh setiap pelajar yang mengambil kursus Perusahaan Makanan ini. Ini adalah merujuk kepada Hasil Pembelajaran Ketiga (HPK3) yang

perlu dicapai dalam kursus ini oleh setiap pelajar iaitu menerusi aktiviti jualan produk makanan yang telah dilaksanakan secara langsung. Malah agihan jumlah pemarkahan Penilaian Berterusan (PB) bagi HPK3 ini adalah yang tertinggi dan pemarkahan adalah berdasarkan rubrik yang telah disediakan.

Program ini menawarkan pelajar-pelajar untuk mendapatkan pengalaman berniaga secara langsung (*hands-on*). Dalam Program Simulasi Perniagaan, pelajar akan bekerjasama dalam satu kumpulan kecil yang telah dibahagikan bagi melaksanakan tugasan yang dikehendaki iaitu bermula dengan penghasilan kertas kerja Program Simulasi Perniagaan, diikuti dengan Kajian Pasaran produk makanan, menjalankan aktiviti perniagaan/ simulasi perniagaan, pengiraan kos pengeluaran dan keuntungan serta akan membuat rumusan dan *post mortem* setelah selesai program yang telah dijalankan. Menurut Nor Hidayatun et al. (2018), aktiviti keusahawanan yang telah dijalankan di peringkat kampus adalah bertujuan untuk membolehkan pelajar mempraktikkan teori dan konsep pengurusan yang telah diajar dan melihat sejauh mana kefahaman serta memberi pengalaman kepada pelajar.

Kementerian Pendidikan Tinggi turut mengeluarkan garis panduan iaitu Pendidikan Keusahawanan Bersepadu (EIE) di Institusi Pengajian Tinggi (IPT) Edisi 2020 untuk membudayakan ilmu keusahawanan dan merealisasikan visi untuk menghasilkan siswazah yang berkemahiran keusahawanan. Melalui pendekatan ekosistem keusahawanan dapat menyuburkan agenda keusahawanan bukan sahaja dalam kampus tetapi akan turut dipraktikkan setelah tamat pengajian. Ini dapat menangani krisis pengangguran yang menjadi isu dalam kalangan siswazah.

Pernyataan Masalah

Meskipun keputusan penilaian berterusan pelajar-pelajar bagi Kursus Perusahaan Makanan ini menunjukkan tercapai bagi setiap HPK, namun demikian setakat hingga kini, masih belum ada lagi kajian menilai kefahaman pelajar mengenai konsep pengurusan melalui aktiviti simulasi perniagaan yang telah dijalankan oleh pelajar-pelajar semester tiga bagi Program Sijil Pemprosesan dan Kawalan Mutu Makanan yang mengambil kursus ini. Oleh itu, tidak dapat mengenal pasti sejauh mana impak atau kesan aktiviti jualan perniagaan makanan secara langsung/ *hands-on* yang telah dijalani oleh pelajar adakah dapat membantu pelajar beroleh faedah dan peningkatan kemahiran insaniah seterusnya untuk membantu kecenderungan pelajar terhadap kerjaya dalam keusahawanan. Ini disokong dengan dapatan Norasmah Othman et al. (2012) yang menyatakan terdapat kecenderungan untuk terlibat dalam aktiviti keusahawanan sekiranya mempunyai persepsi yang positif terhadap kerjaya keusahawanan.

Objektif Kajian

i. Untuk mengenal pasti faedah yang telah diperolehi oleh pelajar melalui aktiviti Program Simulasi Perniagaan.
ii. Untuk mengenal pasti kesan Program Simulasi Perniagaan terhadap kemahiran insaniah pelajar.

Skop Kajian

Kajian ini tertumpu responden iaitu pelajar-pelajar semester tiga (3) yang mengambil Kursus Perusahaan Makanan di lapan (8) buah kolej komuniti yang mempunyai Program Sijil Pemprosesan dan Kawalan Mutu Makanan (SPK) iaitu Arau, Bagan Serai, Jelebu, Jerantut, Lahad Datu, Pasir Salak, Sabak Bernam dan Sik yang menggunakan Silibus Kurikulum Versi: 271020_1 Efektif 2020.

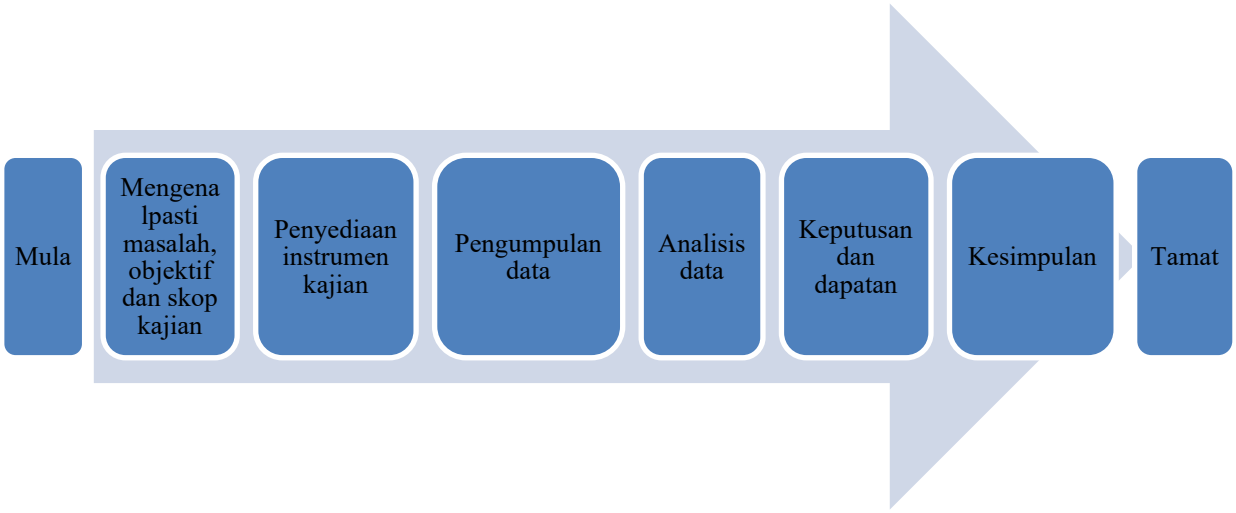
Metodologi

Dalam kajian ini, kaedah soal selidik digunakan dalam mendapatkan data-data yang diperlukan dengan menggunakan instrumen kajian yang disediakan dalam bahasa Melayu. Instrumen yang disediakan ini adalah berpandukan oleh Nor Hidayatun et al. (2018) yang telah diadaptasi dengan

sedikit pengubahsuaian bagi mencapai objektif kajian. Instrumen kajian meliputi maklumat demografik responden diikuti Bahagian A iaitu lapan (8) item berkaitan Kesan Program Simulasi Perniagaan terhadap Kemahiran Insaniah Pelajar, manakala Bahagian B sebelas (11) item berkaitan Faedah Program Simulasi Perniagaan Terhadap Pelajar dan akhir sekali diikuti dengan Bahagian C iaitu terdapat enam (6) item berkaitan Faktor Penyebab Program Simulasi Perniagaan ini perlu diteruskan kepada pelajar. Instrumen yang dihasilkan dipindahkan dalam bentuk *Google Form* secara dalam talian dan diedarkan kepada semua responden.

Populasi kajian terdiri daripada 159 orang pelajar-pelajar semester 3 yang mengambil Kursus Perusahaan Makanan dari 8 buah kolej komuniti yang mempunyai Program Sijil Pemprosesan dan Kawalan Mutu Makanan (SPK) iaitu Arau, Bagan Serai, Jelebu, Jerantut, Lahad Datu, Pasir Salak, Sabak Bernam dan Sik yang telah menjalani Program Simulasi Perniagaan di kolej masing-masing telah dipilih dalam sampel kajian ini. Tempoh kajian berlangsung pada Sesi 1 2022/2023 yang merujuk kepada Kalendar Akademik 2022/2023 Program Pengajian Politeknik dan Kolej Komuniti. Para pelajar dikehendaki menjawab dalam *Google form* yang telah diedarkan pada minggu ulangkaji iaitu minggu ke-15 PdP. Aplikasi *Google Sheets* telah digunakan bagi analisis hasil dapatan kajian yang dibentangkan dalam bentuk frekuensi dan peratusan.

Berikut merupakan gambarajah proses kerja metodologi kajian.



Rajah 1: Proses metodologi kajian

Dapatan dan Perbincangan

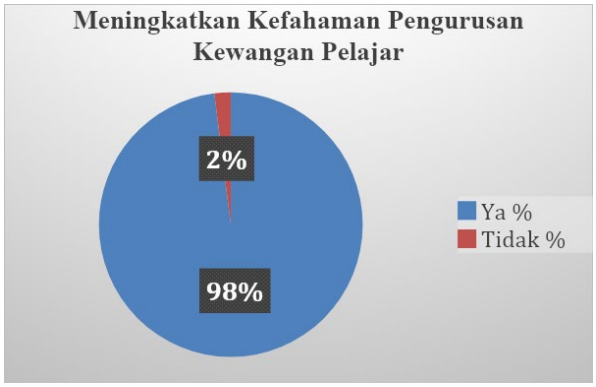
Jadual dibawah menunjukkan maklumat demografi responden yang terlibat dalam kajian ini. Daripada keseluruhan sampel, seramai 37 orang (23.0%) adalah pelajar lelaki manakala 122 orang (77.0%) adalah pelajar perempuan.

Jadual 1. Maklumat demografik responden

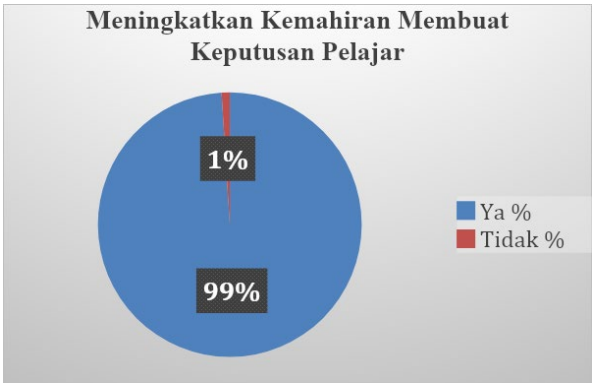
Item	Frekuensi (f)	Peratusan (%)
Jantina		
Lelaki	37	77.0
Perempuan	122	23.0
Bangsa		
Melayu	154	97.0
India	3	2.0
Lain-lain	2	1.0

Item	Frekuensi (f)	Peratusan (%)
Umur		
Kurang daripada 19 tahun	94	59.0
20-25	65	41.0
Kolej Komuniti		
Arau	15	9.0
Bagan Serai	32	20.0
Jelebu	21	13.0
Jerantut	9	6.0
Lahad Datu	7	4.0
Pasir Salak	17	11.0
Sabak Bernam	27	17.0
Sik	31	19.0
Pengalaman Berniaga		
Ya	139	87.0
Tidak	42	13.0

Menerusi perolehan dapatan kajian Bahagian A: Kesan Program Simulasi Perniagaan terhadap Kemahiran Insaniah Pelajar menunjukkan 98% responden bersetuju bahawa kesan program simulasi perniagaan dapat meningkatkan kefahaman pengurusan kewangan. Ini kerana pelajar perlu membuat pengiraan kos pengeluaran bagi sesuatu produk yang dipilih seperti kos bahan mentah, kos pembungkusan dan menetapkan jumlah keuntungan yang sewajarnya. Selain itu juga, terdapat 99% pelajar bersetuju program ini dapat meningkatkan kemahiran membuat keputusan. Pelajar-pelajar dapat beroleh pengalaman berniaga dan sebagai langkah awal untuk menceburi bidang keusahawanan sebagai peluang pekerjaan selepas tamat pengajian dan berpotensi untuk menjadi usahawan yang berjaya (Norfadhilah dan Halimah, 2010). Ini dapat mengatasi isu pengangguran dalam kalangan graduan iaitu menurut laporan Kementerian Pendidikan Tinggi (2020), mendapati lebih daripada 35,000 graduan menganggur dalam tempoh enam bulan selepas tamat pengajian pada tahun 2020.

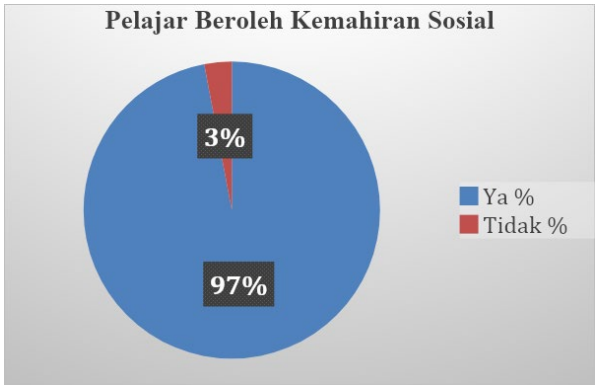


Rajah 2: Kesan meningkatkan kefahaman pengurusan kewangan pelajar



Rajah 3: Kesan meningkatkan kemahiran membuat keputusan pelajar

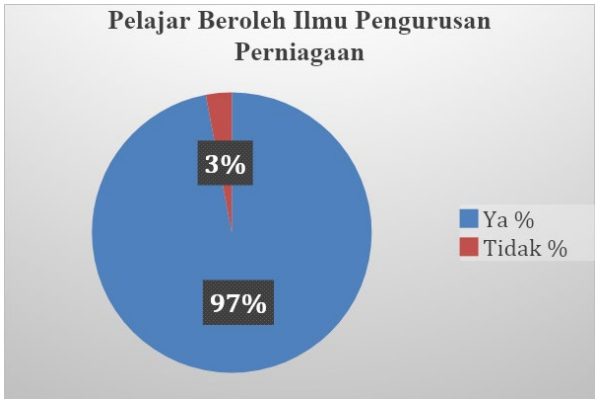
Seterusnya dapatan Bahagian B, kajian ini juga mengkaji daripada aspek faedah program simulasi perniagaan terhadap pelajar. Sebanyak 97% responden bersetetuju bahawa program simulasi perniagaan ini memberi faedah kepada pelajar untuk beroleh kemahiran sosial. Antaranya, setiap pelajar perlu menepiskan perasaan malu untuk menarik minat pelanggan bagi memastikan produk mereka terjual. Selain itu juga, hasil dapatan kajian menunjukkan sebanyak 96% bersetuju pelajar dapat menguasai teknik promosi berkesan. Ini kerana mereka perlu menggunakan medium *online* dan *offline* serta mengikuti trend teknologi pada era globalisasi saat ini bagi memasarkan produk jualan mereka. Di samping itu juga, mereka perlu menghasilkan reka bentuk poster jualan seperti menggunakan aplikasi seperti *canva* untuk menarik minat pelanggan.



Rajah 4: Faedah pelajar beroleh kemahiran sosial

Rajah 5: Faedah pelajar menguasai teknik promosi

Dapatan Bahagian C: Faktor Penyebab Program Simulasi Perniagaan ini perlu diteruskan kepada pelajar menunjukkan program simulasi perniagaan ini wajar diteruskan kerana 97% pelajar bersetuju kerana menerusi program ini pelajar beroleh ilmu pengurusan perniagaan. Data ini disokong oleh Frederick (2014) melalui penglibatan pelajar dalam aktiviti sebenar dapat meningkatkan pemahaman dalam kursus yang dipelajari.



Rajah 6: Faktor penyebab pelajar beroleh ilmu pengurusan perniagaan

Kesimpulan

Kajian ini dilaksanakan dengan objektif untuk mengenal pasti faedah dan kesan bagi Program Simulasi Perniagaan atau aktiviti perniagaan yang telah dijalankan oleh pelajar. Hasil dapatan kajian ini telah membuktikan terdapat penemuan yang positif dalam kalangan pelajar dalam menceburi bidang keusahawanan. Ini juga turut disokong oleh Norasmah et al. (2012) bahawa penyampaian pendidikan keusahawanan kepada pelajar melalui pengalaman atau *hands-on* lebih efisien berbanding dengan pengajaran tradisional dalam bentuk teori semata-mata seperti dalam kuliah, menulis esei dan peperiksaan. Menerusi program ini juga, para pelajar telah didedahkan kepada konsep perniagaan sebenar dan mampu menarik minat golongan belia untuk menjadikan keusahawanan sebagai kerjaya dalam menangani isu pengangguran dalam kalangan graduan. Justeru itu, diharapkan kursus-kursus tambahan seperti Kursus *Copywriting* bagi kemahiran menghasilkan ayat-ayat promosi dapat disertai oleh pelajar-pelajar bagi meningkatkan keupayaan perniagaan dan keusahawanan. Melalui kajian ini juga dapat digunakan sebagai dapatan untuk membantu para pensyarah khususnya dan jabatan umumnya dalam merangka strategi pengajaran dan pembelajaran (PdP) yang lebih berkesan serta

menerapkan elemen keusahawanan seiring perkembangan arus teknologi semasa kepada pelajar-pelajar.

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AUTOMATIC ELECTRIC WALL MOUNTED HANGER RACK

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Abstract. With the Automatic Electric Wall Mounted Hanger Rack, users will no longer face issues with limited space or reaching and pulling out the suspension manually. The inclusion of an automatic electric controller simplifies the operation of the hanger rack. Durability is a key consideration, and the project addresses this by utilizing high-quality stainless-steel materials. This choice of material minimizes the risk of corrosion, ensuring the longevity of the hanger rack. To provide uninterrupted functionality, each product will be supplied with a 12V battery. This backup power source ensures that the hanger rack can still be used during electrical trips or blackouts. The assembly process of the project involves three main parts, the frame part, body part, and mechanism part. In conclusion, the Automatic Electric Wall Mounted Hanger Rack project presents an innovative solution for drying clothes in small spaces. It can support a maximum load of 20 kg and features a rivet nut joint mechanism for smooth movement. The retractable design maximizes space utilization, and the automatic electric controller enhances user convenience. With high-quality stainless-steel construction and battery backup, this project aims to provide a durable and reliable solution for drying clothes in Malaysia.

Keywords: Automatic hanger rack; Innovation hanger rack; Innovation.

Introduction

Technology has significantly transformed our daily lives, revolutionized various aspects and provided us with tools and services that simplify and enhance our routines (Rong, S. J et.al 2022). From multi-functional devices like smartphones and smartwatches to advanced home appliances, technology has made our lives simpler, faster, safer, and more enjoyable (Robles, R. J et.al 2010). One such everyday household item that has seen remarkable advancements is the clothes rack. Traditionally, when doing laundry, homeowners would hang clothes to dry on a rope with two fixed points. This manual method of drying clothes is time-consuming and often presents challenges for homeowners (Nusyirwan, D. 2019). However, with the introduction of clothes racks, the drying process has become more efficient and convenient. Washed and wet clothes are suspended onto drying lines with pegs or hangers, to be dried up by the combination of air, wind, sunlight, and gravity, slowly breaking the bond between the water molecules and to the clothes (Touray, H. 2019). A clothes rack provides a designated space for freshly washed clothes to dry. These racks are typically constructed with a combination of ropes and poles (Mohamad, M. I. 2008). A laundry line, whether set up outdoors or indoors, offers a convenient solution for suspending clothes above ground level. There are a lot of cloth dryer rack designs available in the market. However, most of the designs have a large size and take a lot of space (Ishak, N.N et.al 2020). They come in different sizes and configurations, including large stationary outdoor racks, folding portable racks, and wall-mounted clothes racks. However, the conventional manual wall-mounted hanger rack commonly used by homeowners has its limitations. Users often encounter issues, such as incompatible attachment components, causing difficulties when trying to pull in and out the suspension. Additionally, the attachments may rust over time due to metal-to-metal rubbing, further hampering the functionality of the hanger rack (Garvey, R. 2012). Insufficient space on the clothes rack to hang clothes is another common challenge faced by homeowners. This lack of space poses an inconvenience when attempting to hang freshly washed clothes. Moreover, many homeowners struggle to reach the suspension due to height limitations, often requiring assistance

from others. To address these limitations, this research study focuses on a study of the "Automatic Electric Wall-Mounted Hanger Rack." This innovative solution aims to revolutionize the clothes drying process by utilizing a Linear Actuator mechanism powered by electricity. The proposed hanger rack will be automated, providing users with enhanced convenience during the drying process. By exploring the implementation of an Automatic Electric Wall-Mounted Hanger Rack, this research aims to investigate the potential benefits, usability, and impact of such a solution in improving the clothes drying experience for homeowners. The study will assess factors such as efficiency, space optimization, ease of use, and the overall user experience. Through this study, we seek to shed light on the advantages and challenges associated with the adoption of an automated, electric-powered wall-mounted hanger rack. The findings will contribute to the development of more advanced and user-friendly solutions, paving the way for more streamlined and hassle-free clothes drying process in modern households.

The objective for the study is as follows: -

i. To fabricate an automatic wall-mounted hanger that use linear actuator.
ii. To increase the maximum load of the hanger that can accommodate up to 20 kg of weight.

Methodology

The research methodology for the study of the Automatic Electric Wall Mounted Hanger Rack encompasses several key components. Firstly, the fabrication technique involves the utilization of four distinct methods to construct the hanger rack. These techniques encompass the cutting process, where various tools are employed to eliminate excess material and shape the hanger rack according to the desired geometry. The drilling process follows, utilizing a rotating drill bit to create circular holes in solid materials, facilitating the assembly of the hanger rack. To enhance the hanger rack's properties such as hardness and anti-corrosion, the painting process involves the application of metal spray onto the prepared surface, ensuring a quality finish. Finally, the grinding process employs an abrasive wheel to remove material from the hanger rack, enabling precise forms and fine finishes. Together, these methodologies provide a comprehensive approach to constructing the Automatic Electric Wall Mounted Hanger Rack, showcasing the importance of fabrication techniques in its development. Following the assembly of the automatic electric wall mounted hanger rack, the study conducted an experiment to assess its sturdiness and ability to withstand maximum weight. The objective was to enhance the hanger's weight capacity to accommodate loads of up to 20 kg. The setup parameters are displayed in Table 1.

Table 1. Experiment setup parameter.

Weight (Kg)	5Kg, 10Kg, 15Kg, 20Kg
Observe parameter	Rack Bend/ Break

Product durability tests were conducted to assess its ability to withstand imposed loads. The study utilized a setup consisting of weights suspended on a rack. The experiment involved incrementally adding 5kg weights to the rack every 10 minutes, starting from a sum of 5kg weights, until reaching a total load of 20kg. The objective of testing the product's load-bearing capacity up to 20kg was successfully achieved, and further durability testing beyond this limit was not conducted.

Result and Discussion

The final product, an Automatic Electric Wall Mounted Hanger Rack, was securely installed and underwent load-bearing capacity testing, which demonstrated a maximum capacity of 20 kg. A picture of the final product as in Fig. 1, and the test results are detailed in Table 2.

Fig. 1. Final product automatic electric wall mounted hanger rack.

Table 2. Test Result.

Test	Input Load (Kg)	Sturdiness	Break	Bend
1.	5	Pass	No	No
2.	10	Pass	No	No
3.	15	Pass	No	No
4.	20	Pass	No	No

Based on the additional information provided, a product durability test was conducted to assess the hanger rack's ability to withstand the applied load. The setup involves hanging a weight on a rack, and the experiment follows a specific procedure. The objective is to evaluate the load bearing capacity of the product up to 20 kg. The study used a systematic approach by incrementally adding 5 kg of weight to the rack every 10 minutes. It starts with 1 unit weighing 5 kg and continues to add weight until it reaches a total load of 20 kg. This step-by-step process allows evaluation of the performance and stiffness of hanger racks under increasing loads. The main objective of the test was successfully achieved, as the hanger rack demonstrated its ability to bear a specified load of 20 kg without failing or exhibiting significant issues. However, it is important to note that the durability test did not exceed this limit, meaning that the performance of the hanger rack under a load of more than 20 kg has not been evaluated.

Considering these results, it can be concluded that the hanging rack has been tested and shown to have sufficient load-bearing capacity for weights up to 20 kg. Users can rely on hanging racks to safely support items in this weight range, making them an ideal solution for hanging and storing a variety of objects. However, it is important to consider other factors such as long-term durability, safety regulations and specific usage guidelines provided by the manufacturer when making a thorough assessment of the suitability of hanging racks for individual needs. A test has been performed, as shown in Fig. 2, and the material cost breakdown is presented in Table 3.

Fig. 2. The testing involved using wet cloth (weighed accordingly).

Table 3. Material costing.

No	Component	Quantity	Overall Cost
1	Stainless Steel Rectangle Hollow Galvanise	2 Pcs	RM80.00
2	Aluminium Round Hollow Tube	2 Pcs	RM12.00
3	Anchor Spray Paint (Black)	2 Pcs	RM16.00
4	Bolt And Nut	12 Sets	RM24.00
5	Self-Tapping Screw Philips Pan Round	4 Pcs	RM0.80
6	Linear Actuator Control Switch Relay	2 Unit	RM264.00
7	Wireless Remote Control Switch Relay	1 Unit	RM7.50
8	Receiver Module	1 Unit	RM13.20
9	Power Supply Adapter	1 Unit	RM13.00
		Total Cost	RM430.50

The purchase of various materials and components for the project involved a total cost of RM430.50. Items purchased are Bolt and Nut set, Philips Pan Round Self Tapping Screw, Anchor Spray Paint, Galvanized Square Hollow Galvanized Stainless Steel, Aluminium Round Hollow Tube, Linear Actuator Control Switch Relay, Wireless Remote Control Switch Relay, Receiver Module and Adapter Power supply. These purchased items have been carefully selected to successfully achieve the research goals.

Conclusion

In conclusion, the research project successfully achieved its objectives of fabricating an automatic wall-mounted hanger using a linear actuator as the driving mechanism. The implementation of the linear actuator technology enables the hanger to operate automatically, providing users with convenience and usability, especially in emergency situations and unpredictable weather conditions. Furthermore, the project successfully increased the hanger's maximum load capacity to 20 kg through careful design and engineering. This enhancement ensures that the hanger can securely support heavier items. Additionally, a retractable design was incorporated into the automatic electric wall-mounted hanger to optimize space utilization. Users can conveniently retract the hanger when not in use, creating more available space in their living areas. Overall, this research project offers an affordable alternative for individuals seeking a reliable and cost-effective drying hanger solution. In summary, the research project successfully achieved its objectives of developing an automatic wall-mounted hanger with a linear actuator mechanism. The hanger's increased load capacity, improved joint mechanism, and retractable design make it a practical and space-efficient solution for affordable and reliable drying hanger needs.

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Healthy-Start Mobile Application: Vaccination Scheduling and Child Development Monitoring

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Abstract. This working paper examined the vital preventive system that could enable parental emotional well-being and parenting practices as mediator for health problems. Child health involves complex factors shaping their future. While vaccinations are preventive, holistic childhood health is broader. A comparative study is made based on recent research made related: mHealth apps development, child wellbeing, dental care, parenting, supportive system, mobile phone apps, knowledge system. The results showed that a streamlined monitoring system for parents is lacking, intensifying malnutrition and dental care issues. Children's vulnerability highlights a key problem: the absence of a central tool for parents to track well-being. With prevalent malnutrition, illness vulnerability, and dental care gaps, a versatile solution is vital. Caregivers need a platform to proactively manage overall health and growth. Beyond vaccinations, it integrates growth and teething tracking. Implemented with agility, it's essential for parents, addressing multidimensional concerns. The research emphasizes early, comprehensive health management. The app fills this gap, providing easy vaccination tracking, health insights, growth visualization, and dental milestone monitoring. The study proposes a child health monitoring app for kids up to two years old prototype as next stage of the research. In a world where early healthcare transforms lives, this study drives essential change by blending technology and caregiving, endorsing a proactive child health approach.

Keywords: Maternal and Child Health; Mobile Phones; Mobile Health (or mHealth); Vaccination; Smart and Connected Communities; RAD Methodology.

Introduction

Many terms have been used to characterize parental knowledge of child development and parenting from Sigel's (1985) "belief systems" to Goodnow's (1984) "parental ideas." Whatever terms are used, differences emerge in the varying conceptualizations of parental knowledge, and, consequently, many different aspects and types of knowledge have been studied, mainly at one point in time. The links among parental attitude and knowledge of child rearing, parenting behaviour and child outcome are also unclear (Sigel, 1985). Whereas, in the current era of modernization, a notable portion of parents and guardians remain unaware of the substantial advantages and significance especially associated with child vaccinations. The comprehensive monitoring of child development, encompassing the physical, cognitive, and socio-emotional domains, is of paramount importance for fostering healthy growth and well-being. Yet, within this holistic framework, a crucial aspect often overlooked is the timely and complete administration of vaccinations during childhood. Neglecting vaccination in this pivotal phase poses profound public health risks, potentially reverting us to a perilous era of vaccine-preventable diseases. Diseases such as measles and polio, once on the brink of eradication, can resurge, leading to outbreaks that threaten the health and lives of children and communities, with the looming specter of long-term health consequences. Compounding this issue is the antiquated process of monitoring child vaccination status, which predominantly relies on paper records. This manual system, while once a standard practice, is marred by inefficiencies, errors, and delays. These paper-based records can be easily lost, damaged, or falsified, hindering the accurate assessment of vaccination coverage and impeding the timely intervention necessary to prevent outbreaks.

Despite the availability of vaccines designed to address a spectrum of rare diseases with potential curative capabilities, reluctance among parents and guardians endures, influenced by multifaceted factors. It's crucial to recognize that vaccinations and regular health check-ups play pivotal roles in nurturing a child's growth and overall development. These established health

schedules hold an indispensable role in mitigating developmental delays and identifying early indications of potential illnesses, thus acting as a cornerstone in ensuring a child's overall well-being. The heightened vulnerability of children to recurrent illnesses can often be attributed to inadequate healthcare attention and, unfortunately, instances of malnutrition. Moreover, it's evident that parents and guardians frequently lack an adequate understanding of their child's healthcare requirements, rendering them uncertain about potential health challenges that may arise. The integration of progress growth charts emerges as a valuable tool, assisting parents and guardians in anticipating potential health issues through the analysis of deviations within growth curves. The confluence of vaccination schedules and growth charts within child health management is pivotal, serving a dual purpose of safeguarding against diseases and offering a means to monitor and address developmental considerations. In the realm of child health management, dental care for children stands as a paramount concern Katsaliaki et. al., 2022).

Unfortunately, dental care is frequently underestimated by parents and guardians, often due to an insufficient focus on the potential repercussions related to the eruption of a child's teeth. The vigilant monitoring of a child's dental eruption takes on a pivotal role, given its capacity to trigger symptoms ranging from fever to nausea and even diarrhoea, thereby underscoring the critical nature of timely dental intervention. These aspects resonate deeply with the foundational principles of comprehensive child health management. Embracing a holistic approach that encompasses vaccinations, growth tracking, and dental care becomes imperative for fostering optimal child development and well-being (Skelton, et.al, 2021). The challenge lies in closing the existing information gap, equipping parents, and guardians with the essential knowledge to make well-informed decisions, thus ensuring that their children's health can attain its highest potential.

The principal objective of this research study is to conduct a meticulous comparative investigation into mobile applications dedicated to the monitoring of child progress, specifically targeting the critical age bracket spanning from 0 to 24 months. The study is driven by the intention to meticulously examine and juxtapose various mobile app solutions designed to facilitate the tracking and assessment of child development during this foundational period. By meticulously assessing the attributes, functionalities, and user-friendliness of these applications, the research aims to yield insightful observations concerning their efficacy and potential influence on the optimal growth, health, and overall well-being of infants and toddlers. Such a system would ensure the real-time, accurate, and complete recording and monitoring of child vaccinations. By embracing digital solutions, we can mitigate the risk of outbreaks, protect vulnerable populations, and safeguard the long-term health and well-being of children. Through this rigorous comparative analysis, the research aspires to offer a judicious perspective to parents, caregivers, and healthcare professionals, thereby facilitating informed decision-making regarding the selection of appropriate tools for monitoring child progress. The overarching aim is to contribute to the facilitation of holistic child development within the early years of life.

Related Work

Santos et. al. (2023) discussed a comparative smart review on child health focused on indoor activities and suggested a child benefits to preterm and newborns exposed to aquatic therapy once the physiological parameters are maintained in normal and safe patterns. Stoodley et. al. (2023) in their review using a similar Joanna Briggs Institute framework method claimed that the role of having midwives is well placed to support the developing relationship between the mother and baby proves good wellbeing of the child in general. Kemp et. al. (2023) also urges that through their narrative review of international research literature about babies' and toddlers' engagement with the outdoor environment whilst attending ECEC (Early Childhood Education and Care) settings brings new understanding on child wellbeing. Hartshorn, J. et. al. (2023) discussed the use of tele dentistry, artificial intelligence (AI), innovative restorative materials, digitization of fixed and removable prosthodontics, cone beam computed tomography (CBCT) scans to guide dental implant placement and endodontic procedures. Besides that, Mobley, A.R., et.al. (2023) conducted qualitative study to

determine parental preferences for mobile health (mHealth) app content and features designed to improve responsive feeding practices using Technology Acceptance Model and ultimately to improve responsive feeding practices in parents through m-health apps.

Halfon, N. et.al. (2022) researched on life course intervention research using Life Course Health Development model to synthesise their finding using review method claims through the collaborative use of incremental, disruptive, and transformational strategies, the LCIRN aims to improve the development of health, reduce health disparities, and build health equity across the life span. Vázquez-Paz, A. M, et.al. (2023) studies a exploratory pilot study describes the development of the PersuHabit app, a stand-alone mobile health app targeting parents to promote the intake of fruits and vegetables (FVs) and reduce the intake of ultra-processed foods (UPF) in children aged 6 to 10 years. Mueller, E. L., et. al. (2022) conducted a quantitative study to engage directly with end users and proxies to co-design and create a mobile technology app to support caregivers in the medical management of their child with cancer. Antonio A. De, et. al. (2022) researched on extensive data analysis to assess the functionality and feasibility of the GROWIN app for promoting early detection of growth disorders in childhood, supporting early interventions, and improving children's lifestyle by analysing data collected over three years (2018–2020).

Furthermore, Bond, S.J., et.al. (2022) conducted a bibliometric review to understand the potential efficacy of mHealth interventions to promote wellness in children, adolescents, and young adults and challenges in the biomedical literature. In addition, Wang, K. et. al. (2022) conducted systematic review evaluated the effectiveness of oral health education using mHealth approach to parents for improving their children's oral health. Peterson, C.M., et.al. (2022) examine the projects' challenges with attuning the designs to children and young people and how these drove their exclusion as users of the emerging mHealth apps. Lio, M. et.al. (2020) conducted a semi structured interview to identify the beneficial features of a prototype mHealth app developed for children with asthma and their caregivers. Moreover, Skelton, B., et.al. (2021) examine 2149 articles through scoping review was to identify care coordination needs of families of children with Down syndrome (DS) and the strategies they used to meet those needs, with the goal of contributing to the evidence base for developing interventions by using an mHealth application.

Table 1 presents an overview of the studies conducted pertaining to the objectives of this paper. A smartphone, functioning as a sophisticated hub, provides health-related insights, monitors physical activity, and offers medication reminders. Seamlessly integrating into daily routines, these apps empower users to actively manage their health. In the realm of parenting and child development, the fusion of contemporary technology with mobile apps opens remarkable possibilities. While many apps share common features such as sleep, diapers, and feeding tracking, a significant aspect like child teething care remains largely unexplored. This critical developmental phase lacks sufficient attention within apps and studies

Table 1. Overview of Literature on M-Health Apps

Author	Year	Approach	Method	Inferences
Santos et. al.	2023	Qualitative	Smart Literature Review Using PRISMA Model	Aquatic therapy benefits child's cognitive development as well physiological pattern
Stoodley et.al	2023	Mix Method	Joanna Briggs Institute Framework Model Smart Review	Discuss the importance of midwifes as caretakers both mother and infant create good cognitive support to develop positive relationship
Kemp et. al	2023	Qualitative	Narrative Review Study	Child developed in positive atmosphere when involved in outdoor activities often.
Hartshorn, J. et. al.	2023	-	Review	Uses of AI for dental care could propose innovativeness in tele-dentistry
Mobley, A.R., et.al.	2023	Qualitative	Semi-Structured Interview	Propose responsive feeding practices in parents through m health apps could increase bonding between mother and infants

Halfon, N. et.al. (2022)	2022	-	Review	Proposes Life Course Health Development model as strategy to build health equity across the life span
Vázquez-Paz, A. M, et.al.	2023	Qualitative	Exploratory Pilot Study	Proposes the PersuHabit app to encourage kids for vegetable intakes through interactive GUI
Mueller, E. L., et. al.	2022	Quantitative	Mix-Method	Proposes mobile apps to monitor and support child with cancer
Antonio A. De, et. al.	2022	-	Extensive Data Analysis	Examined GROWIN app to assist parents with disabled detection of growth disorders in childhood and recommend the apps for supporting parents for detection and prevention
Bond, S.J. et.al.	2022	Qualitative	Bibliometric Review	Examined the potential efficacy of mHealth interventions to promote wellness in children and conclude that lack of studies in biomedical focusing wellness in particular
Wang, K. et. al.	2022	Qualitative	Systematic Literature Review	Examined effectiveness of oral health education using mHealth to improve teen children's oral health.
Peterson, C.M. et.al.	2022	-	Survey	Examined the m-health in general to view the GUI that drove children to continue use the apps
Lio, M. et.al.	2020	Qualitative	Semi-Structured Interview	Examined features to develop mhealth apps for children with Asthma. This apps could provide signals to caregivers if children got attack and to take immediate action
Skelton, B. et.al.	2021	-	Extensive Data Review	Propose mhealth to help parents of down syndrome children to raise evidence for medical treatment propose, where this apps works as repository system for doctors to monitor and treatment purpose.
Santos, A. et. al.	2019	Narrative study	Descriptive study and experience report	Importance and benefits of childhood vaccination, factors leading to vaccine delay
Kennedy et. al.	2009	Quantitative	Survey and data analysis	Parents' vaccine-related attitudes, concerns, and information sources.
Opel et. el.	2013	Quantitative	Prospective cohort study	Predictive validity and test-retest reliability of the Parent Attitudes About Childhood Vaccines survey, child's immunization status
Pinja et.al.	2016	Quantitative	Pre-post quasi-experimental study with a control group	Impact of m-health intervention on maternal, neonatal, and child health services utilization, cost-effectiveness of the intervention, long-term effects on mortality, morbidity, and disability, incremental cost per disability-adjusted life year averted, cost per unit increase in composite service coverage.
Aljohani et.al.	2021	Qualitative	Systematic Review	m-health strategies in developing nations are considered one of the best platforms for guaranteeing the citizenry's safety and healthcare security
Katsaliaki et. al.	2022	Qualitative	App feature analysis and review	mHealth app feature trustworthiness, quality, and popularity
Fu. Yu. et. al.	2023	Qualitative	Model development and comparison	User satisfaction and continuous usage intention of m-health management apps
Bahja et. a.	2018	Mix-method	Survey and interviews	User needs and expectations for a patient management m-health system
Assadok et. al.	2017	Qualitative	Systematic Literature Review	Usability, security and privacy in mHealth applications.

Based on the examination made, it shows that research on mobile apps developments regarding to m-health have been extensively explored in various ways to aid children from all age groups from tremendous factors which could one possibly think of However, little study was made on infant's growth monitoring in particular teething. This study will produce a prototype that in corporate factors which enable new parents a stress-free monitoring system. The proposed system shall replace the manual monitoring booklet provided when it works as an overall system that

generates triggers as reminders, record keeping of child medical treatment records for future use. These apps will incorporate apps that can be sync with parents' personal diary with interactive GUI for easy access and end user friendly purposes.

Conclusion

This working paper provides recent review studies on child-based processes towards the development of the Baby and Kids Progress Monitoring Apps. This paper further includes comparative studies relating to children wellbeing and parenting strategies. Furthermore, this paper raised the novelty of the study through the comparison of related works done previously and justified the proposed system as an important as for new parenting tool for infant growth record keeping mechanism for growth. Moreover, the result of the study will be applied to produce the prototype model of this app using Rapid Application Development (RAD) Methodology. Figure I illustrate the proposed methodology for the development of the apps.

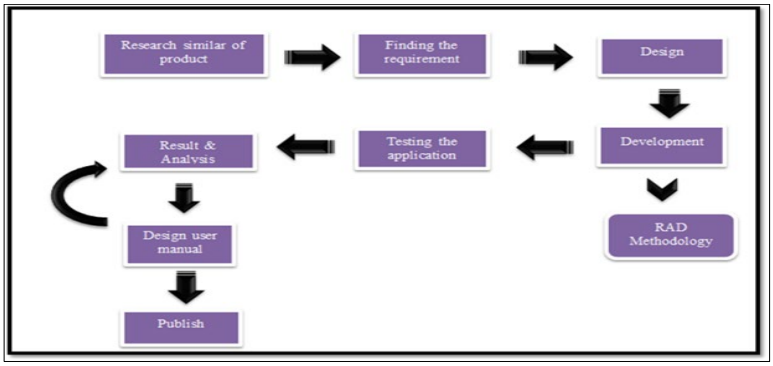

Figure 1. Proposed Project Methodology.

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KEBERKESANAN *ALTERNATOR TESTER KIT* DALAM MENINGKATKAN TAHAP PEMAHAMAN KONSEP SISTEM PENGECASAN KENDERAAN KEPADA PELAJAR SKR KOLEJ KOMUNITI ROMPIN

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Abstrak. Tujuan kajian ini dijalankan bagi menentukan keberkesanan penggunaan *Alternator Tester Kit (ATK*) dalam pengajaran dan pembelajaran (PdP) Sijil Servis Kenderaan Ringan (automotif) di Kolej Komuniti Rompin, Pahang. *Alternator Tester Kit* adalah produk inovasi yang dihasilkan pada tahun 2016 sebagai alat bantu mengajar yang dipertandingkan pada Pertandingan Inovasi Peringkat Kebangsaan (PERISA) 2017. Elemen yang diukur adalah keberkesanan, impak penggunaan dan kemahiran pensyarah dalam mengendalikan *Alternator Tester Kit* . Sampel kajian melibatkan 2 kohort iaitu bekas pelajar semester 3 sesi 1 2021/22 dan sesi 1 2022/23 dengan jumlah sampel 37 orang. Kajian menggunakan set soal selidik secara dalam talian melalui aplikasi *Google Fo*rm yang dihebahkan di dalam *group WhatsApp* bekas pelajar. Set soalan mengandungi 21 item berdasarkan kepada skop kajian. Perisian *Microsoft Excel 2019* telah digunakan untuk menganalisa dapatan kajian bagi mendapatkan min. Hasil kajian menunjukkan responden memberikan persepsi yang positif kepada soalan yang diajukan. Responden juga menyatakan perubahan yang dialami semasa proses PdP selepas menggunakan alat *Alternator Tester Kit* seperti lebih berminat untuk mempelajari proses mengecas dan lebih mudah memahami proses mengecas. Secara keseluruhan *Alternator Tester Kit* mampu menjadikan proses PdP lebih menarik, mudah difahami, serta meningkatkan minat pelajar.

Kata kunci: Automotif; Keberkesanan inovasi; Sistem pengecasan kenderaan; *Alternator Tester Kit*

Pengenalan

Melihat kepada perkembangan dan revolusi industri sekarang, dapat disimpulkan keperluan tenaga kerja berkemahiran adalah amat penting. Bidang TVET bukan lagi pilihan terakhir para pelajar. Menurut Jusoh (2017) institusi Kolej Komuniti menawarkan kursus berkaitan bidang TVET yang memberi peluang kepada lepasan pelajar sekolah menengah menyambung Pendidikan di tahap yang lebih tinggi biarpun tidak cemerlang dalam akademik. Mohd Jalil Ahmad (2015) pula menyatakan bahawa pembangunan dan Pendidikan TVET telah bermula lebih 40 tahun yang lepas dimulakan dengan hanya dua buah institusi dan berkembang kepada lebih kepada 500 buah kini daripada berbagai-bagai kementerian.

Mutakhir ini, perkembangan pesat bidang TVET di negara ini menyebabkan kaedah pengajaran dan pembelajaran (PdP) dipelbagaikan termasuk penggunaan bahan inovasi yang dilaksanakan oleh para pensyarah supaya pelajar mudah untuk memahami sesuatu konsep dan menjadikan PdP semakin menarik. Amalan guru terhadap BBM dalam PdP sering diperkatakan kebelakangan ini. Faktor-faktor seperti bahan pengajaran tidak mencukupi, beban mengajar yang tinggi, kekurangan masa, tidak praktikal tidak mahir membina bahan secara sendiri dan sumber kewangan tidak mencukupi merupakan beberapa halangan atau kekangan yang dihadapi oleh para pendidik untuk melaksanakan dan menyediakan BBM dalam PdP (Lai et.al., 2002). Tahap kesedaran guru dalam menggunakan BBM dalam PdP perlu ditekankan kepada faktor-faktor latar belakang guru yang berbeza, keupayaan guru dari segi pengetahuan, sikap, motivasi dan kemahiran serta lokasi sekolah akan menentukan keberkesanan sesuatu kurikulum (Abd Samad et.al., 2018).

Berdasarkan silibus Sijil Servis Kenderaan Ringan (SKR), Sistem Elektrik Kenderaan merupakan salah satu kursus bagi semester yang ketiga yang merangkumi subtopik sistem pengecas kenderaan. Sistem pembelajaran di Kolej Komuniti menerapkan 70% pembelajaran dalam bentuk amali manakala selebihnya adalah teori. Kaedah pengajaran dalam subtopik ini memerlukan pelajar memahami terlebih dahulu konsep pengecasan kenderaan. Penghasilan sebuah inovasi bahan bantu mengajar (BBM) yang diberi nama *Alternator Tester Kit (ATK)* bertujuan untuk menerangkan secara ringkas kepada para pelajar automotif di Kolej Komuniti Rompin (KKRP) berkenaan konsep sistem pengecasan pada kenderaan yang boleh digunakan tanpa menggunakan kenderaan. Melalui penggunaan ATK ini, penggunaan kenderaan sewaktu proses pengajaran dan pembelajaran tidak lagi diperlukan. Pelajar dapat mempelajari berkenaan konsep pengesan pengecas berbantukan ATK

Pernyataan Masalah. Penyampaian pengajaran dan pembelajaran (PdP) yang lebih efektif kepada pelajar boleh dimantapkan dengan penggunaan bahan bantu mengajar (BBM) oleh tenaga pengajar. Menurut Fadzli bin Dahalan (2012) penekanan kepada kaedah pengajaran yang melibatkan latihan amali menjadikan pengajaran KH memerlukan penggunaan BBM yang pelbagai dan bersesuaian. Namun demikian, faktor kos yang mempengaruhi penggunaan BBM di Kolej Komuniti Rompin beserta kekangan bajet mendapatkannya daripada pembekal menjadikannya sukar untuk diperoleh. Walaupun BBM berkaitan banyak berada di pasaran namun kekangan kewangan institusi memaksa pensyarah hanya mampu menggunakan bahan yang sedia ada di kolej. Di sebalik masalah dan kekangan ini sebenarnya telah melahirkan pensyarah yang kritis dan kreatif melalui penghasilan dan inovasi bahan bantu mengajar bercirikan dan hampir menyerupai BBM yang telah sedia ada di luar sana. Maka terinspirasilah idea penghasilan *Alternator Testing Kit* (*ATK*) yang telah pun digunakan oleh pelajar ini. Aset kerajaan iaitu kenderaan latihan merupakan sebahagian daripada bahan yang digunakan untuk menjalankan proses PdP dalam silibus SAU30142 Sistem Elektrik Enjin di bengkel Automotif Kolej Komuniti Rompin. Namun demikian, terdapat beberapa penyebab proses PdP tidak dapat disempurnakan sebaiknya antaranya ialah dari segi aspek keselamatan ketika amali, penggunaan ruang yang luas serta kos pembelian dan penyelenggaraan pada sistem pengecas kenderaan.

Sehubungan dengan itu, usaha penyelidik yang telah membina *Alternator Testing Kit* sebagai salah satu cara untuk memberi penekanan kepada ciri keselamatan, dalam masa yang sama mengurangkan penggunaan peralatan berat, bahan, ruang, kos dan masa. Sebelum penggunaan inovasi ini, pensyarah terpaksa mengambil masa untuk menghidupkan kenderaan dan memastikan kenderaan dalam keadaan baik bagi membolehkan proses PdP berjalan dengan lancar. Seterusnya konsep sistem pengecas dapat diterangkan bila mana kenderaan dalam keadaan hidup.

Tujuan kajian ini dijalankan adalah bagi melihat dan mengetahui keberkesanan penggunaan ATK oleh pensyarah kepada pelajar dalam proses PdP. Selain itu, kajian ini juga digunakan untuk mengetahui persepsi pelajar terhadap penggunaan alat inovasi ini sama ada mencapai objektif atau tidak. Hasil kajian ini diharapkan dapat memudahkan pensyarah SKR di KKRP seterusnya membantu mereka membuat penyampaian yang lebih baik untuk masa akan datang.

Objektif Kajian. Kajian ini mengandungi beberapa objektif yang hendak dicapai seperti berikut:

i. Mengenal pasti sama ada pensyarah mempunyai kemahiran dalam menggunakan *Alternator Tester Kit (ATK)* dalam Pengajaran dan Pembelajaran(PdP).
ii. Mengenal pasti persepsi pelajar SKR Kolej Komuniti Rompin sebelum dan selepas penggunaan *Alternator Tester Kit* (*ATK*) dalam pengajaran dan pembelajaran (PdP).
iii. Mengenal pasti impak penggunaan *Alternator Tester Kit* (*ATK*) dalam pengajaran dan pembelajaran (PdP) kepada pelajar.

Persoalan Kajian. Kajian ini cuba untuk menjawab tiga persoalan kajian yang berikut:

i. Apakah pensyarah mempunyai kemahiran dalam menggunakan *Alternator Tester Kit* (*ATK*) dalam pengajaran dan pembelajaran?

ii. Apakah persepsi pelajar SKR Kolej Komuniti Rompin sebelum dan selepas penggunaan *Alternator Tester Kit* (*ATK*) dalam pengajaran dan pembelajaran?
iii. Apakah impak penggunaan *Alternator Tester Kit* (*ATK*) dalam pengajaran dan pembelajaran kepada pelajar?

Sorotan Kajian

Sangat penting pengajar memiliki penguasaan BBM agar proses PdP dapat berjalan baik dan lebih efektif. Selain itu, kemampuan pengajar dalam menggunakan BBM dengan cekap akan memberikan mereka kepercayaan diri sewaktu proses PdP berlangsung dengan sendirinya. Berdasarkan Blair (1998), proses pengajaran dan pembelajaran (PdP) dengan berbagai-bagai kaedah mampu memberikan tarikan kepada pelajar. Mereka juga lebih percaya pada pembimbing yang dapat merangsang minat belajar mereka. Menurut penelitian lain, terdapat hubungan yang sangat signifikan antara keterampilan mengajar dengan penguasaan konsep oleh pelajar (Nik Mohd Rahimi, 2008). Lantaran itu, pendidik perlu memilih teknik dan cara mengajar yang tepat dan efektif agar pelajar dapat menguasai kemahiran yang diajarkan dengan betul.

Bahan bantu mengajar (BBM) juga merupakan solusi kepada kekangan masa yang dihadapi kebanyakan pensyarah semasa penyediaan PdP (Siti Fatimah & Ab. Halim, 2010). Ini jelas menunjukkan bahawa BBM adalah pilihan terbaik yang boleh digunakan oleh pengajar untuk menjadikan proses PdP lebih menyeronokkan dan menjimatkan masa dan usaha. Menurut Mohd. Izham (2010) berpendapat bahawa penggunaan BBM juga dapat meningkatkan motivasi pelajar untuk memberikan sepenuh perhatian terhadap proses PdP. Ini kerana penggunaan BBM memudahkan pelajar memahami teori dalam situasi praktikal.

Oleh itu, mengikut pelbagai kajian lepas, penggunaan BBM telah terbukti dapat membantu pengajar mencapai keputusan yang terbaik dalam setiap proses PdP. Kaedah asal PdP untuk subtopik sistem pengecasan adalah berbantukan kenderaan semata-mata. *Alternator Tester Kit* yang telah dihasilkan penyelidik jelas memberikan pelbagai kelebihan dari segi masa, kos, ruang dan aspek keselamatan berbanding kaedah sebelumnya yang hanya menggunakan kenderaan sebagai bahan pengajaran.

Metodologi Kajian

Sampel Kajian. Responden bagi kajian ini adalah melibatkan 37 orang pelajar Automotif atau Servis Kenderaan Ringan (SKR) bagi semester 3 bagi sesi pengajian sesi 2 2022/2023 dan sesi 2 2021/2022 di Kolej Komuniti Rompin. Sampel diambil adalah berdasarkan rujukan jadual penentuan saiz sampel daripada Krejcie & Morgan (1970).

Instrumen Kajian. Proses pengumpulan data yang diperlukan untuk kajian ini adalah menggunakan borang soal selidik sebagai instrumen kajian. Penggunaan e-borang iaitu melalui aplikasi *Google Form* telah diedar kepada responden terpilih. Borang soal selidik dan instrumen kajian ini telah diadaptasi daripada kajian lepas. Kajian yang bertajuk Keberkesanan *Spark Plug Tester* Dalam Meningkatkan Tahap Pemahaman Konsep dan Kemahiran Sistem Elektrik Enjin Pelajar SKR Kolej Komuniti Rompin oleh Mohd Roslan & Mohd Rasidi (2018) telah digunakan untuk mengadaptasi instrumen kajian. Berdasarkan kajian sebelumnya penyelidik berpendapat bahawa responden akan memberi maklum balas yang positif terhadap persoalan yang diutarakan

Skala Likert terdiri daripada lima bentuk pilihan jawapan telah digunakan. Penggunaan skala ini disesuaikan dengan persoalan kajian. Responden dikehendaki menjawab dengan menandakan jawapan yang dikehendaki pada aplikasi *Google Form*. Menurut Mohd Majid (1994), Skala Likert digunakan dalam kajian ini mempunyai tahap kebolehpercayaan yang sangat tinggi iaitu sehingga 85 peratus. Tafsiran dan nilai Skala Likert adalah seperti Jadual 1.

Jadual 1. Tafsiran dan nilai Skala Likert

Nilai Likert	Tafsiran
1	Sangat tidak setuju
2	Tidak setuju
3	Tidak Pasti
4	Setuju
5	Sangat setuju

Aplikasi *Microsoft Excel 2019* digunakan untuk menganalisis semua data yang diperoleh. Analisis deskriptif menggunakan interpretasi min sepertimana yang dicadangkan oleh J.W Creswell (2005) dalam buku metodologi penyelidikan terkemuka beliau iaitu *Educational Research-Planning, Conducting and Evaluating Quantitative and Qualitative Research*. Interpretasi min yang diguna pakai oleh Creswell (2005) adalah seperti berikut:

Jadual 2. Interpretasi Min

Julat Skor Min	Interpretasi Min
1.00 - 1.80	Sangat tidak setuju
1.81 - 2.60	Tidak setuju
2.61 - 3.40	Tidak Pasti
3.41 - 4.20	Setuju
4.21 - 5.00	Sangat setuju

Analisis Dan Keputusan

Persoalan Kajian 1. Bagi mengenal pasti sama ada pensyarah mempunyai kemahiran dalam menggunakan ATK dalam pengajaran dan pembelajaran, penggunaan analisis deskriptif untuk mencari nilai min dilakukan. Hasil analisis diletakkan dalam jadual seperti berikut :

Jadual 3. Min Kemahiran Pensyarah dalam Menggunakan ATK dalam PdP

Bil	Item	Skor Min	Interpretasi Min
A1.	Tunjuk cara yang disampaikan oleh pensyarah dalam penggunaan *Alternator Tester Kit* menyakinkan saya.	4.22	Sangat Setuju
A2.	Pensyarah saya dapat memberi tunjuk cara penggunaan *Alternator Tester Kit* dalam kelas amali dengan cekap dan berkesan.	4.27	Sangat Setuju
A3.	Langkah-langkah pensyarah saya menggunakan *Alternator Tester Kit* sangat teratur dan mudah difahami.	4.27	Sangat Setuju
A4.	Pensyarah saya menggunakan *Alternator Tester Kit* dengan baik.	4.38	Sangat Setuju
A5.	Pensyarah saya mahir menggunakan *Alternator Tester Kit* dalam membantu pelajar yang bermasalah dalam latihan amali.	4.38	Sangat Setuju
A6.	Saya meyakini tunjuk cara pensyarah saya terhadap penggunaan *Alternator Tester Kit.*	4.41	Sangat Setuju
Purata Min Keseluruhan: N = 37		**4.37**	**Sangat Setuju**

Berdasarkan Jadual 3, skor min secara keseluruhannya untuk aspek kemahiran pensyarah adalah sebanyak 4.37 iaitu pada tahap interpretasi min sangat setuju melalui rujukan pada Jadual 2. Skor tertinggi dicatatkan oleh item A6 (skor min= 4.41). Item A4 & A5 mencatatkan nilai min yang sama dan kedua tertinggi dengan jumlah skor min 4.38. Skor min yang sama juga dicatatkan oleh item A2 dan A3 dengan nilai 4.27. Manakala skor min yang terendah dicatatkan oleh item A1 dengan nilai min 4.22 yang mana masih lagi berada dalam tahap interpretasi min sangat setuju.

Persoalan Kajian 2. Analisis deskriptif yang sama digunakan untuk mencari nilai min bagi mengenal pasti persepsi pelajar SKR Kolej Komuniti Rompin sebelum dan selepas penggunaan *Alternator Tester Kit (ATK)* dalam pengajaran dan pembelajaran. Hasil analisis dijadualkan seperti berikut :

Jadual 4. Min Persepsi Pelajar SKR Kolej Komuniti Rompin Sebelum dan Selepas Penggunaan ATK dalam PdP

		Sebelum Penggunaan	Interpretasi Min	Selepas Penggunaan	Interpretasi Min
Bil	**Item**	**Skor Min**		**Skor Min**	
B1.	Menambah minat pelajar untuk belajar	2.76	Tidak Setuju	4.32	Sangat Setuju
B2.	Menjadikan proses PdP sistem pengecasan kenderaan lebih menarik	2.68	Tidak Setuju	4.38	Sangat Setuju
B3.	Menjadikan masa demonstrasi amali sistem pengecasan kenderaan oleh pensyarah lebih singkat	2.59	Tidak Setuju	4.30	Sangat Setuju
B4.	Meningkatkan pemahaman pelajar tentang teori sistem pengecasan kenderaan berbanding kaedah tanpa penggunaan *Alternator Tester Kit.*	3.14	Tidak Pasti	4.43	Sangat Setuju
B5.	Menjadikan pelajar mengetahui aplikasi sesuatu teori sistem pengecasan kenderaan dengan baik.	2.57	Tidak Setuju	4.51	Sangat Setuju
B6.	Meningkatkan kemahiran pelajar dalam sistem pengecasan kenderaan.	2.70	Tidak Setuju	4.68	Sangat Setuju
B7.	Mengurangkan kadar kemalangan bengkel disebabkan pelajar tidak memahami teknik-teknik asas penyelenggaraan sistem pengecasan kenderaan.	2.51	Tidak Setuju	4.38	Sangat Setuju
B8.	Menambahkan keyakinan pelajar untuk melakukan amali sistem pengecasan kenderaan.	2.51	Tidak Setuju	4.70	Sangat Setuju
B9.	Mengurangkan kadar kerosakan alatan dan komponen sistem pengecasan kenderaan.	2.54	Tidak Setuju	4.41	Sangat Setuju
Purata Min Keseluruhan: N = 37		**2.61**	**Tidak Pasti**	**4.46**	**Sangat Setuju**

Merujuk skor kepada Jadual 4 bagi min persepsi pelajar sebelum penggunaan ATK dalam PdP menunjukkan purata keseluruhan sebagai tidak pasti iaitu 2.61. Daripada sembilan item yang dijawab oleh responden, empat daripada item iaitu B1, B2, B4 dan B6 diberikan maklum balas tidak pasti dengan nilai skor min masing-masing dicatatkan ialah 2.76, 2.68, 3.14 dan 2.70 hasil interpretasi min daripada jadual 2. Manakala selebihnya mencatatkan skor min purata bagi item sebagai tidak setuju. Nilai purata skor min bagi item untuk persepsi sebelum penggunaan ATK dalam PdP adalah paling rendah dicatatkan oleh item B7 dan B8 dengan nilai skor 2.51. Reaksi sebaliknya diberikan apabila interpretasi min sangat setuju bagi kesemua 9 item soalan bagi persepsi selepas penggunaan ATK dalam PdP dicatatkan dengan nilai min purata sebanyak 4.48. Item B8 memperoleh skor min purata paling tinggi dengan nilai 4.70 dan skor terendah tetapi masih dalam kategori sangat setuju pula dicatatkan oleh item B3 dengan nilai skor 4.30. Melalui respons yang diberikan menunjukkan bahawa responden sangat setuju bahawa impak yang positif diberikan oleh penggunaan ATK dalam PdP di samping memperoleh nilai tambah dalam pembelajaran mereka.

Persoalan Kajian 3. Impak penggunaan *Alternator Tester Kit (ATK)* dalam pengajaran dan pembelajaran kepada pelajar diperoleh melalui analisis deskriptif yang dijalankan adalah seperti jadual berikut:

Jadual 5. Min Impak Penggunaan ATK Dalam PdP Kepada Pelajar

Bil	Item	Skor Min	Interpretasi Min
C1.	Penggunaan *Alternator Tester Kit (ATK)* mampu menjadikan proses PdP lebih menarik dan tidak membosankan.	4.38	Sangat Setuju
C2.	Menjadikan pelajar lebih berwaspada semasa melakukan amali sistem pengecasan kenderaan.	4.35	Sangat Setuju
C3.	Meningkatkan kecekapan pelajar dalam amali sistem pengecasan kenderaan.	4.43	Sangat Setuju

C4.	Menjadikan tempoh demonstrasi amali sistem pengecasan kenderaan lebih cepat dan ringkas.	4.27	Sangat Setuju
C5.	Memberikan pengetahuan awal mengenai proses amali sistem pengecasan kenderaan sebelum ia dilaksanakan.	4.41	Sangat Setuju
C6.	Dapat meningkatkan pencapaian pelajar dalam subjek sistem pengecasan kenderaan.	4.46	Sangat Setuju
Purata Min Keseluruhan: N = 37		**4.38**	**Sangat Setuju**

Interpretasi min bagi impak penggunaan ATK adalah sangat setuju diperoleh hasil analisis yang dijalankan kepada semua persoalan kajian. Nilai purata min dicatatkan ialah 4.38. Item C6 memperoleh skor min tertinggi dengan nilai min 4.46. Manakala nilai skor min terendah dicatatkan 4.27 oleh item C4 yang masih berada pada tahap sangat setuju berdasarkan maklum balas responden berikan.

Rumusan Keseluruhan Analisis Data

Hasil daripada semua analisis daripada ketiga-tiga persoalan kajian dirumuskan melalui jadual 6 seperti berikut:

Jadual 6. Taburan Peratusan Responden Secara Keseluruhan Persoalan Kajian

Bil	Persoalan Kajian	Purata Min	Tahap
1.	Apakah pensyarah mempunyai kemahiran dalam menggunakan *Alternator Tester Kit (ATK)* dalam pengajaran dan pembelajaran?	4.32	Sangat Setuju
2.	Apakah persepsi pelajar SKR Kolej Komuniti Rompin sebelum dan selepas penggunaan *Alternator Tester Kit (ATK)* dalam pengajaran dan pembelajaran?	2.67 / 4.46	Tidak Setuju / Sangat setuju
3.	Apakah impak penggunaan *Alternator Tester Kit (ATK)* dalam pengajaran dan pembelajaran kepada pelajar?	4.38	Sangat Setuju

Kesimpulan yang dapat dibuat untuk ketiga-tiga persoalan kajian, dapat dilihat bahawa nilai purata min diperoleh adalah pada tahap yang sangat dipersetujui oleh responden. Purata min bagi sebelum dan selepas penggunaan ATK nyata memberikan perbezaan yang kurang ketara namun masih tetap berbeza antara keduanya daripada tidak pasti kepada sangat setuju berdasarkan nilai min keseluruhan item kajian sebelum 2.67 kepada 4.46 iaitu nilai purata min yang paling tinggi dalam kalangan tiga persoalan kajian diutarakan. Nilai min terendah pula dicatatkan ialah 4.32 daripada persoalan "Apakah pensyarah mempunyai kemahiran dalam menggunakan *Alternator Tester Kit (ATK)* dalam pengajaran dan pembelajaran?" namun masih berada pada tahap sangat setuju bagi responden. Bagi menjawab persoalan impak penggunaan ATK dalam PdP kepada pelajar, responden telah memberikan skor purata min 4.38.

Rumusan

Melalui dapatan yang telah diperoleh menunjukkan ketiga-tiga objektif kajian telah berjaya dicapai. Penggunaan ATK dalam PdP memberikan impak positif kepada pelajar. Di samping itu, pensyarah juga mempunyai kebolehan mengendalikan ATK dengan cekap seterusnya memberi manfaat kepada pelajar sepanjang proses PdP berlangsung.

Kemahiran Pensyarah Menggunakan ATK dalam PdP. Dapatan analisis jelas menunjukkan pelajar begitu yakin dengan tunjuk cara yang diajar oleh pensyarah dengan melihat item A6 dalam jadual 3 iaitu "Saya meyakini tunjuk cara pensyarah saya terhadap penggunaan Alternator Tester Kit mendapat skor min 4.41. Pensyarah juga terbukti tidak kekok menggunakan *Alternator Tester Kit* dengan begitu mahir semasa menguji kebolehfungsian alternator dan data ini ditunjukkan dalam item A5 iaitu "Pensyarah saya mahir menggunakan *Alternator Tester Kit* dalam membantu pelajar yang bermasalah dalam latihan amali" yang membawa kepada skor min 4.38 merupakan tahap interpretasi yang sangat memuaskan. Pensyarah juga mampu membantu pelajar yang bermasalah menggunakan

Alternator Tester Kit dengan berkesan dan ini ditunjukkan pada skor min 4.38 pada item A4 jadual 3 iaitu "Pensyarah saya mahir menggunakan *Alternator Tester Kit* dalam membantu pelajar yang bermasalah dalam latihan amali". Bagi menambahbaik kesediaan pensyarah dalam meningkatkan kemahiran penggunaan serta keyakinan pelajar semasa proses menunjuk cara beberapa perkara perlu diteliti:

5.1.1 Pensyarah perlu menguji ATK terlebih dahulu satu jam sebelum kelas bermula bagi memastikan kelancaran proses tunjuk cara.

5.1.2 Pensyarah perlu menyediakan beberapa sampel alternator yang berbeza kondisi bagi mengulangi beberapa kali proses tunjuk cara.

Perspektif Pelajar SKR Sebelum dan Selepas Penggunaan ATK dalam PdP / Impak kepada Pelajar. Impak kepada pelajar dibahagikan kepada impak pengetahuan, kecenderungan dan seterusnya kemahiran amali pelajar. Impak pengetahuan dapat diperhatikan pada item B4, B5, B6 pada Jadual 4 menunjukkan peningkatan yang ketara skor Min. Penggunaan *Alternator Tester Kit* dalam pengajaran dan pembelajaran (PdP) meningkatkan minat dan kefahaman pelajar, menjadikan proses PdP lebih menarik, membantu mereka dalam memudahkan melakukan kerja-kerja amali berkaitan sistem pengecasan kenderaan. Ini dibuktikan di dalam Jadual 4 menunjuk skor min purata meningkat dari 2.61 kepada 4.46. Jadual 4 juga membuktikan masa perjalanan amali disingkatkan serta meningkatkan tahap keselamatan pelajar semasa menjalankan amali serta mengurangkan kerosakan peralatan komponen mengecas pada kenderaan. Secara tak langsung keyakinan pelajar untuk melaksanakan amali sistem pengecasan meningkat dan ini dibuktikan pada item B8 Jadual 4 "Menambahkan keyakinan pelajar untuk melakukan amali sistem pengecasan kenderaan" meningkat daripada skor min 2.51 yang membawa interpretasi tidak bersetuju kepada sangat setuju dengan skor min 4.70.

Impak yang positif kepada pelajar dari analisis pada Jadual 5 menggambarkan bahawa penggunaan ATK dapat menjadikan proses PdP lebih menarik dan tidak membosankan. Ia mampu menjadikan pelajar lebih peka, lebih berwaspada dan memberikan kecekapan proses amali serta memberikan pengetahuan awal kepada pelajar sebelum mereka menjalankan amali pada kenderaan sebenar. Pengajaran yang berkesan dapat menjadikan suasana proses PdP lebih efektif seterusnya dapat membantu pelajar dalam meningkatkan kefahaman dan kemahiran mereka.

Hubungkait Dapatan Kajian Dan Objektif Kajian. Secara keseluruhannya dapatan kajian menunjukkan objektif kajian tercapai bagi ketiga objektif yang dinyatakan berdasarkan jadual 6 dengan jelas menunjukkan keseluruhan purata min bagi ketiga-tiga objektif melebihi 4.21 mengikut Interpretasi min yang diguna pakai oleh Creswell (2005).

Cadangan Untuk Kajian Seterusnya. Beberapa cadangan untuk kajian yang seterusnya adalah seperti berikut:

i. Mengkaji pengetahuan pelajar automotif berkaitan asas-asas elektrik. Pelajar yang berpengetahuan perlu dihubungkait dengan minat mereka mempelajari sistem elektrik kenderaan.

ii. Memperluaskan skop kajian mengkaji keberkesanan penggunaan *Alternator Tester Kit* dalam pengajaran dan pembelajaran di kolej-kolej komuniti seluruh Malaysia.

iii. Melakukan analisa statistik seperti penganalisaan varian bertujuan untuk meningkatkan keabsahan hipotesis. Bagi mencapai matlamat ini, pensyarah perlu memasuki kelas-kelas berkaitan bagi meningkatkan kemahiran penggunaan pakej-pakej perisian statistik berkaitan sains kemanusiaan.

Kesimpulan

Hasil dapatan kajian yang menunjukkan bahawa responden bersetuju dengan penggunaan *Alternator Tester Kit* membantu mereka menambahkan minat, meningkatkan kefahaman sistem pengecasan serta meningkatkan keyakinan diri untuk menjalankan amali sistem pengecasan elektrik kenderaan.

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EXPLORING FACTORS AFFECTING THE USE OF DIGITAL PLATFORMS BY PARTICIPANTS OF INSTAGRAM MARKETING INCENTIVE WORKSHOP

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Abstract: Many sectors, including business, education, government, and society have all been severely impacted by the Covid-19 pandemic. This pandemic had a big influence on entrepreneurs' ability to run their business physically. The digital transformation is urgently required. Therefore, digital entrepreneurship been the alternate way to entrepreneur to conduct their business. Based on previous literatures the role of digital platforms is more significant to micro and small enterprises due to limited resources, size of the firm and their financial capabilities. This research focused on exploring factors affecting the use of digital platforms in term of skills in using the internet, motivation of using internet in enhancing business and source of information obtained from internet that used for business purpose. 25 participants of Instagram Marketing Incentive Workshop were chosen as respondent for this study. Social media was found to have a positive impact. Carrying out qualitative analyses, the findings shows that Instagram give motivation to entrepreneur doing a business using a social media. Outcome from the data analysis shows that respondents have moderate skills in using internet. Besides that, using internet for business purpose motivates more in engaging in business. Finally using internet help them to get business related information moderately. The findings of this study empirically expose SME solutions to support their recovery and sustainability during the COVID-19 pandemic and serve as a foundation for multiple future studies in this field. Furthermore, these results demonstrate that SMEs' limited understanding of how to use new digital tools prevents them from realising their full potential and from keeping up with technological advancements.

Keyword: Platform; Digital; Entrepreneurship.

Introduction

The dynamics of the economy have been affected by the emergence of digital tools. This been a great opportunity to entrepreneurs in use digital technologies to locate the services and items they require and share vital information on social media. According to Atshaya & Rungta (2016), Digital marketing serves as a prime illustration of the various ways that technical advancements can be applied. Conducting business in online base described as a type of marketing in which products and services are advertised online utilising digital platforms. Like traditional marketing, digital business uses a predetermined supply chain to distribute goods and services, but instead of using physical bricks, this supply chain is made up of technologies and techniques that enable online transactions over internet connections (Todor, 2016). Thus, internet-based systems that may synchronously create, promote, and transport value from producers to consumers via digital networks are referred to as digital marketing channels (Key, 2017).

In today's knowledge-based society, the technological revolution that is currently taking place is aimed not only at large companies that are dedicated to developing new technologies or at those that offer digital and internet services, but also at Small and Medium-Sized Enterprises (SMEs) that provide goods and services and are a vital component of the economy. The digital revolution has the potential to significantly help small and medium-sized enterprises (SMEs) as it has a favourable correlation with their growth, performance, and competitiveness (Shideler, Badasyan & Broadband, 2012). Digital marketing is the most effective approach for businesses to market their goods and services, claims ((Kurniawan, Suwarno & Rajiani, 2019). Furthermore, they clarify that the advancements in technology have brought about a considerable change in the conventional ways of brand promotion. Despite this, SMEs are less competitive than other businesses that are set up in accordance with the new business models based on information and communication technologies (ICTs) and the internet since they do not yet use digital marketing extensively.

Social media and digital marketing give SMEs the chance to reach existing customers and draw in new ones more effectively (Nuseir & Aljumah, 2020). Additionally, SMEs may be able to boost their growth and competitiveness in the market by using digital technologies to communicate with customers more effectively and at a higher performance level. In the Asian context, for instance, Somjai, Charoen & Pocmontri (2020) stated that in addition to increasing revenue, digital marketing lowers total marketing expenses. As a result, it becomes an interesting and less expensive kind of promotion because it increases customer awareness more quickly than traditional marketing. In context of the economic advantages that internet-based tools and platforms can offer, Somalo (2022) claims that investment costs for digital marketing are lower because it requires fewer production resources (Kannan & Honhshuang, 2017).

Problem statement. Entrepreneurship is one the main drivers of economic growth. It is also a major strength behind the development of a nation, the establishment of new jobs, and the social stability. The Covid-19 pandemic has had a significant negative impact on businesses' ability to conduct business physically. As a result, digital entrepreneurship has emerged as one of the vital possible alternatives for entrepreneurs as to execute their operations, especially during the pandemic. Due to the advantages of the internet, some businesses are compelled to shift and begin utilising it to benefit from more sophisticated applications, including e-Commerce (Fahri and Timothy, 2008).

According to (Hashim,2007) internet use by small and medium businesses (SMEs) can help them become more competitive. Entrepreneurs can save time and lessen their management effort requirements by using the rapid availability of information (Singh, 2012). Utilizing the digital platform is crucial for a business's expansion, production, and efficiency. Nowadays SMEs can use many social media platforms such as Instagram, TikTok, Twitter, Facebook, and YouTube as a communication tool. More than half of the world’s population is already online and will use social media as their daily activities. It shows that using the digital is very important for the entrepreneur to move forward.

The physical environment has changed because of technical development in the digital age, which has an impact on marketing and commercial decisions. A new establishment, business, product, or service that is offered online and a new entrepreneur with a start-up business are both considered to be digital entrepreneurs. Another major consideration when examining the SME business sector and digital marketing is a firm's level of expertise in this area. One of the main reasons for their success in the e-commerce sector is the methods and technologies they employ for online selling. According to Kovalenko and Kuzmenko (2020), by using the right techniques, they can improve their search engine visibility and it will be a good outcome of their advertising efforts.

To analyse the application of digital marketing of small and medium-sized enterprises (SMEs) in handling the business, Unit Diploma of Business Studies, Politeknik Sultan Azlan Shah have conducted a program namely “Instagram Marketing Incentive Workshop”. The program aimed to guide local entrepreneur to use Instagram to market their product easily so that the participant can incorporate themselves into the modern business environment and independently create the internet business. 25 participants from this program were chosen as respondent for this study. From this study

the aim of researcher is to understand the factors that affecting the use of digital platforms relating to internet usage skill, motivation of use of internet and availability of information from internet in performing business through online method.

Research questions. Based on previous studies it was found that the use of digital marketing has a strong positive impact on financial performance of SMEs. It was also discovered that the digital marketing cause positively impacts the non-financial performance of SMEs in terms of cost reduction on marketing and customer service, improved customer relations and improved information accessibility. Because of this, traditional business owners should try to convert their existing products, services, and business into digital ones. It is crucial that the entrepreneur develop knowledge, skills, attitudes, and actions. Entrepreneurs must adapt to technological development because it is a significant factor that can enhance their quality of life.

Therefore, this research focused on exploring factors affecting the use of digital platforms in term of skills in using the internet, motivation of using internet in enhancing business and source of information obtained from internet that used for business purposes of the 25 participants of Instagram Marketing Incentive Workshop that was held at Polytechnic Sultan Azlan Shah. The following research questions have been identified for this study:

1. What factors affecting the use of Digital Platforms by participants of Instagram Marketing Incentive Workshop on internet usage skill?
2. What are the impacts affecting the use of Digital Platforms by participants of Instagram Marketing Incentive Workshop on motivation use the internet.
3. Which factor affecting the use of Digital Platforms by participants of Instagram Marketing Incentive Workshop to get information from internet source?

Literature Review

The aim of the research described here is to provide a clearer understanding of the motivations for adoption and use of the Internet by entrepreneurs in conducting business using digital platforms. Digital technology has transformed how entrepreneurs operate their businesses. According to Jelonek, D. (2015) the Internet technology help entrepreneurs perform business in lower operating costs and can operate on a scale that is larger than before. Nambisan, S., Wright, M., & Feldman, M. (2019) indicates that digital start-ups have very low barriers to entry in conducting business and do not require costly equipment. Performing business in digital platform could reduce the cost of information searches, cost of the transaction and time (Astuti & Nasution, 2014). Nowadays people spend more time in the digital platform to search information, product, service, and communication. Omar, Rahim, & Othman (2017) stated that entrepreneurs could promote their products as well as more easily acquire potential customers through cyberspace networks such as electronic mail, social media such as blog, Facebook, and Instagram. Thus, with social connections and online discussions obtained by entrepreneurs allows them to share ideas, expand the market as well as enriching information sources.

The positive development of online business is also contributed by the emergence of social media. Facebook, Instagram, Twitter, to name a few, are among the top social media applications that have been introduced and totally changed our life, especially in Malaysia (Rahim et al, 2019). Following that, digital platforms with various Internet applications provides opportunities to entrepreneurs to improve social relations with others who eventually become their customers, agents, or suppliers even if not through online (Nurdin et al., 2014)

On the other hand, exploration focuses on learning new knowledge, discovering new capabilities, and investigating new ways of doing business. The exploration orientation generally has links to uncertain outcomes, high autonomy, and long-term results. According to Huang, Wang & Lai (2022) when people are willing to accept challenges and think that internet entrepreneurship can obtain enjoyment and satisfaction or get external rewards and recognition, they are more likely to have high internet entrepreneurial intention to use technology products. The motivation to adopt new technology based on two factors, there are perceived usefulness and perceived ease of use. Technology provides

enjoyment to users or adoptees. Recent literature provides evidence that perceived enjoyment can significantly affect the intention to adopt the technology (Thakur & Srivastava, 2014).

Based on previous findings it shows that entrepreneurs should have self-motivation in terms of acquiring and exploration information through internet to success in conducting business using digital platforms. Other than that, our research agree that source of information can obtained from internet can be used for business purpose. Since the end of 2019, the COVID-19 pandemic has spread throughout the world, resulting in dramatic changes in industrial structure such as for technology products, such as computers, communication devices, films, platforms, and live broadcast for online communication (Wang et al., 2020). Information such as, knowledge about doing business using social media platform can we get through internet that share with other. Beyond the variation in perspectives, some researchers study that entrepreneur need internet skill to digest the information, such as into specific skill (e.g., share posting through social media) or other platform. For example, Van Deursen and Van Dijk measured internet skill using the following domains: operational, 'the skills to operate digital media'; formal, 'the skills to handle the special structures of digital media such as menus and hyperlinks'; information, 'the skills to search, select and evaluate information in digital media'; and strategic, 'the skills to employ the information contained in digital media as a means to reach a particular personal or professional goal' (2009: 334).

Based on this, our workshop which explain our participant on Instagram marketing to improve skills and how to get information and sharing in this platform. Other studies have focused on self-efficacy measures (Bandura, 1977) that capture how confident or competent people believe they are in using the internet (Bunz,2004; Eachus and Cassid, 2006; Eastin and LaRose, 2000). Eastin and LaRose (2000) developed an eight-item internet self-efficacy scale in which participants report their confidence using a Likert agree-disagree scale in accomplishing a series of tasks (e.g., 'I feel confident understanding terms/words relating to internet hardware'). Similarly, Spitzberg's (2006) computer-mediated communication competence scale asks participants how true they believe a list of 77 statements to be, such as: 'I am very familiar with how to communicate through email and the internet'. Bunz's computer-email-web (CEW) fluency scale composed of seven items asks respondents to rate statements such as, 'I can use the "reply" and "forward" features for email' and 'I can create a website' with response choices, 'very well', 'well', 'not so well', and 'not at all' (Bunz, 2004: 488).

Digital entrepreneurship is the process of entrepreneurial creation of value using various socio-technical drivers to support the effective acquisition, processing, distribution, and consumption of digital information (Sahut et al. 2019). As technology advances, firms across all industries realize the importance of digital transformation to make their business sustainable. This digital transformation includes various business functions, such as sales, marketing, human resources, operations, finance, research and development, and customer support service (Antonizzi and Smuts 2020). The contribution of digital entrepreneurship to the economy has brought about a great demand from the academe and various industries in the field of research. The concept is multi- and interdisciplinary between the ecosystem and technology-related practices (Sussan and Acs 2017). Despite being at its prime, digital entrepreneurship has brought a monumental change in how entrepreneurs operate their businesses (Kraus et al. 2018).

Research Objective

1. To identify the factors affecting the use of Digital Platforms by participants of Instagram Marketing Incentive Workshop on internet usage skills.

2. To identify the impact affecting the use of Digital Platforms by participants of Instagram Marketing Incentive Workshop on motivation use the internet.

3. To identify the factors affecting the use of Digital Platforms by participants of Instagram Marketing Incentive Workshop to get information from internet source.

Methodology

The study applies a quantitative approach in achieving its objectives. The goals are to test on factors that contributes to the affecting the use of Digital Platforms by participants of Instagram Marketing Incentive workshop in the aspects of internet usage skills, motivation use the internet and information from internet source among the participant in this workshop.
A research questionnaire was designed as the main instrument for this study. The instrument consists of demographics and factors used to test the study. Research questionnaires were distributed to workshop participant attending Instagram marketing incentive workshop through google meet. 25 completed questionnaires were returned, and data were analysed using SPSS software. Data analysis focuses on descriptive analysis for mean and standard deviation value.

Result and Discussion

Respondents' Characteristics. Total 25 questionnaires were gathered from the respondents from 22 – 40 years old. Initial analysis of data indicated that age was represented with 10% 22-26 years, 10% 27-33 years, 35% is 34-39 years and 45% is 40 above years. It is identified that 50% from our respondents have SPM level, 25% have diploma and 15% are degree holders. Besides that, 65% our respondents are user internet more than 10 years, 10% uses internet 8-9 years, 10% uses internet 6-7 years and another 10% uses internet about 4-5 years. Another from this, we also survey the average time when browsing the internet, from result we got 35% uses more than 29 hours in a week, 25% uses 22-28 hours in a week, 25% uses internet about 15-21 hours in a week and 10% uses internet around 8-14 hours in a week. Another from that, we also get result from the how our respondents access the internet connection, 55% is from internet paid line, 45% form WIFI connection, 35% from prepaid and 10% from others. According to Wardaya et al. (2019), SMEs do not fully realise their potential since they are unable to keep up with digital changes due to a lack of expertise about digital marketing and its application.

Wardaya, A.; Sasmoko, S.; So, I.G.; Bandur, A. Mediating effects of digital marketing on dynamic capability and firm performance: Evidence from Small and Medium-Sized Enterprises (SMEs) in Indonesia. Int. J. Recent Technol. Eng. 2019, 8, 461–464 Last, we also survey the internet application access, result show in this table:

Table 1. Mean and standard deviation for internet application access.

Internet application access	Mean	Standard Deviation
Access to WhatsApp's	5.00	1.07
Access to Instagram	3.12	1.09
Access to Facebook	3.85	0.91
Access to Emel	3.13	1.36
Access to WeChat	1.38	0.95
Access to other	3.65	1.49
Average	3.35	1.15

Six items were constructed to identify respondents use internet for browsing which platform. Respondents were required to state the level of their agreement with each statement, ranging from "1", "strongly disagree" and "5"," strongly agree".
Based on table 1, it is shows that respondents use internet to access social media platform which is the highest score mean value 5.00. the lowest mean score falls for the item WeChat which are this platform not more access from respondents.

Furthermore, according to Sexton (2018), one of the key elements affecting SMEs' adoption of ICTs is market positioning. This suggests that the need for SMEs to cut expenses, make better use of limited resources, stay competitive, enhance customer service, strengthen ties with suppliers, expand their market reach, and have a meaningful impact on the productive sector they are a part of is what motivates them to put in place a business system.

Descriptive Analysis

This section will answer to the research question according to three effectiveness factors affecting the use of digital platforms in terms of skills in using the internet, motivation of using internet in enhancing business and source of information obtained from internet that used for business purposes.

Table 2. Mean and standard deviation for factor internet usage skill.

Internet Usage Skill	Mean	Standard Deviation
Have a skill to use social media	3.42	1.15
Search engine (search engine like google, yahoo etc)	3.19	1.22
Have a skill to use e-mail	3.32	1.29
Upload/ download documents (upload/download documents)	3.38	1.34
Upload/ download videa (upload/download video)	4.00	1.17
Average	3.46	1.23

According to table 2, it is shows that respondents able to use internet with their skill and this factor influence respondent to use Instagram for medium digital marketing for their business. The five item was survey, and average score is 3.46 which are respondents able to use their skill and agree for this factor. The next section is regarding respondents' motivation to use the internet for digital marketing using Instagram as their platform.

Table 3. Mean and standard deviation motivation to use internet.

Motivation to use internet	Mean	Standard Deviation
Enthusiasm for the latest information	4.00	0.94
Friend relationships are getting better	3.73	0.88
Easy to get information	3.96	0.94
Saves time	4.00	1.01
Feeling left behind without the internet	3.73	0.83
Average	3.89	0.77

Based on the table 3, the result show that item regarding motivation to use internet is a factor of influence respondents when doing business using Instagram as their platform. The average score

is 3.89 which are respondents agree that motivation to use internet influences them towards browsing internet to do business. The last section of the questionnaire is about the information source is the factor influence respondent to browsing the internet. Six items were constructed in this section.

Table 4. Mean and standard deviation for information source is factor influence.

Information source	Mean	Standard Deviation
Searching for entrepreneurial information and types of business	3.73	0.943
Doing the latest product surveys on the market	3.69	1.00
Searching for information about suppliers	3.69	1.34
Seeking information related to the economy	3.81	1.09
Searching for politically related information	3.12	1.06
Looking for education-related information	3.81	1.09
Average	3.67	1.08

According to the result shown in Table 4, it is identified respondents always get information when browsing the internet with the highest score mean is 3.73. Although respondents learned the important and ways to enhance information for internet and use the information to make a sale. The total average is 3.67. it is showing that respondents moderately agree with the factors affecting respondent for business purpose.

Based on the result, from the three factors affecting the use of digital platform in term of skills in using the internet, motivation of using internet in enhancing business and sources of information obtained from internet that used for business purposes. However, respondent need to explore on how to enhances the information and implement in term for their business. They can seek advice from experts or their mentor to get more information on how to increase their income when doing business through internet and importantly using social media platform. The goal of internet entrepreneurship is to create new businesses by technology and resources. It is an extension of the traditional entrepreneurial process.

According to Wang et al., in 2016, an individual's intention to start and own an e-commerce business is considered the basis of Internet entrepreneurship. This study has not only explored the three factors influence to enhance internet which is skill, motivation and information for internet but also found that challenge, enjoyment, and outward motivation have a relationship between technology product and internet entrepreneurial intention to use technology for development this business. These findings add insight to previous research, which often emphasizes the effect of intrinsic and extrinsic motivation on internet.

Overall, this study shows clearly that the respondent can fully use the Internet as a source of information search. Seems the respondents for this study are female and the finding is in line with the study of Syed Shah Alam et al. (2011) who found that female entrepreneurs are certainly not faced with skill constraints run their businesses. Moreover, there have been many female entrepreneurs have business skills that lead to success. Thus, the results of this study show that the digital platforms really play an important role in forming online businesses run by micro or small enterprises owners. Dependence on the Internet is essential to ensure the product and users find each other's place in cyberspace. Therefore, current and future entrepreneurs need to strengthen their ability in using Internet for business purpose which will help them success both online and offline business.

Conclusion

Overall, this study contributes to the in-depth knowledge of consumption Internet from the aspect of access, skills, and motivation. Generally, in the present day many youth entrepreneurs are skilled and motivated to use the Internet in conducting business using digital platforms. Besides this, theoretically the result of this study shows that there is a compatibility with the principles of Internet use which outline that access, skills and motivation are the catalyst for the success of a business online. In addition, respondents have made the Internet as a source to obtain business and product information. Thus, this can contribute to the success of the next online business attract more young entrepreneurs to engage in the online business world. The research acknowledges its limitation and require further study specially to identify other variables affecting in conducting business through digital platform covering more diverse respondents and areas.

The findings of this study empirically expose SME solutions to support their recovery and sustainability during the COVID-19 pandemic and serve as a foundation for multiple future studies in this field. Furthermore, these results demonstrate that SMEs' limited understanding of how to use new digital tools prevents them from realising their full potential and from keeping up with technological advancements. To add to a comprehensive and worldwide perspective, future research might also test the hypotheses in other circumstances and compare the outcomes with those found here. They might investigate this topic with a bigger sample size, taking developed nations into account, and enhancing their analysis with a variety of qualitative interview-based methodologies, which could contribute to the body of knowledge already available on digital marketing.

Furthermore, the fact that only marketing professionals in operational positions within the SMEs under investigation were polled may also be seen as a limitation, as managers and area leaders frequently have the last say when it comes to the adoption and application of digital marketing in companies. These individuals were left out of this study because they were difficult to get in touch with. Therefore, the features of this population in the sample could be considered in future study.

SMEs must pass through five stages to become sustainable: existence, survival, success, take-off, and resource maturity. Given this, the fact that the SMEs in question were just getting started may be another research drawback. But these are the most important times because that's when the lowest rates of business survival are shown. As a result, using digital marketing in these stages could help companies develop. Therefore, future research should consider SMEs that are at different phases of development and be able to draw connections between elements like the usage of digital tools and economic success.

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The Effectiveness of Personal Financial Management Education for Business Studies Students at Politeknik Sultan Azlan Shah

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Abstract. The issues of personal finance, particularly financial management among undergraduates, has noticeably increased in recent years. Personal financial management is a skill that undergraduate students must know, and it is one of the important aspects of life in terms of self-disciplining to achieve a quality life in the future. Based on previous literature, student's spending habits on campus will influence the way they manage money throughout their lives. This research focused on studying the effectiveness of personal financial management for students involving factors such as knowledge, attitude, and usefulness of learning personal financial management in polytechnic. The data was obtained from 36 respondents using a questionnaire as an instrument. The outcome from the data analysis shows that most of the respondents have good knowledge in understanding of personal financial management. However, it is identified that even though the respondents know the importance of savings, at the same time they prefer to spend a lot at present time. The recommendation and limitation stated for future researchers in terms of studying more regarding pattern of spending among students that affects their financial management.

Keyword: Financial management; Knowledge; Attitude; and Usefulness.

Introduction

In our personal lives, financial management helps us create a comfortable life with guaranteed future, providing the guarantees and freedom to spend money to keep us happy. The importance of planning and financial management is manifested in all areas of personal and business life. All individuals no matter what their financial capabilities, must learn and study financial management and adapt it to improve their lives. The importance of personal financial management allows students to improve their standard of living, which leads to good health and reduces financial stress. In addition, it also allows individuals to make better financial decisions that reduce poverty, reduce debt, and increase savings and investments. Financial literacy will provide financial awareness to all, especially to students which is in line with the development of the financial industry. Therefore, having excellent financial knowledge and attitudes is essential for making wise financial decisions. Chinen & Endo (2012) stated that today's young adults especially university students are less capable of handling their finances. In other words, financial literacy is low in the modern economy and is currently becoming a global problem (Wolla, 2017). Students who have less knowledge in handling their financial management, have poor financial attitudes, and are unaware of the importance of personal financial education, financial literacy will help them to survive their entire life.

Less than one-third of young people lack fundamental financial literacy. Wolla (2017) stated that there are ignorant of concepts like interest rates, inflation, and risk diversification (Huston, 2010). Parents are the primary source of informal financial education. High financial literacy among high school kids is directly correlated with parents' higher levels of financial education (Cameron et al., 2014). Parents with a wealth of educational attainment can demonstrate high-risk tolerance, good lifetime incomes, and improved financial decision-making (Grohmann et al., 2015). Relatively, students must have the necessary financial knowledge, abilities, beliefs, and attitudes for personal financial management during their transition from adolescence to adulthood (Shim et al., 2010). Furthermore, a person's level of financial literacy may have an impact on their financial behaviour.

In this context, financial literacy is defined as an individual's ability to comprehend and manage their finance relevant details (Huston, 2010). Moreover, knowing appropriate attitudes and behaviour in managing personal finances will help students to make better financial decisions throughout their lives. According to Lusardi and Mitchel (2014), financial literacy describes a person's unique source or input that describes their financial conduct. This resulted in the improvement of risk management and financial literacy that enabled the promotion of better financial decision-making and good financial practices as well as further promoting long-term financial health.

The Personal Financial Management course is one of the elective courses for Diploma in Business Studies students, Sultan Azlan Shah Polytechnic for students to choose from. This course requires students' skills to manage personal finances wisely and be able to spend within their means and achieve financial goals with ease. This course emphasizes controlling one's finances regardless of whether it is facing financial difficulties or not. However, there is relatively little exposure to money management, and as a result, students mostly experience difficulties throughout their time in college. Therefore, it is necessary to improve the financial literacy of individuals, particularly final-year students who will join the workforce therefore they will have positive financial management attitudes (Yahaya et al., 2019). From the study, it is identified that although students understand and have knowledge in personal financial management through education, their financial attitude in the aspects of buying things using credit payment is high. Students must understand the causes of buying things on credit without proper management may lead to serious financial problems.

Based on previous studies, it showed that raising financial literacy skills may lower poverty rates. This will enable young individuals to make wiser financial decisions, save more money, and build wealth for the future. (Garg & Singh, 2018). Therefore, they must develop sound financial knowledge, attitudes, and actions. This research intends to investigate personal financial literacy specifically the effectiveness of studying personal financial management course taken by Business Studies students at Sultan Azlan Shah Polytechnic for the following research questions that have been identified for this study:

1.1 What are the factors affecting the effectiveness of personal financial management education among Business Studies students at Sultan Azlan Shah Polytechnic?
1.2 What is the impact for each factor affecting the effectiveness of personal financial management education among Business Studies students at Sultan Azlan Shah Polytechnic?

Literature Review

Money is essential for human requirements, particularly for students who are dealing with difficult financial circumstances. It is a fact that money is essential to carrying out business deals and supplying modern society's demands. Determining own financial well-being major capacity in managing finances. In-depth, personal finance management uses a variety of techniques to organize, oversee, and manage one's financial resources. A positive attitude toward managing one's income, loans, and investments is indicative of sound financial behaviour (Husniyah et al., 2017).

The social financial system is changing because of the expansion of the world economy. In the modern world, global financial markets are inherently more complex. These markets provide a wide range of sophisticated financial products and services, even to those with modest incomes (Wolla, 2017; Garg & Singh, 2018). This is seen in how technological advancements and complexity affect financial services and products. For instance, easy access to financial services products and loan disbursement. If one does not handle this with sound financial behaviour, they may find themselves in a difficult financial situation very quickly. Personal financial management can be linked to financial behaviour. One application of the idea of financial management at the individual level that includes tasks for financial planning, management, and control is personal financial management. Planning involves determining what to do with money that has been received and allocated for it.

Good financial behaviour development in students calls for special attention because the financial behaviour aspect has a significant effect on their life after graduation from a university. For the students who live far away from their parents, for the first time, they will be faced with the choice of monthly financial management by themselves. On the other hand, consumptive behaviour among students is extremely high along with the rampant online business that is developing today. However, in Malaysia, the percentages of saving habits reducing from year to year even in our financial institutions, saving institutions keep on promoting their rates of return if customer saves their money in the banks. The focus is mainly on the students at higher educational levels. In Malaysia, not all of them receive study loans or scholarships, however, they will purposely spend their money on unnecessary items such as IT gadgets, accessories, and entertainment and normally this will lead them to financial problems. Financial knowledge is the decision-making of an individual. It can help with decisions about budget, debt, and investing. Financial literacy is the ability to understand and use various financial skills, including personal financial management, budgeting, and investing.

Ineffective financial behaviours, such as a propensity for rising credit card debt, insufficient savings, and careless record keeping, can be caused by a lack of financial literacy. They are accustomed to using credit as a first option and lack budgeting knowledge, which is the justification for this (Sabri et al., 2012). On the other hand, Nanda & Samanta (2018). stated that financial mismanagement is likely to arise in situations where individuals lack financial literacy. Hutson (2010), further claimed that fresh graduates are similarly prone to misuse their wealth by merely investing in financial goods and services that offer no benefits or returns. Students who are just after their first job are also more likely to take out expensive loans (Grohmann & Menkhoff, 2015). Malaysia is among the greatest examples of this, with high rates of student loan defaults and credit card bankruptcies (Nga et al., 2010).

The awareness of the importance of financial management education is improving across the nation. In Malaysia, several programs have been established to improve and encourage financial management education for Malaysian students. Financial behaviour, attitude, and influence are related to financial knowledge (Jorgensen, 2007). Besides that, Anjali (2016) implies that a person's level of financial literacy is determined by their financial requirements and habits. The financial literacy of Malaysian university students was directly impacted by financial education, financial socialization tools, and money-related attitudes (Albeerdy & Gharleghi, 2015). This illustrates how financial education and attitude have affected students' money management practices, abilities, and behaviour.

The decision taken concerning financial management also depends on personal satisfaction. For example, the attitude toward financial management may be built from one’s experiences, positions in life, education, and present circumstances. Furnham (1984) stated that financial attitudes shape the way people spend, save, hoard, and waste money. Parrotta and Johnson (1998) find a positive relationship between financial attitudes and financial behaviours. This shows that people who have positive financial attitudes tend to be more successful in financial management. The knowledgeable person shall tend to be more responsible financially.

Financial management education among students is aimed at improving their economic performance, especially in the economic sector, both as an individual and as a society. This is because the level of education is an indication of the ability of a person to make better decisions in their financial management. Ergun (2017) investigated the relationship between financial behaviour and financial knowledge of university students across five European countries, the result shows that financial education has improved financial literacy among students and those who took finance courses at university were more knowledgeable than those who got information about financial issues from social media. Additionally, the study further found that the respondents in the research moderately agree with the usefulness of personal financial management.

According to (Xu and Zia 2012), those with a higher income are more likely to be able to make ends meet which is one component of financial capability. Gerrans and Heaney (2016) found that family discussion of financial goals, value, and money matters improves financial capability. A study by Kempson et al. (2013) explained that women were better at managing money in the short

term, but in other areas, such as choosing products and wealth accumulation, men showed higher performance. An experimental study by Cole et al. (2009) found that financial education had no significant impact on increasing the use of bank/savings accounts. In other words, informal learning also has a big impact on financial management capabilities.

Research Objectives

a) To identify the factors affecting the effectiveness of personal financial management education among Business Studies students at Sultan Azlan Shah Polytechnic.
b) To identify the impact of each factor affecting the effectiveness of personal Financial management education among Business Studies students at Sultan Azlan Shah Polytechnic.
c) To offer some suggestions and recommendations according to the analysis of the outcomes of the study.

Methodology

The study applies a quantitative research approach in achieving its objectives. The goals are to test factors that contribute to the effectiveness of personal financial management in the aspects of financial knowledge, financial attitudes, and the usefulness of studying personal financial management. A research questionnaire was designed as the main instrument for this study. The instrument consists of demographics and factors used to test the study. Research questionnaires were distributed to Business Studies students attending the DPA10203 Personal Financial Management Course at Sultan Azlan Shah Polytechnic. 36 completed questionnaires were returned, and data were analyzed by using SPSS software. Data analysis focuses on descriptive analysis for mean and standard deviation values.

Results

Respondents' Characteristics. A total of 36 questionnaires were gathered from the respondents from 19 to 21 years old. Initial analysis of data indicated that gender was represented with 77.8% of respondents being female and 22.2% being male. It is identified that 55.6% are PTPTN borrowers and 44.4% are non-PTN borrowers. Besides that, 16.7% of respondents are earning side incomes while 83.3% of respondents are not earning any side incomes. Based on these results, generally it shows that student's main income is based on their education loan and family support.

Descriptive Analysis. This section will answer the research question according to three effectiveness factors which is knowledge about personal financial management, financial attitude, and the usefulness of studying personal financial management.

Table 1. Mean and standard deviation for knowledge of students about personal financial management.

Knowledge about Personal Financial Management	Mean	Standard Deviation
I understand the importance of financial planning	4.75	0.44
I understand the concept of the time value of money	4.33	0.59
I can set up my personal financial goals	4.44	0.56
I understand banking facilities, products, and services in Malaysia	4.19	0.58
I know some basic investment products available in Malaysia to increase my personal net worth.	3.94	0.75
I know the importance of insurance/takaful	4.47	0.61
I understand the importance of not over-committing on loans	4.53	0.51

I understand the use of credit card and debit card	4.64	0.49
I have an awareness of financial responsibility	4.50	0.65
Average score	**4.42**	**0.57**

Ten items were constructed to identify respondents' knowledge about personal financial management. Respondents were required to state the level of their agreement with each statement, ranging from "1", "strongly disagree" and "5", strongly agree. Table 1 shows that students can understand the importance of financial planning where this item scored the highest mean value 4.75. The lowest mean score falls for the item relating to students' knowledge of some basic investment products available in Malaysia to increase personal net worth with a mean value of 3.94. The total average score for this section is 4.42. This value indicated respondents agreed that they are knowledgeable in personal financial management. The next section is regarding respondents' financial attitudes. Nine items were constructed in this section.

Table 2. Mean and standard deviation for financial attitude among students

Financial attitude	Mean	Standard Deviation
I am very organized when it comes to managing my money day-to-day	4.00	0.64
I am more of a saver than a spender	4.22	0.72
I prefer to buy things on credit rather than wait and save up	2.50	1.18
I always make sure I have money saved for a rainy day	4.58	0.55
I always begin saving well in advance for a big event (e.g: Hari Raya, any Festival)	4.50	0.61
I prefer to live for today rather than plan for tomorrow	3.06	1.24
Having rainy day savings is important	4.75	0.55
Searching for information before deciding to buy is important	4.75	0.44
Keep up to date with financial matters is important	4.69	0.47
Average score	**4.12**	**0.72**

Based on Table 2, the results showed that items regarding the importance of saving during emergency time and searching for information before deciding to buy scored the highest mean value 4.75. While item regarding students' preferences to buy things on credit rather than wait and save up scored the lowest mean value 2.50. The total average score for this section is 4.12. The last section of the questionnaire is about the usefulness of studying personal financial management. Seven items were constructed in this section.

Table 3. Mean and standard deviation for the usefulness of studying personal financial management.

Usefulness of studying Personal Financial Management	Mean	Standard Deviation
I always do comparisons before purchasing a product or service	4.61	0.49
I paid all my bills on time	4.03	0.61
I always stayed within my budget or spending plan	4.28	0.57
I began or maintained an emergency savings fund	4.28	0.57
I saved money to reach my personal financial goals such as buying a car, house, education, etc.	4.22	0.72
I kept a written or electronic record of my monthly expenses	3.67	0.89
I bought bonds, stocks, or mutual funds	2.39	1.25
Average score	**3.92**	**0.73**

According to the results in Table 3, it is identified that respondents always do comparisons before purchasing a product or service with the highest mean score 4.61. Although students learned the importance and ways to enhance personal wealth, their preferences to buy bonds, stocks or mutual

funds scored the lowest mean value 2.39. The total average mean score is 3.92. It is showing that respondents moderately agree with the usefulness of personal financial management.

Discussions

Based on the results, from the three effectiveness factors of personal financial management education to students, the factor regarding knowledge about personal financial management scored the highest value. However, students need to explore more on how to enhance their net worth. They can seek advice from experts or financial advisors to get more information on how to increase their net worth. According to Hanna & Lindamood (2010) stated that some financial planning advice could help individuals make a better preparation for their future and guidance from financial advisors would help individuals in increasing their wealth, preventing loss, and smoothing consumption.

Besides this, from the aspects of financial attitude, it is showing a decrease in the attitude of respondents in terms of preferences to buy in credit rather than to wait and save up first. Preferences to buy using credit methods may cause them to increase their debt and lead to other problems in their whole life. The result of the research is in line with David et al (2019) stated that irregular financial attitudes will lead to an increase in stress levels. It will create problems in the psychological well-being of the individual due to a lack of managing debt. Furthermore, according to Joo (2008), practicing effective money management will improve one's financial well-being, and failing to manage one's funds can have detrimental long-term effects on one's relationships with others and society at large.

Finally, the usefulness of personal financial education to students mainly helps them in terms of comparing products and services before buying them. This may lead them to not buy anything without proper analysis in terms of price before purchasing any product or service. Besides this, it is identified that students' preferences to increase their net worth need to be emphasized more. It is because based on results, students less use or find more information on how to invest their money to enhance their net worth. Both knowledge and usefulness of basic investment and interest in buying bonds, stocks, and mutual funds score the least mean score. This result is in line with Nga et al., 2010 stated that students lack the necessary funds and resources, have little financial literacy to invest, and participate in the capital market at a low rate.

These results clearly showed that students need more exposure and knowledge on how to enhance their personal net worth to make them financially stable in the future and not just depend on salary income. According to Hutson (2010), Young individuals who only invest in financial products and services without receiving any benefits or returns run the danger of abusing their income. Moreover, college students need to prepare for prepared for post-college life in terms of understanding financial products and services and raising awareness of financial risks (Beal & Delpachitra, 2003).

Conclusion

In conclusion, this research aims to study the effectiveness of personal financial management education for Business Studies students at Polytechnic Sultan Azlan Shah. From the study, it is identified that although students understand and have knowledge in personal financial management through education, their financial attitude in the aspects of buying things using credit payment is high. Students must understand the causes of buying things on credit without proper management may lead to serious financial problems. In the short term, the desired lifestyle and financial obligations can drain people's resources significantly and seriously risk their ability to live comfortably in subsequent years. Previous studies have demonstrated that those with more financial literacy will behave more wisely and have better financial outcomes. Moreover, students need to engage more in investing their money in proper and safe investments to increase their net worth. Students must prioritize their future by being well-to-do in the long run may provide individuals with a sense of security and fulfilment. The educational programs should focus on the financial products and services for the young generations. Financial management awareness programs should be conducted for them, as financial

management habits are formed early in life. Government agencies should organize and promote more financial education events to make the public aware of the importance of better financial management. The future researcher may conduct studies on the effects and benefits of investing money in the stock market and mutual funds for young generations.

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KAJI SELIDIK TAHAP KEPUASAN PENGGUNA ALAT BANTU PERKONGSIAN PEMBELAJARAN LUKISAN DAN PENGIRAAN "*WHITE BOX*"

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Abstrak. Kajian ini dijalankan untuk mendapatkan tahap kepuasan pengguna alat bantu perkongsian pembelajaran lukisan dan pengiraan "*White Box*". Tujuan kajian ini dilaksanakan untuk menilai sejauh mana produk ini dapat membantu para pensyarah dan pelajar dalam pembelajaran dan pengajaran dalam talian (PdPDT). Pembangunan "*White Box*" ini adalah untuk membantu pengunaan telefon pintar secara meluruh untuk bekerja dari rumah. Kajian ini difokuskan adalah kepada bidang pendidikan di mana interaksi dalam talian adalah antara pensyarah bersama pelajar untuk mengajar mata pelajaran yang mempunyai elemen pengiraan dan lukisan. Kajian tahap kepuasan ini dilaksanakan setelah produk ini digunakan oleh pengguna dengan menjawab set soal selidik yang mengandungi 12 soalan. Analisa mendapati kedua dua pihak berpuas hati dengan kebolehfungsian "*White Box*". Kajian lanjutan boleh diteruskan dari segi reka bentuk dan saiz produk ini.

Kata kunci: *White box*; PdPDT; Alat bantu mengajar.

Pengenalan

Alat bantu mengajar (ABM) adalah satu media atau perantaraan yang digunakan oleh seorang pendidik bagi membantu penyampaian ilmu kepada pelajar. Alat ini bertujuan untuk menjadikan sesi pengajaran lebih menarik. ABM dapat dibangunkan mengikut kesesuaian topik dan media pengajaran sama ada bersemuka ataupun secara maya. ABM mempunyai tiga kategori iaitu alat pendengaran, alat pandangan dan alat pandang-dengar (*Alizah Lambri & Zamri Mahamood, 2019*), oleh yang demikian penulis mengkategorikan "*White Box*" ini dalam kategori pertama iaitu penglihatan.

"*White Box*" merupakan salah satu ABM untuk memudahkan penyampaian ilmu antara pensyarah dan pelajar dalam talian terutama dalam subjek yang melibatkan lukisan dan pengiraan. Penulis menyedari bahawa semasa PdPDT dilangsungkan pensyarah mengalami kesukaran untuk menyampaikan teori lukisan dan pengiraan secara maya. Alat bantu perkongsian pembelajaran lukisan dan pengiraan "*White Box*" adalah sebuah alat bantuan pengajaran dan pembelajaran yang membantu perkongsian maklumat yang lebih jelas dan selesa. "*White Box*" ini mengambil konsep kotak fotografi yang memberikan ruang pencahayaan yang lebih kemas dan dilengkapi ciri tambahan untuk membantu memberi sudut pandangan kamera video yang lebih jelas dalam sesi perkongsian pembelajaran secara konvensional di atas talian.

Perbezaan "*White Box*" dengan Pemegang Telefon yang Berada di Pasaran

Seperti yang diketahui umum, terdapat banyak reka bentuk pemegang telefon yang berada di pasaran. Masalah utama yang dihadapi adalah produk tersebut tidak dapat menampung berat telefon pintar apabila diletakkan secara selari dengan kertas kesan daripada kedudukan kamera yang tidak tegak mengakibatkan video yang dipaparkan melalui kamera kurang jelas dan mengurangkan tumpuan pelajar. Selain sudut penyampaian yang kurang jelas, tangan pengajar juga akan melindungi pandangan pelajar dan mengganggu pencahayaan yang baik ketika pembelajaran sedang berlaku. "*White Box*" direka khas untuk menampung berat telefon pintar pelbagai saiz oleh kerana mempunyai permukaan tempat yang luas dan tapak yang stabil.

Penyampaian Secara Langsung (*Live*)

Sebelum kewujudan "*White Box*" penulis menulis menyediakan slaid pengiraan yang sudah siap menggunakan aplikasi Microsoft Excel. Hal ini menyebabkan pelajar gagal fokus dan tidak memahami jalan kerja yang dipaparkan. Dengan penggunaan "*White Box*" penulis dapat menunjukkan setiap jalan kerja satu per satu di atas kertas seperti yang berlaku di dalam kelas sebenar. Impaknya pelajar lebih memahami jalan kira yang diterbitkan menggunakan formula yang terlibat. Begitu juga dengan subjek yang melibatkan lukisan seperti Lukisan Kejuruteraan. Pensyarah dapat menunjukkan setiap langkah lukisan dengan baik selepas menggunakan "*White Box*".

Ciri-Ciri "*White Box*"

Sebelum membangunkan produk ini, penulis telah mengambil kira empat ciri-ciri khas yang akan ditengahkan dalam "*White Box*" iaitu keupayaan boleh lipat, kukuh, pencahayaan dan ruang kamera.

Kebolehupayaan boleh lipat. Konsep mudah lipat dititikberatkan supaya produk ini mudah untuk disimpan. Hal ini bertujuan untuk memudahkan dan menjimat ruang untuk menyimpan "*White Box*". Selain daripada itu, konsep reka bentuk ini juga dapat membantu memudahkan pensyarah membawa "*White Box*" ini dari satu tempat ke satu tempat.

Kukuh. Rangka *Imfraboard* digabungkan dengan menggunakan engsel aluminium yang ringan. Selain berfungsi sebagai penggabung antara rangka, ianya juga berfungsi sebagai "Locking System" atau pengunci bagi memberikan ciri yang teguh kepada produk.

Lampu LED tanpa wayar mudah alih. Produk dilengkapi dengan Lampu LED tanpa wayar yang dilengkapi dengan teknologi magnet mudah pasang. Selain itu, Lampu LED ini boleh dicaj berulang kali menggunakan kabel pengecasan jenis C. Lampu LED ini memberikan pencahayaan sempurna yang memberi keselesaan kepada pengajar dan pelajar.

Ruang kamera. Di bahagian atas produk dilengkapi satu ruang lebar bersaiz 4 inci yang sesuai untuk saiz kamera telefon bimbit yang berada di pasaran. Selain penggunaan telefon bimbit, "Webcam" juga boleh digunakan. Ruang yang berpusat di bahagian tengah kotak secara memanjang membolehkan pengguna melaraskan kamera mengikut kesesuaian sendiri.

Pernyataan Masalah

Semenjak Perintah Kawalan Pergerakan dilaksanakan, tenaga pelajar perlu memikirkan satu kaedah pengajaran yang sesuai untuk dilaksanakan secara maya. Bagi pensyarah yang mengajar mata pelajaran yang memerlukan teknik pengajaran dan pembelajaran secara penulisan, mereka menghadapi kesukaran untuk menjalankan aktiviti pengajaran dan pembelajaran dalam talian (PdPDT) (*Mamat, 2020*). Sebagai contoh, pensyarah yang mengajar Lukisan Kejuruteraan

menghadapi kesukaran untuk menunjukan teknik lukisan dengan menggunakan alatan kejuruteraan. Selain itu, bagi mata pelajaran Matematik Kejuruteraan, pensyarah sukar untuk menunjukkan jalan kerja penyelesaian masalah matematik secara maya. Sebelum *"White Box"* dibangunkan kebanyakan pensyarah menggunakan kamera telefon bimbit bersama *"phone holder"* untuk menjalankan PdPDT. Namun begitu, gabungan kedua-dua alatan ini adalah tidak sesuai berikutan sudut kamera yang tidak dapat diletakkan secara 180^{o}. Kesan daripada kedudukan kamera yang tidak tegak mengakibatkan video yang dipaparkan melalui kamera tidak memuaskan.

Fokus Kajian

Skop kajian ini hanya fokus kepada subjek PdPDT yang memerlukan teknik pengajaran konvensional dan memerlukan demonstrasi pengajar secara bertulis atau lukis yang tidak melibatkan teknologi perincian komputer "*White Box*" telah digunakan sejak tahun 2020. Tidak dapat dinafikan bahawa PdPDT sudah tidak lagi menjadi norma sekarang apabila Covid-19 sudah tiada. Walau bagaimanapun, masih lagi terdapat kursus-kursus secara dalam talian yang ditawarkan dari Institusi Pengajian Awam. Selain dari itu, "*White Box*" ini juga boleh digunakan apabila pensyarah ingin membuat kelas tambahan di luar waktu kelas. Produk ini sangat bersesuaian dengan subjek yang melibatkan pengiraan dan lukisan.

Objektif Kajian

Objektif kajian ini adalah seperti berikut**:**

1. Membangunkan satu set soalan kajian soal selidik berkaitan tahap kepuasan penggunaan *"White Box"*.
2. Memudah cara proses PdPDT sebagai medium pertukaran ilmu antara pensyarah dan pelajar.
3. Mendapatkan tahap kepuasan pengguna daripada pensyarah dan pelajar.

Kumpulan Sasaran

Kumpulan sasaran dalam pembangunan produk ini adalah dalam kalangan pensyarah dan pelajar. Soal selidik telah diberikan kepada pensyarah sebagai responden yang menggunakan "*White Box*" sebagai alat bantuan mengajar manakala pelajar sebagai responden yang melihat dan belajar melalui "*White Box*".

Metodologi Kajian

Kaedah kajian ini dilakukan secara kuantitatif. Perlaksanaan projek ini dibahagikan kepada tiga fasa. Fasa yang pertama adalah pembangunan produk, diikuti dengan penggunaan produk dan kaji selidik keberkesanan kepada pensyarah dan pelajar.

Pembangunan "*White Box*". Faktor utama yang diberi keutamaan dalam pembangunan projek ini adalah kebolehupayaan untuk melipat dan berat. Oleh yang demikian, penulis telah memilih infraboard sebagai rangka utama produk. Ukuran produk bersaiz 75×75×75cm memberikan satu ruang yang selesa kepada pengguna yang boleh memuatkan kertas A3 dan alatan lukisan/pengiraan. Walaupun bersaiz agak besar, produk boleh dilipat dengan senang dan mudah untuk disimpan tanpa memakan ruang yang banyak. Untuk mendapatkan keupayaan boleh lipat, mini engsel telah digunakan sebagai sistem sendi produk ini. Satu ruang kamera telah disediakan berukuran 5×15cm pada permukaan atas "*White Box*".

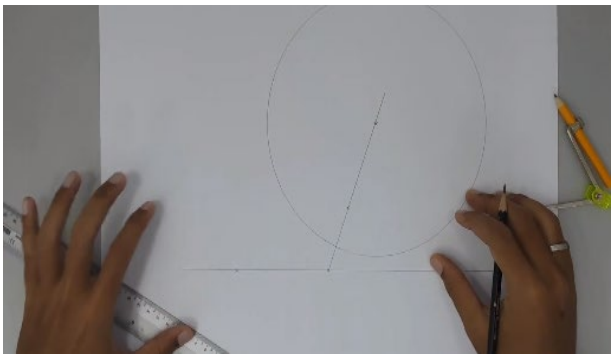
Rajah 1. Rupa bentuk "*White Box*"

Rajah 2. Lampu LED wireless dipasang secara magnet

Penggunaan "*White Box*". Kaedah penggunaan "*White Box*" adalah sama secara amnya di mana pensyarah masih perlu untuk menggunakan mana-mana platform dalam talian seperti Google Meet, Webex dan sebagainya. Bezanya adalah kedudukan peranti yang lebih baik untuk mendapatkan paparan yang lebih jelas kepada pelajar. Sudut penyampaian "Point of View" memberikan gambaran seakan-akan daripada pandangan pengajar. Visual yang hendak disampaikan jelas kelihatan daripada pandangan atas. Bantuan pencahayaan daripada Lampu LED tanpa Wayar meningkatkan daya Fokus kamera.

Rajah 3. Kedudukan telefon pintar atau "*Webcam*"

Rajah 4. Situasi semasa menggunakan "*White Box*"



Rajah 5. Pandangan dari sudut pelajar

Soal Selidik Keberkesanan "*White Box*". Penulis telah merangka satu set soalan soal selidik untuk mendapatkan maklum balas penggunaan "*White Box*". Satu pautan telah diberikan kepada pensyarah dan pelajar yang terlibat dalam penggunaan produk ini. Jumlah responden yang telah dikumpul adalah seramai 71 orang di mana 27 daripada jumlah tersebut adalah pensyarah manakala selebihnya 44 responden adalah pelajar. Pensyarah yang dipilih adalah dalam kalangan yang pernah menggunakan "*White Box*" sebagai alat PdPDT dan juga yang telah melihat secara langsung penggunaannya. Manakala responden pelajar yang dipilih adalah yang telah belajar melalui PdPDT menggunakan "*White Box*". Sebanyak 12 soalan telah diberikan. Soalan adalah berfokus kepada penggunaan, visual dan pencahayaan pengguna semasa menggunakan "*White Box*".

Hasil Kajian

Respons daripada 71 responden telah dikumpul dan dianalisis. Seterusnya penulis telah memaparkan hasil respons yang dikumpulan dalam Jadual 1.

Soalan Soal Selidik	Sangat tidak setuju	Tidak setuju	Neutral	Setuju	Sangat setuju
"*White Box*" ringan dan mudah untuk dibawa.	2		7	12	50
Pemasangan "*White Box*" mudah dan tidak mengambil masa yang lama.	1	1	7	15	47
Ciri reka bentuk "*White Box*" agak menarik.	2		10	19	40
Saiz "*White Box*" sesuai dan selesa untuk pengajaran subjek Lukisan dan Pengiraan.	2	2	7	10	50
Penyimpanan "*White Box*" mudah dan tidak mengambil masa yang lama.	2	2	6	12	49
"*White Box*" membantu proses saya untuk mendapatkan visual yang lebih jelas.	2	2	6	14	47
Sudut penglihatan daripada atas memberikan gambaran secara menyeluruh berkaitan maklumat yang disampaikan.	2	1	7	16	45
Lampu Cahaya LED memastikan gambaran yang lebih jelas dan jitu.	2	1	7	14	47
Paparan yang boleh zum/dibesarkan pada skrin paparan membantu saya untuk lebih fokus.	2	1	5	13	50
"*White Box*" membantu saya untuk fokus dengan proses pembelajaran dan pengajaran yang berlangsung.	2	1	5	15	48
Adakah konsep "*White Box*" sesuai dipraktikan di subjek-subjek lain di JKM.	3				68
Adakah keperluan untuk mengadakan kursus jangka pendek untuk berkongsi cara menggunakan Alat Bantu Perkongsian Pembelajaran Lukisan dan Pengiraan "*White Box*"?	13				58
Frekuensi	35	11	67	140	599

Hasil dapatan kajian ini majoriti berpuas hati dengan penggunaan "*White Box*". Seramai 87.3% dari responden bersetuju produk ini ringan dan mudah dibawa. Penggunaan produk ini juga praktikal di mana ia dibuktikan dengan 87.3% bersetuju produk ini mudah dipasang dan mengambil masa yang singkat. Majoriti juga bersetuju "*White Box*" mempunyai saiz yang sesuai untuk digunakan semasa PdPDT. Dari konteks visual pula, 85.9% responden bersetuju dengan kenyataan sudut kamera pada "*White Box*" lebih baik dengan memberikan gambaran secara menyeluruh dengan maklumat yang ingin disampaikan. Seramai 61 daripada 71 responden mengatakan bahawa lampu LED yang dipasang membantu untuk mendapatkan gambar yang lebih jelas dalam kamera, 7 daripadanya menjawab neutral dan 3 responden tidak bersetuju. Secara keseluruhan, melihat daripada frekuensi majoriti responden berpuas hati dengan penggunaan "*White Box*".

Kesimpulan

Kajian ini dijalankan dari pembangunan dan penggunaan satu alat bantuan mengajar yang dinamakan "*White Box*". Pada masa yang sama satu soal selidik kadar kepuasan pengguna telah diedarkan. Rangkuman daripada hasil dapatan kajian dapat dibuktikan penggunaan "*White Box*" banyak membantu pensyarah dan pelajar dalam PdPDT. Kebolehcapaian dan sudut penglihatan pelajar amat penting semasa PdPDT. Hal ini kerana pelajar akan mudah bosan jika sudut visual mereka tidak memuaskan dan menyebabkan mereka hilang minat untuk mengikuti mata pelajaran yang sedang berlangsung. Berikutnya, dengan pembangunan produk ini secara tidak langsung meningkatkan motivasi pelajar untuk menghadiri kelas secara dalam talian. Pensyarah juga lebih mudah untuk membuat kelas ulang kaji dan tidak memerlukan mereka dan pelajar hadir secara fizikal lagi. Kesimpulannya, pembangunan "*White Box*" sebagai alat bantu mengajar adalah diperlukan dan boleh diperluaskan lagi penggunaanya.

Rujukan

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Asas Pensabitan Suami Nusyuz: Satu Tinjauan Literatur

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Abstrak. Ketidakpatuhan isteri terhadap suami dalam hal-hal yang dituntut agama ditakrifkan sebagai nusyuz dan layak dikenakan hukuman oleh suami sebagai didikan. Realitinya perbendaharaan hukum Islam tidak pernah menoktahkan nusyuz hanya semata-mata ketidakpatuhan isteri berperanan. Sebahagian para ulama' turut membincangkan perilaku suami nusyuz pada konteks tertentu. Menerusi metodologi kajian secara kualitatif menerusi tinjauan literatur mendapati terdapat asas yang signifikan kepada pensabitan nusyuz seorang suami dari aspek pengabaian nafkah, menzalimi pasangan dan pengabaian pendidikan agama. Asas-asas sedemikian dalam rangka kebertanggungjawaban suami kepada isteri perlu diperincikan dengan lebih jelas pada ukuran konteks semasa. Sebagai cadangan dalam usaha meningkatkan kefahaman masyarakat Islam di Malaysia, Modul Bersepadu Praperkahwinan Islam (MBPKI) perlu dinilai semula secara lebih berstruktur. Diharapkan pelarasan oleh pihak JAKIM dan JAIN menyambut baik saranan ini agar pasangan-pasangan yang hadir ke kursus praperkahwinan mendapat input yang lebih inklusif dan eksklusif pada kerukunan ilmu rumah tangga.

Kata kunci: Suami, Pensabitan Nusyuz, MBPKI.

Pengenalan

Nusyuz secara umumnya amat sinonim dalam kehidupan hal ehwal rumah tangga pasangan suami dan isteri. Dalam perbendaharaan hukum Islam, nusyuz antara lain berpunca daripada keguguran ketaatan isteri terhadap suami ketika melakukan beberapa perkara asas sehingga membawa permusuhan, kemudaratan serta kebencian dalam kehidupan rumah tangga (Muhammad Zuhailiy, 2011). Larangan ini turut disebut secara jelas dalam al-Quran mahupun al-Hadith. Antara ciri-ciri dianggap memenuhi kriteria nusyuz bukan hanya dinilai melalui perbuatan bahkan merangkumi tutur lisan pasangan (Al-Syarbini, 1994). Walau bagaimanapun pemikiran masyarakat Islam kontemporari seperti jumud dalam perspektif isteri sebagai punca utama nusyuz. Adakah layak dihukum seorang isteri berlaku nusyuz sekiranya ketidakpatuhan isteri kepada suami hanyalah semata-mata mendapatkan hak sebagai tanggungjawab seorang suami kepada isteri yang wajib dilaksanakan. Oleh demikian, kajian menumpukan objektif perbincangan mengenai asas-asas pensabitan suami nusyuz dalam konteks hukum Islam sebenar. Hasil perbincangan mampu menjernihkan Islam bercirikan sifat *wasatiyyah* dan *tawazun* terutamanya dalam membela hak asasi keadilan seorang isteri dalam rumah tangga.

Metodologi

Penulis memilih reka bentuk kajian secara pengumpulan data berasaskan kajian perpustakaan. Asasnya tujuan kajian adalah untuk melihat kepada asas-asas pensabitan suami nusyuz. Oleh yang demikian, penyelidik melakukan tinjauan kepada kajian-kajian lepas yang berkaitan objektif utama kajian. Empat kaedah diaplikasi dalam kajian ini melalui pengkalan data *Google Scholar* iaitu pencarian, pemilihan, pengekstrakan dan analisis data. Seterusnya strategi kajian hasil pengumpulan data berdasarkan teknik induktif dan komparatif diguna pakai.

Analisis Perbincangan

Kriteria Asas Pensabitan Nusyuz Suami Terhadap Isteri

Pengabaian Nafkah. Kajian oleh Musthapar & Ahmad (2022) mendapati antara polemik paling utama perhubungan suami isteri di Malaysia antaranya kegagalan pengurusan ekonomi. Dalam erti kata lain bermaksud nafkah. Bagi Wahbah Al-Zuhailiy (1985), hak nafkah terhadap isteri berbentuk harta dan bukan harta. Antara peringatan yang sering dirakamkan melalui kisah Abu Sufyan yang mengabaikan tanggungjawab menafkahi isterinya Hindun binti 'Atbah sehingga Rasulullah SAW membenarkannya mengambil harta suaminya sekadar yang perlu bagi perbelanjaan diri dan anak-anak (Riwayat Al-Bukhari, No. 5364, 1026).

Seterusnya di dalam sebuah hadith lain diriwayatkan Rasulullah SAW menekankan kewajipan nafkah oleh suami kepada isteri mengikut kemampuan suami sekadarnya seperti makanan dan pakaian (Riwayat Abu Dawud, No.2142, 476). Melalui firman Allah SWT yang lain turut mengingatkan kewajipan utama suami ke atas isterinya adalah dengan menyediakan sebuah kediaman yang baik

أَسْكِنُوهُنَّ مِنْ حَيْثُ سَكَنتُم مِّن وُجْدِكُمْ

(Surah al-Talaq: 6)

> Yang bermaksud: "Tempatkanlah isteri-isteri (yang menjalani idahnya) itu di tempat kediaman kamu sesuai dengan kemampuan kamu".

Menurut Aswat & Rahman (2021), nafkah yang berterusan amat mendapat perhatian di sisi agama kerana implikasinya mengundang kemudaratan terhadap isteri dan anak-anak sekiranya diabaikan. Kemudaratan ini diperluaskan oleh Harun & Ali (2021) dalam kajiannya untuk membina kesejahteraan sebuah keluarga harmoni, seorang suami harus bertanggungjawab dalam menafkahi keluarganya dalam aspek ekonomi. Sekiranya di bawah pengetahuan isteri masih berlaku ketidakmampuan suami menyempurnakan tanggungjawab nafkah sebelum perkahwinan, Islam masih membenarkan pembubaran dilakukan berdasarkan peruntukan keluarga Islam negeri melalui jalan fasakh (Hashim & Kusrin, 2023). Demikian rumusan

Menzalimi Pasangan. Kajian menunjukkan tanpa komunikasi yang harmoni, akan memberi kesan kepada kepuasan dalam kesejahteraan hubungan antara pasangan (Suzana Mohd., Manap, J., dan Zakaria, (2020). Demikian itu, bagi kualiti perkahwinan amat bergantung kepada kebijaksanaan pasangan dalam menggambarkan komunikasi yang baik. Berlaku sopan terhadap pasangan, memberi layanan mesra, sentiasa berkasih sayang, mengambil berat antara *mu'asyarah* (pergaulan) yang dituntut (Fadzilah Kamsah & Abdullah Hassan (2004). Sejajar peringatan daripada Allah SWT kepada hamba-Nya:

وَعَاشِرُوهُنَّ بِٱلْمَعْرُوفِ ۚ فَإِن كَرِهْتُمُوهُنَّ فَعَسَىٰٓ أَن تَكْرَهُوا۟ شَيْـًٔا وَيَجْعَلَ ٱللَّهُ فِيهِ خَيْرًا كَثِيرًا

(Surah al-Nisa: 19)

> Yang bermaksud: Dan bergaulah kamu dengan mereka (isteri-isteri kamu itu) dengan cara yang baik. Kemudian jika kamu (merasai) benci kepada mereka (disebabkan tingkah-lakunya, janganlah kamu terburu-buru menceraikannya), kerana boleh jadi kamu bencikan sesuatu, sedang Allah hendak menjadikan pada apa yang kamu benci itu kebaikan yang banyak (untuk kamu).

Ayat di atas secara mafhumnya dapat difahami dengan kegagalan mewujudkan pergaulan yang harmoni dalam hubungan merupakan suatu kezaliman kepada pasangan secara jelas.

Apa sahaja perbuatan mencederakan fizikal seperti memukul dengan niat mencederakan, yidak menghiraukan isteri ketika sakit, menyetubuhi isteri melalui jalan paksa atau diharamkan agama merupakan satu bentuk asas sabitan yang jelas. Kemudian pengabaian keperluan seksual isteri turut menjadi kriteria utama suami berperilaku nusyuz. Keperluan ini merupakan satu kewajipan malah menjadi fitrah kepada suami yang sentiasa terarah pada tujuan yang sama. Firman Allah SWT:

هُنَّ لِبَاسٌ لَّكُمْ وَأَنتُمْ لِبَاسٌ لَّهُنَّ

(Surah al-Baqarah: 187)

Yang bermaksud: Mereka itu adalah pakaian bagimu, dan kamu pun adalah pakaian bagi mereka.

Justeru sabitan nusyuz seorang suami bermula apabila tindakan isteri berterusan mendiamkan diri demi memenuhi hak suami walhal jelas menyalahi ajaran Islam. Hasanah Che Ismail (2006) berpendapat setiap perbuatan ini dapat dicegah lebih awal sekiranya pasangan menguasai kemahiran komunikasi yang cekap dalam menguruskan kestabilan hubungan dalam perkahwinan. Sukar menjadi pendengar yang baik, terus menghukum, tidak berterus terang dan jujur antara aspek nilai paling dominan. Komunikasi pasangan yang amat positif haruslah bermula dengan saling mengamalkan sikap keterbukaan serta mempercayai antara satu sama lain (Hardsen, 2015)

Seterusnya kezaliman berbentuk batin turut mengheret asas kepada pesabitan suami nusyuz. Tidak sebagaimana penderaan fizikal yang jelas memberi kesan ke atas tubuh badan, namun kezaliman ini berbentuk pengabaian emosi dalaman isteri secara keterlaluan sehingga memudaratkan perhubungan. Misalnya memboikot isteri dengan berdiam diri, melafazkan kata-kata kesat, membuka keaiban, bersangka buruk dan menolak tidur bersama antara perbuatan yang ditegah (Salih al-Ghanim, 1996).

Pengabaian Pendidikan Agama. Tanggungjawab suami kepada pasangan bukan sahaja sebagai pemimpin dan pelindung, malah menjadi faktor ketenteraman, kedamaian dan kebahagiaan kepada konsep *sakinah* sebagaimana dituntut agama (Azahari & Jaapar, 2011). Sehubungan dengan itu, salah satu hak terbesar isteri kepada suami adalah wajib mendapatkan pengetahuan dalam konteks keagamaan. Firman Allah ‘Azza wa jalla:

يَٰٓأَيُّهَا ٱلَّذِينَ ءَامَنُواْ قُوٓاْ أَنفُسَكُمْ وَأَهْلِيكُمْ نَارًا وَقُودُهَا ٱلنَّاسُ وَٱلْحِجَارَةُ عَلَيْهَا مَلَٰٓئِكَةٌ غِلَاظٌ شِدَادٌ لَّا يَعْصُونَ ٱللَّهَ مَآ أَمَرَهُمْ وَيَفْعَلُونَ مَا يُؤْمَرُونَ

(Surah al-Tahrim: 6)

Yang bermaksud: Wahai orang-orang yang beriman! Peliharalah diri kamu dan keluarga kamu dari neraka yang bahan-bahan bakarannya: Manusia dan batu (berhala); Neraka itu dijaga dan dikawal oleh malaikat-malaikat yang keras kasar (layanannya); mereka tidak menderhaka kepada Allah dalam segala yang diperintahkan-Nya kepada mereka, dan mereka pula tetap melakukan segala yang diperintahkan.

Menurut Al-Syaukani (2007) ingatan di atas membawa mesej kepada suami untuk melakukan apa yang diwajibkan oleh syariat dan meninggalkan apa yang terlarang sama sekali khususnya aspek didikan ilmu. Menurut Rashid (2023), pengamatan dalam nilai agama yang tinggi merupakan kunci utama kebahagiaan pasangan. Tanpa didikan yang berterusan akhirnya membawa realiti kezaliman suami terhadap isteri iaitu ketidaktaatan dalam hubungan (Musthapar, Azahari & Ahmad (2020). Amini (2007) menjelaskan dalam konteks seorang isteri untuk mempelajari ilmu agama yang bersifat

kefarduan baginya adalah dibolehkan mempelajari sama ada secara bersemuka, menghadiri wacana ilmiah mahupun menyertai program-program keagamaan. Sekiranya kefahaman agama isteri pada peringkat yang baik pada asasnya, maka tiada kewajiban baginya meneruskan pengajian selagi mana kemampuan suami lebih baik. Pada masa yang sama amat dituntut suami lebih berusaha mempelajari pengajian agama berterusan dengan mendampingi para asatizah dalam permasalahan hukum dari masa ke masa (Sayyid Sabbiq: *t.t*)

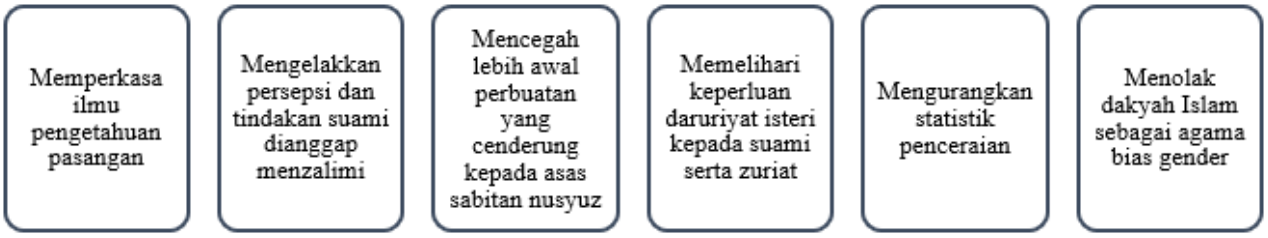
Oleh demikian, asas-asas yang telah dibincangkan berikut bukanlah suatu yang baharu kepada dunia perbendaharaan hukum Islam. Dalilnya telah dirakamkan secara jelas dalam tuntasan karya para ulama'. Namun begitu, naratif masyarakat sedikit terbatas kepada polemik rumah tangga lantaran persepsi "isteri nusyuz" tidak mudah padam malah telah berjaya menguasai pemikiran umat khususnya di Malaysia. Jelas antara medium yang sangat wajar untuk mengembalikan disiplin ilmu yang kian pudar adalah melalui penambahbaikan kurikulum kursus praperkahwinan. Usaha ini mampu memberikan ilmu yang lebih eksklusif dalam mempengaruhi pasangan ke arah watak yang dituntut oleh Islam sebagai suami mahupun isteri yang lebih berhikmah.

Modul Bersepadu Praperkahwinan Islam (MBPKI)

Digubal pada tahun 1996 dan diwajibkan pelaksanaannya pada tahun berikutnya. Telah melalui siri penambahbaikan sebanyak tiga kali sehingga versi terakhir pada 2012. Beberapa input baharu berasaskan maklumat lebih interaktif, ilustrasi foto, video serta elemen-elemen dokumentari. Modul ini merupakan antara usaha awal oleh Kerajaan Malaysia bagi pelarasan setiap negeri bawah Jabatan Agama Islam Negeri (JAIN) bersama pihak JAKIM bagi menyediakan platform ilmu rumah tangga kepada pasangan bakal berkahwin. Pada tahun 2016 satu garis panduan pelaksanaan kursus berasaskan MBPKI bagi pemusatan yang lebih cekap kepada pemegang taruh dalam penganjuran kursus dalam dan luar negara. Garis panduan ini turut meletakkan sasaran disemak setiap lima (5) tahun sekali. Walau bagaimanapun sehingga hari ini masih tiada modul semakan terkini dikeluarkan.

Bagi menyempurnakan kursus ini pasangan perlu mempelajari 11 subtopik berkaitan ilmu kekeluargaan Islam merangkumi 13 jam mata kredit selama tempoh dua (2) hari berkursus. Jika diperincikan semua subtopik akan dilaksanakan sekitar satu hingga dua jam sahaja bagi setiap slot. Penetapan had jam adalah baik namun harus realistik kepada konteks pendedahan nilai dan keberkesanan ilmu kepada para peserta Khususnya topik nusyuz merupakan antara topik yang seharusnya diwacanakan dengan penuh ilmiah dan komprehensif kepada peserta tanpa mengira latar belakang akademik.

Hal ini berikutan majoriti faktor awal konflik rumah tangga adalah disebabkan pengurangan tanggungjawab antara pasangan. Maka tajuk nusyuz harus diberi peranan lebih utama kepada peserta. Hakikatnya ramai pasangan kurang terkesan dan didedahkan dengan ilmu yang tidak lengkap dengan penganjuran kursus yang kurang efektif dalam aspek pengisian dan bahan kursus (*outdated*). Meneliti garis panduan pelaksanaan, penyusunan tajuk-tajuk harus distruktur semula terutamanya judul isu-isu pembubaran perkahwinan agar langkah-langkah membendung faktor perceraian pasangan muda dapat ditangani dengan lebih berkesan melalui kefahaman asas-asas pensabitan nusyuz mengikut acuan hukum Islam kontemporari.



Rajah 1. Pensabitan Asas-asas Suami Nusyuz dalam Konteks Perkahwinan

Rumusan

Asas pensabitan nusyuz disebutkan di dalam al-Quran dan al-Sunnah sebagai bukti Islam amat cakna dalam kerukunan rumah tangga. Kriteria asas pensabitan seperti dibahaskan boleh diukur menerusi kesempurnaan tanggungjawab dan peranan oleh pasangan. Sedia maklum suami dan isteri harus jelas keberkesanan tanggungjawab yang perlu dilaksanakan dalam institusi kekeluargaan. Seandainya nyata salah seorang mengurangi hak-hak pasangannya maka hukuman berbentuk didikan (*ta'dib*) dituntut agar meraih kembali elemen ketaatan. Peranan ini sudah tentunya disokong melalui pendedahan Modul Bersepadu Kursus Praperkahwinan Islam (MBPKI). Melihat statistik perceraian mutakhir ini semakin membimbangkan bagi pasangan muda, setiap individu dan masyarakat hendaklah mempunyai kesedaran yang tinggi dan memainkan peranan penting bagi mengekalkan pembinaan generasi kekeluargaan Islam yang berkualiti dengan kefahaman konsep nusyuz sebagai titik sempadan.

Perakuan

Penyelidik merakamkan setinggi penghargaan kepada Kolej Komuniti Semporna khususnya Unit Penyelidikan Inovasi dan Komersialan (UPIK) bagi kelulusan menjalankan penyelidikan bagi penerbitan ini. Diharapkan dapatan kajian memberi impak positif kepada amalan di agensi berkaitan seterusnya menjadi nilai tambah asas (*fundamental added value*) pembelajaran dan pengajaran (PdP) di institusi.

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Examining the Role of Peer Support in Enhancing Student Learning in Polytechnic Institutions: A Comprehensive Analysis of Student Perceptions

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Abstract. This research delves into students' perceptions of peer support within the polytechnic education, encompassing diverse dimensions such as informational, emotional, instructional, confirmation/feedback, and overall peer assistance. The primary objective is to comprehensively gauge how peer support influences student learning in polytechnic institutions. Employing a quantitative design, the study utilized a Google Form questionnaire with two main sections: the respondent's profile and five facets of peer support. A total of 70 randomly selected participants contributed to the study. The analysis revealed that instructional support garnered the highest mean score, underscoring the pivotal role of peer support in empowering students towards favorable educational outcomes. These findings imply the significance of further exploration into the intricate relationship between various facets of peer support and the enhancement of students' learning experiences, particularly within the realm of polytechnics.

Keywords: Peer support; Informational support; Emotional support; Instructional support; Companionship support.

Introduction

Problem Statement. Peers wield undeniable influence in higher education, aligning with Crisp, Rickwood, Martin, and Bryom's (2020) perspective that a peer support center is crucial in constituting a valuable facet of mental health support services on campus. This, in turn, positively impacts students by enhancing resilience, confidence, and overall mental well-being. Indirectly, peer support programs empower students and create opportunities for engagement, fostering a safe and inclusive learning environment. Consequently, this contributes to positive youth development and nurtures a healthier school culture.

In higher education institutions, peer support plays a vital role in guiding students through their university journey, particularly in addressing mental health challenges. It is emerging as a valuable complement to professional services, aiding students in identifying and addressing their struggles while bridging the gap for those hesitant to seek professional help. However, research by Brar, Ryu, Shaikh, Altman, and Ng (2012) during the years 2005-2007 revealed a significant prevalence of students facing enduring mental health problems. Unfortunately, less than half of these students received effective treatment within two years. Has peer support lost its potential to foster a healthy learning culture? In light of this, the researchers aim to scrutinize the extent to which peer support can strengthen student learning in a polytechnic context.

Methodology

Research Design. This study adopts a quantitative research design, employing numerical representation and manipulation of observations to describe and elucidate underlying phenomena. Quantitative research finds widespread application across diverse natural and social sciences, encompassing fields such as physics, biology, psychology, sociology, and geology. Rooted in empirical methods and statements, as delineated by Cohen, Lewis, Swanson, and Hebert (1980), it offers descriptive insights into real-world situations, moving beyond idealized scenarios. As outlined

by Creswell (1994), quantitative research is distinguished by its collection of numerical data and subsequent analysis through mathematical techniques, providing a valuable approach to comprehending complex phenomena.

Population and Sampling. The population, in this context, encompasses the entire unit or object with the relevant characteristics under study, representing a group to which research findings can be generalized. For this study, the population consists of students aged 18 years and above who are pursuing diploma studies at a polytechnic. A group of such students was randomly selected as study respondents. The concept of a sample is introduced as a subset of the population that provides insights into the whole. It is emphasized that an ideal sample should be proportional, encompassing all characteristics of the population and selected fairly.

In this study, Semester 3 students are given priority due to their ability to understand and identify the best option based on their experiences at the polytechnic. Consequently, a total of 90 Semester 3 students voluntarily registered as respondents for the study. Utilizing the Table for Determining Sample Size (Krejcie & Morgan, 1970), 70 of them will be identified through a simple random sampling method. This method is employed to ensure that each individual has an equal opportunity for selection (Sharma, 2017).

Research Instrument. The researcher employed a questionnaire as the research instrument, utilizing Google Forms for data collection. The questionnaire comprised two distinct parts: Part 1 gathered demographic information about the respondents, including gender and academic program, while Part 2 focused on peer support. Part 2 consisted of twenty-two items categorized into five dimensions: emotional support (5 items), instrumental support (4 items), informational support (3 items), peer support (4 items), and validation (6 items). This instrument was adapted from the Peer Support Questionnaire (PSQ), developed and validated by Mahnaz and Hedieh (2021). Each item utilized a six-point Likert Scale, ranging from (1) Strongly Disagree to (6) Strongly Agree, facilitating a comprehensive assessment of students' perceptions regarding peer support in their learning experience.

Pilot Test. A pilot study refers to a quantitative investigation of a small sample conducted before a large-scale study or clinical trial (Connelly, 2008). It uses similar methods and procedures for the larger study it is intended for, providing important data to justify and guide subsequent research efforts. Unlike purely exploratory studies, pilot studies play an important role in anticipating and mitigating unexpected challenges in collecting patient data in a dynamic clinical environment. This preliminary research serves to test the reliability of the results, such as Cronbach's Alpha coefficient, with this study showing a high-reliability score of .95 based on responses from 40 participants involved in the pilot study.

Research Findings

Descriptive Findings. The study's findings illuminate that within the assessment of informational support, Item 5 emerges prominently with the highest mean score of 4.58. This signifies that peer support plays a significant role in fostering a culture of enriching knowledge-sharing. This observation resonates with Japanese educational practices, where there is a strong emphasis on cultivating robust student relationships and early collaborative group work, contributing to a well-established peer support system (James, Cowie, & Toda, 2013). In Japanese preschool settings, the positive influence of peer support is evident as students who misbehave are encouraged to emulate the well-behaved majority group. Closely following, Item 1 records the second-highest mean score at 4.49, underscoring that peer support contributes to elevated knowledge levels and improved academic performance among students. While researchers may employ diverse terms to characterize student-student teaching within the broader concept of peer support, its core purpose remains consistent: pairing less experienced students with successful peers to enhance academic performance without burdening teachers unduly. Conversely, Item 4 presents the lowest mean score for

informational support at 3.97, suggesting that peer support may not universally propel students toward pursuing further studies and achieving their educational goals. Individual opinions and plans regarding higher education may vary among students, highlighting the nuanced nature of the impact of peer support in this context.

In emotional support, Item 2 leads with the highest mean score (4.58), indicating that classmates' assistance reduces academic-related anxiety. This connection between emotional support and academic performance is grounded in the idea that a student's success is linked to peer dynamics, fostering intellectual stimulation or motivation based on self-awareness and independence (Filade Bello, Uwaoma, Anwanane, & Nwangburuka, 2019). Peer influence positively impacts academic achievement. Following closely, Item 1 scores the second-highest mean (4.57), emphasizing that peer support boosts students' classroom self-confidence, providing fresh perspectives and enriching their learning experience. However, Item 4 records the lowest mean score (4.30), indicating peers contribute less to emotional security in learning. Peer emotional support, associated with positive academic and social outcomes, fosters school belonging, counters loneliness, and promotes overall well-being. Studying how peers promote school belonging is crucial, especially in ethnically diverse urban schools at the middle school level.

In terms of instructional support, Item 2 stands out with an impressive mean score of 4.64, highlighting how classmates play a key role in offering practical assistance that empowers learners to attain favorable educational outcomes. This aligns with the implementation of peer support systems in schools, as discussed by Visser (2005), within the framework of Bronfenbrenner's system theory, recognizing the multi-level interactions between micro, exo, and macro levels of the educational system. Establishing an effective peer support system, as outlined by Sarason (1996), necessitates simultaneous changes across various domains and levels of the educational system and the broader community.

Closely following, Item 3 secures the second-highest mean score at 4.54, highlighting that peer advice enhances students' preparedness to employ effective learning strategies. These strategies, per Chamot (2004), involve conscious actions aligned with learning goals, encompassing an understanding of task requirements and metacognitive knowledge. While often unobservable, they manifest in behaviors like selectively focusing on main ideas and taking notes to aid memory during a newscast.

Conversely, Item 1 records the lowest mean score at 4.42, indicating that peer classmates' contributions to improving attention toward learning materials may be less pronounced. Sarason's (1996) concept of establishing an effective peer support system as a psychological intervention underscores the complexity, requiring comprehensive changes across various domains and levels within the educational system and the community, as emphasized by Visser (2005). Bateson (1979) further highlights the impact of actions at different levels, illustrating how school organization-level actions can influence sub-systems like teacher-student interactions within schools.

In the realm of validation and feedback, Item 1 takes the lead with a mean score of 4.55, highlighting how peer feedback fosters student cooperation, and creates a positive learning environment. This is exemplified by Japanese educational practices where teachers encourage students to form close-knit groups, promoting collaborative activities such as learning, dining, cleaning, and project completion (James et al., 2013). Consequently, peer support systems in Japan align with their cultural values.

Table 1. Descriptive findings on dimensions of peer support (N=74)

No.	Item	Likert Scale						Mean	S.D.
		1	2	3	4	5	6		
Dimension: Informational Support									
1	Peer support enhances my level of knowledge and academic performance.	4 5.4	4 5.4	11 14.9	12 16.2	19 25.7	24 32.4	4.49	1.483
2	Peer support makes me actively engaged in my studies.	3 4.1	5 6.8	7 9.5	24 32.4	19 25.7	16 25.7	4.34	1.327

3	When I receive peer support, I am equipped with the required knowledge to overcome academic challenges.	2 2.7	7 9.5	7 9.5	25 33.8	17 23.0	16 21.6	4.30	1.321
4	With the support of my peers, I am more likely to pursue further studies and achieve educational goals.	5 6.8	12 16.2	8 10.8	18 24.3	17 23.0	14 18.9	3.97	1.544
5	Peer support can enrich a knowledge-sharing culture.	4 5.4	5 6.8	3 4.1	14 18.9	28 37.8	20 27.0	4.58	1.395
Dimension: Emotional Support									
1	Peer support can increase my self-confidence in the classroom.	2 2.7	5 6.8	5 6.8	17 23.0	27 36.5	18 24.3	4.57	1.272
2	With the help of my classmates, I feel less anxious about my academic performance.	2 2.7	7 9.5	3 4.1	18 24.3	23 31.1	21 28.4	4.58	1.346
3	With my peer support, my self-esteem increased.	2 2.7	5 6.8	12 16.2	17 23.0	24 32.4	14 18.9	4.32	1/294
4	My peers help me develop emotional security in learning.	3 4.1	3 4.1	8 10.8	28 37.8	19 25.7	13 17.6	4.30	1.236
Dimension: Instructional Support									
1	My peer classmates offer resources which improve my attention to the available learning materials.	4 5.4	3 4.1	6 8.1	24 32.4	19 25.7	18 24.3	4.42	1.345
2	My classmates mostly offer practical help which empowers me to obtain desirable educational outcomes.	2 2.7	3 4.1	6 8.1	18 24.3	25 33.8	20 27.0	4.64	1.234
3	When I am provided with my peers' advice, I become more prepared to use learning strategies.	2 2.7	7 9.5	3 4.1	15 20.3	31 41.9	16 21.6	4.54	1.295
Dimension: Validation/Feedback									
1	Peer feedback encourages student cooperation to establish a positive learning atmosphere.	1 1.4	6 8.1	5 6.8	16 21.6	31 41.9	15 20.3	4.55	1.207
2	Peer feedback promotes and accelerates learning. Peer feedback enhances students' critical thinking.	4 5.4	3 4.1	6 8.1	16 21.6	27 36.5	18 24.3	4.53	1.347
3	Peer support fosters a relationship of mutual learning.	4 5.4	4 5.4	5 6.8	16 21.6	25 33.8	20 27.0	4.54	1.387
4.		5 6.8	10 13.5	10 13.5	20 27.0	15 20.3	14 18.9	3.97	1.508
Dimension: Companionship Support									
1	Peer support enhances my sense of belongingness in a learning community.	5 6.8	6 8.1	4 5.4	18 24.3	23 31.1	18 24.3	4.38	1.478
2	Peer support establishes a relationship based on trust and respect.	4 5.4	3 4.1	4 5.4	18 24.3	27 36.5	18 24.3	4.55	1.323
3	My classmate's friendship increases my chance of being accepted by others.	5 6.8	3 4.1	1 1.4	21 28.4	26 35.1	18 24.3	4.54	1.357
4.	My peer support could create an intimate relationship with other classmates based on educational equality.	4 5.4	5 6.8	6 8.1	21 28.4	21 28.4	17 23.0	4.37	1.391
5.	Peer support can develop my academic identity.	10 13.5	5 6.8	6 8.1	21 28.4	16 21.6	16 21.6	4.03	1.638
6.	Peer support creates more positive attitudes towards my academic field of study and appreciation of the university environment.	9 12.2	5 6.8	8 10.8	15 20.3	21 28.4	26 21.6	4.11	1.627

Note:
Likert scale: 1-Strongly disagree, 2-Disagree, 3-Less disagree, 4-Less agree, 5-Agree, 6-Strongly agree.
S.D.: Standard deviation

Item 3, securing the second-highest mean at 4.54, highlights how peer feedback fosters critical thinking and cooperative learning, promoting motivation and deeper understanding. Peer assessment is recognized for positively impacting higher-order thinking and active learning. Conversely, Item 4 records the lowest mean score at 3.97, suggesting that despite various strategies and peer mentoring programs, peer support may not significantly foster mutual learning relationships in secondary schools. Integrating peer support systems into broader policies for students' emotional well-being requires a crucial role from school staff. On the other hand, Item 2, with the highest mean score of 4.55, underscores that peer companionship builds trust and respect, leading to enhanced student engagement, academic outcomes, and a positive learning environment.

Moving to another aspect, Item 3, with a mean score of 4.54, emphasizes the significance of classmates' friendships in enhancing acceptance, particularly in peer support systems aimed at

bolstering emotional well-being in classrooms. Proven effective in promoting safety and reducing bullying, common strategies like buddying, reconciliation, and befriending are prevalent in Western elementary schools, while secondary schools prefer mentoring, friendship, and mediation, often incorporating extra peer support activities. In contrast, Item 5, with the lowest mean score of 4.03, suggests that peer support may have a limited role in shaping students' academic identity, distinct from traditional peer-to-peer learning (Devenish, Dyer, Jefferson, Lord, van Leeuwen, & Fazakerley, 2009). This implies that it may not significantly contribute to students' academic self-concept and sense of belonging within the academic community.

Future Recommendations and Conclusion

Future Recommendations. In this research study, two pivotal areas requiring attention are sampling recommendations and population details. Presently, the research process lacks essential information, hindering its depth and precision. To address this, gathering more specific data from respondents—such as their institution, program affiliations, and age—is crucial. This additional granularity promises to significantly enrich the research, ensuring a comprehensive and precise study. Additionally, broadening our understanding by consulting diverse research articles from reputable sources will enhance the robustness and well-rounded nature of our research study.

Conclusion. In summary, this study acts as a preliminary exploration into the five dimensions of peer support: instructional, emotional, informational, validation/feedback, and companionship support. The insights gleaned underscore the imperative for researchers to delve further into the intricate relationship between peer support and variables like academic adjustment among students. This underscores the significance of conducting more comprehensive studies in this domain to acquire a profound understanding of how peer support resonates across diverse facets of the student experience.

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Keberkesanan Pengurusan Acara Program VISCOM Show di Luar Kampus Terhadap Pelajar Politeknik METrO Tasek Gelugor

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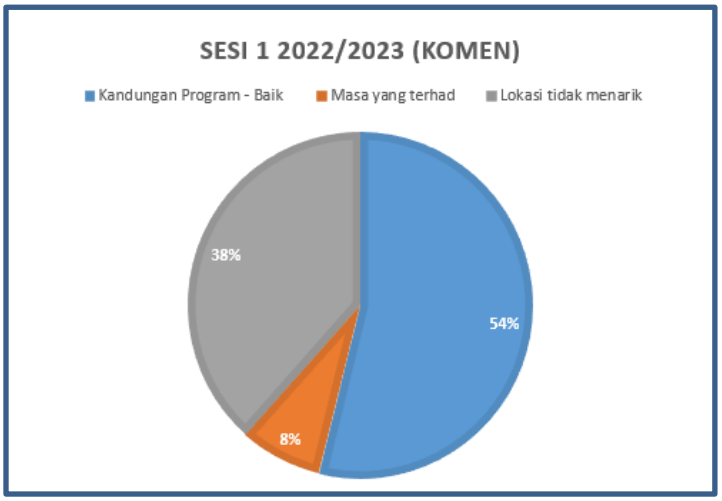
Abstrak. Politeknik Malaysia yang menjalankan Program Diploma Komunikasi Visual di Jabatan Rekabentuk dan Komunikasi Visual (JRKV) akan mengadakan VISCOM Show pada setiap semester. Pelajar akan membentang dan mempamerkan hasil karya kreatif dan inovatif mereka, pada masa yang sama, karya ini akan dinilai oleh pihak industri dan/atau pihak akademik luar bagi mengukur kualiti dan kreativiti pelajar. Sebelum ini program VISCOM Show diadakan di dalam kampus PMTG. Oleh itu terdapat beberapa kekangan terhadap perancangan dan pelaksanaan program ini seperti tempat dan ruang yang terhad, pertindihan aktiviti pelajar dan kandungan program yang terhad. Oleh itu perkara ini menjadi masalah yang mendorong kepada penghasilan penulisan ini. Objektif kajian ini dijalankan adalah untuk melihat keberkesanan program VISCOM Show yang diadakan di premis di luar kampus PMTG. Pensyarah kursus telah mengambil inisiatif dengan menganjurkan program VISCOM Show Sesi II 2022/2023 di Setia Fontaines, Kepala Batas. Tujuannya adalah bagi meningkatkan kemahiran pengurusan acara dan kemahiran komunikasi dalam kalangan pelajar. Semasa VISCOM Show sesi I 2022/2023 satu soal selidik mengenai keberkesanan pelaksanaan VISCOM Show turut diadakan. Maklum balas daripada pelajar dan cadangan mengenai lokasi penganjuran telah diambil perhatian oleh pensyarah kursus dan dijadikan punca kuasa dalam menghasilkan kajian ini. Kajian ini dijalankan untuk melihat keberkesanan Program VISCOM Show Sesi II 2022/2023 terhadap pelajar Politeknik METrO Tasek Gelugor (PMTG). Metadologi kajian adalah berbentuk kuantitatif menggunakan kaedah soal selidik dengan skala likert dianalisis menggunakan kaedah statistik deskriptif. Sangat Tidak Setuju (1) hingga Sangat Setuju (5) dengan 90 responden. Hasil kajian menunjukkan bahawa pelajar sangat bersetuju bahawa objektif program VISCOM Show tercapai di mana kandungan dan aktiviti program serta lokasi pelajar adalah sesuai. Peningkatan terhadap keyakinan diri, komunikasi dan kemahiran pengurusan pelajar juga meningkat selepas penganjuran program ini. Kesimpulannya program VISCOM Show yang diadakan di luar kampus ini adalah berjaya, bermanfaat dan memberi dimensi baharu terhadap pelajar bagi kursus DVV5013-Event Management. Walaupun hasil kajian menunjukkan tahap keberkesanan yang tinggi namun setiap halangan yang dihadapi oleh pelajar sepanjang menguruskan acara ini seperti dokumentasi, pengurusan tempat, protokol, teknikal dan pengurusan masa perlu diambil perhatian dan cadangan penulis adalah pada masa hadapan kualiti pengurusan acara boleh dipertingkatkan melalui rujukan manual pengurusan acara VISCOM berkesan sebagai panduan kepada para pelajar.

Kata kunci: Pengurusan acara; Keberkesanan pengurusan acara; Lokasi pengurusan acara

Pengenalan

Pengurusan Acara merupakan kursus bawah program Pengajian Video dan Filem (DVV) yang akan diikuti oleh pelajar semester 3. Antara hasil kursus (Course Outcome) DVV5013-Event Management yang perlu dicapai oleh pelajar ialah mempersembahkan kemahiran kepimpinan berkesan dan kemahiran kerja berpasukan di samping mengaplikasikan ciri-ciri keusahawanan dengan kemahiran pengurusan dan pembangunan berkaitan perniagaan dalam bidang video dan produksi. Melalui kursus Event Management ini pelajar merancang penganjuran dan pengurusan sesuatu acara, sama ada kecil atau besar, ia memerlukan perancangan yang teliti agar dapat berjalan dengan lancar. [1] Kelancaran dan kejayaan menguruskan majlis dengan baik bergantung kepada kepimpinan yang cekap, sikap bekerjasama, daya kreativiti, inovasi dan semangat kerja berpasukan semua yang terlibat. Berdasarkan kepada penyataan Mohd Noorizzuddin [2] penganjur acara perlu prohatin terhadap keperluan pengunjung bermula dari tempat letak kereta, pemandu arah, kemudahan khas dan kemudahan yang dapat memberi kemudahan kepada pengunjung, Justeru pemilihan lokasi sesebuah tempat adalah penting sebelum sesuatu acara dilaksanakan. Menurut Samsudin & Nor Azila, [3] pengurusan acara menjadi semakin penting apabila menjadi satu kemahiran yang diukur dalam sistem pendidikan formal. Kemahiran insaniah juga termasuk di dalam aspek penting pengurusan acara bagi membantu mahasiswa menganjurkan majlis yang akan dianjurkan. Oliver, Bettina & Peter [4] mengatakan pengurusan acara menjadi semakin penting bagi sesebuah institusi sebagai instrumen komunikasi pemasaran. Pengurusan acara merangkumi tugas disiplin, dan perlu kajian kepuasan pengunjung/respons. Perancangan awal yang teliti dan pelaksanaan yang tepat adalah sangat penting untuk sesebuah pengurusan acara. Lynn & Lauren [5] menyatakan lokasi yang menawarkan ruang untuk aktiviti dalaman dan luaran memberi kelebihan kepada peganjur dalam kepuasan pengunjung, perlu juga pertimbangan perkhidmatan katering, logistik, kebersihan dan keselamatan diberi keutamaan sebelum pemilihan sesuatu tempat sebelum merancang acara atau program. [6] William J. memberi saranan mengenai perancangan projek/ Project Planning Casade meliputi aspek definisi projek, skop tugas, atur cara tadbir/penstrukturan, analisis tugasan dan tanggungjawab dan senarai semak, sebagai langkah dalam merancang acara.

Jesteru itu Program VISCOM Show bagi Sesi II 2022/2023 telah dilaksanakan di luar kampus PMTG selepas mendapat maklum balas daripada pelajar Sesi I 2022/2023 agar pengajuran VISCOM diadakan di tempat yang lebih kondusif seterusnya memberi pengetahuan dan pengalaman baharu kepada pelajar semasa persiapan penganjuran program ini. Objektif penganjuran VISCOM Show di peringkat komuniti ini ialah: meningkatkan kemahiran komunikasi dan keyakinan pelajar semasa fasa persiapan, memberi pengalaman pengurusan dan pengoperasian acara semasa persiapan dan penganjuran dengan skala yang lebih besar dengan jumlah pengunjung yang lebih ramai dan meluaskan jaringan kolaborasi antara institusi PMTG dengan pihak luar (Setia Fontainers). Satu kajian telah diadakan bagi mengenal pasti tahap keberkesanan program VISCOM Show bagi Sesi II 2022/2023 yang telah dianjurkan oleh pelajar semester 3 program DDV, PMTG. Objektif utama kajian ini ialah bagi mendapatkan maklumat secara langsung daripada peserta program berkaitan tahap keberkesanan penganjuran program ini di luar kampus ke atas pelajar dan pengunjung. Responden VISCOM Show Sesi I 2022/2023 telah memberi komen dan cadangan seperti Gambarajah 1 sehingga tercetusnya idea penganjuran VISCOM Show di luar kampus pada Sesi II 2022/2023 dapat direalisasikan. Komen dan cadangan responden semasa VISCOM Show Sesi I 2022/2023 adalah seperti di Gambarajah 1.



Gambarajah 1. Rumusan Responden VISCOM Show Sesi I 2022/2023

Metadologi

Kajian yang dijalankan adalah secara kuantitatif iaitu menggunakan borang soal selidik secara atas talian sebagai kaedah pengumpulan data. Sampel soalan kajian adalah menggunakan kertas kajian Suhaila & Suliati (2022). Bilangan soalan terdiri daripada dua bahagian soalan dengan jumlah soalan sebanyak 11 soalan berbentuk soalan tertutup. Responden kajian ini adalah seramai orang 45 pelajar, 20 orang pensyarah dan 25 pelawat/pengunjung yang terlibat semasa penganjuran VISCOM Show. Jumlah keseluruhan responden ialah 90 orang. Borang soal selidik dengan skala likert "Sangat Tidak Setuju" (1) hingga "Sangat Setuju" (5) diedarkan kepada pelajar bagi mendapatkan maklumat berkaitan kajian. Soal selidik yang diedarkan terdiri daripada 2 konstruk iaitu penilaian program dan penilaian keberkesanan program. Respon yang diambil digabungkan bagi memudahkan analisis data di mana jawapan bagi penyataan "Sangat Setuju" digabungkan dengan "Setuju" bagi mendapatkan satu respons positif iaitu setuju, manakala skala likert respons "Sangat Tidak Setuju" dan "Tidak Setuju" menunjukkan pendapat yang negatif dan tidak berkesan terhadap pelaksanaan penganjuran ini di luar kampus. Hasil dapatan kajian akan diterangkan menggunakan statistik deskriptif (peratusan).

Dapatan Kajian

Hasil analisis soal selidik responden bagi konstruk pelaksanaan program menunjukkan bahawa responden bersetuju (83.3%) menyatakan bahawa pemilihan lokasi penganjuran dan fasiliti yang disediakan sepanjang VISCOM Show ini adalah bersesuaian. Sebanyak 63.9% responden menyatakan kandungan program yang dilaksanakan semasa program adalah lancar dan tersusun. Bagi item 'Masa yang diperuntukkan untuk semua aktiviti program semasa VISCOM Show PMTG 2023 adalah bersesuaian' sebanyak 75%. Peratusan 'Sangat Setuju' bagi item 'Pameran dan produk projek pelajar yang dipamerkan sempena VISCOM Show PMTG 2023 kali ini' ialah sebanyak 88%. Responden juga memberi respons 'Sangat Setuju' bagi item 'Kualiti makanan dan minuman yang disediakan sepanjang program ini iaitu 58.3%.

Jadual 1: Keputusan konstruk penilaian program

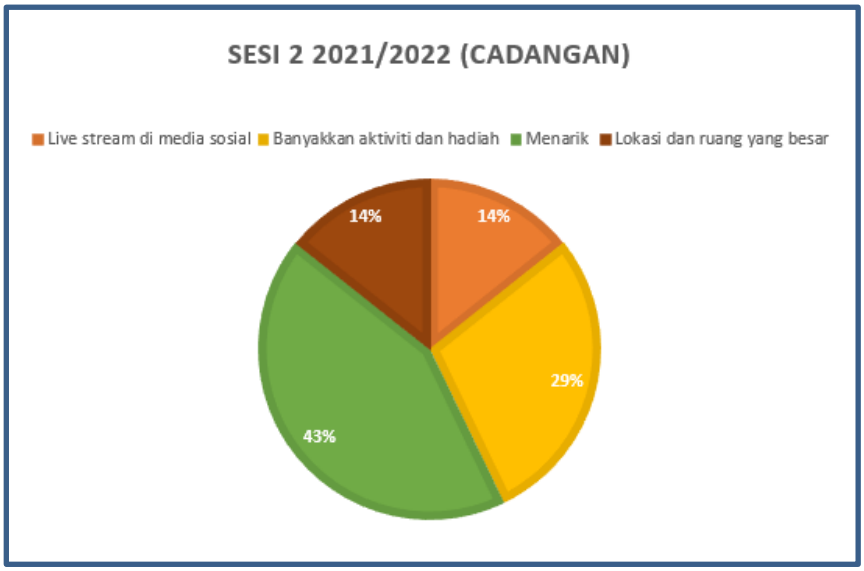
Bil	Konstruk	Setuju & Sangat Setuju
1	Program VISCOM Show Sesi II 2022/2023 yang dilaksanakan hari ini tersusun dan lancar.	63.9%
2	Masa yang diperuntukkan untuk semua aktiviti VISCOM Show Sesi II 2022/2023 adalah bersesuaian.	75%
3	Fasiliti yang disediakan di lokasi program VISCOM Show Sesi II 2022/2023 adalah bersesuaian.	83.3%
4	Makanan dan minuman yang disediakan sepanjang program ini adalah baik.	58.3%
5	Pameran dan produk projek pelajar yang dipamerkan sempena VISCOM Show Sesi II 2022/2023 adalah baik.	88.9%

Jadual 2: Keputusan konstruk penilaian keberkesanan program

Bil	Konstruk	Ya	
1	Saya pernah menyertai program/aktiviti anjuran PMTG:	94.4%	
2	Saya berpendapat penganjuran VISCOM Show di luar kampus memberi banyak kelebihan kepada pelajar PMTG.	91.2%	
		Setuju	Sangat Setuju
1	Saya mengikuti program kerana kemahuan saya sendiri.	30%	40%
2	Saya berpeluang melawat semua booth pameran hari ini.	52%	36%
3	Pengurusan program hari ini mengikut tentatif yang telah dirancang.	26%	65%
4	Maklumat mengenai program ini diketahui melalui sosial media rasmi PMTG.	40%	50%
5	Saya jelas dengan kandungan dan aktiviti program hari ini.	36%	57%

Berdasarkan jadual 2, kajian mendapati majoriti responden pernah menyertai program yang telah dianjurkan oleh PMTG. Keputusan responden juga adalah positif terhadap item penganjuran VISCOM Show di luar kampus memberi banyak kelebihan kepada pelajar PMTG sebanyak 91.2%. Kajian juga mendapati respondan mengikuti program atas kemahuan saya sendiri sebanyak 70%. 88% responden menyatakan mereka berpeluang melawat semua *booth* pameran semasa program VISCOM Show Sesi II 2022/2023 berlangsung. Responden juga bersetuju (91%) Pengurusan program VISCOM Show mengikut tentatif yang telah dirancang. 90% Responden mendapat maklumat mengenai hebahan berkenaan program VISCOM Show melalui sosial media rasmi institusi dan 93% responden 'bersetuju' jelas dengan kandungan dan aktiviti program VISCOM Show yang diadakan. Ini menunjukkan bahawa penganjuran program VISCOM Show di luar kampus memberi maklum balas yang positif dan memberi impak yang baik terhadap kemahiran softskills pelajar sekaligus objektif pelaksanaan program ini telah tercapai.

Tinjauan turut dijalankan terhadap cadangan bagi tujuan penambahbaikan untuk penganjuran VISCOM Show bagi sesi seterusnya. 43% responden menyatakan aktiviti yang dijalankan sepanjang VISCOM Show Sesi II 2022/2023 adalah menarik. 29% responden mencadangkan untuk menambah bilangan aktiviti dan hadiah. 14% responden mencadangkan lokasi dan ruang yang lebih besar dan 14% mencadangkan agar diadakan *live stream* di media sosial.



(a)

Gambarajah 2. Rumusan Cadangan Responden VISCOM Show Sesi 2 2022/2023

Gambarajah 3. QR Code Buku Panduan Pengurusan Acara.

Kesimpulan dan Cadangan

Berdasarkan kepada hasil dapatan kajian, jelas menunjukkan bahawa program VISCOM Show patut diadakan di luar kampus bagi memberi pendedahan dan impak positif terhadap pelajar. Selain itu pelajar perlu memperlengkapkan diri dengan pengetahuan dan kemahiran yang diperlukan oleh industri sebagai usaha dan strategi bagi memperkasa kualiti graduan politeknik dalam pasaran pekerjaan global yang kompetetif.

Justeru, pengalaman dalam lapangan seperti ini memberi pendedahan berteraskan konsep pembelajaran melalui amalan mempraktikkan teori dan konsep akademik yang telah dipelajari dalam situasi kerja yang sebenar sebagai persediaan kepada pelajar DDV3 sebelum mereka menjalani Latihan Industri/ Work-Based Learning (WBL).

Penulis mencadangkan pelaksanaan program di luar kampus seperti ini tidak terhad kepada program VISCOM Show. Penulis juga telah membangunkan sebuah panduan pengurusan acara VISCOM Show dengan menerbitkan sebuah manual berbentuk e-book untuk dijadikan panduan kepada pelajar dan penganjur pengurusan acara sebagai rujukan tambahan dalam merancang dan melaksanakan acara (Gambarajah 3. QR Code Buku Panduan pengurusan Acara).

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Students' acceptance of self-directed learning using simulation packet tracer for Introduction to Network at Polytechnic

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Abstract. This study aims to examine the student acceptance of self-directed learning for the Introduction to Network course offered to Diploma in Digital Technology students at Polytechnics. This study was conducted to determine students' self-learning through a learning approach using packet tracer and conventional learning. The sample was divided into two groups, the control group and the experimental group. Student self-learning is measured using questionnaires. The study sample consists of sixty students. The results of the independent samples t-test indicate a significant difference in student acceptance before and after receiving the treatment. Overall, these findings demonstrate that students are receptive and willing to use Packet Tracer in their learning for the Introduction to Network course.

Keywords: Self-Directed Learning; Packet Tracer; Introduction to Network; Polytechnics.

Introduction

Self-directed learning is a learning approach in which students take an active role in their learning process. In self-learning, students have the freedom to set a schedule, choose learning materials, and arrange learning steps according to their needs and interests Sun, W., Hong, JC., Dong, Y. et al (2023). Self-directed learning allows students to develop independent skills and monitor their learning progress Adnan, N.H., & Sayadi, S. S. (2021).

In the context of the Computer Networking course at the Polytechnic, self-directed learning plays an important role in providing opportunities for students to explore complex concepts and engage in practical learning activities by adapting their learning styles as needed. This statement is supported by Chong, L., & Han, C. G. K (2023) where students have different learning options where students can choose and access learning materials that suit their learning style by using packet tracer compared to students having to learn conventionally by using real equipment.

According to Brandt, W. C. (2020) with the use of self-learning, students can become active learners, continuously build knowledge and skills, and develop self-efficacy in mastering the Computer Networking course. Based on Constructivism Theory, states that self-learning is an active process in which students actively construct their knowledge and understanding through interaction with the environment and experiences Li, W., Liu, X., Zhang, Q., Zhou, B., & Wang, B. (2023).

Problem Statement. The computer network course is a course that has difficulties for students because students do not understand the concept of networks and operations in real networks. According to Abd Majid, Atan, and Mohd Yusof (2023) also stated that students face challenges in learning Computer Networks that require logical thinking and a clear picture of its implementation in a real situation using real network equipment.

This statement is supported by Abdul Halim (2022) that students experience difficulties in understanding the concept and how the network operates in forming a network topology due to the use of complex real equipment. This statement is also supported by Elias, Zamzuri, and Anuar (2012) stating that the Computer Network course contains terms that are difficult to understand and learning content that is abstract and students also face difficulties in understanding the basic concepts of problem solving in computer network theory.

Therefore, this challenge makes it difficult for students to understand the concept of learning by using real equipment compared to students who can learn to use packet tracer by referring to existing resources. The next problem is that students cannot solve configuration problems if there is a configuration error on the actual equipment.

Objectives. This study is conducted based on the following objectives:

- To examine the impact of self-directed learning on the use of simulation packet tracer and conventional learning for Introduction To Network.

Research Hypothesis. The following research hypothesis has been conducted:

H01: There is no significant difference in student self-directed learning after using the simulation packet tracer compared to conventional learning for the Introduction to Network course.

Scope of Study. This study encompasses second-semester students, specifically those enrolled in the Department of Information and Communication Technology (JTMK). The target group involved comprises students who are registered and pursuing full-time study methods exclusively**.**

Methodology

This study employs a quasi-experimental design to examine the variable of student self-directed learning. The research sample has been divided into two groups, which will be tested to assess student self-directed learning concerning the use of simulation packet tracer and conventional physical learning.

Population and Study Sample. The population for this study consists of 80 students enrolled in the Diploma in Digital Technology (DDT) program under the Department of Information and Communication Technology at Politeknik Seberang Perai. The study sample comprises 60 respondents.

Research Instrument. This study utilizes a questionnaire as the research instrument. The instrument is divided into two sections: Section A- Demographic and Section B-Student Acceptance Level. A pilot study was conducted to test the reliability and validity of the developed instrument to prevent confusion and identify any weaknesses in the constructed items.

Table 1. Distribution of Questionnaire Instruments

Section	Description	Number of Questions
A	Demographics	1
B	Measuring the Level of Student Acceptance of Self-Learning	10

Instrument Reliability. To test the reliability of the research instrument, Cronbach's Alpha Coefficient methods were used for the acceptance instrument. SPSS version 23 was employed to assess the questionnaire's reliability. The results from the reliability test for the constructed items indicated that Cronbach's alpha values for all factors exceeded 0.7 (> 0.7). This indicates that each factor is reliable and can proceed with further analysis.

Results and Discussion

The research findings were obtained through the questionnaire. The research findings consist of descriptive analysis and inferential analysis. Descriptive statistics, such as percentages, were used to describe demographic data and the research instrument. Inferential statistical analysis was used to test the research hypothesis using an independent samples t-test. The data is analysed using IBM Statistical Package for the Social Sciences version 23.

Demographic Data. This study focused on the population of students enrolled in the Diploma in Digital Technology program. A total of 60 students participated in the conducted survey. The questionnaire was administered through Google Forms by the researcher.

Table 2. Number of Students According to Age for DDT Students

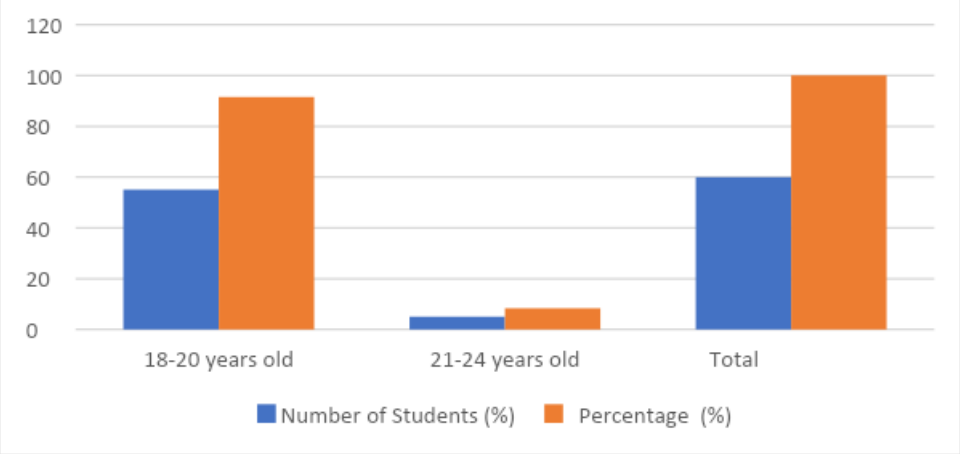

Table 2 shows the number of students aged 18 to 20 years old, which is a total of 55 students (91.6%). For the age group of 21 to 24 years old, there are 5 students (8.33%). The total number of respondents involved is 60 individuals.

Table 3. Number of Students Based on Gender for DDT Class

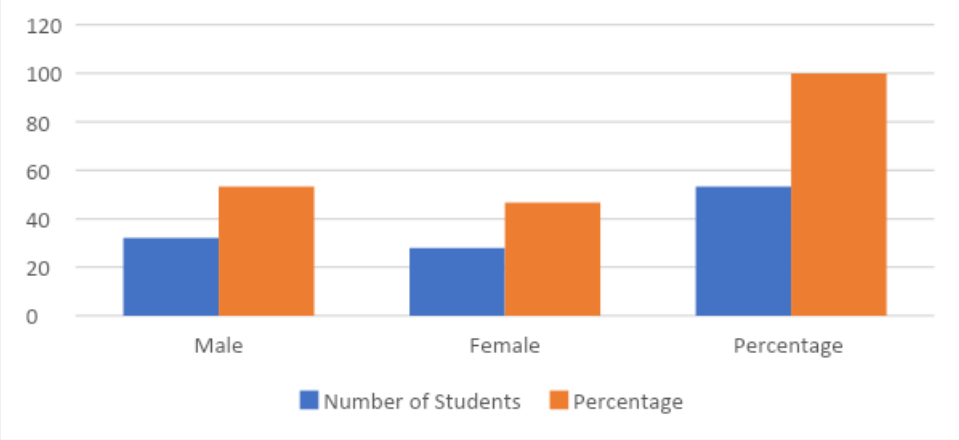

Table 3 shows that the number of male students is 32 (53.3%), while the number of female respondents is 28 (46.6%). These findings indicate that the total number of respondents involved in terms of gender is 60 for both classes.

Hypothesis Testing

H01: There is no significant difference in student self-directed learning after using simulation compared to conventional learning for the Introduction to Network course.

The inferential analysis involves an independent samples t-test to assess student acceptance of self-directed learning for the conventional learning group and the simulation group as the learning medium. The results of the inferential analysis are presented in Table 4 below:

Table 4. Independent samples t-test analysis for the minimum difference in the effect of self-directed learning acceptance.

Group	N	Mean	Standard Deviation	t-value	p-value
Group A Conventional Learning	30	2.10	0.393	-14.924	0.001
Group B Simulation Learning	30	3.12	0.143		

Significant at the level of $p < 0.05$

Based on Table 4, it can be observed that there are two distinct groups, namely Group A comprising 30 students, and Group B representing another 30 students. Group A serves as the control group utilizing conventional learning methods as determined by the course instructor, while Group B constitutes the experimental group employing the Cisco Packet Tracer simulation as the learning medium. The results from the independent samples t-test reveal that the minimum self-directed learning acceptance score for the conventional learning group (Group A) is 2.10, while for the Simulation group (Group B), it shows an increase to 3.12. The standard deviation for conventional learning is 0.393, whereas for simulation learning, it is 0.143. In conclusion, the null hypothesis is rejected.

Analysis of Student Acceptance. The analysis of student acceptance regarding the self-directed learning for packet tracer learning at the polytechnic indicates that, the student acceptance of using packet tracer in their learning activities is high.
These findings confirm that students are receptive and willing to use packet tracer in their learning. This indicates that the use of Packet Tracer simulation has a positive impact on student acceptance in the experimental group. These results are supported by the data analysis findings, which show a significant difference in test scores between the two groups. This is evidenced by the study, which demonstrates that the use of simulation enhances student acceptance and learning focus on simulation usage and has a positive effect on learning (Abdul Rashid, N. bin, Othman, M. Z. bin, Johan, R. bin, & Hj. Sidek, S. F. bin. (2019).
These findings confirm that students are receptive and willing to use packet tracer in their learning. Therefore, this form of learning encourages students that the learning is engaging, and students are engaged in self-directed learning to enhance their knowledge (Jamal, F. A., 2020).

Discussion

Referring to the findings of the study, overall it shows that students' acceptance of self-learning for the Computer Networking course offered to Digital Technology Diploma students at the Polytechnic is positive. This is due to students showing acceptance of self-learning towards the use of packet tracer compared to real devices and like to do repeated exercises by using packet tracer.

The findings of this study also show that students can learn independently where the aspect is flexible, independent, and not tied to time and the attention of students using packet tracer can be used consistently because packet tracer can be inserted into a mobile device. This learning process is seen as one of the methods to diversify learning techniques between the control group and the experimental group and increase student motivation in learning.
Based on the results of the study, learning to use packet tracer requires the lecturer's skills and mastery of packet tracer. Therefore, training and usage guides can help lecturers in diversifying the use of packet tracer in teaching and learning. Apart from that, lecturers need to diversify teaching aids with the use of packet tracer by doing various learning activities where students can pattern flexible learning more systematically.

Implications of the Proposed Study

To obtain more comprehensive results, future studies should consider studying polytechnics that offer Computer Networking courses in different zones, as this study only focused on Seberang Perai Polytechnic. Therefore, this study should be extended to Polytechnic Malaysia to strengthen the findings of the study conducted.

Conclusion

In conclusion, the findings of this study show that the use of packet tracer has improved student understanding in teaching and learning. This follows the teaching packet tracer can learn by self-learning. The results of this study also found that the use of packet tracer has helped students in improving their ability to use packet tracer as a learning medium where students can learn independently where by using packet tracer it helps students to better understand the actual operating conditions of the network. With this, the increase in student motivation towards the acceptance of using packet tracer is high because from a positive point of view it can be seen that the increase in student knowledge is better.

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PROGRAM SANGKUTAN INDUSTRI PENSYARAH: IMPAK TERHADAP PENSYARAH DI POLITEKNIK PORT DICKSON

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Abstrak Kajian ini bertujuan untuk meninjau tahap penglibatan dan impak program kepada pensyarah di Politeknik Port Dickson selepas menjalani Program Sangkutan Industri Pensyarah (SIP). Kajian dibuat berdasarkan jumlah pensyarah yang telah menjalani Program SIP pada tahun 2020 hingga 2022. Kaji selidik juga dibuat berdasarkan data kuantitatif yang menggunakan instrumen borang kaji selidik. Instrumen yang diambil bagi mendapatkan impak dan tahap pencapaian pensyarah dalam penguasaan kemahiran teori dan teknikal sepanjang menjalani program tersebut. Penilaian melibatkan 25 orang sampel yang terdiri daripada pensyarah yang telah menghadiri Program SIP. Hasil kajian yang terbahagi kepada 3 bahagian meliputi jumlah penglibatan pensyarah menjalani program, penilaian impak terhadap pelaksanaan program dan penilaian impak program terhadap pensyarah. Analisa menunjukkan secara keseluruhan penilaian terhadap pelaksanaan program berada pada tahap tinggi iaitu dengan nilai min: 4.93 dan penilaian impak program terhadap pensyarah adalah nilai min: 4.79. Dapatan kajian ini diharapkan dapat dijadikan panduan dan membantu Unit Latihan dan Pendidikan Lanjutan Politeknik Port Dickson agar memperkasakan dan mempertingkatkan secara lebih berkesan program SIP dalam kalangan pensyarah.

Kata kunci: Sangkutan Industri Pensyarah; Impak; Kuantitatif

Pendahuluan

Program sangkutan industri dalam kalangan pensyarah institut pengajian tinggi (IPT) adalah salah satu kaedah pembangunan profesional yang berkesan terutama dalam bidang kejuruteraan, teknikal dan vokasional (TVET) (Noridah, 2022). Program SIP juga salah satu pelaksanaan program yang dapat menghubungkait antara pembelajaran teori dan teknikal bersama dengan rakan pengamal industri. Melalui Teras Strategik Jabatan Pendidikan Politeknik dan Kolej Komuniti (JPPKK) berdasarkan teras 3 iaitu pemerkasaan bakat merupakan salah satu hala tuju bagi meningkatkan kecemerlangan profesionalisme pensyarah di institusi. Program SIP adalah salah satu cabang program dalam memperkasakan bakat jangka pendek yang komprehensif dalam mempergiat perkongsian pengetahuan antara pensyarah dan pengamal industri secara berterusan sejajar dengan teknologi terkini.

Pelaksanaan program SIP dibahagikan kepada tiga peringkat iaitu sebelum, semasa dan selepas tenaga pengajar teknikal menyertai sangkutan industri (Norfadila M.N, 2011). Di peringkat pertama, pensyarah perlu mencari penempatan di industri yang bersesuaian dengan bidang kepakaran. Pada peringkat kedua, pensyarah akan menjalankan program SIP selama tempoh yang telah dipohon dan diluluskan oleh pihak pengurusan institusi. Sepanjang tempoh menjalani program SIP ini, pensyarah akan diselia dan dipantau oleh penyelia industri dan pegawai daripada Unit Latihan dan Pendidikan Lanjutan (ULPL) institusi. Di peringkat ketiga pula pensyarah perlu menghantar pelaporan teknikal program dan membuat pembentangan serta sesi perkongsian ilmu kepada rakan-rakan pensyarah juga pelajar di institusi.

Menurut Rosita (2018), kerjasama strategik dengan industri/agensi/syarikat dijangka mampu meningkatkan peluang graduan mendapat pekerjaan selepas tamat pengajian. Oleh yang demikian, pensyarah juga tidak terkecuali dalam menjayakan program SIP ini sebagai salah satu gerak kerja dalam usahasama meningkatkan pengetahuan di tahap kesediaan proses pengajaran dan pembelajaran. Pensyarah juga memainkan peranan penting berganding bahu dalam membekalkan maklumat dan ilmu bagi membantu graduan supaya lebih bersedia terhadap keperluan masa kini. Kerjasama strategik yang dijalankan melalui program SIP oleh pensyarah ini dapat memberikan impak yang tinggi kepada pensyarah itu sendiri mahupun pelajar.

Pernyataan Masalah

Program SIP merupakan salah satu daripada jalinan kerjasama antara institusi pendidikan dan industri. Program ini juga sebagai titik permulaan dalam proses pensyarah mendapatkan pengalaman sebenar dan berkongsi idea untuk bersama mempertingkatkan lagi program kurikulum antara politeknik dan pihak industri. Menurut Rahimah (2020), cabaran dan perubahan semasa memerlukan pelaksanaan dan penambahbaikan terhadap pendekatan pendidikan dalam menyediakan modal insan yang relevan bagi memenuhi keperluan dalam pasaran TVET.

Berdasarkan kajian Rahimah (2020), dalam mengenal pasti kecekapan industri yang dimiliki oleh pensyarah politeknik dan keperluan kecekapan dalam pasaran TVET. Hasil kajian memfokuskan kepada program pembangunan profesional pensyarah sebagai cara untuk meningkatkan tahap kecekapan pensyarah politeknik bersama dengan rakan industri sebagai salah satu cabang kolaborasi. Cabaran dalam mencapai keperluan teras strategik JPPKK adalah ketidaksepadanan antara kecekapan industri dengan kecekapan pensyarah. Ini adalah disebabkan kekurangan kemahiran dalam teknologi terkini dalam menyampaikan sesuatu pembelajaran kepada pelajar dan juga kurangnya pengalaman dan pengetahuan industri oleh pensyarah. Dalam pada masa yang sama, kurang pendedahan tentang kemajuan teknologi terkini di industri.

Objektif

Kajian ini bertujuan mengenal pasti tahap penglibatan pensyarah dalam program sangkutan industri dan mengenal pasti impak terhadap pensyarah selepas menjalani program sangkutan industri.

Metodologi

Instrumen Kajian. Dalam kajian kes ini, penyelidik menggunakan 2 jenis instrumen untuk mendapatkan data kajian iaitu rekod arkib organisasi dan soal selidik. Kajian ini dijalankan dengan menggunakan persampelan seramai 25 orang responden yang terdiri daripada pensyarah yang telah menjalani Program SIP daripada tahun 2020 hingga 2022. Instrumen kajian dibahagikan kepada tiga (3) bahagian iaitu:

i. Bahagian A: maklumat responden
ii. Bahagian B: penilaian impak terhadap pelaksanaan program
iii. Bahagian C: penilaian impak terhadap pensyarah

Analisis dan Statistik. Data yang diperolehi akan dianalisis dengan menggunakan perisian *Statistical Package for Social Sciences for Windows Version 27* (SPSS) secara deskriptif seperti skor min, peratusan dan sisihan piawai. Skala Likert 5 Mata digunakan bagi menentukan tahap penilaian oleh responden seperti ditunjukkan dalam Jadual 1 manakala Jadual 2 menunjukkan tahap keberkesanan skor min.

Jadual 1. Skala 5 mata.

Peringkat	Skala
Sangat Tidak Setuju	1
Tidak Setuju	2
Tidak Pasti	3
Setuju	4
Sangat Setuju	5

Jadual 2. Tahap keberkesanan skor min.

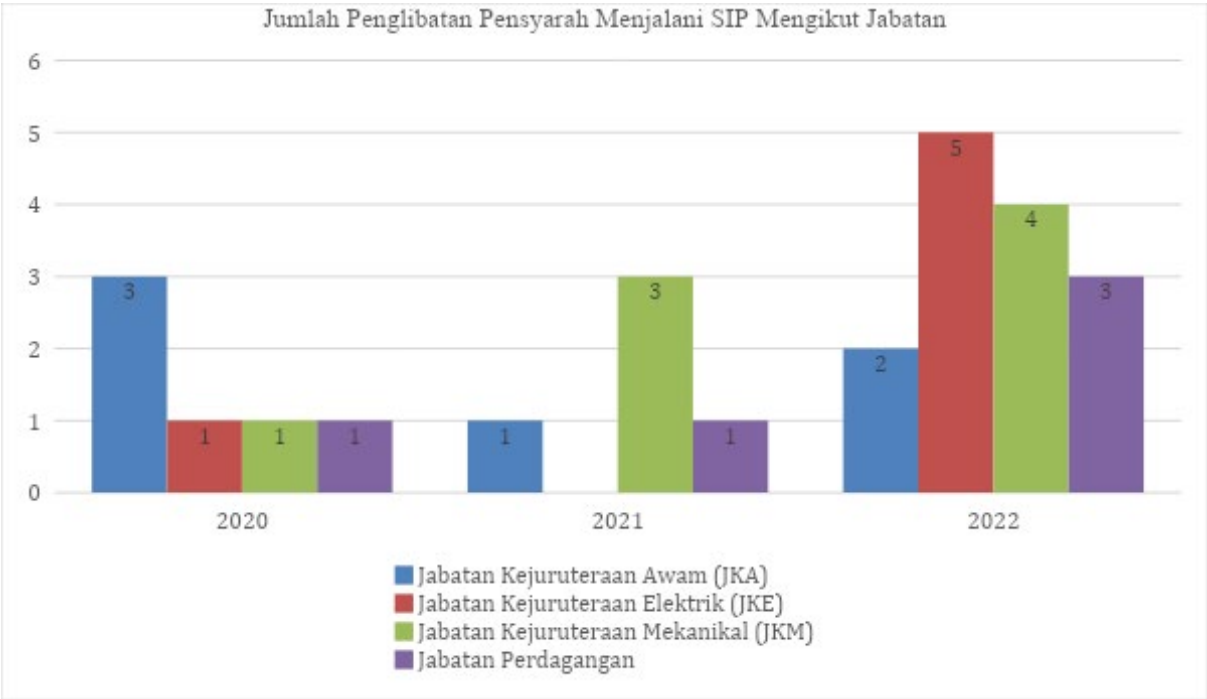
Tahap	Skor Min
Rendah	1.00 – 2.33
Rendah	2.34 – 3.66
Tinggi	3.67 – 5.00

Sumber: Diadaptasi daripada Mohd Majid (2000)

Keputusan dan Perbincangan

Analisa Bahagian A: Jumlah Penglibatan Pensyarah Menjalani Program SIP

Rajah 1 di bawah menunjukkan jumlah pensyarah yang menjalani Program SIP pada tahun 2020, 2021 dan 2022. Penglibatan pensyarah membabitkan empat jabatan induk di Politeknik Port Dickson iaitu Jabatan Kejuruteraan Awam (JKA), Jabatan Kejuruteraan Elektrik (JKE), Jabatan Kejuruteraan Mekanikal (JKM) dan Jabatan Perdagangan (JP). Jumlah pensyarah yang menjalani program SIP pada tahun 2020 adalah seramai 6 orang, manakala pada tahun 2021 seramai 5 orang. Pada tahun 2022 terdapat peningkatan jumlah penglibatan pensyarah yang telah menjalani Program SIP iaitu seramai 14 orang pensyarah.



Rajah 1. Jumlah penglibatan pensyarah menjalani program SIP.

Analisa Bahagian B: Penilaian Impak Terhadap Pelaksanaan Program

Jadual 3 menunjukkan dapatan bagi penilaian impak terhadap pelaksanaan program SIP. Secara keseluruhan impak program yang dijalankan adalah berada pada tahap tinggi. Ini menunjukkan kerjasama syarikat/firma dari segi perkongsian peningkatan kemahiran, pengetahuan dan amalan baik semasa latihan serta program memberi impak positif dalam membantu pensyarah menyalurkan idea, inovasi dan teknologi terkini masing-masing dengan nilai min 4.92. Manakala item program memberikan impak positif dalam jurang kemahiran berfokuskan bidang dengan nilai min 4.96.

Jadual 3. Penilaian impak terhadap pelaksanaan program.

Kesan / Impak	Skor Min	Tahap
Rakan Pengamal Industri / Firma / Penyelia memberi kerjasama penuh dari segi perkongsian peningkatan kemahiran, pengetahuan dan amalan baik semasa latihan.	4.92	Tinggi
Pelaksanaan latihan memberi impak positif dalam merapatkan jurang kemahiran, pengetahuan dan amalan baik berfokuskan bidang/industri dan Institusi.	4.96	Tinggi
Pelaksanaan latihan memberi impak positif dalam membantu pegawai menyalurkan idea, inovasi dan teknologi terkini berfokuskan bidang/industri di Institusi.	4.92	Tinggi

Analisa Bahagian C: Penilaian Impak Terhadap Pensyarah

Sebanyak lima (5) item dinilai untuk mengenal pasti kesan/impak terhadap pensyarah setelah menjalani program SIP dan dapatannya seperti ditunjukkan dalam Jadual 4. Hasil dapatan bagi kesemua penilaian menunjukkan pensyarah mencapai tahap tinggi. Menurut Layta (2018), program sangkutan industri sebagai program perantisan yang berkesan supaya pensyarah mendapat gambaran dan kecekapan mengenai pengetahuan yang lebih terkini yang digunakan oleh industri. Pensyarah dapat mencapai tahap penerimaan informasi yang terkini dan relevan dalam memfokuskan kepada sesi pembelajaran pelajar. Pensyarah dilihat dapat mengembangkan pengetahuan profesional dan mengikuti perkembangan industri seiring dengan permodenan teknologi terkini.

Jadual 4. Penilaian impak terhadap pensyarah.

Kesan / Impak	Skor Min	Tahap
Pegawai dapat menjalani latihan yang diperlukan secara komprehensif untuk mencapai Course Learning Outcome (CLO).	4.80	Tinggi
Pegawai lebih berkeyakinan dan berkongsi pengetahuan dalam mengajar modul berkaitan bidang industri yang dipelajari.	4.84	Tinggi
Pegawai mengaplikasikan kemahiran dalam mengajar modul berkaitan bidang industri yang dipelajari.	4.88	Tinggi
Pegawai menjalankan jaringan kolaborasi bersama pihak industri untuk institusi.	4.60	Tinggi

Pegawai berkongsi ilmu yang diperolehi dalam menjalankan aktiviti/projek kepada institusi berkaitan bidang latihan.	4.80	Tinggi

Kesimpulan

Program SIP berdasarkan hasil kajian jelas memberikan manfaat positif kepada pensyarah dan institusi dalam menepati kehendak industri. Ini adalah disebabkan oleh pertambahan pensyarah yang menjalani program SIP meningkat daripada tahun 2020 hingga 2022. Kajian juga mencapai objektif dalam memberikan impak yang sangat tinggi dan memperlihatkan kepuasan dan keyakinan dalam penerimaan, penyampaian hasil kerja, merealisasikan potensi diri sebenar, memperhalusi dan mempercepat proses pembelajaran pensyarah. Tahap penerimaan dan penguasaan kemahiran teori dan amali oleh pensyarah dapat menambah baik produktiviti nilai tambah kemahiran kepada lebih tinggi, mempertingkatkan kerjasama antara institusi dan industri serta penerimaan perubahan teknologi.

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Analisis Faktor Luaran Yang Mempengaruhi Enrolmen Di Kolej Komuniti Perak Menurut Teori Pilihan Rasional

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Abstrak. Kajian ini bertujuan untuk menganalisa faktor yang mempengaruhi enrolmen pelajar di Kolej Komuniti Negeri Perak (KKNP) bagi pelajar semasa sehingga Sesi II 2022/2023. Objektif kajian dijalankan bagi mengkaji daya tarikan enrolmen pelajar baharu ke Kolej Komuniti Negeri Perak dengan mengenalpasti perhubungan faktor luaran individu dalam memilih KKNP sebagai pilihan mereka. Kerangka konseptual kajian merupakan adaptasi dan ubahsuai daripada '*Model Of Student College Choice'* yang dibangunkan oleh Chapman 1981 dan asas kajian berdasarkan teori sosiologi iaitu '*Teori Pilihan Rasional James S. Coleman'*. Kajian ini berbentuk kuantitatif deskriptif menggunakan kaedah tinjauan *survey research*. Populasi dan sampel kajian adalah pelajar KKNP, jumlah responden ditentukan berdasarkan jadual Krejcie & Morgan (1970), sebanyak 327 responden terlibat daripada 1926 keseluruhan pelajar. Set soal selidik dibahagikan kepada dua bahagian iaitu bahagian A berkaitan demografi responden, bahagian B berdasarkan pemboleh ubah tidak bersandar (Faktor Luaran) yang diedarkan secara atas talian. Data dikumpul melalui borang soal selidik dan dianalisa dengan menggunakan perisian *IBM SPSS Statistics* versi 25.0 bagi menguji data mengikut hipotesis dan persoalan kajian yang dibina iaitu ujian regrasi linear berganda dan ujian kolerasi. Analisis data menunjukkan hasil penyelidikan mencerminkan semua faktor seperti Persekitaran Sosial Individu**,** Faktor Institusi Pengajian**,** Bentuk Publisiti dan Promosi**,** Faktor Prospek Masa Depan dan Pengiktirafan memberikan pengaruh terhadap kemasukan pelajar, tetapi secara realitinya jumlah kemasukan pelajar masih membimbangkan.

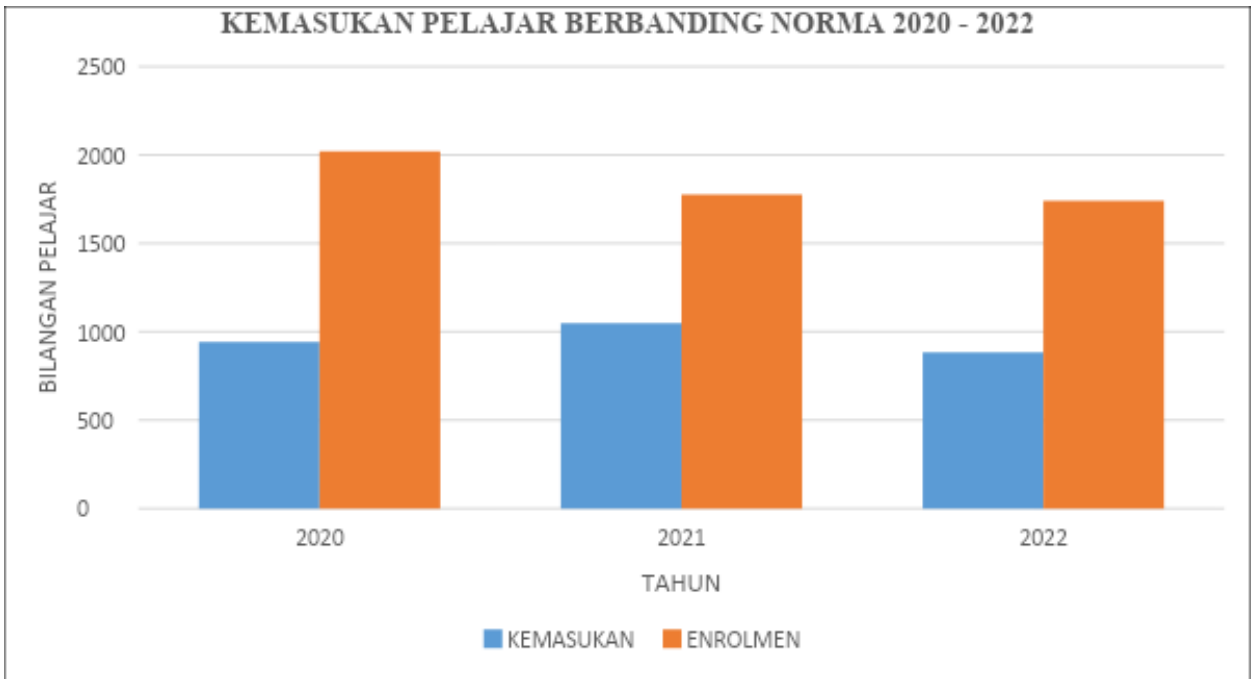
Kata kunci: Faktor Luaran; Kolej Komuniti; Enrolmen.

Pengenalan

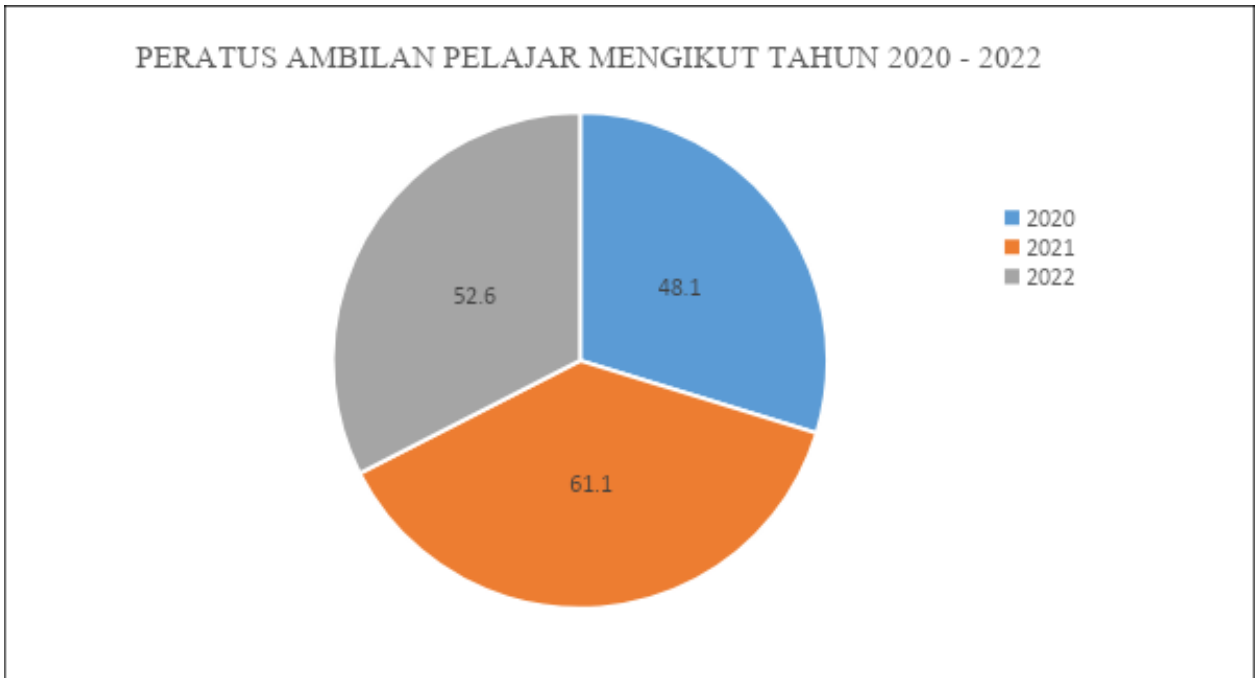
Perkembangan Institusi pendidikan di Malaysia yang semakin hari semakin rancak berkembang, dengan penubuhan pelbagai institusi pendidikan serta bertambahnya kesedaran pelajar terhadap keperluan pendidikan peringkat tertiari. Walaubagaimanapun, statistik yang dikeluarkan oleh Kementerian Pendidikan Tinggi untuk kemasukan ke Kolej Komuniti Negeri Perak adalah sebaliknya, di mana statistik menunjukan graf penurunan bagi 3 tahun kebelakangan ini. Tren penurunan ini adalah cabaran utama bagi kolej komuniti di seluruh Malaysia amnya.

Jadual 1. Peratus ambilan pelajar berbanding norma 2020 – 2022 KKNP

Tahun	Kemasukan	Enrolmen	Peratus Ambilan
2020	942	2,020	48.1% SESI JUN 2020 & SESI DISEMBER 2020
2021	1,049	1,775	61.0% SESI I 2021/2022 & SESI II 2021/2022
2022	883	1,740	52.6% SESI I 2022/2023 & SESI II 2022/2023



Rajah 1. Graf Kemasukan Pelajar Berbanding Enrolmen Bagi Tahun 2020 – 2022



Rajah 2. Pencapaian Peratus Ambilan Pelajar Mengikut Tahun 2020 - 2022

Ra

Tujuan Kajian

Kajian ini dijalankan bagi mengkaji daya tarikan enrolmen pelajar baharu ke Kolej Komuniti Negeri Perak dengan menggunakan Model Chapman dan Teori Pilihan Rasional.

Objektif Kajian

Objektif kajian ini adalah seperti berikut:

1.0 Menentukan sama ada faktor luaran merupakan peramal yang signifikan kepada daya tarikan enrolmen pelajar baharu ke Kolej Komuniti Negeri Perak.
2.0 Mengenal pasti hubungan antara jantina dan faktor luaran dalam mempengaruhi enrolmen pelajar baharu ke Kolej Komuniti Negeri Perak.

Latar Belakang Kajian

Memilih institusi pengajian bagi menyambung pengajian ke peringkat tertiari adalah perkara penting kepada pelajar supaya bidang serta pusat pengajian yang dipilih mampu memenuhi kehendak mereka selain dalam mencorak, membina dan membangunkan masa depan mereka. Ia merupakan permulaan bagi pelajar untuk melebarkan langkahnya untuk membina kehidupan yang lebih luas. Bakal pelajar akan cuba memilih institusi pengajian yang tepat dan terbaik mengikut faktor tertentu seperti kehendak pasaran semasa, kelulusan akademik, kemahuan atau minat dan sokongan keluarga dan rakan sangat penting dalam proses memilih sesuatu institusi pendidikan. Faktor luaran kerana individu akan melihat kemudahan dan peluang yang akan menyokong dirinya.

Kajian Lepas - Faktor Luaran (Ekstrinsik)

Faktor pengaruh luar seperti sokongan dan desakan ibu bapa, saudara terdekat dan kawan dalam memilih tempat pengajian juga mampu mempengaruhi pelajar untuk melanjutkan pengajian di tempat tersebut (Awang et al., 2012). Kenyataan ini juga sama dengan dapatan kajian oleh Sia (2010), yang juga membincangkan faktor pengaruh luar yang menjadi pendorong kepada pelajar untuk memilih lokasi tertentu atau institusi pendidikan, di mana maklumat berkaitan institusi tersebut juga saranan dan pengaruh keluarga termasuk juga pengaruh rakan banyak memainkan peranan dalam proses pemilihan oleh individu. Institusi pendidikan yang mempunyai reputasi yang baik seperti kualiti kakitangan yang cemerlang, urusan pentadbiran yang efisen dan cekap, mengutamakan kebajikan,

keperluan pelajar dan keluaran graduan yang berkualiti tinggi dan bermutu adalah institusi pendidikan yang perlu dipilih (Ahmad Zaharudin Idrus, 2001).

Faktor Di Persekitaran Sosial Individu. Persekitaran boleh diklasifikasikan sebagai pengaruh daripada manusia yang berada di sekeliling mahupun mereka yang rapat dengan pelajar tersebut. Awang, A. H., Ramli, Z., dan Ibrahim (2012) di dalam kajiannya turut menemui faktor sokongan dan syor daripada ibu bapa turut mempengaruhi pelajar di dalam menentukan pilihan bagi menyambung pendidikan mereka di Universiti Kebangsaan Malaysia (UKM).

Faktor Pengaruh Rakan Sebaya. Pengaruh rakan sebagai satu di antara faktor utama yang dapat memberi kesan kepada pelajar semasa membuat pilihan dalam memilih institusi pendidikan. Menurut Zuraidah (2006), di dalam period pertumbuhan dan pembesaran remaja, kekuatan pengaruh ibu bapa dan keluarga akan semakin berkurangan terhadap diri remaja dan remaja pula dilihat lebih banyak berbincang dan bergantung kepada rakan–rakan mereka dalam mencorak dan menanam nilai-nilai kehidupan, nilai keperibadian serta membentuk kefahaman dalam diri mereka. Kemahuan seseorang pelajar untuk melanjutkan pelajaran akan teraspirasi apabila terdapat rakan baiknya yang mempunyai rancangan dan kehendak yang sama.

Faktor Institusi Pengajian. Kemasukan dan pemilihan pelajar ke institusi pendidikan mereka juga bergantung kepada faktor institusi pendidikan tersebut. Terdapat pelajar yang meletakkan pilihan kepada institusi pendidikan yang terkenal, besar, moden dan mempunyai reputasi yang baik sebagai pilihan mereka. Hasil dapatan daripada kajian Sia (2010) menyatakan bahawa faktor institusi pengajian yang tersenarai dalam rangka kerja konseptual yang dibina adalah lokasi, program atau kursus yang ditawarkan, reputasi institusi pendidikan, kemudahan yang disediakan dalam pembelajaran, implikasi kewangan seperti kos pengajian atau kadar yuran dan bantuan kewangan kepada pelajar, kebolehpasaran dan peluang dalam kerjaya, promosi dan pengiklanan, wakil bagi pihak institusi dan juga lawatan kampus. mempengaruhi pelajar dalam membuat keputusan.

Publisiti Dan Promosi. Perubahan teknologi yang berkembang pantas dalam dunia digital adalah salah satu tren bagi pemasaran sesebuah institusi pendidikan masa kini, pelbagai promosi yang diiklankan secara berterusan bagi menarik minat klien. Davies (2003), ada menyatakan bahawa di antara sebab pelajar memilih kursus yang ditawarkan di sesebuah institusi pendidikan adalah disebabkan oleh faktor informasi iaitu hebahan maklumat berkaitan yang merupakan strategi pemasaran yang dibuat oleh sesebuah institusi pendidikan.

Faktor Prospek Masa Depan. Antara perkara yang penting yang akan dinilai oleh pelajar, membina kerjaya yang baik selepas menamatkan pengajian. Kajian Abd Hair (2012) yang dijalankan ke atas pelajar antarabangsa di UKM mendapati faktor yang mempengaruhi pelajar antarabangsa untuk menyambung pengajian di sini adalah keupayaan institusi tersebut dalam menyediakan fasiliti dan keperluan program pengajian tersebut adalah bersesuaian dengan kehendak pasaran selepas tamat pengajian kelak.

Pengiktirafan – Akademik, Kurikulum Dan Infrastruktur. Bagi institusi pendidikan di Malaysia, Agensi Kelayakan Malaysia (MQA) adalah berperanan sebagai badan akreditasi bagi menilai kualiti kurikulum dalam sesuatu program atau kursus yang ditawarkan oleh sesebuah IPT/IPTS dalam memberi jaminan kemudah pasaran graduasi, kebolehpasaran dalam mendapatkan pekerjaan dan jaminan masa depan pelajar setelah mereka menamatkan pengajian. M.Y.Yuzainee(2011), dalam kajiannya menyatakan calon lebih mementingkan kualiti bagi sesebuah pusat pendidikan dan pengiktirafan program-programnya yang telah diterima daripada badan akreditasi bagi jaminan masa depan mereka melalui kebolehpasaran, kemudahpasaran setelah menamatkan pengajian mereka (Sailin et al., 2014).

Teori Pilihan Rasional (Rational Choice Theory). Teori yang berasaskan pendekatan sosiologi yang dikembangkan oleh Max Weber dan daripada teori ekonomi (Toenlioe, 1988). Awalnya ia banyak mempengaruhi perkara-perkara yang berkaitan dalam analisis-analisis ekonomi dan kemudiannya diadaptasi dan diubahsuai oleh ahli–ahli sosiologi, psikologi dan politik. Rasional adalah cara berfikir untuk dipertimbangkan dengan wajar.

Teori Pilihan James Samuel Coleman. Teori ini mula berkembang di dalam bidang sosiologi dan semakin popular sekitar tahun 1990-an. James S. Coleman menyatakan, teori pilihan rasional yang juga disebut oleh Coleman sebagai 'paradigma tindakan rasional' adalah antara teori yang menyediakan peluang untuk 'integrase paradigmatic' dihasilkan. Coleman menyatakan sesuatu tindakan itu boleh dipertimbangkan dan dijelaskan jika tindakan itu hanya diambil sebagai tindakan rasional di mana seseorang melakukan tindakan dengan memanfaatkan suatu sumber untuk memenuhi matlamat dan tujuannya di mana pilihan individu atau nilai yang membuat penentuan dan keputusan. Aliran bagi teori ini adalah sederhana, ia banyak mengaplikasikan perkara yang berkait rapat dengan kehidupan manusia, yang mana manusia seringkali berhadapan dengan pelbagai pilihan di dalam kehidupannya seperti impian, cinta, pendidikan, kerjaya, berkeluarga, organisasi, berpolitik dan sebagainya.

Metodologi

Kajian adalah melibatkan seluruh pelajar dan semua program di KKNP. Populasi dan sampel kajian yang digunakan adalah daripada Jadual Penentu Saiz Sampel dari Krejcie dan Morgan (1970), di mana terdapat seramai 1926 pelajar semasa di KKNP dan jumlah sampel adalah sebanyak 327 pelajar. Kajian berbentuk kuantitatif deskriptif yang menggunakan kaedah tinjauan *(survey research)* adalah kaedah bagi menentukan perhubungan antara dua pembolehubah, pembolehubah bersandar dan tidak bersandar yang diadaptasi dari Model Pilihan Chapman. Data dikumpul melalui instrumen soal selidik yang dibina dan terdapat juga soalan–soalan soal selidik yang diadaptasi dan diubahsuai daripada penyelidik lain seperti Sailin et al. (2014) Zarulrizam bin Ab. Jalil (2013) mengikut kesesuaian kajian ini. Ianya di bahagikan kepada dua iaitu Bahagian A dan B dalam Bahasa Malaysia. Data dan maklumat yang diperolehi dianalisa dengan perisian *Statistical Package for Social Science* versi 25.0 (SPSS).

Dapatan Kajian

Jadual 2. Profail Responden

Demografi Responden		Frekuensi	Peratus
Jantina	Lelaki	146	44.6
	Perempuan	181	55.4
Bangsa	Melayu	276	84.4
	Cina	9	2.8
	India	39	11.9
	Lain-lain	3	.9
Umur	18 tahun-20 tahun	251	76.8
	21 tahun-25 tahun	70	21.4
	26 tahun-30 tahun	5	1.5
	31 tahun ke atas	1	.3
Taraf Pendidikan	SPM	292	89.3
	STPM	23	7.0
	STAM	0	0
	SPMV	12	3.7
Taraf Perkahwinan	Bujang	322	98.5
	Berkahwin	5	1.5
Semester	Semester 1	113	34.6
	Semester 2	132	40.4
	Semester 3	27	8.3
	Semester 4	36	11.0
	Semester 5	8	2.4
	Semester 6	11	3.4
Pendapatan Ibu bapa / penjaga	Kurang RM 3000.00	213	65.1
	RM3100.00 – RM 5000.00	80	24.5
	RM5100.00–RM 10000.00	29	8.9
	Melebihi RM 10000.00	5	1.5

Analisis Deskriptif

Jadual 3. Analisis Deskriptif untuk Pengaruh Faktor Luaran

Item	Kenyataan	Min	Sisihan Piawai
PL1	Saya perlu berbincang dengan ibu bapa saya sebelum memilih institusi pendidikan bagi menyambung pengajian	4.29	.831
PL2	Saya memilih kolej komuniti atas kemahuan dan dorongan ibu bapa dan ahli keluarga	3.99	.995
PL3	Ibu bapa saya merasakan program ini akan menjamin masa depan saya	4.25	.763
PL4	Kejayaan rakan–rakan yang mengikuti program di kolej komuniti mendorong saya untuk menyambung pengajian di kolej komuniti	4.03	.899
PL5	Rakan–rakan yang menyambung pengajian di kolej komuniti mengesyorkan saya menyambung pengajian di kolej komuniti	3.72	1.083
PL6	Guru–guru semasa di sekolah sentiasa memberikan galakan dan sokongan untuk memilih bidang kemahiran / TVET	4.06	.940
PL7	Yuran pengajian di kolej komuniti amat berpatutan dan kompetitif berbanding institusi pengajian tinggi tempatan yang lain	4.40	.698
PL8	Yuran pengajian yang dikenakan adalah sangat berpatutan dengan kemudahan pembelajaran yang disediakan	4.35	.740
PL9	Adanya bantuan kewangan dari sumber lain seperti Bantuan Kewangan Pelajar Kolej Komuniti / BPKK, Yayasan Negeri, biasiswa dan lain - lain	4.06	.940
PL10	Galakan pihak kerajaan supaya menceburi bidang TVET	4.40	.698

Skor min semua pembolehubah yang diukur pada skala Likert lima mata. Jadual di atas menunjukkan min tertinggi ialah 4.40 yang mana responden bersetuju bahawa mereka mendapat galakan pihak kerajaan supaya menceburi bidang TVET dan yuran yang berpatutan. Min terendah pula ialah 3.72 yang mana mereka memilih kolej komuniti atas syor dari rakan–rakan mereka.

Jadual 4. Analisis Deskriptif untuk Institusi Pengajian

Item	Kenyataan	Min	Sisihan Piawai
IP1	Jenama dan reputasi kolej komuniti sebagai institusi pendidikan TVET yang unggul	4.16	.738
IP2	Proses permohonan ke kolej komuniti sangat mudah	4.31	.697
IP3	Kemudahan di pusat pembelajaran yang mencukupi, selesa dan selamat	4.16	.766
IP4	Tenaga pengajar di kolej komuniti terdiri daripada tenaga pengajar yang berkelayakan dan berpengalaman.	4.38	.662
IP5	Kakitangan dan tenaga pengajar yang mencukupi	4.24	.728
IP6	Silibus yang sesuai bagi tempoh masa pengajian yang dijalankan	4.20	.687
IP7	Lokasi Kampus adalah sangat strategik	4.01	.847

Skor min semua pembolehubah yang diukur pada skala Likert lima mata. Jadual di atas menunjukkan min tertinggi ialah 4.38 yang mana responden bersetuju bahawa tenaga pengajar di kolej komuniti terdiri daripada tenaga pengajar yang berkelayakan dan berpengalaman. Min terendah pula ialah 4.01 yang mana mereka mendapati kedudukan serta lokasi kampus kolej komuniti adalah sangat strategik.

Jadual 5. Analisis Deskriptif untuk Publisiti dan Promosi

Item	Kenyataan	Min	Sisihan Piawai
PP1	Saya tertarik untuk melanjutkan pengajian di kolej komuniti menerusi promosi di media massa	3.97	.838
PP2	Promosi dan publisiti yang dilakukan oleh pihak kolej komuniti telah menarik minat saya untuk menyambung pengajian di kolej komuniti	3.99	.838
PP3	Maklumat mengenai kolej komuniti mudah untuk diakses melalui pautan atas talian untuk mendapatkan maklumat berkaitan	4.18	.747
PP4	Maklumat yang dipaparkan di laman sesawang, laman sosial dan edaran risalah berkaitan kolej komuniti mampu mendorong anda untuk melanjutkan pengajian di kolej komuniti.	4.11	.747
PP5	Kaedah promosi oleh kolej komuniti berkesan	4.08	.759
PP6	Adakah anda mengetahui kolej komuniti melalui media massa	3.88	.973

PP7	Media sosial sangat membantu anda dalam mendapatkan maklumat berkaitan kolej komuniti	4.17	.741

Skor min semua pembolehubah yang diukur pada skala Likert lima mata. Jadual di atas menunjukkan min tertinggi ialah 4.18 yang mana responden bersetuju bahawa maklumat mengenai kolej komuniti mudah untuk diakses melalui pautan atas talian untuk mendapatkan maklumat berkaitan. Min terendah pula ialah 3.88 yang mana mereka mengetahui kolej komuniti melalui media massa.

Jadual 6. Analisis Deskriptif untuk Prospek Masa Depan

Item	Kenyataan	Min	Sisihan Piawai
PD1	Untuk meningkatkan taraf kehidupan melalui peluang kemahiran dan keusahawanan yang diberikan oleh kolej komuniti.	4.22	.701
PD2	Program yang dilaksanakan berbentuk kemahiran dan teknikal akan membantu saya membina kerjaya yang baik.	4.27	.683
PD3	Saya merasa yakin dengan masa depan kerjaya saya berdasarkan laporan kebolehpasaran graduan kolej komuniti yang dikeluarkan	4.19	.723
PD4	Kursus yang ditawarkan memenuhi kehendak industri sekarang.	4.29	.677
PD5	Saya memilih kolej komuniti kerana program yang ditawarkan adalah memenuhi kehendak pasaran dan industri.	4.25	.677
PD6	Bidang kemahiran menawarkan peluang pekerjaan dan perniagaan yang luas dan pendapatan yang lumayan	4.26	.635

Skor min semua pembolehubah yang diukur pada skala Likert lima mata. Jadual di atas menunjukkan min tertinggi ialah 4.29 yang mana responden bersetuju bahawa kursus yang ditawarkan memenuhi kehendak industri sekarang. Min terendah pula ialah 4.19 yang mana mereka merasa yakin dengan masa depan kerjaya mereka berdasarkan laporan kebolehpasaran graduan kolej komuniti yang dikeluarkan.

Jadual 7. Analisis Deskriptif untuk Pengiktirafan

Item	Kenyataan	Min	Sisihan Piawai
PD1	Saya mengetahui bahawa pelajar sijil lepasan kolej komuniti diterima oleh majikan sebagai pekerja	4.20	.690
PD2	Saya mengetahui bahawa graduasi daripada kolej komuniti boleh menyambung pengajian mereka ke pusat pengajian yang lebih tinggi.	4.39	.626
PD3	Saya mengetahui bahawa program – program yang ditawarkan di kolej komuniti telah diiktiraf oleh agensi – agensi pengiktirafan yang berkaitan.	4.28	.678
PD4	Adakah anda tahu kursus yang ditawarkan di kolej komuniti mempunyai pengiktirafan pihak MQA dan MBOT.	4.09	.848
PD5	Perakuan MQA dan MBOT serta pengiktirafan yang lain yang diterima menjamin kualiti pendidikan yang disediakan.	4.21	.691

Skor min semua pembolehubah yang diukur pada skala likert lima mata. Jadual di atas menunjukkan min tertinggi ialah 4.39 yang mana responden bersetuju mengetahui bahawa graduasi daripada kolej komuniti boleh menyambung pengajian mereka ke pusat pengajian yang lebih tinggi. Min terendah pula ialah 4.09 yang mana mereka tahu kursus yang ditawarkan di kolej komuniti mempunyai pengiktirafan pihak MQA dan MBOT.

Jadual 8. Analisis Regresi Linear Berganda

Model	Unstandardized Coefficients	Standardized Coefficients	t-value	Sig. (P-value)
	B-value	β-value		
Institusi Pengajian	B = 0.329	β= 0.329	5.088	.000

Publisiti Promosi	B = 0.194	β= 0.234	4.207	.000
Prospek Masa Depan	B = 0.198	β= 0.207	2.869	.004
Pengiktirafan	B = 0.082	β= 0.083	1.361	.174
F- value	119.592			
F-Sig.	0.000			
R	0.773			
R^2	0.598			
Adjusted R^2	0.593			

Analisis Regresi Linear Berganda dijalankan untuk mengetahui sama ada faktor institusi pengajian, publisiti dan promosi, prospek masa depan serta pengiktirafan adalah signifikan dengan kepuasan kerja. Dapatan utama analisis regresi menunjukkan bahawa (R=0.773) bermakna terdapat hubungan positif yang tinggi antara pembolehubah tidak bersandar dan pembolehubah bersandar. Pembolehubah tidak bersandar (institusi pengajian, publisiti dan promosi, prospek masa depan serta pengiktirafan) untuk 59.8 % varians (R^2 = 0.598). R^2 terlaras = 0.598 hendaklah sama atau hampir dengan nilai R dan nilai F = 119.592 iaitu lebih tinggi daripada 1, sig = 0.000) menunjukkan model yang digunakan dalam kajian ini sesuai. Nilai B digunakan untuk mengukur kekuatan pembolehubah tidak bersandar terhadap pembolehubah bersandar. Ia mengenal pasti bahawa nilai B untuk institusi pengajian adalah pembolehubah terkuat yang mempengaruhi enrolmen di KKNP (nilai B = 0.329). Nilai beta pekali piawai antara institusi pengajian, publisiti dan promosi, prospek masa depan serta pengiktirafan ialah (β= 0.329, 0.234, 0.207 dan 0.083). Ia menunjukkan bahawa faktor institusi pengajian adalah yang paling tinggi pengaruhnya kepada enrolmen di KKNP. Manakala keputusan dari Analisis Regresi Berganda juga turut menolak hipotesis di bawah:
H_01: Faktor luaran bukan peramal yang signifikan kepada daya tarikan enrolmen pelajar baharu ke Kolej Komuniti Negeri Perak. Ini kerana semua faktor luaran adalah peramal yang signifikan kepada daya tarikan enrolmen pelajar baharu ke Kolej Komuniti Negeri Perak.

Jadual 9. Analisis Pekali Korelasi

Pembolehubah	**Pengaruh Luar**	**Institusi Pengajian**	**Publisiti Promosi**	**Prospek Masa Depan**	**Pengiktirafan**
Pengaruh Luar	1				
Institusi Pengajian	0.725**	1			
Publisiti Promosi	0.678**	0.720**	1		
Prospek Masa Depan	0.711**	0.804**	0.742**	1	
Pengiktirafan	0.643**	0.742**	0.652**	0.792**	1

Pekali korelasi bagi pembolehubah yang dikaji adalah antara 0.643 hingga 0.725 yang menunjukkan semua pembolehubah tidak bersandar mempunyai hubungan positif yang mempengaruhi enrolmen di KKNP mengikut Pekali Korelasi Pearson. Faktor institusi pengajian mempunyai perkaitan positif tertinggi yang mempengaruhi enrolmen di KKNP (r = 0.725). Diikuti dengan faktor prospek masa depan juga mempunyai korelasi yang positif yang mempengaruhi

enrolmen di KKNP (r = 0.711). Selain itu, keputusan menunjukkan bahawa faktor publisiti dan promosi dikaitkan secara positif yang mempengaruhi enrolmen di KKNP (r = 0.678). Akhir sekali, nilai pekali korelasi bagi faktor pengiktirafan ialah (r = 0.643) yang menegaskan bahawa faktor pengiktirafan juga mempunyai hubungan positif yang mempengaruhi enrolmen di KKNP. Keputusan ini juga membantu untuk mencapai objektif kajian ini iaitu untuk menentukan hubungan antara pembolehubah bersandar dan pembolehubah tidak bersandar. Oleh kerana semua nilai korelasi Pearson adalah positif, dapat disimpulkan bahawa objektif kajian nombor 1 adalah tercapai. Manakala keputusan dari Analisis Pekali Korelasi juga turut menolak hipotesis di bawah:
$H_0$2: Tidak terdapat hubungan yang signifikan antara jantina dan faktor luaran dalam mempengaruhi enrolmen pelajar baharu ke Kolej Komuniti Negeri Perak. Ini kerana semua faktor luaran terdapat hubungan yang signifikan antara jantina dan faktor luaran dalam mempengaruhi enrolmen pelajar baharu ke Kolej Komuniti Negeri Perak.

Perbincangan Analisis

Soalan kajian 1: *Adakah faktor luaran mempengaruhi kemasukan pelajar ke KKNP?*

Bagi hipotesis pertama iaitu faktor pengaruh luar, institusi pengajian, publisiti dan promosi, prospek masa depan serta pengiktirafan bukan peramal enrolmen kemasukan pelajar ke KKNP yang signifikan, daripada analisis data daripada ujian Regression linear berganda (Regression Multiple Test) didapati nilai signifikan adalah 0.773 iaitu lebih besar dan Hipotesis H_{02} gagal ditolak kerana nilai $p > 0.05$. Di sini, semua pembolehubah adalah peramal yang signifikan bagi enrolmen kemasukan pelajar. Penyelidik membuat kesimpulan bahawa kerana semua faktor luaran adalah peramal yang signifikan kepada daya tarikan enrolmen pelajar baharu ke Kolej Komuniti Negeri Perak serta faktor institusi pengajian dengan nilai B adalah pembolehubah terkuat yang mempengaruhi enrolmen di KKNP (nilai B = 0.329). Nilai beta pekali piawai antara institusi pengajian, publisiti dan promosi, prospek masa depan serta pengiktirafan ialah (β= 0.329, 0.234, 0.207 dan 0.083).

Soalan kajian 2 : *Adakah terdapat perbezaan yang signifikan dalam enrolmen kemasukan pelajar ke KKNP berdasarkan jantina?*

Hipotesis kedua, iaitu tidak terdapat perbezaan yang signifikan dalam enrolmen kemasukan pelajar ke KKNP berdasarkan jantina. Dapatan bagi hipotesis berdasarkan Pekali korelasi bagi pembolehubah yang dikaji adalah antara 0.643 hingga 0.725 yang menunjukkan semua pembolehubah tidak bersandar (faktor luaran) mempunyai hubungan positif yang mempengaruhi enrolmen di KKNP Hipotesis H_{02} gagal ditolak kerana nilai dengan nilai $p > 0.05$ dan nilai ujian adalah 0.643 iaitu lebih besar daripada 0.05 maka varians kedua-dua jantina adalah sama bagi enrolmen kemasukan pelajar. Faktor jantina juga tidak memiliki perbezaan yang signifikan dalam enrolmen kemasukan pelajar ke KKNP. Jika dilihat dari sudut jantina pula, berdasarkan kepada hipotesis kajian kedua iaitu dapatan kajian daripada analisis soalan kedua faktor jantina juga tidak memiliki perbezaan yang signifikan dalam enrolmen kemasukan pelajar ke KKNP. Jaafar (1986) yang mengkaji perhubungan antara jantina dan minat kerjaya yang menggunakan soal selidik ubahsuai daripada *Vocational Preference Inventory* berasaskan enam jenis personaliti RIASEK iaitu realistik, investigatif, artistik, sosial dan konvensional yang diadaptasi daripada teori Holland juga menunjukkan tiada hubungan yang signifikan antara minat kerjaya lelaki dan juga perempuan.

Cadangan Kajian Lanjutan

Penambahbaikan untuk kajian yang akan datang, penyelidik merasakan beberapa item perlu diberikan perhatian seperti pembinaan item bagi soal selidik, supaya soalan yang dibina benar–benar dapat memberi fokus kepada penyelidikan yang dibuat. Pemilihan dalam menentukan pembolehubah bersandar supaya lebih menepati tajuk penyelidikan dan bersesuaian. Perlu menggunakan sampel kajian daripada negeri lain di Malaysia supaya dapatan yang diperolehi lebih memberikan gambaran yang sebenar berkaitan penyelidikan serta menggunakan kaedah bercampur, kuantitatif dan kualitatif dalam penyelidikan lanjutan, dapatan kajian dijangka dapat memberi dan menghasilkan dapatan yang lebih baik dan bermakna.

Kesimpulan Kajian

Berhubung dengan hasil daripada kajian oleh penyelidik berkaitan analisa faktor kemasukan pelajar ke KKNP, penyelidik mengharapkan sesuatu perlu dilakukan bagi merangsangkan lagi peningkatan enrolmen kemasukan pelajar ke KKNP. Walaupun hasil penyelidikan mencerminkan semua faktor–faktor yang disenaraikan memberikan pengaruh terhadap kemasukan pelajar, tetapi secara realitinya jumlah kemasukan pelajar masih membimbangkan. Jika ditinjau dapatan daripada kajian, di sini dicadangkan supaya pihak JPPKK untuk mengambil langkah yang proaktif seperti memperluaskan hebahan dan promosi, mempromosikan kisah kejayaan lepasan kolej komuniti melalui rangkaian media massa di facebook, tik tok, instagram dan media massa konvensional seperti televisyen dan radio perlu dipergiatkan lagi. Daripada dapatan kajian keseluruhannya, ia menunjukkan kajian menjawab semua persoalan kajian yang dikemukakan dan objektif kajian ini adalah tercapai.

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Konsep Pengulangan dalam Teknik Lukisan Isometrik pada Seni Kaligrafi Islam Kontemporari Malaysia

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Abstrak: Kajian ini dijalankan bagi menjelaskan konsep pengulangan dan memperluas terminologi konsep pengulangan yang digunakan dalam Seni Kaligrafi Islam. Konsep pengulangan ini dapat ditemui dalam Al-Quran bertujuan sebagai peringatan berterusan kepada manusia. Konsep pengulangan dalam seni Islam merupakan salah satu konsep unik yang menjadikannya berbeza daripada yang lain. Dalam Al-Quran, kita akan mendapati beberapa frasa diulang-ulang sementara seni Islam juga penuh dengan imej berulang dalam kaligrafi. Teori Meyer Schapiro yang memfokuskan kepada gaya akan digunakan sebagai kaedah kualitatif dalam menganalisa hasil seni. Dua hasil karya artis seni kontemporari Malaysia yang menggunakan Teknik Lukisan Isometrik telah dipilih untuk dianalisis. Dapatan kajian memberi kesimpulan bahawa konsep pengulangan yang diterapkan ke dalam seni kaligrafi adalah satu bentuk zikir visual daripada artis kepada Tuhan Yang Esa, Allah SWT. Hasil kajian ini secara langsung menolak kritikan terhadap konsep pengulangan dalam Seni Islam sebagai serampangan yang tidak berasas.

Kata Kunci: Konsep Pengulangan; Teknik Lukisan Isometrik; Kaligrafi Islam; Seni Kontemporari Malaysia.

Pendahuluan

Seni kontemporari yang juga dikenali sebagai seni moden ialah karya seni yang dihasilkan di antara pertengahan abad ke-20 hingga abad ke-21. Seni kontemporari Malaysia juga berkembang dengan penggunaan pelbagai teknik yang memberi nafas baharu dalam dunia seni Malaysia.

Seni Islam terkenal dengan keindahan intrinsik dan reka bentuk abstrak. Seni Islam menggambarkan keimanan umat Islam dalam mempercayai Tuhan Yang Tunggal-Allah S.W.T. Inilah keindahan estetika Seni Islam. Kesenian Islam, sejak dahulu hingga kini kekal untuk tujuan utama iaitu untuk keimanan dan Tauhid kepada Allah S.W.T. Ia dicipta bukan gambaran estetik kemanusiaan atau sifat-sifat manusia atau kebenaran alam semula jadi (Al-Faruqi, 1985).

Kaligrafi adalah bentuk Seni tertinggi dalam Islam, dan ia berhubungan dengan Al-Quran. Ini kerana melalui tulisan Al-Quran diturunkan, tulisan Arab mula-mula diubah dan diperindahkan agar ia layak menerima wahyu Ilahi (Komaroff, 1992).

Pada abad ke-21, penghasilan karya seni kaligrafi Islam telah meningkat dalam kalangan artis Malaysia. Proses pengulangan kaligrafi dalam penghasilan karya adalah berbeza bagi setiap artis. Konsep pengulangan ini dapat dilihat dalam kepelbagaian teknik. Antaranya, teknik catan tradisional, teknik cetakan saring serta teknik lukisan isometrik.

Dalam tulisannya, Akhtar (2007) berkata, walaupun Yahudi dan Kristian mengkritik bagaimana Al-Quran berulang-ulang secara serampangan, mereka telah tersilap menuduhnya kerana pengulangan dalam Al-Quran mempunyai makna lebih daripada itu. Oleh itu, adalah penting isu ini dikaji dan difahami dengan jelas supaya menjadi rujukan bagi para penggiat seni Islam, pengkaji seni mahupun orang awam.

Metodologi Kajian

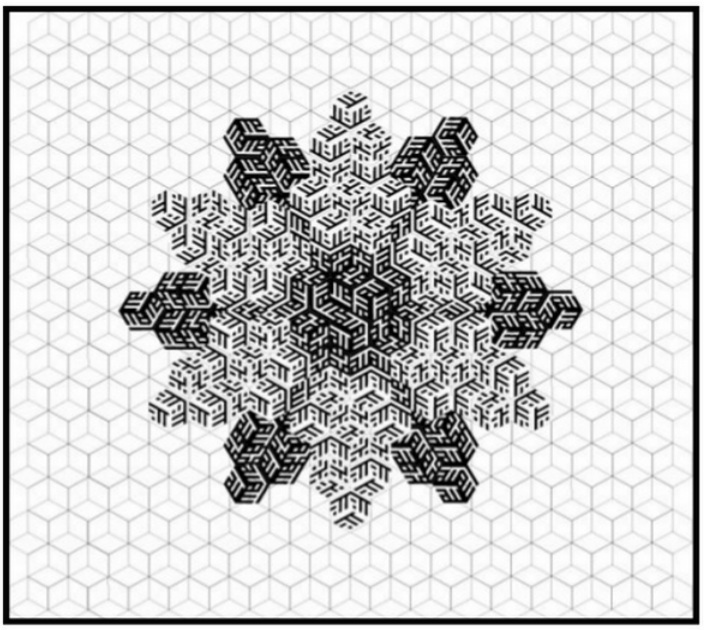
Metodologi kajian yang digunakan untuk kajian ini ialah kaedah kualitatif terutamanya menggunakan *Grounded Theory*. Dua karya seni artis Malaysia Kontemporari yang menggunakan teknik lukisan Isometrik menjadi fokus utama dalam penyelidikan ini.

Bagi kajian ini, teori Meyer Schapiro tentang gaya digunakan untuk menganalisis seni khat Islam melalui teknik lukisan Isometrik. Kajian gaya yang dibentangkan oleh Meyer Schapiro akan digunakan untuk mengenal pasti seni tersebut.

> *"Bagi ahli sejarah seni, gaya adalah objek penting dalam penyiasatan. Dia mengkaji korespondensi dalamannya, sejarah hidupnya, dan masalah pembentukan dan perubahannya. Dia juga menggunakan gaya sebagai kriteria tarikh dan tempat asal karya dan sebagai cara untuk mengesan hubungan antara sekolah seni. Tetapi gaya itu, di atas semua, sistem bentuk dengan kualiti dan ekspresi yang bermakna melalui keperibadian artis dan pandangan luas kumpulan, berkomunikasi dan menetapkan nilai tertentu dalam kehidupan keagamaan, sosial dan moral melalui kesan emosi. daripada borang. Ia adalah, selain asas bersama yang boleh diukur terhadap inovasi dan keperibadian karya tertentu. Dengan mempertimbangkan penggantian karya dalam masa dan ruang dan dengan memadankan variasi gaya dengan peristiwa sejarah dan dengan ciri-ciri pelbagai bidang budaya lain, sejarawan mencuba dengan bantuan psikologi akal dan teori sosial untuk mengambil kira perubahan gaya atau sifat tertentu. Kajian sejarah gaya individu dan kumpulan juga mendedahkan peringkat dan proses tipikal dalam perkembangan bentuk"* (Schapiro, 1953).

Keputusan dan Perbincangan

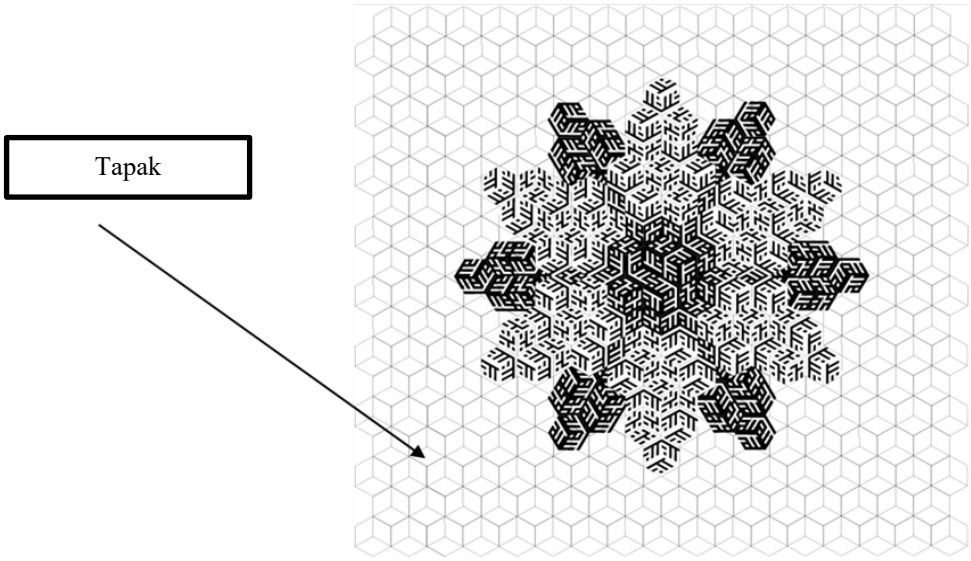
Seni Islam juga boleh dianggap sebagai seni matematik yang menggunakan kecerdasan otak manusia untuk menyusun subjek supaya diletakkan dalam kombinasi yang harmoni tanpa bertindih antara satu sama lain. Salah satu kaedah dalam membuat susunan matematik ialah dengan melakukan lukisan isometrik.



Rajah 1. 'Bunga Cinta' oleh Ponirin Amin (2006)
Sumber : Koleksi Artis

Untuk menggunakan teknik ini, ahli khat biasanya menggunakan 'Kufi Khat' kerana jenis khat ini lebih berbentuk geometri dan senang dibentuk. Bentuk geometri 'Kufi Khat' memudahkan ahli kaligrafi mengolah bentuk dengan lebih fleksibel.

Dari kotak segi empat sama, artis menggunakan pengetahuan asas isometrik untuk menjadikannya kiub kecil. Bentuk itu kemudiannya menjadi heksagon jika dilihat dari dua dimensi. Bentuk itu kemudian diulang secara berterusan untuk menjadi tapak lukisan (Rajah 2).



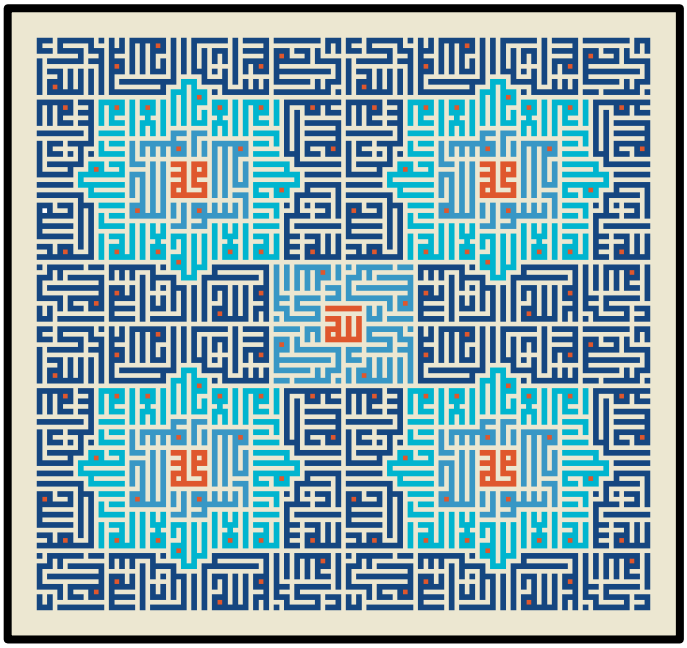
Rajah 2. Tapak lukisan

Nama Allah SWT dan Muhammad SAW kemudian disusun menjadi bentuk sekuntum bunga dengan menggunakan konsep pengulangan. Proses pembuatan seni ini juga sama dengan proses pembuatan *pixel art* yang menggunakan kotak persegi sebagai tapak lukisan. Dengan menyebut nama Allah SWT dan Muhammad SAW berulang kali, ia menjadi zikir visual kerana berfungsi sebagai satu bentuk zikir.

Seniman meluahkan perasaan dengan menunjukkan keindahan Islam melalui keindahan sekuntum bunga. Bunga sentiasa merujuk kepada wanita dan kecantikan. Oleh itu, bentuk bunga dipilih kerana melambangkan perasaan dalaman pelukis terhadap agamanya.

Lukisan isometrik ialah proses terkenal pada masa sekarang dalam dunia seni, terutamanya Seni Grafik. Teknik ini lebih cenderung dipilih oleh ahli kaligrafi muda terutamanya dalam melakukan Seni Kufi yang lebih berbentuk geometrik. Salah seorang ahli khat muda, Muhammad Sobirin Abdul Hamid, tampil dengan konsep zikir visual yang sama seperti yang ditunjukkan dalam Rajah 3.

Rajah 3. Zikir series by Muhammad Sobirin Abdul Hamid. (2012)



Sumber : Koleksi Artis

Berbeza dengan Ponirin Amin, Muhammad Sobirin lebih banyak menggunakan kata-kata zikir untuk melengkapkan lukisan ini. Nama Allah SWT, Muhammad SAW, kalimah Lailahaillallah, Subhanallah, Alhamdulillah dan Allahu Akbar diulang-ulang dan tersusun indah dalam keseimbangan yang harmoni dan sepadan.

Nama Allah SWT diletakkan di tengah-tengah, dikelilingi oleh empat kuntum nama Muhammad SAW. Lafaz zikir bercantum, membentuk bunga dan ruang latar. Ia dicipta dengan cantik dengan menggunakan warna biru dan merah yang harmoni. Susunan seni ini dibuat untuk mengingati Allah SWT. Perkataan Zikrullah dan nama Muhammad berulang kali dibuat sebagai peringatan kepada umat Islam untuk terus mengulangi kata-kata itu. Pengulangan peringatan ini juga mendisiplinkan hati umat Islam agar sentiasa mengingati Tuhan Yang Maha Esa. Hanya terdapat satu nama Allah SWT dan kedudukannya di tengah-tengah. Hal ini demikian kerana setiap perkataan lain akan bertumpu kepada punca tengah.

Kesimpulan

Pengulangan dalam konteks sudut pandangan Muslim adalah untuk menyatakan perasaan mereka terhadap Tuhan Yang Esa iaitu Allah SWT. Gambar ulangan, bentuk dan kaligrafi melambangkan kesatuan dalam Islam. Perpaduan adalah elemen yang penting kerana umat Islam mesti menjaga hubungan baik antara orang di sekelilingnya untuk mendapat keredaan Allah SWT. Imej-imej dan kaligrafi itu diulang-ulang bentuknya secara rata sehingga seseorang tidak dapat menentukan di manakah permulaan seni dan penamat seni itu, dan ia dilambangkan sebagai infiniti yang mewakili Allah SWT. Kata-kata khat juga diulang-ulang untuk menggambarkan zikrullah atau zikir.

Ideologi praktikal yang dipegang oleh seniman Muslim ini kemudiannya tersirat ke dalam seni mereka yang terhasil dalam pelbagai bentuk. Ada di antara mereka menggunakannya untuk meluahkan perasaan. Ada juga artis yang menggunakan konsep ini sebagai peringatan serta sebagai kaedah pengajaran kepada seorang Muslim lain untuk mengingati Tuhan. Hal ini demikian kerana imej dan perkataan yang berulang-ulang boleh menjadi salah satu kaedah dalam terapi minda. White

(2002), dalam bukunya *Printmaking as Therapy: Frameworks for Freedom* membincangkan bahawa kualiti pengulangan yang menenangkan diri boleh membantu dalam membangunkan minda.

Tiga teknik utama yang digunakan oleh artis Seni Kaligrafi Kontemporari Malaysia ialah menggunakan lukisan isometrik, lukisan tradisional dan teknik cetakan saring. Kajian lanjut tentang konsep pengulangan dalam seni khat kontemporari Malaysia boleh dilakukan pada teknik cetakan saring serta pada lukisan tradisional pula.

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Pembangunan Sistem e-Risk Bagi Pengurusan Risiko dan Peluang di Politeknik Ibrahim Sultan

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Abstrak. Pengurusan risiko dan peluang merupakan satu keperluan bagi semua agensi atau institusi yang melaksanakan sistem pengurusan kualiti berasaskan Standard MS ISO 9001:2015. Namun begitu, masih tiada satu sistem pengurusan risiko dan peluang yang sistematik, teratur dan efektif yang digunapakai oleh agensi atau institusi bagi melaksanakan proses tersebut. Oleh itu, satu sistem pengurusan data berbentuk Sistem Pengurusan Pelaporan Risiko dan Peluang, iaitu *e-Risk* telah dibangunkan bagi memudahkan Politeknik Ibrahim Sultan melaksanakan sistem pengurusan risiko dan peluang untuk memenuhi klausa 0.3.3 Pemikiran Berasaskan Risiko dan klausa 6.1 Tindakan Menyatakan Risiko dan Peluang. Artikel ini membincangkan proses pembangunan dan pengujian sistem e-Risk. Hasil dapatan soal selidik yang diperoleh daripada 30 orang pengguna sistem e-Risk menunjukkan dapatan positif daripada pengguna sistem e-Risk dari aspek Reka bentuk Sistem, Kebolehfungsian dan Kemudahgunaan dan Tahap Kepuasan Pelanggan menunjukkan bahawa sistem yang dibangunkan ini dapat mengatasi masalah yang timbul berikutan kesukaran yang dihadapi oleh jawatankuasa risiko dan peluang dan ia mempunyai potensi untuk dijadikan satu sistem gunasama kepada institusi dan agensi seperti Kolej Komuniti dan politeknik lain.

Kata kunci: Pengurusan Risiko; Pembangunan Sistem; Peluang; Memantau; Mengemaskini; Menyemak.

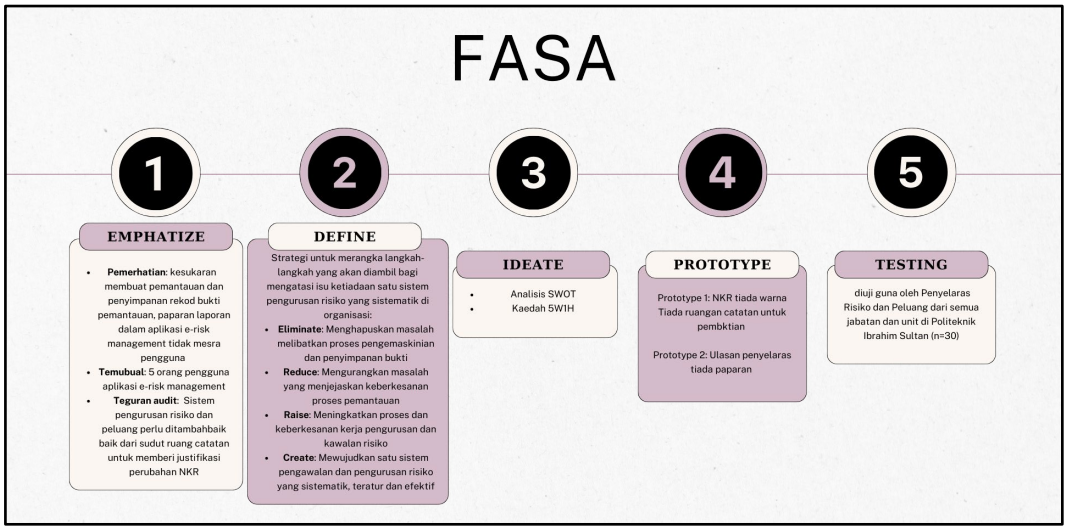
Pengenalan

Pengurusan risiko adalah satu komponen penting dalam menentukan kejayaan sesebuah organisasi dalam apa jua bidang sama ada ekonomi, kewangan, sosial mahupun pendidikan. Pengurusan risiko didefinisikan sebagai suatu penyelarasan atau perancangan aktiviti organisasi secara bersepadu melalui penetapan hala tuju atau strategi dan kawalan dalam menghadapi sebarang risiko (Jabatan Standard Malaysia 2010). Risiko didefinisikan dalam ekonomi sebagai ketidaktentuan yang wujud terhadap hasil mendatang yang mana kemungkinan pendapatan lebih daripada jangkaan dan sumber yang tidak diketahui (Bhatti dan Misman, 2012). Bagi institusi pula, Boas (2012) mendefinisikan risiko dalam institusi tidak bermatlamatkan keuntungan sebagai impak negatif yang mengekang daripada misi, objektif, strategi untuk dicapai. Pengurusan risiko merupakan satu prinsip yang bertujuan untuk mengenal pasti, menganalisis dan mengendalikan faktor risiko untuk meningkatkan peluang bagi mencapai kejayaan atau mengelak dari sebarang kegagalan projek (Bannerman 2008; Boehm 1991). Pengurusan Risiko dan Peluang merupakan satu keperluan Standard MS ISO 9001:2015 yang mesti dipatuhi dan dilaksanakan oleh institusi. Risiko dapat ditakrifkan sebagai kesan ketidakpastian yang boleh memberi kesan terhadap pencapaian objektif atau matlamat sesebuah organisasi dan apa-apa ketidakpastian itu boleh mempunyai kesan positif atau negatif. Peluang pula membawa maksud kesempatan yang baik dari peristiwa atau risiko yang berlaku.

Politeknik Ibrahim Sultan (PIS) mempunyai keseluruhan 28 jabatan dan unit serta telah mempunyai satu struktur jawatankuasa risiko dan peluang yang terdiri dari penyelaras risiko dan peluang, setiausaha serta ahli yang diwakili oleh setiap jabatan dan unit. Antara bidang tugas yang ditetapkan ialah membuat pendaftaran risiko, analisis risiko, rawatan ke atas risiko dan pemantauan terhadap risiko dan peluang yang didaftarkan. Antara masalah yang dihadapi oleh jawatankuasa ini ialah kesukaran untuk membuat pemantauan menggunakan aplikasi sedia ada. Risiko dan peluang yang didaftarkan perlu dipantau dan dilaporkan. Pelaksanaannya dibuat pada awal tahun dengan pendaftaran risiko dan peluang, pada pertengahan tahun dengan laporan pemantauan 1 dan di akhir tahun dengan laporan pemantauan 2. Hasil pelaksanaan pemantauan terdahulu yang dibuat secara manual telah mendapat teguran dari pihak juruaudit samada dalaman dan luaran. Masalah juga timbul apabila sesetengah jabatan atau unit memasukkan maklumat pada link (*google drive*) yang berbeza dan terdapat pertindihan maklumat. Selain itu, pihak penyelaras risiko dan peluang juga sukar untuk membuat pemantauan kerana maklumat setiap jabatan dan unit berada dalam fail yang berasingan dan sukar untuk melihatnya secara *overall*. Keadaan ini akan menjadi bertambah sulit jika ada pembetulan atau penambahbaikan yang perlu dilakukan oleh jabatan dan unit yang terlibat selepas semakan penyelaras. Justeru itu, sistem e-Risk dibangunkan bagi mengatasi masalah yang timbul dengan berasaskan kesukaran yang dihadapi oleh jawatankuasa risiko dan peluang. Ia juga diharapkan untuk memudahkan semua Ketua Jabatan dan Ketua Unit untuk mengemaskini, menyemak dan memantau risiko dan peluang masing-masing.

Metodologi

Sistem e-Risk dibangunkan dengan menggunakan pendekatan *Design Thinking*, yang melibatkan lima (5) fasa, iaitu *Emphatize - Define - Ideate - Prototype - Testing*, seperti yang diringkaskan dalam *Rajah 1*. Pendekatan *Design Thinking*, iaitu satu metode kolaborasi yang bukan sahaja berfokus kepada pemerhatian, tetapi juga pengalaman pengguna, boleh digunakan untuk mencari solusi yang efektif dan efisien bagi mengatasi satu masalah yang kompleks (Sari et al., 2020). Seperti yang diterangkan, proses ini bermula dengan mendefinisikan masalah dan kemudian membangunkan solusi yang berfokuskan pengguna kepada produk akhir (Steinke et al., 2017).



Rajah 1. Pendekatan *Design Thinking*

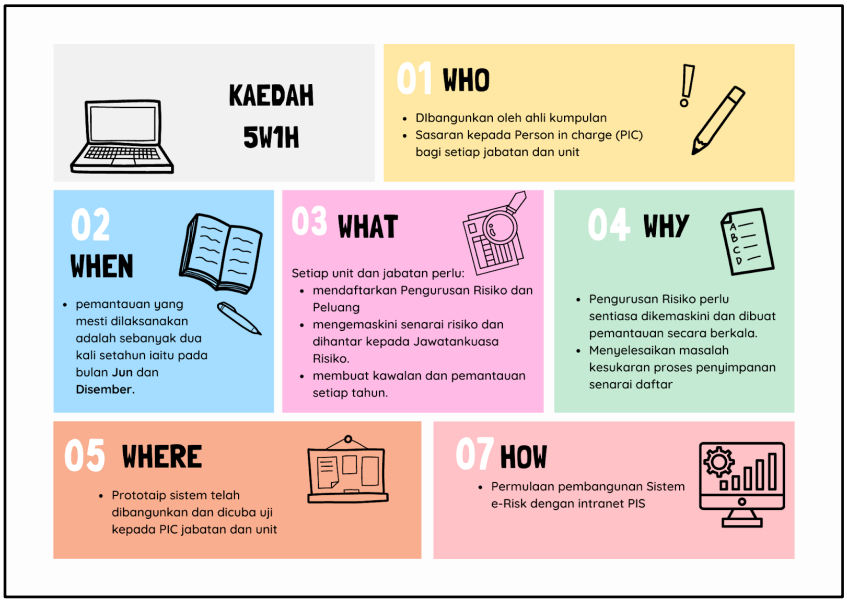
Pada peringkat permulaan, iaitu fasa ***Emphatize***, pemahaman terhadap masalah telah dijalankan melalui pemerhatian, temubual dan maklum balas/ teguran daripada auditor. Antara masalah yang diperhatikan oleh Jawatankuasa risiko dan peluang di PIS ialah kesukaran untuk membuat pemantauan dan penyimpanan rekod bukti pemantauan menggunakan sistem lam. Kaedah temubual pula telah dijalankan terhadap 5 orang pengguna aplikasi sedia ada iaitu *e-risk management*

dan mendapati bahawa aplikasi sedia ada belum memenuhi seluruh proses pengurusan risiko dan peluang. Aplikasi tersebut perlu ditambahbaik untuk memenuhi keperluan pemantauan, paparan laporan, dokumen pembuktian dan kemudahan *storage* dokumen. Teguran audit pula adalah berkaitan dengan keperluan untuk menambahbaik sistem pengurusan risiko dan peluang dari sudut ruang catatan untuk memberi justifikasi perubahan NKR yang perlu disokong dengan bukti. Maka, tindakan penambahbaikan yang diambil adalah dengan membangunkan sistem e-risk ini.

Untuk fasa ***Define***, kaedah analisa kerangka 4 langkah (rujuk *Rajah 2*), iaitu Hapuskan (Eliminate)- Kurangi (Reduce)-Tingkatkan (Raise)- Ciptakan (Create) Grid (ERRC Grid) seperti yang digunakan dalam kajian lain (Aini & Rizal, 2021; Arief & Maupa, 2021) digunakan sebagai strategi untuk merangka langkah-langkah yang akan diambil bagi mengatasi isu kurangnya keberkesanan pengurusan dan kawalan risiko di organisasi. Bagi fasa ***Ideate***, dua lagi metod perancangan strategik, iaitu analisis SWOT (rujuk *Rajah 3*) dan Kaedah 5W1H (rujuk *Rajah 4*) digunakan untuk memudahkan proses transisi dari rumusan masalah ke arah penyelesaiannya.

S	W	O	T
STRENGTHS (Kekuatan)	**WEAKNESSES (Kelemahan)**	**OPPORTUNITIES (Peluang)**	**Threats (Ancaman)**
Mempunyai set senarai daftar risiko dan peluang secara dalam talian.	Kesukaran mendaftarkan risiko dan peluang dengan Aplikasi sedia ada.	Menambahbaik kemudahan proses penyimpanan senarai daftar dan proses pemantauan berkala.	Ancaman virus kepada aplikasi yang boleh mengganggu simpanan data dalam *Google Drive.*
Mempunyai satu aplikasi yang memudahkan sistem pengurusan risiko di PIS.	Kesukaran proses kemaskini, pemantauan dan pembuktian dengan menggunakan Aplikasi sedia ada.	Penjimatan kos	Aplikasi boleh direplikasi oleh pihak lain.

Rajah 3. Analisis SWOT

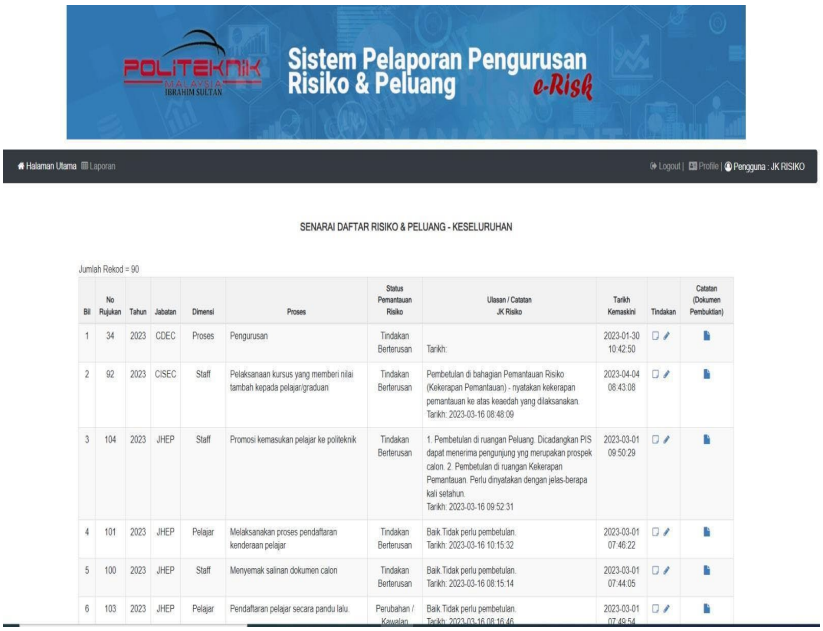


Rajah 4. Rumusan Idea dengan menggunakan kaedah 5W1H

Untuk fasa ***Prototype*** dan ***Testi***ng pula melibatkan penghasilan dan pengujian sistem e-Risk yang dilaksanakan melalui perbincangan dengan pakar iaitu Juruaudit Luar dan penilaian kebolehgunaan sistem melalui soal selidik kepada pengguna. Ulasan pakar menyatakan bahawa sistem e-Risk ini adalah satu sistem yang mesra pengguna untuk pengurusan risiko dan peluang di institusi. Soal selidik pula diedarkan kepada 30 orang pengguna yang terdiri daripada Penyelaras Risiko dan Peluang dari semua jabatan dan unit di PIS. Dapatan ini akan dibincangkan dalam bahagian yang berikutnya.

Dapatan dan Perbincangan

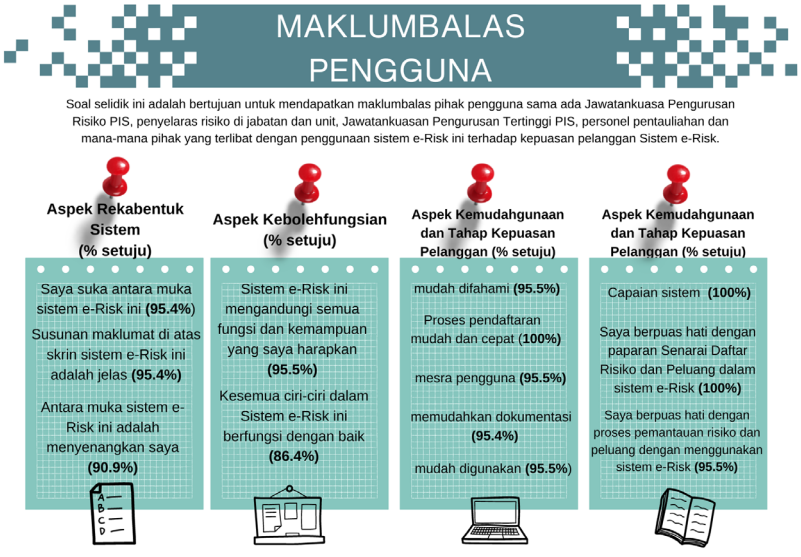
Pendekatan *Design Thinking* dalam kajian ini berjaya menghasilkan satu sistem e-Risk seperti Rajah 5 di bawah.



Bil	No Rujukan	Tahun	Jabatan	Dimensi	Proses	Status Pemantauan Risiko	Ulasan / Catatan JK Risiko	Tarikh Kemaskini	Tindakan	Catatan (Dokumen Pembuktian)
1	34	2023	CDEC	Proses	Pengurusan	Tindakan Berterusan	Tarikh:	2023-01-30 10:42:50		
2	92	2023	CISEC	Staff	Pelaksanaan kursus yang memberi nilai tambah kepada pelajar/graduan	Tindakan Berterusan	Pembetulan di bahagian Pemantauan Risiko (Kekerapan Pemantauan) - nyatakan kekerapan pemantauan ke atas keadah yang dilaksanakan. Tarikh: 2023-03-16 08:48:09	2023-04-04 08:43:08		
3	104	2023	JHEP	Staff	Promosi kemasukan pelajar ke politeknik	Tindakan Berterusan	1. Pembetulan di ruangan Peluang. Dicadangkan PIS dapat menerima pengunjung yng merupakan prospek calon. 2. Pembetulan di ruangan Kekerapan Pemantauan. Perlu dinyatakan dengan jelas berapa kali setahun. Tarikh: 2023-03-16 09:52:31	2023-03-01 09:50:29		
4	101	2023	JHEP	Pelajar	Melaksanakan proses pendaftaran kenderaan pelajar	Tindakan Berterusan	Baik.Tidak perlu pembetulan. Tarikh: 2023-03-16 10:15:32	2023-03-01 07:46:22		
5	100	2023	JHEP	Staff	Menyemak salinan dokumen calon	Tindakan Berterusan	Baik.Tidak perlu pembetulan. Tarikh: 2023-03-16 08:15:14	2023-03-01 07:44:05		
6	103	2023	JHEP	Pelajar	Pendaftaran pelajar secara pandu lalu	Perubahan / Kewajan	Baik.Tidak perlu pembetulan. Tarikh: 2023-03-16 08:16:46	2023-03-01 07:49:54		

Rajah 5. Paparan Sistem e-Risk

Setelah prototaip sistem e-Risk ini terhasil, proses pengujian dilaksanakan untuk menguji kebolehgunaan sistem. Hasil soal selidik mendapati lebih 90% responden bersetuju dengan reka bentuk Sistem e-Risk, lebih 90% bersetuju dengan kebolehfungsian sistem dan juga lebih 90% bersetuju dengan kemudahgunaan sistem ini. Rumusan dapatan adalah seperti Rajah 6 di bawah.



Rajah 6. Rumusan Dapatan Maklum Balas Pengguna

Aspek rekabentuk sistem merujuk kepada paparan sistem seperti antara muka dan susunan maklumat di atas skrin. Dapatan kajian memberi maklumat bahawa paparan sistem ini memberi kesenangan kepada pengguna berdasarkan peratus persetujuan yang diberikan melebihi 90%. Dapatan aspek kebolehfungsian sistem pula menunjukkan sistem ini bukan sahaja boleh berfungsi dengan baik malah memenuhi ciri-ciri yang diperlukan. Selain itu juga, dapatan menunjukkan 90% responden bersetuju dengan kemudahgunaan sistem ini. Hal ini memberi maklumat bahawa kesemua proses pengurusan risiko dan peluang yang terkandung dalam sistem e-Risk ini mudah digunakan. Ini merangkumi proses kenalpasti risiko, analisis risiko, rawatan ke atas risiko dan pemantauan risiko.

Kesimpulan

Secara keseluruhannya, kajian ini telah membincangkan pembangunan sistem e-Risk bagi pengurusan risiko dan peluang di Politeknik Ibrahim Sultan. Selain itu, kajian ini juga turut membincangkan proses pengujian kebolehgunaan sistem. Pembangunan sistem e-Risk ini diharapkan dapat membantu mengatasi masalah pengurusan risiko dan peluang sebelum ini dan membatu Politeknik Ibrahim Sultan mengekalkan pensijilan MS ISO 9001:2015 dengan keperluan standard di bawah klausa 0.3.3 Pemikiran Berasaskan Risiko dan klausa 6.1 Tindakan Menyatakan Risiko dan Peluang.

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Mind Mapping and Student's Mathematics Self-Efficacy and Anxiety: A Quasi-Experimental Study

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Abstract. Mathematics education plays a crucial role in fostering students' academic success and future opportunities. However, many students face challenges in developing self-efficacy and managing anxiety levels when learning mathematics. To address the issue, this quasi-experimental study examined the effects of using mind maps as a learning tool on self-efficacy and anxiety levels in mathematics among 132 matriculation students from Sarawak Matriculation College. The participants were assigned to either an experimental group or a control group. The experimental group received a four-week intervention incorporating mind maps during mathematics lessons, while the control group received traditional instruction. Adapted questionnaires were administered to measure self-efficacy and anxiety levels before and after the intervention. The data were analyzed by using appropriate descriptive and inferential statistics, including paired-sample t-tests, independent-sample t-tests, and correlation analysis. The findings suggest that the use of mind maps positively influences self-efficacy and reduces anxiety in mathematics education. These results have implications for educators and policymakers, highlighting the potential of mind maps as an effective pedagogical approach to enhancing mathematics learning outcomes. Further research is recommended to explore the generalizability and long-term effects of mind-mapping techniques in diverse educational settings.

Keywords: Mind Mapping; Mathematics Self-efficacy; Mathematics Anxiety

Introduction

Mathematics education has long been a challenging area of study for many students, particularly at the college level. Students often experience difficulties in understanding mathematical concepts, lack confidence in their ability to solve math problems, and may feel anxious and stressed when faced with math-related tasks. Mathematics is widely regarded as the most difficult subject in educational institutions, with students frequently struggling to solve math problems (Nurfadhilah et al., 2021). According to the study by Sahin et al. (2014), students found mathematics to be the most difficult subject, followed by science and technology, social studies, and Turkish. The reasons for considering a subject difficult include complex topics, memorization, boredom, and lack of interest. In the study conducted by Erik Rudyanto et al. (2019), the primary reason indicated by students for their attitude toward mathematics is the difficulty in comprehending the mathematical material. Initially, for mathematics, the complexity of the topics and activities was the main reason for students perceiving it as the most difficult subject. Traditional methods of mathematics instruction, such as lectures, textbook readings, and problem sets, may not effectively promote students' understanding and retention of mathematical concepts, leading to disengagement, frustration, and anxiety among college students.

Mathematics is a critical component of the matriculation curriculum, as it lays the foundation for students to pursue further studies and careers in science, technology, engineering, and mathematics (STEM) fields. However, many students struggle with mathematics learning, and some may experience low self-efficacy and high anxiety related to their mathematics abilities (Mamolo, 2022). These challenges can lead to reduced motivation, lower academic performance, and a lack of interest in pursuing STEM-related fields. To facilitate students' engagement in mathematics and STEM careers, it is essential to identify the factors that contribute to mathematics anxiety (Samuel & Warner, 2021). According to MOE (2020), the poor performance in science and mathematics, as well as the declining enrolment of students in STEM majors in Malaysia, are indicative of a lack of foundational understanding of mathematics subjects among students. Various techniques have been developed to improve mathematical learning and reduce anxiety, and one of the most promising techniques is mind mapping, a visual thinking tool that allows students to organize and connect ideas in a more structured and engaging way.

Despite the importance of mathematics education for matriculation students, many students struggle with mathematics learning, and some may experience low self-efficacy and high anxiety related to their mathematics abilities. College students who possess low levels of self-efficacy in mathematics often experience reduced motivation to learn, which can subsequently lead to lower levels of achievement in the subject (May, 2009). The heavy workload and extensive curriculum in mathematics subjects within the one-year program at matriculation colleges often result in students struggling to comprehend and retain the learned material. This challenge is further compounded by the inclusion of multiple core subjects. The tightly packed schedule of the matriculation programme poses a challenge for students, as the mandatory learning contact hours for mathematics subjects are limited to 5 hours per week within an 18-week semester (MOE, 2021). This restricted time frame limits students' ability to fully grasp and retain all the chapters in mathematics throughout the semester, leading to feelings of unease and perceiving mathematics as a difficult subject. To address this

issue, it is crucial to explore effective strategies that can enhance students' comprehension and retention of mathematics topics in the matriculation college setting. Traditional teaching methods may not be sufficient to address these challenges.

There is a need for the development and implementation of effective educational interventions aimed at enhancing students' interest, motivation, and self-efficacy to improve their performance in mathematics (Mamolo, 2022). May (2009) argues that further research is needed to explore the impact of the interplay between mathematics self-efficacy and mathematics anxiety on instructors' efforts to enhance college students' self-efficacy in mathematics and alleviate their anxiety in the subject. The suggestion of utilizing mind maps as a teaching tool has been put forth as a potential strategy that could enhance students' comprehension of mathematical concepts and alleviate their anxiety levels. However, there is a lack of empirical evidence regarding the effectiveness of mind maps in promoting mathematics learning among matriculation students. Therefore, the present study seeks to address this gap by investigating the effects of using mind maps on students' self-efficacy and anxiety levels in mathematics learning.

Mind maps have been suggested as a potential teaching tool that may improve students' understanding of mathematical concepts and reduce their anxiety levels. Mind maps are visual diagrams that help students organize and connect complex information in a structured and memorable way (Dong et al., 2021). The majority of students expressed that they perceived mind mapping as a creative, innovative, and visually appealing learning tool (Sentyawati, 2022). They believed that using mind maps helped them enhance their understanding and memorization of materials compared to traditional note-taking methods. The students reported feeling more engaged and interested in learning when utilizing mind mapping. Some participants mentioned that mind mapping facilitated improvements in their creativity and critical analysis skills through the process of summarizing and structuring information.

Buran et al. (2015) conducted a study on the application of mind mapping techniques in the language classroom and the findings revealed that mind maps have various benefits in educational settings. They were found to be effective for problem-solving, generating ideas through brainstorming, acquiring new vocabulary, note-taking, enhancing reading skills, and preparing presentations. The study highlights the usefulness of mind maps as a versatile tool in language learning and teaching contexts. By using mind maps to represent mathematical concepts, students may be able to better visualize and comprehend the relationships between different mathematical ideas and solve problems more effectively. Moreover, using mind maps may reduce students' anxiety levels by providing a more engaging and interactive learning experience that can help alleviate the stress associated with traditional teaching methods.

With regards to the advantages students perceive when incorporating mind mapping into their learning process, the proposed quasi-experimental study aims to investigate the effects of using mind maps as a learning tool on self-efficacy and anxiety levels in mathematics among matriculation students from Sarawak Matriculation College. Thus, the primary objective was to explore the impact of mind maps on the self-efficacy and anxiety levels of matriculation students in mathematics education. The second objective was to assess whether the utilization of mind maps yields differential effects on self-efficacy and anxiety levels among matriculation students specifically in mathematics learning. The final objective was to examine the correlation between mathematics self-efficacy and mathematics anxiety among matriculation students. By investigating these aspects, a deeper understanding can be gained regarding the potential benefits of mind mapping in enhancing students' self-efficacy and reducing anxiety levels, ultimately contributing to more effective mathematics education.

Literature Review

Mathematics in STEM. Mathematics is a fundamental subject that plays a crucial role in the development of several fields of study, including science, technology, engineering, and mathematics (STEM). STEM education is crucial in today's world, as evidenced by several studies that led to the implementation of a national blueprint in Malaysia's education system. The blueprint aims to cultivate a skilled workforce equipped with problem-solving, independence, and logical thinking abilities to drive innovation in the global economy (Ahmad et al., 2018). Bergsten and Frejd (2019) stated that mathematics has a crucial role in STEM education as it provides a structured approach to integrate and comprehend the skills needed in the 21st century. The current global economic challenges and workforce demands highlight the urgent need for STEM education reform in Malaysia, as evident from the insufficient STEM skills and knowledge among students who will contribute to the future workforce (Karpudewan et al., 2022). Therefore, this critical subject, mathematics, requires further research to determine the effectiveness of mind maps in enhancing student performance.

Mind Maps. According to Buzan (2018), the creator of mind maps in the 1960s, mind maps possess analytical capabilities that enable problem-solving. Through the utilization of associated logic, mind maps allow for a comprehensive understanding of the subject matter by encompassing both detailed and overarching perspectives. Buzan further emphasized that mind maps are not only microcosmic but also macrocosmic, enabling individuals to grasp both the intricate details and the broader context of the topic at hand. Mind maps are a visual technique that involves the use of diagrams to organize information and concepts. It is a visual tool that assists in organizing and enhancing thinking by combining words, images, lines, and colours in a way that creates a clear and concise representation. Its purpose is to unlock your potential and enable you to generate new ideas and insights (Loc & Loc, 2020). It has been used in various fields, including education, to enhance learning outcomes. In mathematics education, mind maps have been explored to improve students' mathematical understanding and reduce anxiety. Moreover, mind maps can be particularly useful for visual learners. One of the benefits of mind maps is that they provide a visual representation of information, which can

be helpful for students who learn better through images or diagrams rather than just text. In mathematics, this can be especially useful for topics such as geometry, where students need to visualize shapes and spatial relationships.

A study conducted by Lu et al. (2021) investigated the effects of mind maps on college students' mathematical performance and anxiety. The results showed that students who used mind mapping had higher math scores and lower anxiety levels compared to the control group. Similarly, a study by Shi et al. (2022) found that mind maps can improve students' conceptual understanding of mathematical concepts and increase their confidence in solving math problems. Recent studies have also explored the use of technology-based mind-mapping tools in mathematics education. A study by Chen et al. (2019) explored the use of a tablet-based mind-mapping tool and found that it can enhance students' mathematical thinking and problem-solving skills.

Self-Efficacy. Self-efficacy refers to an individual's confidence in their ability to learn or perform a task and achieve specific goals. It is based on their beliefs about their performance capabilities for a particular task in a specific context, which they have not yet attempted (Mamolo, 2022). Self-efficacy is an important factor in students' success in mathematics. When students have high self-efficacy beliefs, they are more likely to engage in the subject, persist through challenging problems, and achieve better outcomes. Joie-La Marle et al. (2021) explored the impact of a self-efficacy intervention program on the mathematics achievement and self-efficacy of African-American middle school students. The results indicated that the intervention program led to significant improvements in both mathematics achievement and self-efficacy among the students.

Self-efficacy plays a vital role in mathematics education by significantly influencing students' academic achievement, motivation, overall performance in the subject, and the relationship between mathematics achievement and interest (Zhang et al.,2020). Students who possess higher self-efficacy tend to excel in mathematics due to their cognitive abilities, increased motivation to persist in the face of challenges, reduced anxiety towards math, and greater inclination towards studying the subject (Ozcan & Kultur, 2021). Recent studies have provided insights into the relationship between self-efficacy and mathematics learning and have highlighted the importance of interventions that aim to enhance students' self-efficacy beliefs in mathematics.

Mathematics Anxiety. According to Mamolo (2021), anxiety is a common human emotion characterized by feelings of fear and uncertainty, often experienced when an individual perceives a situation as a threat to their self-worth. Mathematics anxiety is a concept that has been defined in various ways within the scholarly literature. However, a common characteristic is that it involves experiencing uneasiness or nervousness when thinking about or engaging in mathematical tasks (Ganley et al., 2019). Mathematics anxiety can negatively impact students' academic performance and attitudes towards mathematics. Beilock & Maloney, (2015) as cited in Leppma & Darrah (2022) stated that mathematics anxiety is a crucial emotional factor that significantly influences performance, motivation, and interest in mathematics.

Mathematics anxiety can be a significant issue for many matriculation students, causing them to feel fear and discomfort when they encounter math problems. This anxiety can stem from a variety of factors, such as a lack of confidence in their mathematics abilities, negative past experiences with mathematics, or pressure to succeed in mathematics courses. Mathematics anxiety can harm student's academic performance, leading to decreased motivation and engagement, lower grades, and decreased interest in pursuing math-related careers. Mathematics anxiety has been linked to lower performance in mathematics courses and may lead capable students to avoid these courses, which could have an impact on their choice of careers in the STEM fields (Leppma & Darrah, 2022). Additionally, mathematics anxiety can have negative effects on students' mental health and well-being, causing stress and anxiety that can spill over into other areas of their lives. Higher levels of mathematics anxiety among students often result in the development of negative attitudes and emotions toward the subject (May, 2009). The experience of mathematics anxiety is typically described as a state of tension and unease that arises when attempting to solve mathematical problems. This condition can limit one's ability to work with numerical data, not only in academic contexts but also in everyday life situations (Aksu & Kul, 2019). Recognizing the prevalence and impact of mathematics anxiety in matriculation students, researchers and educators are exploring strategies to reduce math anxiety and support students in building confidence and skills in mathematics. These strategies may include providing additional support and resources, using alternative teaching methods that reduce anxiety, and addressing negative attitudes and beliefs about mathematics.

Theoretical Foundation: Social Cognitive Theory. The theoretical framework for this study is based on the social cognitive theory (SCT) proposed by Bandura (1999). SCT is a widely used theoretical framework in education research that focuses on the interactions between individuals, their behaviour, and the environment. The theory proposes that individuals learn through observation, imitation, and feedback and that their learning is influenced by personal, behavioural, and environmental factors. In the context of this study, SCT is relevant as it can explain how the use of mind maps in mathematics learning can improve students' self-efficacy and reduce anxiety.

The theoretical basis for this study is based on the literature review that suggests a positive relationship between the use of mind maps and students' academic performance, self-efficacy, and anxiety. The framework proposes that the use of mind maps in mathematics learning will lead to an increase in students' self-efficacy, a decrease in their anxiety levels, and an improvement in their academic performance. It also considers the potential mediating effect of self-efficacy on the relationship between mind maps and academic performance, as well as the potential moderating effect of anxiety on the relationship between mind maps and self-efficacy.

Method

The research design employed for this study was quasi-experimental. A non-random control group design was employed, where two groups of matriculation students were assigned. The experimental group underwent a four-week intervention integrating mind maps into their mathematics lessons, while the control group received conventional mathematics instruction. The non-random assignment of participants to groups was a key characteristic of the quasi-experimental design, as randomization was not possible due to practical or ethical constraints. In this case, the researcher was unable to randomly assign students to groups as existing classes at the Sarawak Matriculation College were used. As part of the intervention, students in the experimental group were encouraged to create mind maps to visually represent their understanding of mathematical concepts. Examples of mind maps created by students are provided in Figure 1.

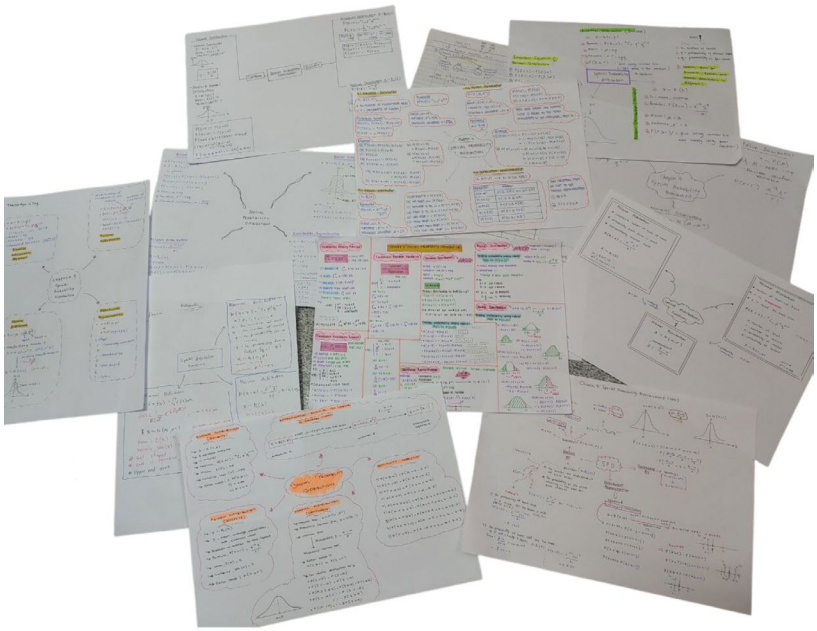

Figure 1: Snapshot of student-created mind maps used in the intervention

Participants. In this study, purposive sampling was the chosen methodology, specifically targeting students from Sarawak Matriculation College based on predefined criteria and characteristics. This approach was well-suited for examining a distinct student population that aligned with the research objectives. However, it is important to acknowledge that the use of purposive sampling may introduce the possibility of sampling bias. While this technique was essential for practical reasons, the study's findings may not be readily generalizable to other populations. To address this limitation and minimize potential bias, the study's results are discussed within the context of Sarawak Matriculation College's student population, offering a comprehensive understanding of the observed effects and their implications. All students enrolled in the Sarawak Matriculation College (KMSw) session 2022/2023 were study subjects. The population size of students in Sarawak Matriculation College was 132, and therefore the ideal sample size was the entire population. Among them, 34 students were assigned to the experimental group, while the remaining 98 students constituted the control group. The students were from the pure Science stream class. KMSw exclusively offered a one-year program with three available modules: Biological Science Module, Physical Science Module, and Computer Science Module. All of these modules were Science classes, and mathematics was one of the required subjects to learn.

Sarawak Matriculation College students were divided into four groups at the beginning of the study; two were called experimental groups, while the other two were called control groups. However, because of the matriculation program's time constraints, which arise from its compressed one-year curriculum, it was only possible to carry out the mind-mapping intervention for one of the treatment groups. When one group received the intervention, the remaining three groups became control groups. Hence, the study only included one treatment group for the mind-mapping intervention, which served as the focus of the quasi-experimental study.

Procedure. An electronic questionnaire survey via Google Forms was conducted to collect data. The questionnaire was one of the most used methods for determining the population's level of knowledge and perception (Arsad et al., 2022). The questionnaire could be instantly assessed and modified to fit a particular need for data collection. The instruments for this study comprised adapted questionnaires based on established scales used to measure self-efficacy and anxiety levels in mathematics, which were modified from May's (2009) questionnaire. The researcher made adjustments to the items of the instruments to make them more applicable to the matriculation college setting. The participants' levels of mathematics self-efficacy and anxiety were assessed using the Mathematics Self-Efficacy and Anxiety Questionnaire (MSEAQ), a 5-point Likert-scale instrument developed by May (2009) to explore the relationship between college

students' mathematics self-efficacy and anxiety. The questionnaire used in this project, adapted from May's (2009) study, demonstrated high reliability and validity. May (2009) piloted the questionnaire and reported a Cronbach's alpha coefficient of 0.96 for the 28-item (MSEAQ), indicating excellent internal consistency. In this study, the questionnaire was further validated through a pilot test involving 40 matriculation college students. The pilot test included two factors: mathematics self-efficacy, consisting of 13 items, and mathematics anxiety, consisting of 15 items. The results, as shown in Table 1 and Table 2, revealed high internal consistency for both factors, with Cronbach's alpha coefficients of 0.975 for mathematics self-efficacy and 0.962 for mathematics anxiety. These findings support the reliability of the instrument, demonstrating its suitability for use in this study. By adapting a rigorously tested and validated questionnaire, this research project ensured the reliability and validity of the measurements used to assess students' mathematics self-efficacy and mathematics anxiety. The high internal consistency of the instrument further strengthens the confidence in the reliability of the data collected.

Table 1. Cronbach's Alpha for the overall scale of mathematics self-efficacy items

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
0.975	0.975	13

Table 2. Cronbach's Alpha for the overall scale of mathematics anxiety items

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
0.962	0.962	15

The MSEAQ serves as a valuable tool for researchers and instructors to assess and gain insights into students' levels of self-efficacy and anxiety in the field of mathematics. This questionnaire included 13 statements related to mathematics self-efficacy and 15 statements related to anxiety. Participants were asked to indicate their agreement level with each statement, using a scale ranging from "never", "seldom", "sometimes", and "often" to "usually." After collecting the data, the self-efficacy and anxiety levels were analyzed and interpreted. Detailed interpretations can be found in Tables 3 and 4.

Table 3. Description and interpretation of the different levels of mathematics self-efficacy.

Score	Description	Interpretation
4.51 – 5.00	Very high	Always believe in his or her ability to succeed in mathematics
3.51 – 4.50	High	Often believe in his or her ability to succeed in mathematics
2.51 – 3.50	Moderate	Sometimes believe in his or her ability to succeed in mathematics
1.51 – 2.50	Low	Rarely believe in his or her ability to succeed in mathematics
1.00 – 1.50	Very low	Never believe in his or her ability to succeed in mathematics

Table 4. Description and interpretation of the different levels of mathematics anxiety

Score	Description	Interpretation
4.51 – 5.00	Very high	Always feel anxious towards mathematics
3.51 – 4.50	High	Often feel anxious towards mathematics
2.51 – 3.50	Moderate	Sometimes feel anxious about mathematics
1.51 – 2.50	Low	Rarely feel anxious towards mathematics
1.00 – 1.50	Very low	Never feel anxious about mathematics

The questionnaire consisted of closed-ended questions and was customized to the target participants' educational backgrounds as matriculation students. The questionnaire consisted of three parts: Part A included personal demographic information, Part B included self-efficacy constructs and Part C included mathematics anxiety constructs.

Data Analysis Procedures. The data collected through the Google Form questionnaires were exported to an Excel spreadsheet and imported into IBM SPSS Statistics for statistical analysis. Descriptive analysis and data screening techniques were employed to analyze the data using SPSS. SPSS was chosen for its ability to handle large datasets with multiple variables (Rahman, 2021). Descriptive statistics, including mean, standard deviation, and frequency distribution, were calculated to summarize the sample characteristics. Inferential statistics were employed to analyze the data, including paired-sample t-tests within each group to compare the pre-intervention and post-intervention scores and examine the impact of the intervention on self-efficacy and anxiety levels. Independent samples t-tests were used to test the research hypotheses and assess whether significant differences existed between the experimental and control groups in terms of their mean scores on the mathematics self-efficacy and anxiety questionnaires. Finally, the Pearson correlation coefficient was employed to examine the relationship between self-efficacy and anxiety levels in both the experimental and control groups.

Ethics. The participants in this study voluntarily participated and their anonymity was ensured. Permission was obtained from the Director of Sarawak Matriculation College to distribute the questionnaire. Before receiving the questionnaire, participants were asked to sign an informed consent form. They were informed about the confidentiality of their responses and that the data would only be used for this study.

Results and Analysis

The main objective of this research study was to enhance students' mathematical self-efficacy and alleviate mathematics anxiety through the implementation of a teaching intervention. The primary focus was on evaluating the effectiveness of the intervention by comparing the results of students in the experimental class with those in the control class. The key evaluation question was whether the intervention led to an increase in mathematical self-efficacy and a decrease in mathematics anxiety among the students in the experimental class.

The collected data were analyzed using SPSS Version 27.0, with a significance level set at $p < 0.05$, indicating a 95% confidence interval for the results. Descriptive statistics, including mean and standard deviation, were used to describe the level of mathematics self-efficacy and mathematics anxiety among students before and after the intervention involving the use of mind maps (Table 5).

Table 5. Students' level of mathematics self-efficacy and anxiety before and after exposure to mind mapping

	N	Mean	Std. Deviation	Description
Pre-Math Self-Efficacy	34	3.17	.69	Moderate
Post-Math Self-Efficacy	34	3.94	.59	High
Pre-Math Anxiety	34	3.04	.46	Moderate
Post-Math Anxiety	34	2.46	.77	Low

Figure 2 shows the graph of the mean scores for the Pre-Post-test of mathematics self-efficacy for both groups. The graph illustrates a notable increase in the post-test scores for mathematics self-efficacy in the experimental group. In contrast, the graph reveals a decrease in the post-test scores for mathematics anxiety in the experimental group.

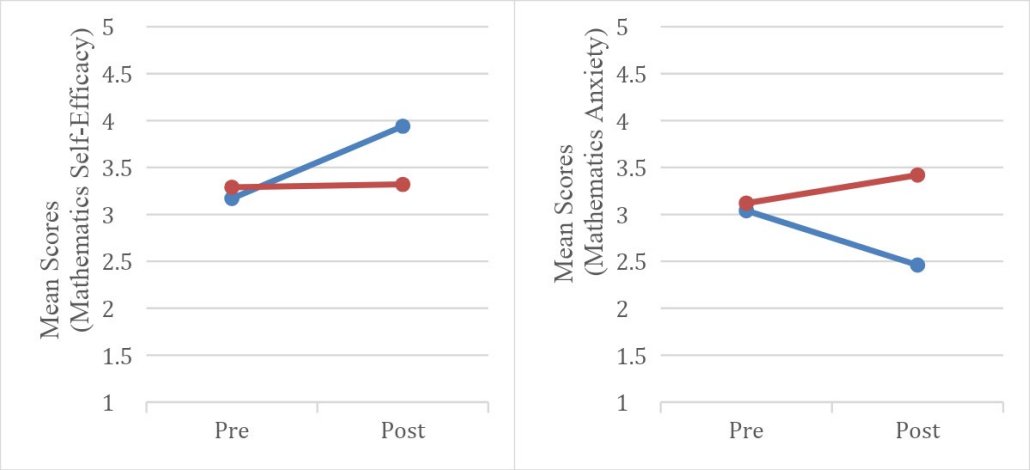

Figure 2. Mean scores for Pre-Post-test of mathematics self-efficacy and mathematics anxiety

To assess the impact of the intervention, the initial step was to examine any significant differences between the pre-post-test scores of the experimental class and the control class. Following the implementation of the teaching intervention, a paired t-test analysis was conducted to compare the scores of the experimental class and the control class and to assess whether there was a significant difference in students' mathematics self-efficacy and anxiety before and after the intervention. The assumptions for normality were satisfied for the paired t-test. Since the sample size was more than 100, the Kolmogorov-Smirnov test of normality was used. Both p-values for each variable were greater than 0.05, indicating that all the collected data, including the variables of interest, exhibited a normal distribution. The results of this analysis are presented in Table 6.

Table 6. Testing for normality using the Kolmogorov-Smirnov test and Shapiro-Wilk test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Math Self-Efficacy	.047	132	.200*	.992	132	.648
Math Anxiety	.058	132	.200*	.984	132	.112

*This is a lower bound of the true significance

[a]Lilliefors Significance Correction

A paired-sample t-test was employed to examine the impact of utilizing mind maps on mathematics self-efficacy and mathematics anxiety among matriculation students (Table 7). The findings revealed significant differences in the scores between the Pre-test Mathematics Self-Efficacy (M=3.17, SD=0.69) and Post-test Mathematics Self-Efficacy (M=3.94, SD=0.59), with a significant t-value of t (33) =-5.413, p < 0.001. Similarly, significant differences were observed in the scores between the Pre-test Mathematics Anxiety (M=3.04, SD=0.46) and Post-test Mathematics Anxiety (M=2.46, SD=0.77), yielding a t-value of t (33) =4.002, p < 0.001. These findings underscore the significant impact of employing mind maps on both mathematics self-efficacy and mathematics anxiety among matriculation students. The obtained p-value, which was below the significance level of 0.05, indicates a statistically significant difference. Consequently, the null hypothesis was rejected, providing evidence that the usage of mind maps exerts an influence on both mathematics self-efficacy and mathematics anxiety.

Table 7. Paired t-test results on the significant difference in student's self-efficacy, and anxiety before and after exposure to mind mapping

		Mean Difference	Df	t	Sig.	95% Confidence Interval	
						Lower	Upper
Pair 1	Pre-Post Math Self-Efficacy	-0.765	33	-5.413	< 0.001	-1.052	-0.477
Pair 2	Pre-Post Math Anxiety	0.580	33	4.002	< 0.001	0.285	0.875

*$p < 0.05$

An independent samples t-test was conducted to compare the mean scores of the post-test measures of mathematics self-efficacy and mathematics anxiety between the experimental group (students who used mind maps) and the control group (students who did not use mind maps). Mishra et al. (2019) describe the test as a widely utilized statistical method for assessing the statistical significance of mean differences between two groups.

Table 8. Independent samples test t-test results

				Levene's Test for Equality of Variances		t-test for Equality of Means						
		Mean	SD	F	Sig.	t	Df	Sig. (2-tailed)	Mean Diff.	Std Error Diff.	95% Confidence Interval of the Diff.	
											Lower	Upper
Post-test Math Self-Efficacy	Mind map	3.94	.59	.62	.432	15.34	130	< .001	1.62	.106	1.41	1.83
	Control	3.32	.51									
Post-test Math Anxiety	Mind map	2.46	.77	5.16	.052	-7.39	130	< .001	-.964	.130	-1.22	-.706
	Control	3.42	.61									

The independent-sample t-test was conducted to examine the effects of using mind maps on mathematics self-efficacy and mathematics anxiety among matriculation students (Table 8). The results of Levene's test for both variables, F (130) = 0.62, p=0.432 and F (130) = 5.16, p = 0.052, indicate that the variances of the two groups are assumed to be approximately equal. Thus, the standard t-test results were used. The post-intervention mean scores for mathematics self-efficacy were significantly higher in the experimental group (M = 3.94, SD = 0.59) compared to the control group (M = 3.32, SD = 0.51), t (130) = 15.34, p < 0.001, with a mean difference of 1.62. On the other hand, the post-intervention mean scores for mathematics anxiety were significantly lower in the experimental group (M = 2.46, SD = 0.77) compared to the control group (M = 3.42, SD = 0.61), t (130) = -7.39, p < 0.001, with a mean difference of -0.964.

Overall, the results of the independent t-test indicate that the use of mind maps has differential effects on both post-intervention scores for mathematics self-efficacy and mathematics anxiety, with a significant improvement in self-efficacy and a significant reduction in anxiety levels among the experimental group compared to the control group. These

findings provide evidence that the use of mind maps had a positive impact on students' mathematics self-efficacy and a negative impact on their mathematics anxiety. The analysis also demonstrated a significant difference in post-test mathematics anxiety scores between the experimental and control groups. The experimental group exhibited significantly lower mean scores on post-test math anxiety compared to the control group. This indicates that the use of mind maps in mathematics learning had a mitigating effect on math anxiety among the experimental group.

Table 9. Correlations between each of the variables in the study

Variables	N	Mean	SD	1	2
Math Self-Efficacy	132	.52	1.23	–	
Math Anxiety	132	-.28	1.16	-.528**	–

**Correlation is significant at the 0.01 level (2-tailed)

A correlation analysis was conducted to investigate the relationship between matriculation students' mathematics self-efficacy and mathematics anxiety, taking into consideration the use of mind maps as an instructional tool (Table 9). Pearson correlation coefficient shows a statistically significant and negative relationship between mathematics self-efficacy and mathematics anxiety, [r (132) = -0.528, $p < 0.001$], indicating that as students' mathematics self-efficacy increases, their levels of mathematics anxiety tend to decrease. This finding suggests that enhancing students' mathematics self-efficacy using mind maps can contribute to reducing their anxiety and promoting a more positive learning experience. When students feel more confident in their mathematical abilities, they may approach math problems with a greater sense of competence and less apprehension. Consequently, this can lead to improved learning outcomes and a greater willingness to engage with mathematical concepts and problem-solving tasks.

Discussion

Main Findings. The findings of this quasi-experimental study indicate that the utilization of mind maps as a learning tool had significant effects on both mathematics self-efficacy and mathematics anxiety among matriculation students. The paired-sample t-test analysis revealed a significant improvement in mathematics self-efficacy scores from pre-test to post-test, indicating that the use of mind maps enhanced students' beliefs in their abilities to perform well in math. Similarly, there was a significant decrease in mathematics anxiety scores after the intervention, suggesting that mind maps helped minimize anxiety levels among the participants.

The independent samples t-test further supported the positive impact of mind maps on mathematics self-efficacy and anxiety. The experimental group, which utilized mind maps, demonstrated significantly higher post-intervention scores for mathematics self-efficacy and significantly lower scores for mathematics anxiety compared to the control group. These findings indicate that the use of mind maps had a differential effect, leading to improved self-efficacy and reduced anxiety levels among the students. The reduction in math anxiety may be attributed to several factors. The visual representation and structured nature of mind maps can help students organize and comprehend complex mathematical information into a structural order (Sentyawati, 2022), thereby alleviating feelings of anxiety and overwhelm. Mind mapping practices likely established a helpful and engaging learning environment, potentially assisting in the reduction of anxiety.

Moreover, the study revealed a significant negative correlation between mathematics self-efficacy and mathematics anxiety among matriculation students, indicating that as students' self-efficacy in mathematics increased, their levels of anxiety decreased. The correlation coefficient analysis suggests a strong inverse relationship between these two variables. This finding aligns with Bandura's (1999) argument that individuals with a high level of self-efficacy are better able to regulate their learning activities and experience reduced levels of anxiety.

These results suggest that the implementation of mind maps as a learning tool positively influenced students' beliefs in their abilities to perform well in math. According to Loc & Loc (2020), mind maps facilitate students in acquiring knowledge through a visual representation, typically in the form of a diagram, that illustrates the complex interconnections between different concepts and ideas. The visual and organizational nature of mind maps may have facilitated a deeper understanding of mathematical concepts, increased confidence, and enhanced self-efficacy among the experimental group. As Bandura (1999) suggested, individuals with elevated self-efficacy levels exhibit an increased motivation to learn and demonstrate greater perseverance when faced with demanding tasks. The mind-mapping technique encourages students' active engagement with concepts, information, and experiences through discussions, questions, and independent exploration. By incorporating mind-mapping techniques into the curriculum, the matriculation programme can enhance students' learning experiences and equip them with valuable problem-solving and critical thinking skills necessary for success in STEM disciplines. Creating mind maps specifically for STEM subjects encourages a deeper understanding of various subjects and concepts, enabling students to establish meaningful connections in their learning process. This approach can contribute to bridging the gap between theoretical knowledge and its practical application, preparing students for further studies in STEM fields and fostering their interest and enthusiasm for scientific inquiry.

Implications. The findings of this study have important implications for mathematics education, specifically regarding the use of mind maps as a learning tool. Mind maps have been shown to effectively enhance students' self-efficacy and reduce anxiety in mathematics. Incorporating mind maps into instruction can create a visually engaging and organized learning environment, promoting a deeper understanding of mathematical concepts and boosting students' confidence.

Educators can utilize mind maps to cater to diverse learning styles, foster active engagement, and improve critical analysis and memorization skills. In the context of mathematics education, emphasizing a positive attitude towards mathematics is crucial for teachers as it significantly impacts students' success in the subject (Erik Rudyanto et al., 2019). These findings contribute to the existing literature and suggest that integrating mind-mapping techniques into mathematics curricula and instructional practices can enhance students' learning experiences and outcomes.

Limitations. It is important to acknowledge several limitations in this study. Firstly, the use of a quasi-experimental design and non-random assignment of participants limits the ability to establish causal relationships. Future research employing a randomized controlled design is needed. Secondly, the findings may not be generalizable beyond the specific context of Sarawak Matriculation College. Replication studies in different settings are necessary. Additionally, reliance on self-reported measures may introduce bias, and the use of objective measures or multiple assessment methods is recommended. Lastly, the relatively short intervention period does not allow for an examination of long-term effects. Future research should explore the sustainability of the observed improvements. Despite these limitations, this study provides valuable insights into the potential benefits of mind maps in mathematics education, specifically in enhancing self-efficacy and reducing anxiety levels.

Conclusion

In conclusion, this quasi-experimental study found that using mind maps as a learning tool significantly enhanced students' mathematics self-efficacy and reduced their mathematics anxiety. The results support the effectiveness of mind maps in promoting students' confidence and engagement in mathematics. Educators can consider incorporating mind maps into their teaching practices to create a supportive learning environment and improve students' mathematics outcomes. Further research is needed to validate and generalize these findings across different populations and educational settings, as well as explore the long-term effects and other potential benefits of mind mapping in various academic disciplines. This study contributes to the existing literature on the use of mind maps and provides empirical evidence for their positive impact on students' self-efficacy and anxiety in mathematics education.

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ANALYSIS OF FLUID FLOW BETWEEN Y-SHAPED AND T-SHAPED PIPE

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Abstract. In domestic plumbing system, pipe fitting plays an important role in connecting straight pipe or tubing section. The most common pipe fitting used are Y-shaped and T-shaped pipes. A Y-shaped and T-shaped pipe equally split the flow line in two directions. T-shaped will split fluid into 90^0 and Y-shaped into 45^0. This paper presents a comparison analysis of velocity, pressure and turbulent kinetic energy inside both shaped pipes using computational fluid dynamics (CFD)model and implemented with the help of ANSYS CFX software. Water is a fluid that is selected to flow through a pipe system. It was observed that Y-shaped structures were found to be better than T-shaped structures.

Keywords: ANSYS CFX; Y-shaped pipe; T-shaped pipe; Pressure; Velocity; Turbulent kinetic energy.

Introduction

Pipe fitting plays an important role in automotive and plumbing systems as they are used to connect various types of components. There are various type of fitting use in the automotive industry. Y-shaped and T-shaped pipes are very common pipe fitting in industry nowadays. Three variables that are significant to the design of pipe joints or fittings are velocity, pressure and turbulence energy. Velocity is a crucial parameter that directly influences the flow of particles or fluid in the pipe assembly. The velocity measurement will affect the performance and efficiency of the system whether the velocity is too high or too low. Second parameter that needs to put into consideration is pressure. It plays a pivotal role in determining the balance and stability of the pipe assembly system in terms of several issues such as leaks and blockages. Turbulence refers to irregular motion or behaviour of the fluid when travelling in the pipeline. Turbulence can contribute to energy loss. Controlling turbulence is important for optimizing the performance of the fittings in the pipe assembly [9]. By analysing these factors, it can identify the effectiveness of fittings in pipe assembly systems especially in the automotive industry.

A Y-branch or known as Y- connector refer to its Y shaped are designed to separate a single flow pipe to two separated branches equally in two directions. It is a fitting with three openings and is used to create branch lines [1]. Standard Y shaped allows one pipe to be joined to another at a 45^0 angle. Y shaped pipe are identical to T shaped pipe except that the branch line is angled to lessen friction that could restricted the flow and that the connection is typically at a 45^0 angle rather than a 90^0 angle [3]. It also can minimize the pressure drop in the pipeline that can improve the efficiency of the system. A 45^0 angle fittings can minimize the turbulence that are generated by fluid stream that can reduce noise and vibration on the pipe assembly. Although 45^0 fitting offer many advantages, it's also some had disadvantages that need to take consideration during the selection of the fitting in the pipe assembly system. Among disadvantages of Y-shaped 45^0 angle fittings is limited change in direction when fittings require more abrupt turn in flow direction, risk of erosion due to high flow of water and manufacturing complexity that led to higher cost production [7].

T shape or 90^0 angle pipe fittings used to connect three pipes at right angle or perpendicular to each other. The T-shape fittings can provide a sharp and immediate change in direction of fluid flow that allow precise routing of the pipe assembly. A sharp change in direction of fluid in 90^0 angle pipes reduces the effect of turbulence in the pipe system and it is generally manageable. It also allows effective flow control in order to manage the pressure of fluid in the system. There are some issue that need to be considered when using 90^0 angle fittings that will affect the performance of fluid. The introduction of T shape pipes in the system can lead to pressure drops when fluid branching into two directions. It also creates imbalance flow that can lead to uneven fluid distribution that will reduce the effectiveness of the pipe assembly system.

Problem Layout

Figure 1 shows the schematic drawing of Y-shaped and T-shaped pipes respectively. The figure also shows an allocation of fluid flow through the pipe and a general physical setup. Water is a medium selected which flow through the network of pipes system. The velocity of water is flow through one inlet and two outlets at the end of Y and T-shaped pipe. Two pipes with diameter 20 mm with same equal length at 10mm each, so that the changes in velocity, pressure and turbulent kinetic energy can be studied throughout the piping system by plotting several points parallel to each other. Water was selected as a flow fluid enteringthe system at initial velocity 0.01m/s. In this simulation method, we investigated and analyzed the data from the point plot the determine the ideal pipe fittings available in the market either Y-shaped pipe (45^0) or T-shaped (90^0).

Various research has been carried out to investigated the performance of fluid when passing through Y shaped and T shape pipe fittings. When fluid flows through a bend section in a pipe it will cause change in the motion of the fluid. The aim of the paper is to make a comparison of water flow through a 45^0 (Y shape) angle pipe and 90^0 (T shape) angle pipes.

In an automotive cooling system, it needs an efficient system to remove heat from the system in order to prevent the engine from overheating. Heat is removed by using water that iscirculate through the engine. An automotive cooling system is equipped with a radiator, water pump, coolant passage, thermostat etc. All those components are connected by using pipe, hose and tubes that present with 45^0 and 90^0 angles bend. Some of them are connected in three section branches in the form of Y shaped and T shaped fittings. Therefore, it's important to understand the water flow and performance through both shapes of pipe. The study will provide a clear perspective on which type of fittings can improve the performance of a vehicle in terms of absorbing heat from the engine and keeping the engine at optimal condition.

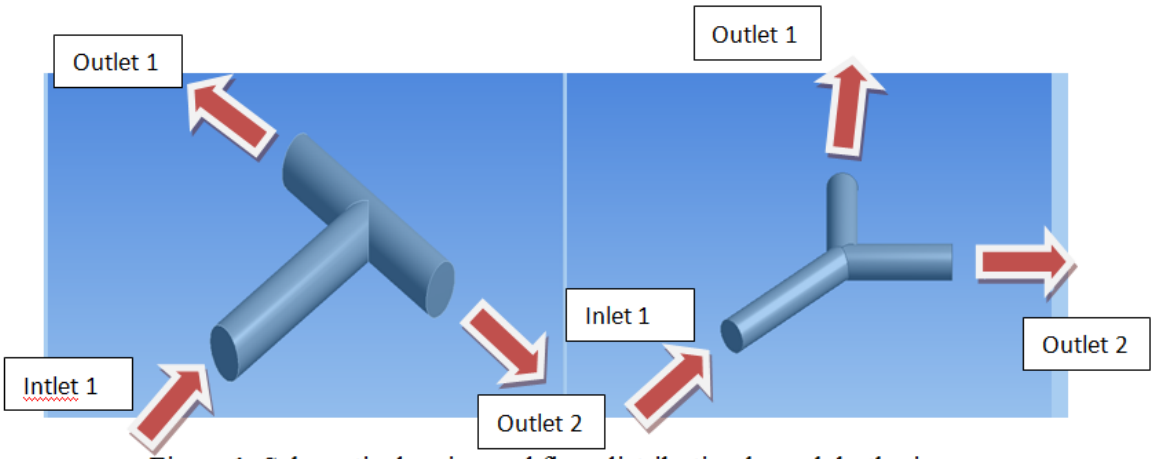

Figure 1: Schematic drawing and flow distribution hrough both pipe

Modelling and Simulation

The Y-shape and T-shaped pipes are modelled in ANSYS CFX. The diameter of each pipe is set at 20 mm length equal. The inlet of each pipe is drawn horizontally and the outlet is drawn at angle of 45^0 and 90^0. Meshing was done by using refinement. The fluid used in the simulation is water with a constant density of 997 kg/m^3 and a dynamic viscosity of 0.0008 kg/ms. The fluid is assumed to have a laminar flow. Fluid enters at an initial velocity of 0.01 m/s. The diameter was set to 20 mm and length at 10 mm. Flow rate was set at 0.00313kg/s [4]. The data shown at table 1

a) Data table for simulation analysis

Angle	Dimension (diameter)	Point	Velocity (m/s)	Pressure (pa)	Turbulent Kinetic Energy (TKE)
45^0	**20 mm**	**A5**	0.00529872	0.00224999	3.93E-06
		A6	0.0053	0.00157123	3.31E-06
90^0	**20 mm**	**B5**	0.0051532	-0.00305664	8.30E-06
		B6	0.005099	0.000971802	7.61381e-006

The figure 2 shows a flowchart of ansys simulation process. After definingthe problem, the geometry will create by using Ansys and generate a meshing on the geometry. Define the analysis type (eg. Thermal and fluid dynamics). Run the solver to perform the analysis. And the post process is analyze and visualizes the result. Figure 3 showsthe meshing process for this simulation.

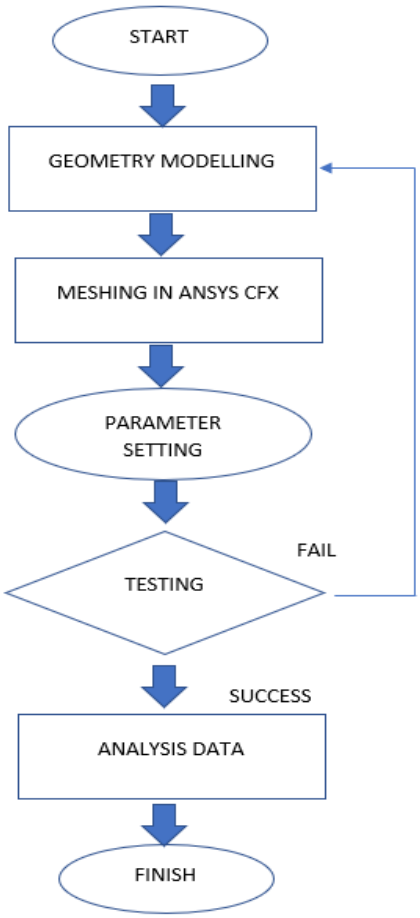

Figure 2. Process flowchart

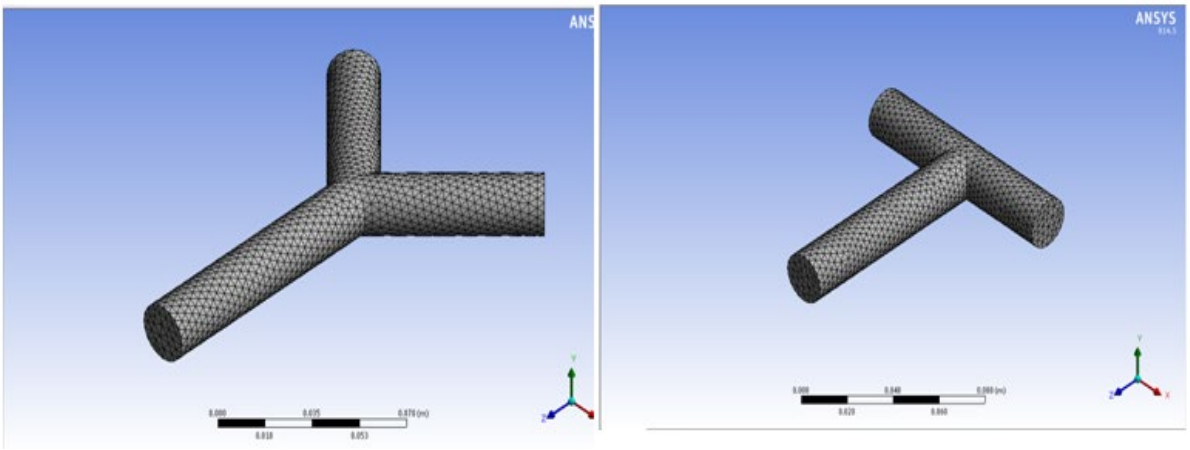

Figure 3. Meshing of Y shape and T-shape

CFD Result and Discussion

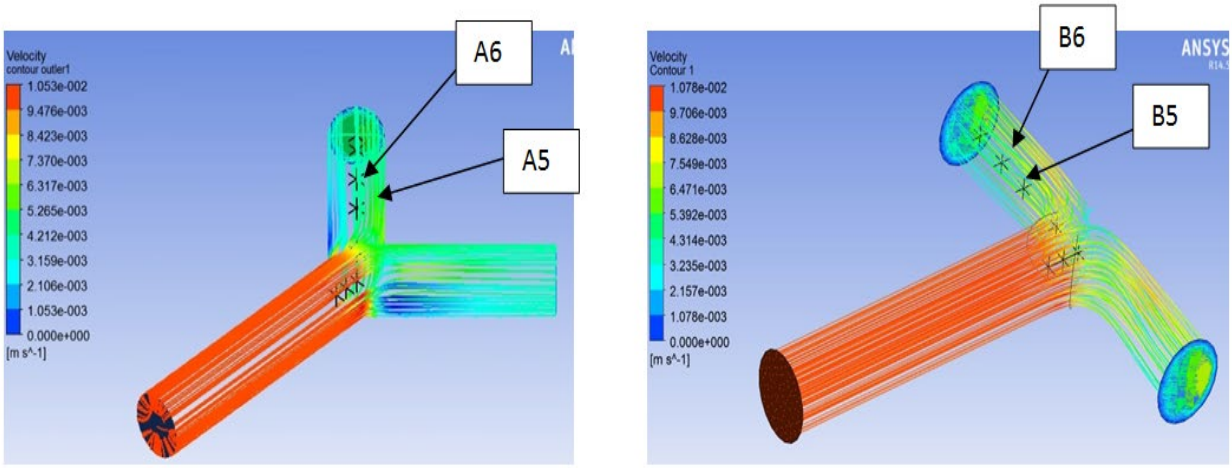

Figure 4 . Velocity contour of Y shape and T shape

Result Analysis

The figure 4 has shown the velocity at two shaped pipe fitting. The shape of 45^0 and 90^0 was selected in the current work and analyzed by simulation of computational fluid dynamics (CFX). The angle of 45^0 is viewed the Y shaped and the 90^0 is viewed the T shaped. The point A5 and A6 is viewed at Y shaped and the point B5 and B6 is viewed from the viewed at T shaped. The distance of the point is same at this two-angle shaped. The inlet flow of water velocity is 0.01m/s and the show n different velocity at two angles. At 90^0 angles showed the velocity dropped more than 45^0 angles. That means the pipe bend of 45^0 angles is better than 90^0. The result of pressure and TKE also show the same situation, when the result from 45^0 angle pipe bend is higher compared to 90^0 angle pipe bend. At the point B5 shows the negative pressure, it is because the point is developed under the vapor situation.

Conclusion

From the simulation of computational fluids dynamics analysis, it was analyzed that the flow caused by a fully developed straight pipe profile at the start of the bend increases to a maximum at a bend angle of about 45° or 90°. After the flow at bend angle, the flow is reduced from the starting point after the bend angle to behind the outlet point. An important outcome of the Computational Fluids Dynamics (CFX) analysis which validates the practical application of Y shaped pipe at bend angle of 45° based on the result velocity, pressure and the kinetic energy.

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ESTETIKA PENGARUH MAKAN TRADISI KELANTAN '*LOMPAT TIKAM*' DALAM REKABENTUK *TIPOGRAFI*

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Abstrak. Kepelbagaian adat, kaum, warisan dan budaya di seluruh negeri di Malaysia merupakan aset yang paling bernilai dan memberi identiti unik kepada negara ini. Keunikan ini telah menjadi sumber inspirasi yang menyatupadukan rakyat Malaysia dari pelbagai lapisan masyarakat. Seterusnya menjadi daya tarikan utama bagi pelancong yang datang melancong di Malaysia. Kuih muih di Kelantan amat terkenal dengan pelbagai aneka jenis dan keunikan yang menarik. Antaranya, kuih Lompat Tikam yang merupakan pencuci mulut atau snek manis yang diperbuat daripada tepung beras dan santan dan ianya telah menjadi ikon makanan tradisi Kelantan yang paling terkenal. Kuih Lompat Tikam ialah pencuci mulut atau snek manis yang diperbuat daripada tepung beras dan santan. Kajian ini dijalankan bertujuan untuk mengkaji hubungan antara makanan tradisi kuih Lompat Tikam dengan reka bentuk tipografi sebagai medium untuk mempromosikan dan melestarikan warisan budaya Kelantan. Kaedah kajian dalam penyelidikan ini adalah menggunakan kaedah kualitatif iaitu pemerhatian, temu bual dan soal selidik untuk mendapatkan maklumat yang lebih tepat daripada responden. Melalui kajian yang dijalankan, penyelidik dapat memperkenalkan estetika bidang tipografi sebagai alat strategik dalam pemeliharaan seni warisan Malaysia Kelantan, khususnya melalui lensa reka bentuk kepada masyarakat luar serta seterusnya menjadi platform dan rujukan kepada generasi akan datang supaya ia dapat dipelihara sehingga ke generasi akan datang.

Kata kunci: Estetika;Makan Tradisi; *Lompat Tikam*; *Tipografi.*

Pengenalan

Malaysia merupakan sebuah negara yang mempunyai pelbagai etnik dan budaya. Kepelbagaian kaum dan budaya ini menghasilkan pelbagai jenis resepi dan makanan tradisi. Khususnya Negeri Kelantan yang terkenal sebagai tempat 'syurga makanan'. Maka tidak hairanlah budaya serta gaya hidup masyarakat di sini agak berbeza dengan budaya Melayu di tempat lain. Selain terkenal dengan budaya tradisi, pantai yang indah dan lokasi membeli-belah, ia juga terkenal dengan makanan dan kuih-muih yang sedap walaupun namanya banyak yang pelik dan ada juga nama yang mengerikan tetapi rasanya sedap. Pelbagai kuih tradisi negeri Kelantan ini yang pastinya sedap dan tidak mengecewakan. Kuih-kuih tradisi ini juga mempunyai warna yang terang dan berwarna warni dapat memikat selera pengunjung dengan kemeriahan warna yang terdapat pada kuih muih tersebut. Walaupun kos untuk membuat kuih tersebut mahal tetapi bagi yang menggemarinya berasa berbaloi dengan keenakan rasa kuih-muih tradisi Kelantan ini.

Dalam kajian ini pengkaji memilih kuih tradisi lompat tikam sebagai kajian kes dalam membentuk reka bentuk *tipografi* kerana warnanya yang menarik. Menurut sejarah kuih *lompat tikam* ini berasal dari kerajaan Majapahit dan dibawa masuk ke Malaysia untuk dipersembahkan kepada kerajaan Kelantan pada tahun 1700. Kuih ini mendapat nama menerusi suatu kejadian dimana salah seorang daripada dayang-dayang di istana sedang membawa dulang berisi kuih ini lalu tersandung pada bendul di istana lalu menyebabkan sultan melompat terkejut dan tertikam dayang itu. Maka, dari situlah terhasilnya nama kuih *lompat tikam* (Jabatan Kebudayaan dan Kesenian Negara 2022).

Kuih *lompat tikam* merupakan antara kuih tradisional Melayu yang sangat popular dalam kalangan penduduk yang tinggal di pantai timur. Mempunyai dua lapisan dan dimakan bersama-sama

dengan air gula melaka, rasanya sangat enak dan menyelerakan. Di bahagian bawah kuih ini mempunyai rasa pandan manakala bahagian atas pula rasa sangat berlemak. Manakala perbezaan *lompat tikam* Kelantan ianya lebih istimewa kerana ada tambahan pulut yang berwarna merah untuk menyerikan lagi dan membezakan ianya dari yang lain. Pulut bewarna merah ini tidak hanya memberikan elemen visual yang menarik tetapi menonjolkan variasi lain dalam hidangan Melayu. Selain itu, ia mencerminkan kreativiti si tukang hasil dalam mempertahankan makanan warisan dengan menambahkan unsur-unsur unik dan menarik makanan di Malaysia, khususnya di negeri Kelantan.

Oleh itu dalam pengkaji ingin meneroka dengan lebih mendalam peranan makanan warisan Kelantan kuih Lompat Tikam dalam pengaruh reka bentuk tipografi dan bagaimana hal ini dapat menyumbang kepada pemeliharaan serta membina idea pengkaji dalam mempromosi budaya Malaysia. Berdasarkan kepada isu dan persoalan di atas terdapat beberapa permasalahan kajian yang menjadi titik fokus dalam penyelidikan ini antaranya bagaimana elemen-elemen estetik dalam kuih Lompat Tikam seperti warna, bentuk, tekstur, dan komposisi visual dapat diterjemahkan ke dalam reka bentuk tipografi.

Seterusnya sejauh mana pengaruh visual makanan ini dapat mencipta dan menghasilkan seni tipografi yang menarik perhatian audien dan memberikan sumbangan kepada pemeliharaan dan promosi warisan budaya Malaysia. Pengkaji akan mengkaji sejauh mana elemen-elemen seperti warna, bentuk, tekstur, dan komposisi visual dalam hidangan ini dapat dijadikan idea dan dapat diaplikasikan dalam rekaan seni tipografi. Permasalahan-permasalahan ini telah menjadi dasar kajian dalam usaha untuk mendalami pengaruh makanan warisan Kelantan iaitu kuih Lompat Tikam dalam estetika reka bentuk tipografi serta peranannya dalam pemeliharaan dan promosi budaya Malaysia.

Hasil kajian ini diharapkan dapat memberikan sumbangan yang bermakna kepada pemeliharaan dan promosi warisan budaya Malaysia, khususnya dalam konteks makanan tradisi Kelantan. Selain itu, ia juga akan memberikan pandangan baru dan inspirasi dalam penggunaan seni tipografi sebagai alat untuk mempromosikan dan memahami lebih mendalam tentang nilai budaya yang semakin berkembang. Kesimpulannya, dasar kajian ini merupakan suatu usaha untuk menghubungkan makanan tradisi, seni tipografi, dan pemeliharaan budaya dalam satu wacana yang kreatif dan bernilai.

Objektif Kajian

Dalam usaha untuk memastikan objektif kajian dapat dicapai dengan jayanya, maka objektif kajian seperti di bawah telah dibentuk.

i) Mengenalpasti elemen-elemen estetik kuih Lompat Tikam yang boleh diaplikasikan dalam reka bentuk seni tipografi

ii) Menganalisis reka bentuk tipografi yang menggabungkan elemen-elemen estetik dari kuih Lompat Tikam dengan tujuan mencipta tipografi yang unik dan menarik yang mempromosikan dan memperkukuhkan estetika makanan tradisi.

Metodologi Kajian

Dalam kajian ini pengkaji menggunakan reka bentuk kajian kualitatif berdasarkan pendekatan etnografi melalui penglibatan pengkaji secara terus turun kelapangan. Etnografi adalah kajian berbentuk diskriptif terhadap budaya, institusi atau kumpulan dalam masyarakat. Terdapat beberapa kaedah yang digunakan dalam usaha pengumpulan data di lapangan kajian antaranya melibatkan kaedah temu bual, pemerhatian langsung dan rekod data. Kajian khusus ini berfokuskan kepada Estetika Pengaruh Makan Tradisi Kelantan '*Lompat Tikam'* Dalam Rekabentuk *Tipografi* dengan kompilasi dan susunan data-data serta maklumat yang bersumberkan tempat kajian, buku rujukan, media massa dan internet.

Penyelidikan etnografi biasanya melibatkan tiga pertimbangan utama. Pertama, penyelidik perlu melakukan kajian literatur melalui perpustakaan untuk mengenalpasti subjek kajian dengan lebih mendalam bertujuan untuk mengidentifikasi masyarakat yang menjadi fokus kajian. Kedua, penyelidik perlu mengumpulkan data dan bahan yang berkaitan dengan subjek kajian, termasuk foto dan bahan audio visual. Penyelidikan ini melibatkan tinjauan lapangan dan analisis terhadap objek kajian iaitu makanan warisan Kelantan kuih Lompat Tikam. Ketiga penyelidik perlu menjalankan eksplorasi yang lebih mendalam untuk mengenalpasti variasi, persamaan, dan perbezaan dalam elemen-elemen yang menjadi tumpuan kajian.

Maklumat yang diperoleh melalui kaedah pemerhatian visual kuih, analisis warna, serta eksperimen dalam mencipta reka bentuk tipografi yang menggabungkan elemen-elemen warna yang terdapat dalam kuih akan mencipta satu reka bentuk tipografi yang baharu. Hal ini secara langsung dapat menambahkan penciptaan tipografi baharu berdasarkan elemen warisan dan mendidik masyarakat tentang kekayaan elemen warisan yang terdapat di negara kita yang harus dimartabatkan.

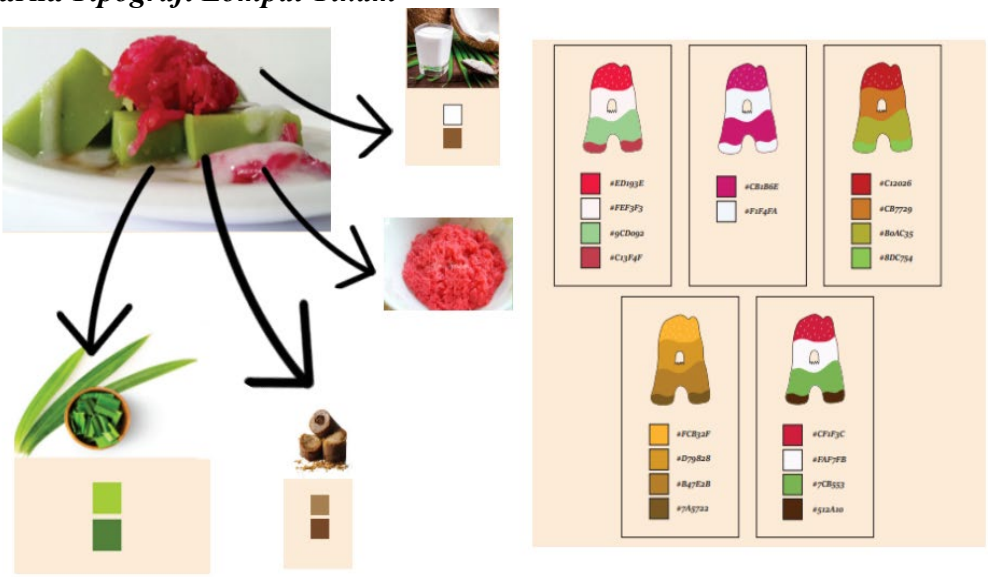
Rekabentuk *Tipografi* Pengaruh Budaya Tradisi

Dalam konteks budaya tradisi, *tipografi* menjadi suatu kaedah dalam menyampaikan sesuatu sejarah, tradisi dan nilai sesuatu budaya untuk merapatkan jurang antara masa lalu dan masa kini supaya terus diwarisi turun-temurun (Ade Lose Hermanto, Y. 2022). Penyelidikan ini merupakan satu kajian di mana tipografi atau huruf boleh berdiri dengan sendiri hasil daripada gabungan idea ciri-ciri yang terdapat pada kuih tradisi *lompat tikam*. Kebanyakan hasil seni cipta *tipografi* terhasil dari pengaruh dengan alam, budaya, warisan dan tradisi melalui peniruan elemen-elemen ini.

Tipografi dicipta bagi melengkapkan hasil karya seni samada dalam bentuk seni komersial atau dalam bentuk seni untuk seni. Penyelidikan secara mendalam telah dijalankan bagi menghasilkan reka bentuk tipografi yang menarik dan mudah dibaca serta boleh dijadikan sebagai bahan seni yang boleh dikomersialkan. Pemilihan *tipografi* atau huruf untuk menghasilkan sesuatu penghasilan seni amat dititikberatkan supaya mesejnya sampai kepada audien untuk membacanya. Gambar 1 dibawah menunjukkan gambar asal kuih lompat tikam yang merupakan makanan warisan Kelantan yang akan dianalisis dan diinterpretasi dengan lebih lanjut oleh pengkaji. Seterusnya setiap elemen yang terkandung dalam kuih ini dimasukkan unsur elemennya dalam rekaan tipografi yang baharu yang akan direka oleh pengkaji.

Gambar 1. Sumber dari Nur Dini Abd Aziz 2019

Kajian Warna *Tipografi Lompat Tikam*



Gambar 2. Gabungan idea warna kuih *lompat tikam* dalam menghasilkan huruf tipografi

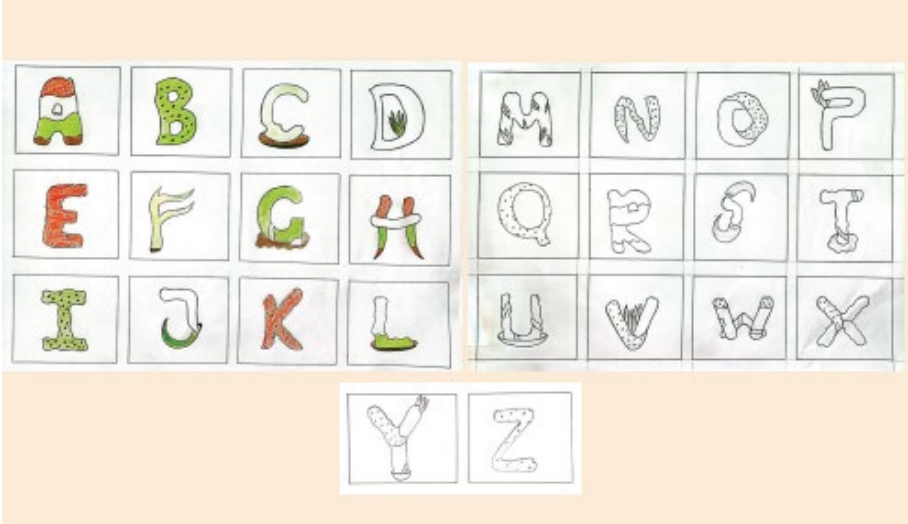
Gambar 2 menunjukkan gabungan kajian warna yang telah dilakukan oleh pengkaji dalam menghasilkan tipografi berdasarkan warna yang terdapat pada bahan-bahan yang digunakan untuk menghasilkan kuih *lompat tikam*. Pemilihan gabungan warna merah, hijau, coklat dan putih ini akan menghasilkan kesan perbandingan kontras antara latar belakang dengan huruf dan teks supaya mudah dikenali dan difahami serta jelas kepada audien. Menurut Kusrianto (2009, hlm.47), warna adalah imej pelengkap dan mewakili suasana psikologi pelukis dalam berkomunikasi.

Warna dalam konteks *tipografi* juga merupakan elemen yang sangat penting untuk merangsang perasaan, kesedihan, kegembiraan, suasana hati, semangat, menyentuh sensitiviti dan sebagainya. Kajian ini juga diharapkan dapat memberikan nafas baharu dalam bidang tipografi tentang pengaruh penggunaan warna yang diinspirasikan daripada makanan warisan Kelantan. Hasil kajian ini juga boleh dijadikan rujukan kepada pereka grafik, pengiklan dan pemasaran dalam menghasilkan rekabentuk tipografi yang kreatif dan menarik. Seterusnya dapat mencipta satu identiti tradisi yang boleh dipromosikan kepada masyarakat luar.

Analisis Visual Rekabentuk *Tipografi Lompat Tikam*

Tujuan utama reka bentuk tipografi adalah mencipta tampilan teks yang estetik, mudah dibaca dan efektif dalam menyampaikan mesej. Penekanan terhadap elemen-elemen tipografi dalam menghasilkan reka bentuk merangkumi pemilihan dan penggunaan muka huruf, saiz huruf dan juga jenis huruf yang jelas dan mudah difahami oleh audien. Gambar 3.1 menunjukkan lakaran idea awal pengkaji dalam membina reka bentuk tipografi. Pada peringkat awal ini, pengkaji menggabungkan unsur-unsur estetik yang terdapat pada elemen kuih Lompat Tikam seperti penggunaan warna merah, putih dan hijau dalam mencipta tipografi yang baharu supaya lebih inovatif dan menarik.

Pemikiran awal ini menjadi asas dalam pembangunan reka bentuk tipografi yang selanjutnya. Manakala gambar 3.2 menunjukkan rekaan akhir huruf tipografi yang dilakar dalam perisian Adobe Photoshop secara digital berpandukan ciri-ciri yang terdapat pada bahan dan karakter kuih Lompat Tikam. Rekaan ini diterbitkan dengan mengambil kira ciri-ciri visual dan karakter yang terdapat pada kuih Lompat Tikam. Hasil kajian akhir ini mencerminkan bagaimana elemen-elemen estetik kuih telah digabungkan ke dalam rekaan tipografi baharu bertujuan untuk mencipta tampilan teks yang memikat dan berkaitan dengan tema makanan tradisional.



Gambar 3.1. lakaran awal reka bentuk tipografi lompat tikam

3.2. Lakaran akhir reka bentuk huruf, warna. komposisi tipografi lompat tikam

Konsep ini dapat dilihat dengan jelas dan mudah dibaca menerusi ciptaan huruf yang dicipta. Gabungan unik antara tradisi dan inovasi *tipografi* ini boleh dijadikan sebagai medium utama membuka ruang pelbagai khalayak untuk melibatkan diri dan menceburi lebih banyak bidang grafik dan teknologi. Selain itu, menerusi penghasilan jenis reka bentuk *tipografi* ini juga dapat disampaikan makna yang jelas berkaitan kepentingan mengekalkan warisan tradisi dan nilai estetika makanan tradisi negara kita. Melalui kajian ini, pengkaji ingin memperkenalkan kembali kepada rakyat di Malaysia khususnya betapa pentingnya seni *tipografi* yang menfokuskan kepada seni muka taip yang akan dihasilkan kepada identiti Melayu melalui idea makanan tradisi.

Kesimpulan

Menerusi kajian ini, penyelidik amat menitik beratkan peranan *tipografi* di dalam membantu menaikkan atau memartabatkan kebudayaan tradisi itu sendiri melalui makanan tradisi yang bertemakan Lompat Tikam. Dengan adanya penyelidikan ini dapatlah mewarnakan negara Malaysia

dengan kepelbagaian kemunculan idea-idea baharu di dalam mencipta dan mereka bentuk seni visual *tipografi*. Selain itu, menerusi kajian ini pengkaji ingin menjadikan penciptaan reka bentuk ini sebagai perantaraan untuk menerapkan konsep tradisional dan moden dengan menyelitkan intipati tradisi dan warisan yang harus dijaga dan dikekalkan.

Melalui kajian ini menyedarkan masyarakat bahawa seni tipografi bukan hanya sekadar penekanan aspek teknikal dalam seni grafik malahan turut berperanan penting dalam menterjemahkan nilai budaya. Dengan gabungan elemen-elemen tradisi dalam kuih Lompat Tikam membolehkan pengkaji untuk mencipta reka bentuk yang unik yang mengekalkan akar budaya seterusnya menambahkan idea baharu dengan menggabungkan pengaruh moden dalam penciptaan tipografi. Hal ini membuka ruang kepada pengkaji-pengkaji baharu dalam menghasilkan idea baharu dan inovasi dalam seni reka bentuk yang mempromosikan warisan budaya dan menghormati nilai-nilai tradisional yang harus dijaga dan dikekalkan.

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TAHAP PENGETAHUAN, SIKAP DAN AMALAN (*KNOWLEDGE, ATTITUDE, AND PRACTICE*, KAP) KESELAMATAN DAN KESIHATAN PEKERJAAN DALAM KALANGAN KAKITANGAN PERKHIDMATAN AWAM

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Abstrak: Keselamatan dan kesihatan pekerjaan merupakan salah satu elemen penting yang perlu dipantau dan dikawal dalam sesebuah organisasi. Berdasarkan statistik Jabatan Keselamatan dan Kesihatan Pekerjaan pada tahun 2020, sebanyak 32,674 kes berkaitan kemalangan dan 312 kes berkaitan kematian yang melibatkan pekerja dalam pelbagai sektor pekerjaan di dalam negara dilaporkan. Purata dua kematian dan kes kemalangan di tempat kerja yang dilaporkan setiap hari mendorong kerajaan mengambil pelbagai langkah bagi mewujudkan tempat kerja yang selamat, sihat selain bebas kemalangan serta penyakit. Oleh itu, kajian ini bertujuan untuk mengkaji tahap pengetahuan, sikap dan amalan (KAP) terhadap hazard yang dikenalpasti di Bahagian Standard Swasta, Jabatan Pendidikan Tinggi. Kaedah kajian adalah secara deskriptif dan inferensi bagi KAP di tempat kerja. Responden terdiri daripada 66 orang kakitangan dengan kaedah soal selidik kuantitatif merangkumi aspek demografi dan tahap KAP sebagai instrumen utama untuk mendapatkan data. Data dianalisis menggunakan *Statistical Package for The Social Science* (SPSS) versi 20.0. Hasil kajian menunjukkan tahap pengetahuan adalah sederhana dengan min 3.59, manakala penilaian sikap menunjukkan tahap tinggi dengan min 4.22 dan penilaian amalan berada pada tahap tinggi dengan min 4.07. Kajian ini dapat dijadikan rujukan kepada pihak penyelidik akan datang serta pihak-pihak lain yang berkaitan terutamanya sektor awam bagi mengurangkan risiko kemalangan dan kecederaan di tempat kerja.

Kata kunci: *Knowledge; Attitude and Practice* (KAP); Keselamatan; Kesihatan; Hazard; Risiko.

Pendahuluan

Isu berkaitan keselamatan dan kesihatan pekerjaan merupakan salah satu elemen yang dititikberatkan dalam pengurusan sumber manusia sesuatu organisasi (Nurul Asmad, 2015). Menurut Akta 514, Akta Keselamatan dan Kesihatan Pekerjaan 1994 (AKKP 1994), tanggungjawab keselamatan dan kesihatan pekerjaan semasa bekerja adalah terletak kepada pihak majikan (Azreen & Nasir, 2020) di mana pihak majikan hendaklah mewujudkan sebuah Jawatankuasa Keselamatan dan Kesihatan Pekerjaan yang dipengerusikannya sendiri di tempat kerja sekiranya jumlah pekerja melebihi 40 orang. Pejabat boleh diklasifikasikan sebagai rumah kedua kerana banyak masa dihabiskan oleh pekerja iaitu hampir lapan jam tanpa menyedari bahawa mereka dikelilingi oleh persekitaran yang boleh membahayakan diri. Seperti juga tempat kerja yang lain, pejabat juga tidak terkecuali daripada hazard fizikal, biologikal, kimia, faktor ergonomik dan psikososial (Selamat & Mukhiffun, 2018).

Dengan pelaksanaan AKKP 1994 khususnya melalui Perkara 15(2), pihak kerajaan telah mewajibkan majikan memberikan maklumat tentang cara dan bila menggunakan peralatan keselamatan, serta memastikan pekerja sentiasa berada dalam situasi yang selamat. Pemeriksaan dan penyelenggaraan alat yang digunakan juga perlu diambil perhatian. Tanda amaran juga perlu disediakan untuk mengingatkan para pekerja memakai peralatan pelindung diri yang sesuai (Muhammad Shazwi, 2017). Statistik Jabatan Keselamatan dan Kesihatan Pekerjaan, 2020 menunjukkan bilangan pekerja di Malaysia adalah sebanyak 14.9 juta, manakala 32,674 kes kemalangan dan 312 kes kematian yang melibatkan pekerja dalam pelbagai sektor di mana purata dua kematian dan kes kemalangan di tempat kerja dilaporkan setiap hari. Oleh itu, kajian ini bertujuan untuk mengenal pasti tahap pengetahuan, sikap dan amalan (KAP) terhadap kepentingan pengurusan risiko hazard keselamatan dan kesihatan pekerjaan di tempat kerja.

Kajian Literatur

Kajian pengetahuan, sikap dan amalan (KAP) merupakan penilaian untuk mengenal pasti tahap kesedaran tentang pengurusan risiko hazard bagi keselamatan dan kesihatan di tempat kerja. KAP berfungsi sebagai ujian untuk mendiagnosis masyarakat untuk menilai sejauh mana tahap pengetahuan, sikap dan amalan dalam pengurusan keselamatan dan kesihatan (Kaliyaperumal, 2004: Mostafa NS & Momen M, 2014).

Tinjauan KAP banyak digunakan untuk menyiasat tingkah laku kesihatan dan amalan untuk mempromosi kesihatan secara efektif (Hausmann-Muela et al. 2003: Mostafa NS & Momen M, 2014). Pendedahan KAP setiap hari kepada pekerja dapat membantu intervensi berdasarkan bukti untuk memperbaiki keadaan kerja atau perubahan tingkah laku (Goh & Chua, 2016: Nuruzzakiyah, 2019). Selain itu KAP berupaya menjadikan pengurusan lebih sistematik, hubungan pekerja dan majikan bertambah baik, peningkatan pengeluaran dan kos insurans pampasan yang rendah dapat dicapai (Mostafa NS & Momen M, 2014).

Kajian KAP mendedahkan terdapat hubungan yang signifikan antara pengetahuan, sikap dan amalan dengan tempoh pengalaman bekerja tetapi tidak signifikan terhadap latihan hazard keselamatan dan kesihatan (Selman et al. 2018). Daripada hasil kajian tersebut, pihak pengurusan disaran melaksanakan program latihan mengenai bahaya pekerjaan dan mengkaji kualiti latihan terdahulu. Meningkatkan kesedaran pekerja terhadap keselamatan dan kesihatan pekerjaan melalui latihan merupakan langkah penting untuk memperkuat pemahaman mereka tentang pentingnya kepatuhan terhadap prosedur keselamatan serta untuk meningkatkan kesedaran akan risiko yang terkait dengan lingkungan kerja mereka (Kadir et al. 2021).

Metodologi

Penyelidikan ini menggunakan pendekatan kuantitatif di mana soal selidik diedarkan untuk mengkaji hubungan KAP dengan pengurusan risiko keselamatan dan kesihatan pekerjaan. Soal selidik yang digunakan telah disahkan dan dikenal pasti kebolehpercayaan oleh pakar serta diubahsuai mengikut kesesuaian kajian. Sebanyak 66 set borang soal selidik telah diedarkan kepada kakitangan perkhidmatan awam di mana kumpulan sasaran adalah Bahagian Standard Swasta (BSS), Jabatan Pendidikan Tinggi. Penyelidikan ini menggunakan kaedah pensampelan secara rawak mudah menggunakan jadual Krejcie dan Morgan (1970). Populasi seramai N= 80 orang apabila menggunakan formula Krejcie dan Morgan akan menghasilkan sampel s= 66 orang.

Kajian ini memberi tumpuan kepada pekerja yang bekerja di dalam pejabat dan menggunakan komputer terutamanya pekerja di bahagian pengurusan dan pentadbiran. Responden terbahagi kepada pekerja Perkhidmatan Tetap (Penjawat Awam) dan Perkhidmatan Jangka Pendek *(Malaysia Short-Term Employment Programme,* MySTEP). Jumlah responden yang terlibat adalah seramai 66 orang yang terdiri daripada Unit Khidmat Pengurusan, Seksyen Perhubungan, Seksyen Piawaian, Seksyen Pendaftaran, Seksyen Kolej Swasta dan Seksyen Universiti Swasta di BSS.

Instrumen kajian ini merangkumi tiga aspek utama iaitu pengetahuan, sikap dan amalan pekerja serta penentuan tahap risiko terhadap hazard keselamatan dan kesihatan di tempat mereka bekerja iaitu di BSS, JPT. Borang soal selidik ini mengandungi tiga bahagian yang perlu dijawab oleh responden iaitu bahagian A: Demografi, bahagian B: Pengetahuan, bahagian C: Sikap dan bahagian D : Amalan. Bahagian A: Demografi mengandungi enam (6) item soalan berkaitan latar belakang responden iaitu jantina, umur, latar belakang pendidikan, kumpulan perkhidmatan, tempoh perkhidmatan dan unit atau seksyen dalam BSS. Bahagian B: Pengetahuan mengandungi lapan (8) item soalan merujuk kepada kesedaran pekerja dari segi pengetahuan terhadap pengurusan risiko keselamatan dan kesihatan di tempat kerja. Manakala pada bahagian C: Sikap mengandungi enam (6) item soalan merujuk kepada penilaian sikap pekerja terhadap pengurusan risiko keselamatan dan kesihatan di tempat kerja. Bahagian D: Amalan pula mengandungi penilaian amalan pengurusan risiko keselamatan dan kesihatan yang dijalankan di tempat kerja.

Item soalan selidik bahagian B, C dan D menggunakan kaedah skala likert, lima (5) pilihan telah digunakan bermula dari Sangat Setuju sehingga ke Sangat Tidak Setuju. Analisis tahap diukur dengan tiga tahap skor min yang utama iaitu tahap rendah (1.00 – 1.67), sederhana (1.68 – 3.35) dan tinggi (3.36 – 5.00). Borang soal selidik yang disediakan terbahagi kepada lima (5) bahagian, iaitu bahagian A (demografi), B (tahap pengetahuan), C (penilaian sikap), dan D (penilaian amalan). Pecahan bahagian borang soalan selidik dapat dilihat seperti Jadual 1.

Jadual 1. Kandungan Soal Selidik dan Bilangan Item

Item	Konstruk	Dimensi	No. Item	Jumlah
B	Tahap pengetahuan	aspek pengetahuan hazard keselamatan dan kebersihan di tempat kerja	B1 – B8	8
C	Penilaian sikap	aspek sikap terhadap hazard keselamatan dan kebersihan di tempat kerja	C1 – C6	6
D	Penilaian amalan	aspek amalan mengelakkan hazard keselamatan dan kebersihan di tempat kerja	D1 – D6	6
			Jumlah	**20**

Item-item dalam borang soal selidik telah diuji menggunakan ujian kebolehpercayaan Cronbach's Alpha, mengikuti panduan yang disarankan (Pallant, 2010; Nor Suhaily et.al, 2018). Nilai skor Cronbach's Alpha yang diperoleh adalah 0.89, menunjukkan tahap kebolehpercayaan yang sangat baik bagi setiap item. Oleh itu, dapat disimpulkan bahawa soal selidik yang disediakan untuk tujuan pengumpulan data dalam kajian KAP mengenai pengurusan risiko keselamatan dan kesihatan di tempat kerja adalah sesuai dan boleh dipercayai.

Data dalam Jadual 2 menunjukkan penyebaran frekuensi dan peratusan tahap pengetahuan responden mengenai hazard keselamatan dan kesihatan. Analisis menunjukkan bahawa tahap kesedaran responden terhadap hazard keselamatan dan kesihatan adalah sangat tinggi, yang disokong oleh skor min keseluruhan sebanyak 3.59. Sebanyak 51 responden setuju bahawa organisasi tempat mereka bekerja memastikan keadaan keselamatan melalui sistem kawalan 24 jam untuk item B1. Sementara itu, 43 responden mengakui kehadiran Jawatankuasa Keselamatan dan Kesihatan di tempat kerja bagi item B2. Tambahan pula, 40 responden bersetuju bahawa terdapat dasar atau polisi keselamatan dan kesihatan di tempat kerja untuk item B3.

Selain itu, sebanyak 35 responden juga setuju dengan pernyataan item B4 yang menyatakan bahawa polisi keselamatan dan kesihatan di tempat kerja mudah dibaca dan diakses. Namun, item B5 menunjukkan bahawa 40 responden tidak bersetuju atau tidak yakin terdapatnya aktiviti atau program keselamatan dan kesihatan yang dilaksanakan secara aktif di jabatan tempat mereka bekerja. Meskipun demikian, dari segi item B6, sebanyak 37 responden menyatakan kemampuan mereka dalam mengendalikan peralatan pemadam kebakaran, menunjukkan inisiatif mereka untuk mempelajari teknik penggunaan peralatan tersebut dalam situasi kecemasan. Bagi item B7, hanya 30 responden mengakui pengetahuan mereka mengenai teknik pertolongan cemas. Manakala majoriti 35 responden dalam item B8 mengakui pengetahuan mereka mengenai pegawai yang bertanggungjawab dalam situasi kecemasan yang melibatkan hazard keselamatan dan kesihatan.

Purata peratusan persetujuan responden terhadap keseluruhan item soalan ini yang bertujuan untuk menilai tahap pengetahuan pekerja tetap dan MySTEP di jabatan mereka mengenai hazard keselamatan dan kesihatan, adalah sebanyak 58.15%. Hasil ini menunjukkan bahawa tahap pengetahuan mereka masih berada pada tahap sederhana. Secara umumnya, pekerja tidak sedar akan paparan risiko pelbagai jenis yang dapat mengancam keselamatan dan kesihatan di tempat kerja, termasuk risiko kesihatan mental dan fizikal, kondisi kerja yang tidak selesa, bahaya penggunaan bahan kimia, persekitaran kerja yang tidak selamat dan lain-lain (Rosley Jaafar et. al, 2018).

Jadual 2. Analisis Tahap Pengetahuan Terhadaphazard Keselamatan dan Kesihatan

Item soalan		STS	TS	TP	S	SS	min
B1. Saya bekerja di dalam premis yang selamat dengan sistem kawalan keselamatan 24 jam.	K	0	1	4	24	37	4.47
	(%)	0	1.5	6.1	36.4	56.1	
B2. Saya tahu kewujudan Pengurusan Keselamatan dan Kesihatan di Jabatan	K	4	6	13	26	17	3.70
	(%)	6.1	9.1	19.7	39.4	25.8	
B3. Saya tahu kewujudan Dasar / Polisi Keselamatan dan Kesihatan Pekerjaan di pejabat	K	3	7	16	22	18	3.68
	(%)	4.5	10.6	24.2	33.3	27.3	
B4. Polisi Keselamatan dan Kesihatan telah ditampal di tempat yang mudah dibaca.	K	2	10	19	22	13	3.52
	(%)	3.0	15.2	28.8	33.3	19.7	
B5. Terdapat program keselamatan dan kesihatan yang aktif di tempat kerja saya	K	4	10	26	21	5	3.20
	(%)	6.1	15.2	39.4	31.8	7.6	
B6. Saya tahu menggunakan alat pemadam kebakaran di tempat kerja	K	5	8	16	27	10	3.44
	(%)	7.6	12.1	24.2	40.9	15.2	
B7. Saya berpengetahuan dalam asas pertolongan cemas	K	3	9	24	28	2	3.26
	(%)	4.5	13.6	36.4	42.4	3.0	
B8. Saya tahu pegawai yang perlu dihubungi jika berlaku kecemasan	K	3	7	21	25	10	3.48
	(%)	4.5	10.6	31.8	37.9	15.2	
Min keseluruhan							**3.59**

Jadual 3 menunjukkan bahawa sikap responden terhadap hazard keselamatan dan kesihatan di tempat kerja adalah di tahap yang baik di mana responden mencatatkan skor min keseluruhannya pada min 4.22. Ini menunjukkan bahawa responden cakna pada hazard di sekeliling tempat bekerja. Seramai 65 responden sentiasa memastikan persekitaran kawasan kerja yang selamat dan bebas dari unsur berbahaya, hanya seorang responden yang tidak pasti untuk item C1 ini. Seterusnya dalam item C2, menunjukkan seramai 95.4% responden bersetuju akan segera memberi bantuan jika terdapat situasi kecemasan. Ini bermakna mereka sentiasa bersiap sedia dengan sebarang hazard melibatkan

keselamatan dan kesihatan. Bagi item C3 pula, menyatakan seramai 98.5% responden bersetuju bahawa mereka bersedia untuk melaporkan sebarang kejadian tentang keselamatan dan kesihatan di tempat kerja.

Seramai 61 responden juga sangat bersetuju dengan item C4 iaitu mereka bersedia untuk menyertai sebarang program yang dianjurkan berkaitan keselamatan dan kesihatan tempat kerja. Namun begitu, seramai 34 responden tidak bersetuju dengan item C5 di mana mereka berpendapat bahawa program keselamatan yang dihadiri tidak memadai untuk mereka menilai risiko di tempat kerja. Hal ini perlu dilihat dengan lebih mendalam untuk kakitangan kerajaan secara tetap mahupun jangka pendek. Pembangunan program keselamatan dan kesihatan mampu memberikan impak yang besar dalam penghasilan tugas yang berkualiti jika dapat dilaksanakan secara holistik dan berterusan.

Hasil dapatan daripada item C6 iaitu kecuaian responden boleh meletakkan diri mereka dan rakan sekerja dalam keadaan berbahaya menunjukkan bahawa 93.9% daripada keseluruhan responden bersetuju dengan kenyataan ini. Hanya 6.1% responden yang tidak pasti dan sangat tidak setuju dengan item ini. Purata peratusan keseluruhan responden bersetuju dengan item soalan penilaian sikap terhadap hazard keselamatan dan kesihatan adalah sebanyak 95.8%. Hasil kajian ini disokong oleh kajian Nur Aqilah Mohamad Riza (2010) dalam kajian beliau terhadap kakitangan di sebuah Institusi Pendidikan Tinggi Swasta (IPTS), beliau mendapati faktor komitmen dan sikap merupakan faktor yang paling dominan mempengaruhi tahap pematuhan terhadap aspek pengurusan keselamatan dan kesihatan pekerjaan. Menurutnya juga, faktor ini merupakan kekuatan dalaman yang ada pada individu dan kumpulan di dalam organisasi secara semulajadi. Oleh itu, majikan sepatutnya menggunakan kekuatan dalaman ini untuk melaksanakan program atau aktiviti keselamatan dan kesihatan untuk terus meningkatkan prestasi keselamatan dan kesihatan di tempat kerja. Sikap yang baik pekerja akan membentuk amalan keselamatan dan kesihatan yang baik, justeru akan berjaya mengurangkan risiko bahaya kemalangan di tempat kerja. (Zulhizzam & Hazelena Dewi, 2014).

Jadual 3. Analisis Sikap Responden Terhadap hazard Keselamatan dan Kesihatan

Item soalan		STS	TS	TP	S	SS	min
C1. Saya sentiasa memastikan persekitaran kawasan kerja yang selamat dan bebas dari unsur berbahaya.	K	0	0	1	35	30	4.44
	(%)	0	0	1.5	53.0	45.5	
C2. Saya akan segera memberi bantuan jika terdapat situasi kecemasan	K	0	1	2	35	28	4.36
	(%)	0	1.5	3.0	53.0	42.4	
C3. Saya bersedia untuk melaporkan sebarang kejadian tentang keselamatan dan kesihatan di tempat kerja	K	0	0	1	32	33	4.48
	(%)	0	0	1.5	48.5	50.0	
C4. Saya bersedia untuk menyertai sebarang program yang dianjurkan berkaitan keselamatan dan kesihatan tempat kerja	K	0	1	4	36	25	4.29
	(%)	0	1.5	6.1	54.5	37.9	
C5. Program keselamatan yang dihadiri memadai untuk saya menilai risiko di tempat kerja	K	6	7	21	24	8	3.32
	(%)	9.1	10.6	31.8	36.4	12.1	

C6. Kecuaian saya boleh meletakkan diri saya dan rakan sekerja dalam keadaan berbahaya.	K	1	0	3	27	35	4.44
	(%)	1.5	0	4.5	40.9	53.0	
Min keseluruhan							**4.22**

Jadual 4 menunjukkan taburan kekerapan dan peratusan amalan responden terhadap hazard keselamatan dan kesihatan. Skor min keseluruhan 4.07 jelas menunjukkan responden adalah berada pada tahap yang tinggi.

Analisis menunjukkan bahawa 65 responden bersetuju dengan item D1 bahawa mereka sentiasa patuh kepada prosedur keselamatan ketika melakukan apa jua pekerjaan. Walau bagaimanapun bagi item D2, seramai 35 responden masih tidak pasti dan tidak setuju untuk selalu menyertai program keselamatan dan kesihatan di tempat kerja yang dianjurkan. Didapati kemungkinan terdapat kekangan dari segi masa dan jadual tugasan di tempat mereka bekerja.
Selain itu, 64 responden bersetuju bagi item D3 iaitu sentiasa mengamalkan kebersihan sebelum dan selepas melakukan sebarang jenis pekerjaan sebagai amalan dalam menjalankan tugas sebagai kakitangan perkhidmatan awam. Malahan 54 responden bersetuju sentiasa memastikan pintu laluan kecemasan di tempat kerja bebas daripada sebarang halangan bagi item D4.

Item D5 menunjukkan bahawa 51 responden bersetuju bahawa mereka sentiasa memastikan peti pertolongan kecemasan diletakkan di tempat yang mudah diakses. Hal ini kerana jika terdapat sebarang kecemasan atau kecederaan, mereka sedar dan tahu bagaimana untuk bertindak. Ini merupakan suatu amalan yang sangat baik terhadap hazard di sekeliling mereka.

Manakala 53 responden turut bersetuju dengan item terakhir D6, iaitu sentiasa memastikan alat pemadam api diletakkan di tempat yang mudah diakses. Walau bagaimanapun terdapat 13 responden kurang dan tidak setuju dalam amalan ini. Purata peratusan responden bersetuju dengan item soalan penilaian amalan terhadap hazard keselamatan dan kesihatan adalah sebanyak 78.9% dengan skor min 4.07.

Jadual 4. Analisis Amalan Responden Terhadap hazard Keselamatan dan Kesihatan

Item soalan		**STS**	**TS**	**TP**	**S**	**SS**	**min**
D1. Saya sentiasa patuh kepada prosedur keselamatan ketika melakukan apa jua pekerjaan	K	0	0	1	41	24	4.35
	(%)	0	0	1.5	62.1	36.4	
D2. Saya selalu menyertai program keselamatan dan kesihatan di tempat kerja	K	2	13	20	25	6	3.30
	(%)	3.0	19.7	30.3	37.9	9.1	
D3. Saya sentiasa mengamalkan kebersihan sebelum dan selepas melakukan sebarang jenis pekerjaan.	K	0	1	1	29	35	4.48
	(%)	0	1.5	1.5	43.9	53.0	
D4. Saya sentiasa memastikan pintu laluan kecemasan di tempat kerja saya bebas daripada sebarang halangan.	K	1	3	8	28	26	4.14
	(%)	1.5	4.5	12.1	42.4	39.4	
D5. Saya sentiasa memastikan peti pertolongan kecemasan diletakkan di tempat yang mudah diakses.	K	2	3	10	25	26	4.06
	(%)	3.0	4.5	15.2	37.9	39.4	
D6. Saya sentiasa memastikan alat pemadam api diletakkan di tempat yang mudah diakses.	K	2	3	8	28	25	4.08
	(%)	3.0	4.5	12.1	42.4	37.9	
Min keseluruhan							**4.07**

Kesimpulan

Secara keseluruhannya, penyelidikan ini telah mencapai objektif kajian yang telah ditetapkan iaitu mengenalpasti tahap pengetahuan, sikap dan amalan (KAP) pengurusan risiko. Menurut analisis statistik yang menyeluruh untuk penilaian ini,

dapat disimpulkan tahap pengetahuan, sikap dan amalan terhadap pengurusan risiko keselamatan dan kesihatan adalah berada di tahap yang baik dan tiada perbezaan di antara pegawai tetap dan MySTEP.

Impak daripada penyelidikan ini mampu menjamin persekitaran tempat kerja yang selamat dan kondusif. Hal ini membuktikan bahawa tempat kerja yang kondusif boleh memberikan hasil kerja yang cemerlang dan meningkatkan mutu penghasilan sesuatu tugasan.

Hasil penyelidikan ini juga dapat menyumbang dalam menjadikan organisasi lebih cekap dan berkesan dalam menangani permasalahaan isu di tempat kerja oleh para majikan yang berkaliber. Isu-isu di tempat kerja juga merupakan antara hazard yang dapat dikenalpasti dalam kuantiti yang kecil dan terpencil di mana ia memberi risiko kepada mental pekerja.

Penyelidikan ini juga dilihat turut memberi kesan kepada organisasi lain dalam perkhidmatan awam yang turut sama mula menyedari bahawa pentingnya kesedaran kakitangan awam yang berkhidmat tidak kira secara tetap dan profesional mahupun secara kontrak terhadap hazard keselamatan dan kesihatan di tempat mereka bekerja bagi memastikan kerja dan tugasan mereka dapat dilaksanakan dengan baik dan dalam keadaan yang ergonomik. Selain itu, untuk kajian masa depan, disarankan untuk meluaskan skop kajian dengan memasukkan lebih banyak sektor industri serta meneliti hubungan antara program keselamatan dan kesihatan dengan produktiviti pekerja. Lebih lanjut, penting juga untuk memperluas fokus kajian ke isu-isu kesihatan mental pekerja, termasuk tekanan kerja, keletihan, dan ketidakseimbangan kerja-hidup, serta bagaimana faktor-faktor ini dapat mempengaruhi keselamatan dan kesihatan secara keseluruhan.

Oleh itu, bagi cadangan penyelidikan masa depan, disarankan agar dilakukan analisis perbandingan antara organisasi awam dan swasta, untuk memahami perbezaan dan persamaan dalam pengurusan risiko keselamatan dan kesihatan di kedua-dua sektor tersebut. Meneliti pengaruh inisiatif keselamatan dan kesihatan terhadap reputasi pekerja dan kepuasan kerja juga boleh memberikan pandangan yang lebih mendalam mengenai kesan program keselamatan dan kesihatan terhadap organisasi secara keseluruhan.

Dengan melaksanakan saranan-saranan ini, diharapkan kajian masa depan dapat memberikan sumbangan yang lebih luas dan mendalam dalam pembangunan dan peningkatan amalan pengurusan risiko keselamatan dan kesihatan di tempat kerja, memberi impak yang positif terhadap produktiviti, kepuasan kerja, dan kesejahteraan pekerja secara keseluruhan.

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Development of Augmented Reality to Improve Tourist Experience During Visit to the Museum in Malacca.

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Abstract. The Malaysian economy depends heavily on tourism, which accounts for a sizeable amount of its GDP. The ancient city core of Malacca, which is home to various artifacts, temples, and structures from the colonial era, is one of the city's major attractions and is designated as part of the UNESCO World Heritage list. Numerous museums with interesting and significant artifacts might entice tourists. However, some industry researchers contend that the tourism sector is becoming increasingly competitive, making it difficult to both survive and sell a place. Due to the lack of engagement and boredom, many young tourists avoid visiting museums and other historical places. This research is designed to evaluate the effectiveness of Augmented Reality (AR) technology to improve tourist experience during their visit museum in Malacca. The project's objective is to employ cutting-edge multimedia tools, such as augmented reality, to provide visitors with fun interactive experiences at historical locations. An effectiveness test was made for several museum visitors and the results are discussed in this research paper.

Keywords: AR Technology; Museum; Effectiveness

Introduction

Tourism is one of the key contributors to the Malaysian economy, accounting for a significant portion of the country's GDP. According to Melaka Chief Minister Datuk Seri Sulaiman Md Ali, in 2019, Malacca received 18.7 million tourists, generating a total revenue of RM21.298 billion (Melaka State Economic Planning Unit, 2021). Some of the top attractions in Malacca include the UNESCO World Heritage-listed historic city centre, which is home to numerous museums, temples, and colonial-era buildings. Having a lot of museums with fascinating and important items can draw visitors (Department of Statistics, 2022).

However, some industry researchers contend that the tourism sector is becoming increasingly competitive, making it difficult to both survive and sell a place (Spadoni et al., 2022). Another tourism issue is that many young visitors do not visit museums and other heritage sites due to the lack of interaction and boredom (Bernama, 2021). To maintain the tourism industry in Malacca, high technology can help in this situation which can give the differential traveling experience in Malacca (Billock, 2017).

Augmented reality (AR) is an interactive experience that combines the real world and computer-generated content. The content can span multiple sensory modalities, including visual, auditory, haptic, somatosensory, and olfactory. For example, Muzium Negara's augmented reality (AR) mobile app has been launched to provide information to visitors on 28 selected collections in 2D and 3D multimedia content (Billock, 2017). According to a study conducted by the Center for the Future of Museums, millennials emphasize interactivity, immersive Ness, and participatory activities as things they hope to see in museums (Hassassian, 2018).

The application of AR technology in tourism will make a significant contribution to the transformation of cities into smart cities and may lead to future interactive applications. Malacca is home to the more antiquated cultural relics (Britannica, 2023). Each cultural artifact is noticeable and can be used to draw visitors. The shortcoming will show itself, though, since the lack of connection and dullness at heritage attractions may turn away many young tourists. This also indirectly affects the "Melakaku Maju Jaya 2035 Strategic Plan" because the tourism sector is a vital contributor to the economy of Melaka (Melaka State Economic Planning Unit, 2021).

This project aims to offer visitors an alternative experience using an application that will present information about the cultural relics in the Malacca Museum using technology. The AR technology will influence the learning motivation for the user (Chen & Lai, 2021). The project will involve the development of an application designed to showcase cultural relics along with digital information through various media, including animation, video, and sound. Visitors will have the opportunity to utilize the AR application to access detailed information about the cultural relics. An AR application that will enable visitors to scan cultural artifacts. The AR application will enhance visitors' interactive experiences by allowing them to visualize the history of the cultural artifacts. This means that visitors can download an app and then explore the stories of cultural artifacts using the camera on their phone or tablet. Visitors can interact with the two-dimensional animations created from these stories.

Literature Review

A technology known as AR improves the physical environment by superimposing digital data such as images, sounds, or text on top of it. Devices like smartphones, tablets, and smart eyewear can all be used for this (Paulauskas et al., 2023). The camera and sensors in these devices are used by augmented reality technology to track the user's actual environment and add digital information to it in real time (Alexandar S. Gillis, 2019). The digital data can appear as text, films, or 3D objects that seem to be physically present in the user's environment.

Usually, mobile devices such as smartphones, tablets, smart glasses, or headsets are used to deliver augmented experiences. By utilizing the devices' cameras and sensors, AR systems can recognize and track real-world environments. Users receive contextual data, visuals, or interactive features through augmented reality to enhance their perception of reality. Users can access information and instructions related to things or places that do not exist in the physical world.

Related Work. Augmented reality keeps people from looking at boring photos and uninspiring devices. Instead, it uses visual effects to add to the unconventional user experience. It allows people to interact with virtual objects and bring different experiences. Make people more interested in certain aspects (Michael Georgiou, 2023). AR is also applied in various fields such as education, training, and entertainment.

Domain of Augmented Reality

AR as Teaching Tool. Teachers are using the AR learning experiences as a "hook" to captivate and astound their pupils. The book's content will reveal additional information that can provide students with more in-depth study materials, such as solAR and Visible Body Augmented Reality. (Spadoni et al., 2022) use the AR technology to give a new interaction way to customers and enhance user experience when visiting the museum. The student may observe and interact with the virtual model thanks to AR technology. This could increase student enthusiasm for their studies and help them better understand the material.

AR as Marketing Tool. Customers who are interested in a product may see how it looks, feels, and fits without having to physically touch or test it out in their homes thanks to augmented reality (AR). Instead of merely saturating prospects with marketing material, AR enables organizations to demonstrate how their goods or services stand out, improving the connection and interaction that leads to conversions and sales such as the IKEA app.

In conclusion, AR technology gives users a new way to interact and improves learning outcomes. Users can learn something with increased motivation, a learning approach that is more beneficial than traditional ways employing AR technology. As a result, AR technology serves as the finest learning assistance.

Methodology

The Methodology used in this project is the Multimedia Production Process (Sherwood & Rout, 1998). The use of multimedia has enhanced our capacity to learn and understand information. The Multimedia Production Process model was chosen because of its emphasis on the combination of various media such as image, animation, text, and audio which can increase the message's effect. Below is the multimedia production process model.

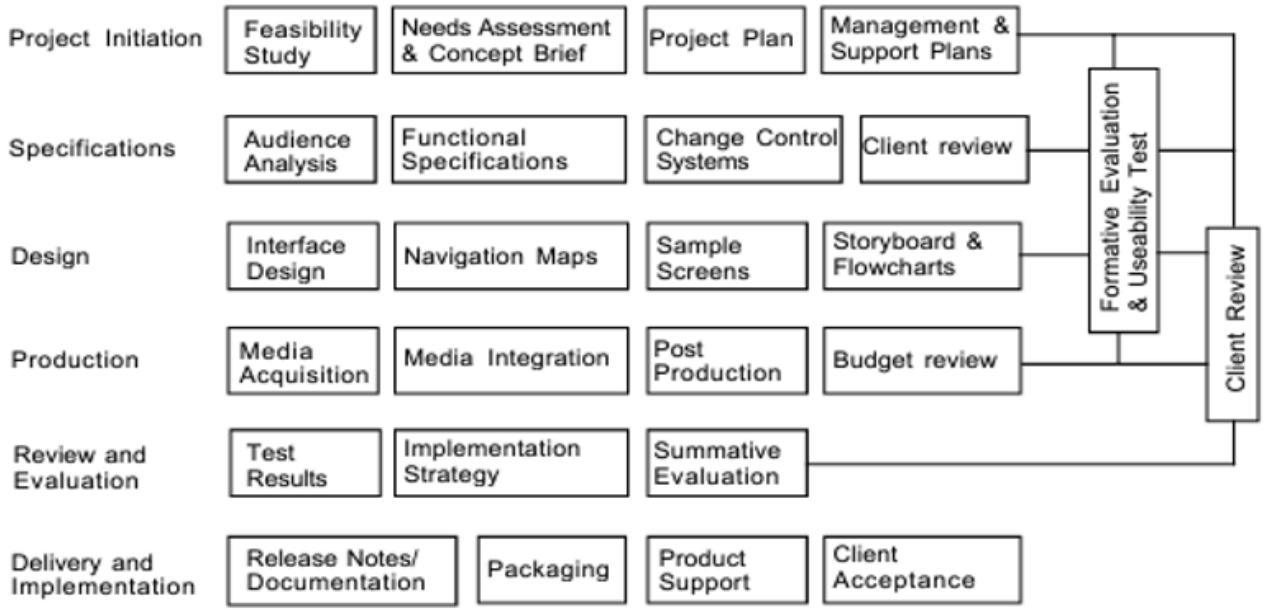

Fig. 1 Multimedia Production Process model (Sherwood & Rout, 1998)

Initiation. The project has been divided into five modules based on five cultural artifacts. Each uses 3D models with animations and images to boost visuals. The project's storyline involves converting a historical tale into 3D animation. The story's authenticity is museum-certified. All data are obtained on the spot for accuracy and trustworthiness. Researchers conducted on-site information gathering at the following locations in Gallery Kota Malacca: Cannon Melaka, Coin-coin, A Famosa, and Maritime trade.

Specifications. Making decisions about the project's goals, objectives, and target audience is all part of development. All of these must be established after choosing a theme for a multimedia project. The objective is to provide information about cultural relics in a museum for users through virtual means. The project's clear goal is to streamline researchers' work processes and reduce completion times.

Design. A storyboard is produced in AR before the main project starts to ensure correct story flow. Each cultural relic contains its storyboard and story. The storyboard below contains a simple explanation of how the final scene will be presented. It allows developers to produce 3d objects and arrange them according to the storyboard. The storyboard samples for this project are shown in Figure 2 below.

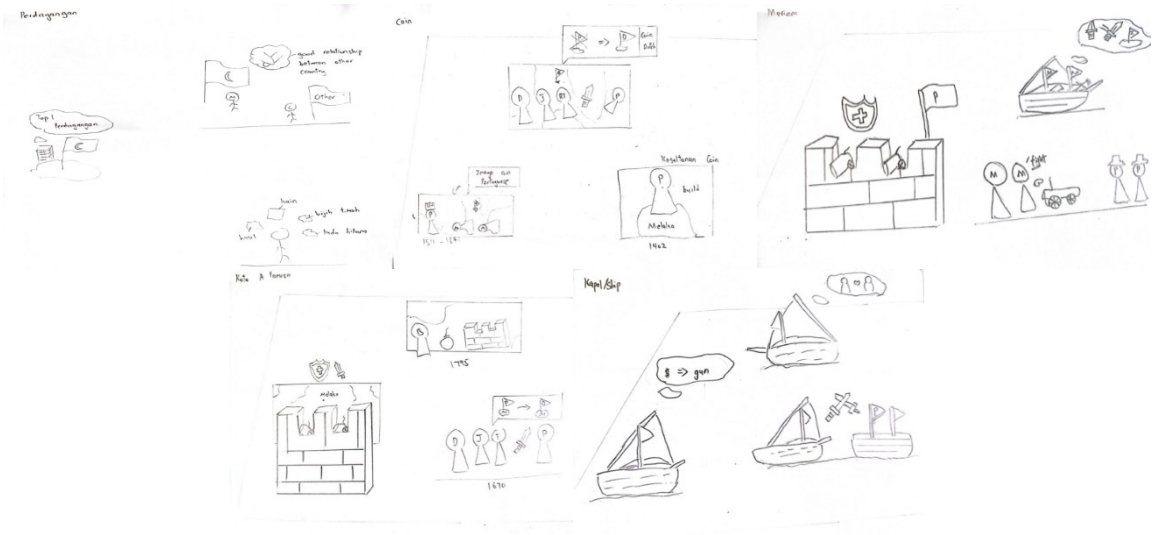

Fig. 2 Hand Drawing Storyboard

Design and Development Process. The pre-production, production, and design phases that went into making this brief animation are covered in detail in this stage. All 2D graphics will be designed in this part, along with the plot flow and the images needed for each scene.

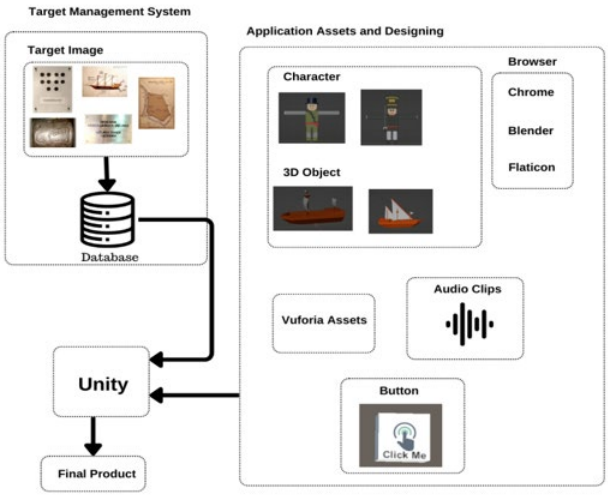

Fig. 3 Design and Development Phase of the Application

All image targets were uploaded to Vuforia, converted into image targets, and then imported for usage in Unity. The developer utilized the free program Blender and other free online tools to create the 3D model and character. The audio clips will be arranged with a button for each audio clip to ensure the button can play the specific audio clips. The whole design and development content for the AR application has been merged into the Unity application.

Production. This phase required coding, exporting assets to units, setting up all required hardware, and performing other duties. This is to ensure the project flow, charts, and storyboards created for this project will help the implementation of the technology to be used, analysis of the current system, and lack of the current system, which are all components of the need.

Review and Evaluation. The beta version of the application was developed for testing. A limited number of diverse testers were selected, and their feedback was collected to improve the application. Ensure the application reaches the expectation and public acceptance for the application developed.

Delivery and Implementation. The multimedia application goes through alpha and beta testing in the post-production phase. After testing and updating, the program advances to the packaging phase.

It might be published online and posted to a free video-sharing service like YouTube, or it could be burned to a CD-ROM or DVD.

Applications Workflow

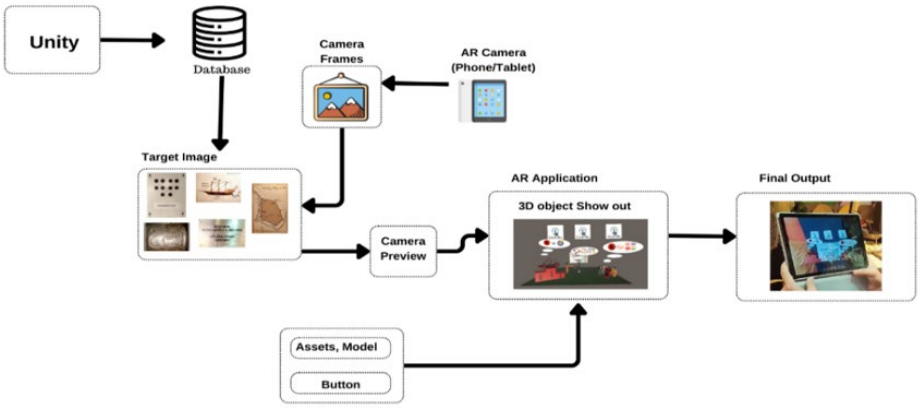

Fig. 4 Application workflow

The image target is scanned using the camera. The scanned image will be stored in the database and the application will process matchup between the data and the image target. If successful, the application will show the learning content and graphics pass through the device.

Testing. The testing was done in the Malacca Art Gallery. The participant is the visitors who walk into the Malacca Art Gallery. The testing sessions encompassed around 30 participants. The testing session took place on weekends which time set on the 2nd and 3rd in September 2023 from 1 pm until 5 pm. There are two parts to this testing session. The first part is the experience task. We provide a tablet or phone that already installed the AR application. The participant is given around five to ten minutes to experience the AR.
The second part is the questionnaire. The survey form was distributed to the participants, and they filled in the survey form after using the application. The survey form contains 15 questions with a 5-point Likert scale in it, indicating their degree of agreement on this scale that required participants to choose from the option of “Strongly Disagree”, “Disagree”, “Neutral”, “Agree”, “Strongly Agree”. For collecting the demographic data, the survey form involved questions for participant names, ages, education levels, and citizenship status. It contains an open question for the participant. The questionnaire session took around 5 to 10 minutes for each participant. An explanation for each question is provided to help participants answer the survey.

Fig. 5 Testing Session

Analysis and Data Collect. We successfully found 30 participants to help in the testing session. All the data were collected and analyzed after the testing session.

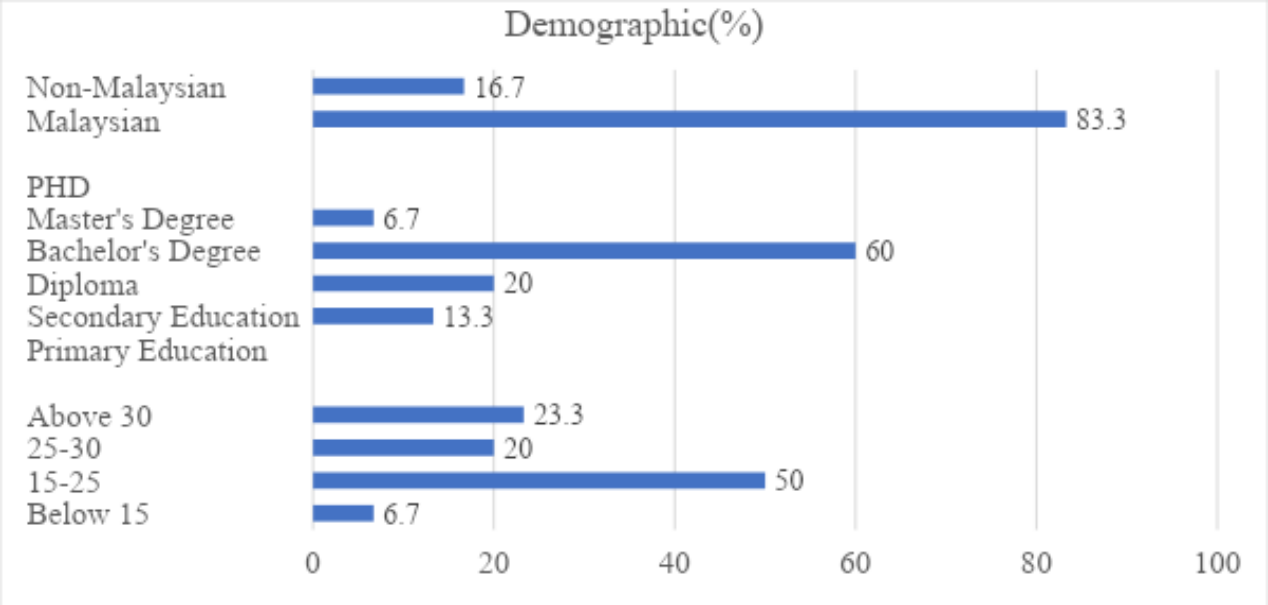

Fig. 6 Pie Chart Demographic

The majority of the participants ages 18-25 are 15 participants (50%). The second is the above 30 ages, which encompass 7 participants (23.3%) and 25-30 ages are 6 participants (20%). The least participants are below 18 with only 2 participants (6.7%).

Around 25 participants (83.3%) are Malaysian and only five of them are non-Malaysian. Of most of the participants that have bachelor's degrees 18 participants (60%), 6 participants (20%) for Diploma holders, and 4 participants (13.3%) from Secondary Education. The last is the master's degree with only two participants (6.7%). The primary education and PHD didn't contain any participants.

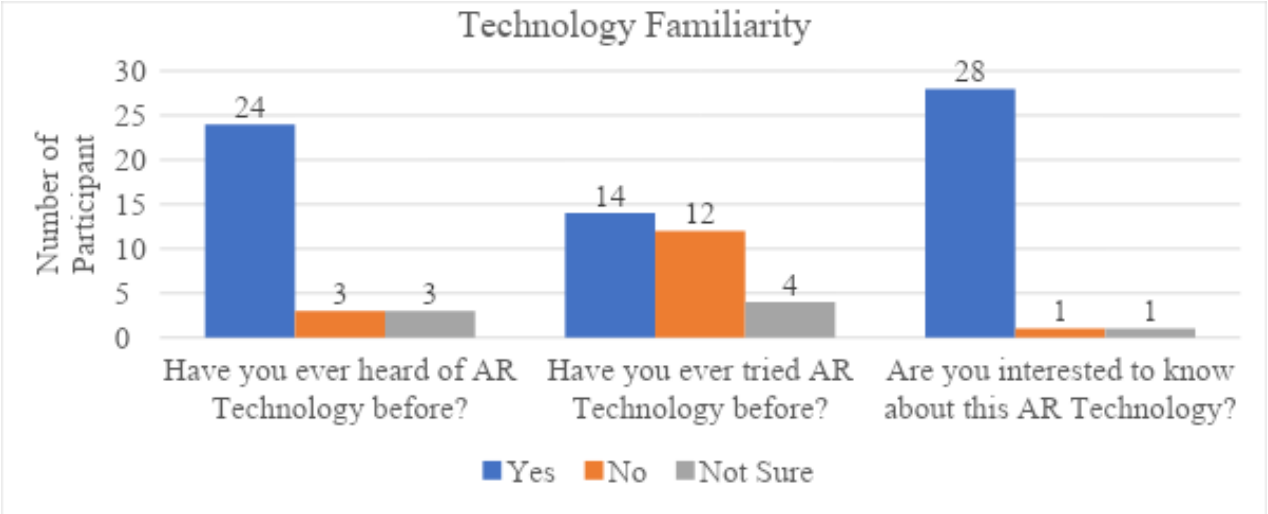

Fig. 7 Technology Familiarity Chart

As shown in Fig. 7 above, it focuses on the questions about participant's familiarity with AR technology. From the data collected, we can ensure that AR technology is already common nowadays. 24 out of 30 participants (80%) are aware of this technology. This means the majority of the participants have a certain knowledge of AR technology. They may know some of the existing applications using AR technology such as Pokémon Go or other applications. Therefore, the public is not unfamiliar with this technology. Hence, this technology can be quickly adapted in various aspects.

In the second question “Have you ever tried AR technology before?”, we can see that not all the people have used the AR technology because only 14 out of 30 participants (46.7%) tried the AR technology and 12 participants (40%) haven’t tried the technology yet. For this, we can see that most people are aware the AR technology but haven’t tried this technology before. A minority of the participants did not know about AR technology even though they already tried it. In conclusion, many people may have heard about AR technology but don't know what it is. They don't have a certain understanding of related technologies, so they just know and don't understand the benefits and uses of sub-technologies.

For this AR technology, most of the participants have the interest to try this AR technology where 28 out of 30 participants (93.3%) answered ‘yes’ to the question. In conclusion, the new interaction from the application can successfully attract the audience. This allows researchers to use this technology more actively to develop certain applications that can help in various aspects such as education, medicine, engineering, and other aspects.

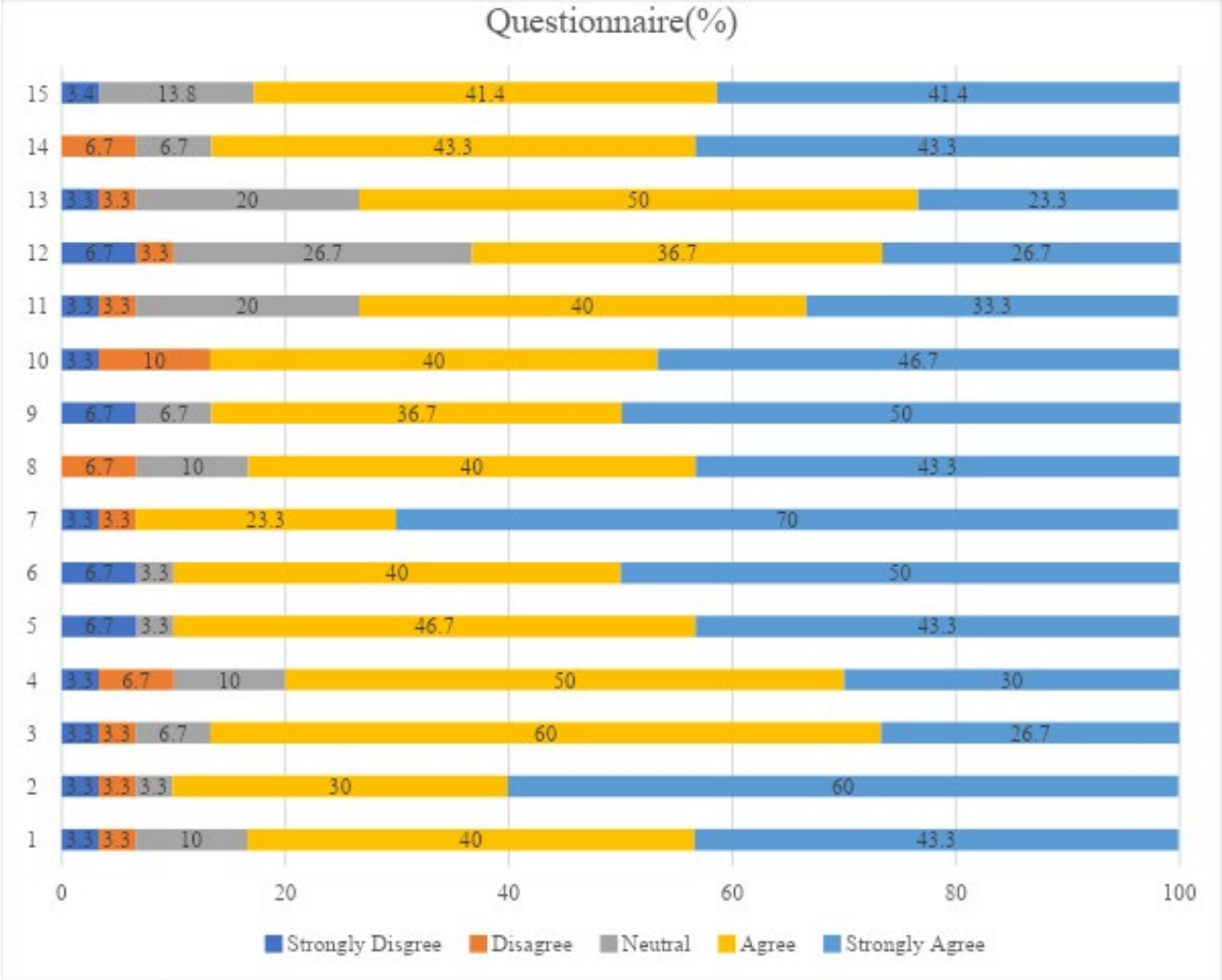

Fig. 8 Result from the Questionnaire.

The question above pertains to the user experience among the participants after testing the application. This question is divided into three parts: overall evaluation, perceived value, and the sense of presence and usefulness. These three sub-questions will expedite data collection, facilitating more efficient data analysis for this round of testing.

In the first aspect, 'Evaluation Overall,' we can see that this application was well-received by the participants. Overall, the participants expressed a high level of satisfaction with the app. When evaluating the icon display, over 80% of participants responded with 'agree' and 'strongly agree.' They unanimously agreed that the test did not cause any inconvenience and that the application significantly aided their understanding of the history associated with specific antiquities. Consequently, this application has the potential to enhance the user experience when visiting the museum.

Moving on to the aspect of value, the question in this section assesses whether the application can offer value to users. According to the data collected by the researchers, a significant number of participants expressed that this application indeed provides value. Over 80% of the responses fall into the 'agree' and 'strongly agree' categories. Participants believe this software enhances their learning experiences. They often find traditional museums, with their typical text and visuals, boring and uninspiring. This app, on the other hand, sparks their curiosity and interest in the exhibits. Applications like this one simplify the presentation of historical information, enabling users to quickly grasp essential details and stay engaged. Many participants also see potential for this application in various industries, including education. Its cartoon-like aesthetics make it suitable even for children, who can use it for educational purposes.

The final aspect to consider is the sense of presence and value, which evaluates whether the program delivers a positive user experience. Based on the data collected by the researchers, many users indicated that this program indeed enhances their overall experience. Impressively, over 80% of the responses fall under the categories of 'agree' and 'strongly agree.'

The results demonstrate participants' satisfaction with the application's audio-visual effects. Despite its minimal use of vibrant colours, participants appreciate the application's understated colour scheme, which complements its simple design. The cartoon-like aesthetics make it appealing to younger users, and the characters are designed with straightforward actions and specific roles in the introductory plot, providing fresh opportunities for engagement and preventing boredom.

This app effectively utilizes audio and visual elements to convey the history of various artifacts through electronic narration. The narrator is an adult male, ensuring clarity in the audio. The absence of unnecessary background noise allows users to hear essential information. Besides that, the straightforward and uncomplicated historical explanations have also received positive feedback.

In terms of controls, this program keeps things simple. After installation and scanning a specific photo with the camera, virtual products associated with it are readily displayed. Users can use buttons to access information about a particular historical period, and swiping can be used to zoom in on or move virtual objects. Its user-friendly controls make it easy to operate, and users are likely to recommend it to others due to its accessibility.

Out of the 15 questions, the responses 'Agree' and 'Strongly Agree' collectively cover over 80% of the feedback from the 30 participants. Based on this data, it is reasonable to conclude that this application offers significant benefits to museum visitors. Participants can enrich their user experience through this application, facilitating deeper and faster comprehension of the history associated with specific museum artifacts.

Conclusion

Through data collection and analysis in this testing phase, several issues have been identified. Firstly, the application encounters problems with the phone's camera. If the phone camera fails to scan the image target clearly, often due to light glare on the display glass, the virtual object won't appear on the screen, hampering user interaction with cultural relics. Secondly, there is a language limitation, as the application currently supports only the English language. This could present challenges for tourists who are not proficient in English, potentially hindering their comprehension of the application's explanations.

Nonetheless, the multimedia elements serve as the primary strengths of this application, incorporating 3D virtual objects, audio components, and images to elucidate relevant historical information for the user. This has the potential to enhance the user's engagement with the history of cultural relics. Based on both analysis and user feedback, several avenues for application improvement emerge. These include enhancing audio clarity and adjusting the pace of explanations for better comprehension. The animations could be refined to achieve greater realism and dynamism. Furthermore, expanding language options beyond English, such as adding Chinese and Bahasa Melayu, for explanations would enhance accessibility.

AR technology can help users gain a deeper understanding of the historical significance of cultural relics. First, it breaks away from traditional study methods by providing new interactive ways for users to learn. The combination of good visual effects and clear audio explanations can help users focus more on the topic at hand. Furthermore, this project can serve as educational material for history courses, helping more people learn about the history of cultural relics in museums.

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Animated Short Film: Being Careless about Road Safety Issues

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Abstract. A road accident is an incident that involves at least one vehicle in open traffic, and it can lead to mild or severe injuries or even fatalities. It is a global tragedy with an ever-rising trend, especially now that the number of vehicles in use has increased. Approximately 1.17 million deaths occur each year worldwide, with 70% of them happening in developing countries. In Malaysia, on the other hand, motorcyclists account for the highest number of road accidents, contributing to about 60% of fatal accidents. Here, we demonstrate that animation can be an effective means of raising awareness about road safety issues. The project has been shown to have a significant impact on the young people of Malaysia, potentially helping to reduce the number of road accidents or at least keeping young people informed about road accident cases. This project has shown that animation can be a powerful tool for spreading messages and educating people. If this form of media can achieve these results with young adults, the project should be considered successful despite its flaws in conducting the research. This may pave the way for better educational tools, especially in the age of social media consumption among young people.

Keywords: Road Safety; Road Accident; Animation; Young Adult.

Introduction

According to the World Health Organization, an average of 1.25 million people perish every year due to road accidents globally, and most young people die as a result of them (Miurugesan, 2022 In Malaysia, the first nine months of 2022 saw 58% rise (147,094 cases) in road accidents compared to 2021, with the death toll increasing by around 32%. Although the number of road accidents in Malaysia has been declining since 2010, it is still considered high, with 402,626 road accidents recorded from January 2022 to September 2022. About 17 fatalities occur per day due to road accidents. The Malaysia Ministry of Transport has stated that more than 80 percent of this problem is attributed to negligence (Lim, 2022).

Persatuan Insurans Am Malaysia (PIAM) and the Malaysian Takaful Association (MTA) have jointly Kickstarter PIAM-MTA 2022 Nationwide Road Safety Campaign to reduce road accidents and increase awareness of road safety among road users. This campaign aims to educate and promote safe driving behavior. Some of their activities to promote the campaign include sustaining awareness through road safety programs via digital media and a series of road safety educational quizzes (Miurugesan, 2022).

Based on three videos that can be found on social media, road safety remains an issue, especially around school environments. Several reports can be found on social media, such as a case that shows a motorcycle colliding with a car, involving a child (Pahhussin, 2023b). This incident occurred in a school area. Another video shows a student getting hit by a motorcycle while crossing a zebra crossing (Pahhussin, 2023a). Finally, a news channel broadcasted the death of a 10-year-old due to a truck driving through (TV3, 2023). This demonstrates the need to educate young adults about road safety, as heavy traffic and an increase in the number of travelers after the world recovers from the virus have contributed to more road rage incidents in the country.

The problem remains critical, despite a decrease in road accidents around 2020, which may have been affected by the Movement Control Order. There is a high chance that this situation will see

an increase in numbers as the world recovers, with new young drivers (Singh, 2022). Based on a statistic provided by Malaysia Road Safety Plan 2022-2030 (Ministry of Transport Malaysia (MOT), 2022), motorcyclists constitute the most high-risk group on the road, accounting for 60% of the total number of deaths. Car users face a 20% risk, and pedestrians face a 6% risk. Children and youth (0-30 years of age) are stated to be at high risk, accounting for 50% of the total death count.

This problem needs to be addressed because young people need to be more aware of road safety issues and support the Malaysia Road Safety Plan 2014-2023. It is important to ensure that Malaysian drivers feel safer on the road since it is stated that only 58% feel confident enough, but around 67% have no confidence in their driving skills, and only 61.1% say they feel that road users follow the law and road regulations (Ramanujam, 2022).

To raise awareness about road safety issues, 2D animation was chosen as a solution. This choice is based on the idea that much like films such as Studio Ghibli's "Spirited Away," animation can effectively promote awareness of environmental issues. Helena Gabrijelčič conducted a study on how animation can impact students' knowledge of mental illness (Plot et al., 2020). Researchers like Ismail, M.E., Irwan Mahazir, I., Othman, H., Amiruddin, M.H., & Ariffin, A. also share the same idea about using animation to educate young people. In their research, they employed animation to assess its potential for enhancing the imagination and visualization skills of engineering students in drawing. The results of their study demonstrated the capability of animation to increase the imagination and visualization skills of students (M.E, Ismail, Irwan Mahazir, I., Othman, H., Amiruddin, M.H., Ariffin, 2017). If these studies have shown positive results, then this medium can certainly be used to raise awareness about road safety.

The objectives of the project include studying animation and road safety issues, developing a 2D animation that educates people about road safety, and investigating the effectiveness of animation in promoting road safety awareness.

If this research proves successful, it should be able to assist the PIAM-MTA 2022 Nationwide Road Safety Campaign in raising awareness about road safety through digital media. The goal is to make young adults in Malaysia more conscious of road safety issues and to support the Malaysia Road Safety Plan 2014-2020. The expected outcome is the ability to convey road safety messages through engaging and concise 2D animations that resonate with all Malaysians.

Literature Review

In this project, the primary means of creating road safety awareness is through digital 2D animation, drawing inspiration from anime, which is often associated with Japan's art direction in animation.

Animation. Animation (Maio, 2023) is the process of transforming still images into dynamic motion. This process requires carefully crafted static drawings created through various art mediums, whether it's pen and paper, digital tools, or photography. It involves manipulating these static images to create the illusion of motion. For this project, digital 2D animation will be used to create both the characters and backgrounds. I chose this form of animation because it can evoke a sense of nostalgia for those who grew up with older animations like "Tom and Jerry" and Studio Ghibli films during this era of 3D animation. Due to this emotional connection, it possesses the charm to capture people's attention for educational entertainment.

There are multiple types of animation, including rotoscoping, anime, cutout, stop motion, and motion graphics. Each form brings its uniqueness and beauty and can profoundly influence the emotional impact of the project.

Animation Domain. Animated videos are beloved by audiences of all ages, from the young to the elderly. Their unique storytelling presentation is exceptionally engaging, making them suitable for conveying various messages and providing entertainment. While animated videos can be enjoyed by older audiences, they hold a special appeal for children due to their vibrant colors and character designs. As children grow older, they can develop a deeper appreciation for the content they watched

in their younger years, similar to how older Disney films resonate with those who grew up during that era. Animated videos serve as an excellent means of entertainment for spreading information and explaining specific concepts. With this medium, the message of road safety can be effectively disseminated.

There is a wide range of purposes for using animation. Here are some of the examples:

i. Animation as a form of Entertainment (Studio, 2016)
For years, animation has been used as entertainment. Disney films have conquered the market to this day with their classic films like Snow White, Sleeping Beauty, Cinderella and so on. They also tend to be viewed by children since they are colourful and family-friendly.

ii. Animation as an Education Tool (Prior, 2023)
Visual is a great tool for learning purposes. Most humans can remember what they see which is the reason why we can remember faces more than their names. Animation is an even better tool to educate kids since it can keep them engaged with their motion graphics. It can keep them entertained for hours, which can be seen with one of the famous YouTube children's shows, Cocomelon, an animated nursery show.

Existing Project:

i. Lara and Friends COVID-19 Adventure (Fadipe, 2020)
Created by an education team of the UNICEF Nigeria Young Advocates network, saw the gap in the virus awareness creation. To provide information to children on what is COVID-19 and why they must stay safe in their houses, they created a 3D animation to do so.

ii. End to Cyberbullying (Are et al., 2015)
Cyberbullying is a rising case in our modern era. In 2015, ETCB Organization created a video to teach the viewers about the issue. Though it is not a big animation project, it uses motion graphics and simplified visuals that do not distract the audience from the informative facts on the issue. It is enough to create educational entertainment with a powerful impact on people.

iii. 3D Animated Short Film on Road Safety Series (Project, 2014)
A series of 3D Animated Short Films on Road Safety for CiteZen Project by Vivo Energy Mauritius. This series was made to sensitize the public towards various road hazards.

Methodology

In this project, the primary means of creating road safety awareness is through digital 2D animation, drawing inspiration from anime, which is often associated with Japan's art direction in animation.

Animation Development. This project will be using the Animated Film Production Process (Fatima Ali, 2020). It will integrate various forms of media, including images, animations, audio, and text, to emphasize the road safety message.

In animation, pre-production refers to the initial planning and preparation phase before the actual production of an animated project begins. This critical stage involves various tasks and processes aimed at laying the groundwork for the project and ensuring its smooth execution. Key aspects of pre-production in animation include concept development, scripting, storyboarding, character design, background, and environment concepts, and more.

The production phase is where the actual creation of the animated project takes place. It encompasses several stages that build upon the work done during pre-production. Key steps in the production process of animation include character animation, clean-up and inbetweening frames, colouring, texturing, and more.

Post-production occurs after the main production of the animated project is complete. This phase involves various tasks and processes aimed at finalizing the animation, refining the visuals and sound, and preparing the project for distribution or exhibition.

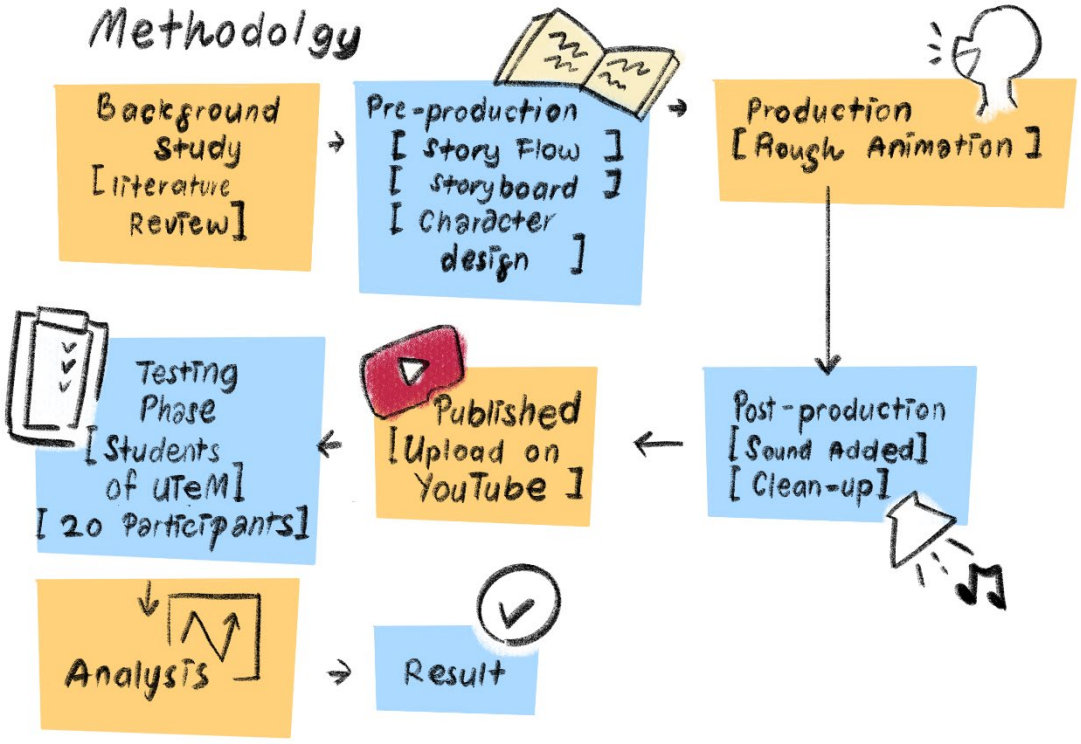


Fig 1. Methodology of Animation Production

There are additional steps in this methodology, including publishing, a testing phase, analysis, and reviewing the results. The "publishing" step involves releasing the final product on social media platforms. Meanwhile, the "testing phase" will involve approximately 20 participants, specifically young adults who are students at Universiti Teknikal Malaysia Melaka. Once the data is gathered, it will be analyzed to evaluate the project's outcomes.

Procedures. The experiment will take place at UTeM's Satria Hostel, specifically among young diploma and degree students residing there. These participants were selected because they are allowed to have their vehicles, primarily motorcycles, and cars, during their current semester or when they don't return home. The target audience for this experiment is over 20 individuals.

To collect data, a questionnaire will be created using Google Forms. This method was chosen for its ease of use, ability to generate pie charts for data analysis, and the convenience of sharing via QR codes with other students. Google Forms also allows for the inclusion of the related short film.

Testing. The project involved 23 young adults (aged 18 to 25 and above) from Universiti Teknologi Malaysia Melaka. Participants, whether diploma or degree holders, accessed the project through a web-browsing supported platform using smartphones or personal computers with internet access. The

surveys were conducted using Google Forms and distributed physically by approaching students directly.

The online test, conducted through Google Forms, consisted of awareness questions related to road safety. The questionnaire had two main parts: pre-testing and post-testing.

In the pre-testing section (Part A and Part B), respondents provided demographic information and answered questions about their road safety knowledge.

Afterward, participants watched a short film (Part C, less than 2 minutes) and answered post-test questions (Part D and Part E). Part D focused on the film's appeal, utilizing a 5-point Likert scale. Part E mirrored Part B, assessing changes in awareness of road safety after watching the short film, also using a 5-point Likert scale for responses, including options like "strongly disagree," "disagree," "neutral," "agree," and "strongly agree."

Methods

Design and Development Phase

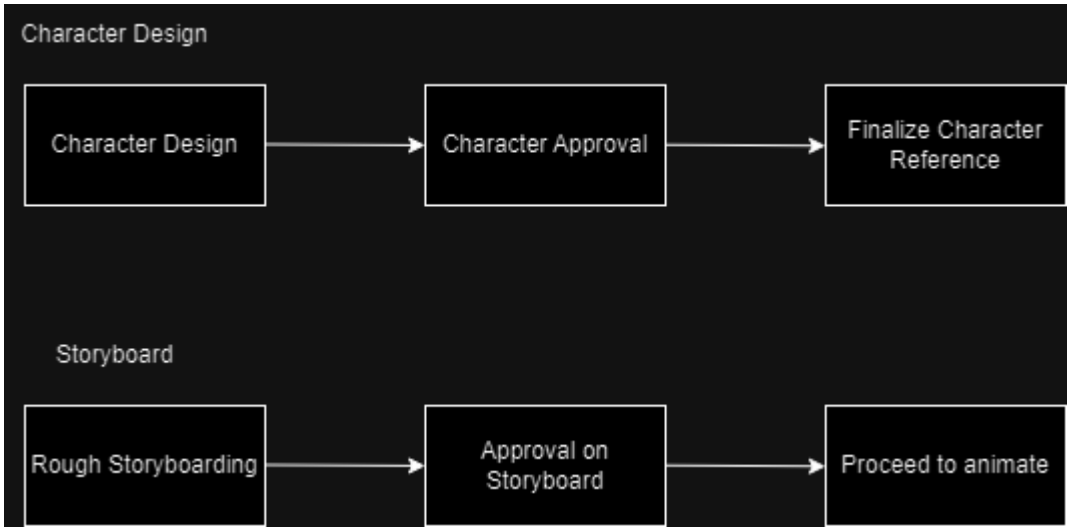


Diagram 1: Design and Development

In the design phase, two essential elements are created: character design and the storyboard. Character designs must undergo approval by higher-ups before progressing further. Once approved, the storyboard is developed to ensure the story's flow is cohesive and clear for the animator to bring it to life. Below are the character designs and some of the storyboards.

Fig 2. All of the Character Designs

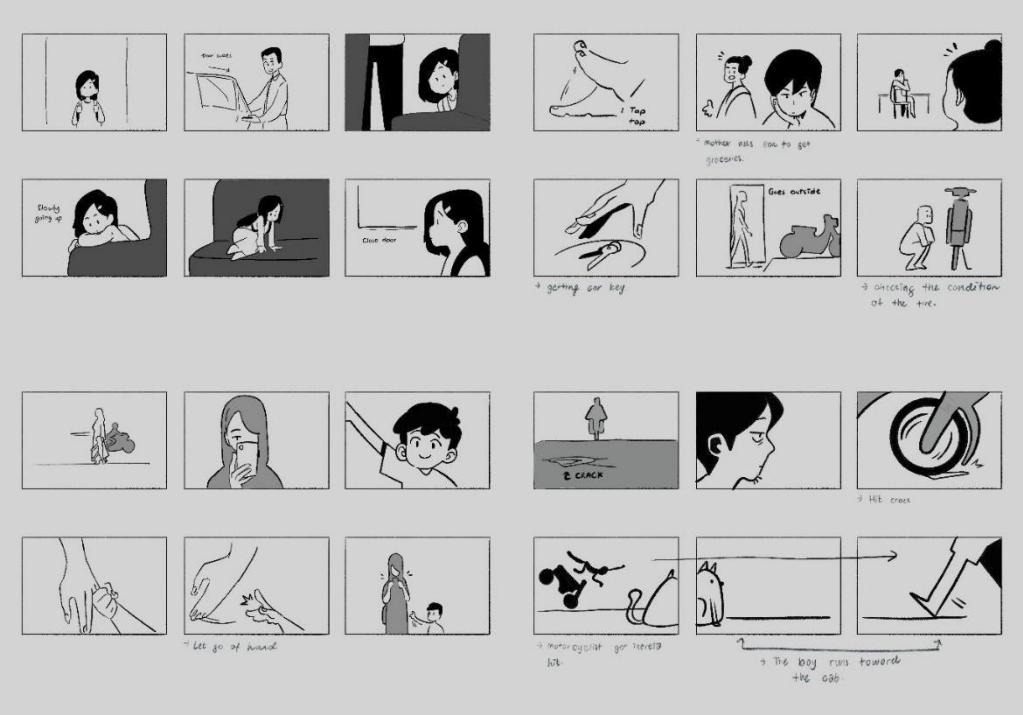


Fig. 3. Some of the Storyboard Panels

Once the design phase is completed, the development of the film can commence. For this project, we utilized the ToonSquid App, which is exclusively available on the iPad. This phase involves numerous steps, including keyframe drawing and inbetweening. Detailed backgrounds are created during this process, and once all the elements come together, audio can be seamlessly integrated as well.

Fig. 4. Animation software interface, ToonSquid.

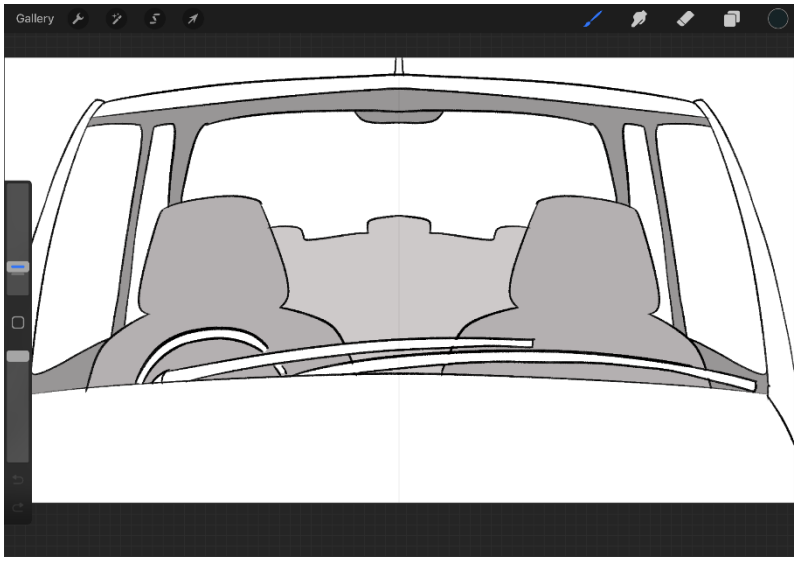


Fig. 5. Drawing software interface, Procreate.

Publish. The project was saved as a .mp4 file and subsequently uploaded to YouTube for easy viewing. Additionally, it could be integrated into Google Forms for further accessibility.

Results and Discussion

Table 1. Participants' Infographic and Driver/Rider Experience

Gender	No. of Respondents
Male	13
Female	10

Age	No. of Respondents
18	1
19	5
20	0
21	2
22	4
23	8
24	4
25 and above	1

Car/Motorcycle License	No. of Respondents
Yes	21
No	2

Current Mode of Transportation	No. of Respondents
Walking	5
Car	10
Motorcycle	5
Carpool	2
Bus	1

How Often do you Drive/Ride?	No. of Respondents
None	4
1-2 times a week	10
3-4 times a week	3
More than 5 times	6

Experience Road Accidents	No. of Respondents
Yes	11
No	12

Near-death Experience	No. of Respondents
Yes	4
No	19

Based on the table above, there were 13 males (58.5%) and 10 females (43.5%) participating in this survey. Most of them are aged 24 (34.8%), followed by age 19 (21.7%), and the rest were distributed among ages 18, 21, 22, and 25 and above. Interestingly, there were no students aged 20.

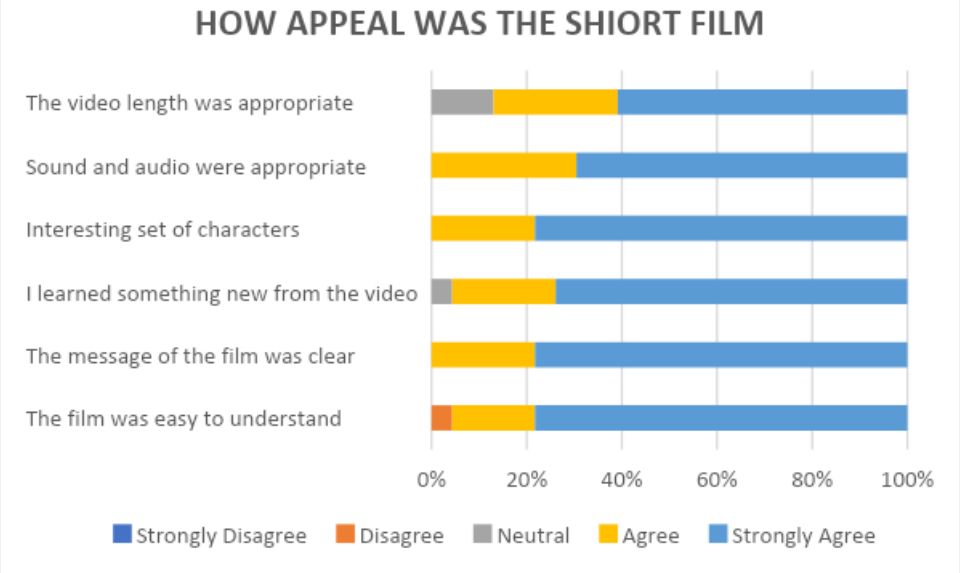
About 91.3% of students have a car or motorcycle license, while only 8.7% of students do not possess either. As for their current mode of transportation, most students use a car (43.5%), while an equal number of students either walk or use a motorcycle (21.7%). Buses are the least preferred mode of transportation, chosen by only 4.3% of students. This suggests that students find walking suitable for campus travel, while cars are convenient for those who venture outside for leisure activities.

Around 43.5% of students drive/ride 1-2 times a week, with about 26.1% of students driving/riding more than 5 times a week. The remainder either drive/ride 3-4 times a week or not at all. This indicates that many students explore outside the campus during weekends, and some engage in frequent travel for new experiences.

Unfortunately, approximately 47.8% of students have experienced road accidents, ranging from mild to critical, while the remaining 52.2% have not. Although not a large number, about 17.4% of students have had near-death experiences while driving/riding, while the majority (82.6%) have not encountered such incidents.

Fig. 6. Spreading the survey around the students at Satria Hostel

Result



Graph 1. How Appeal Was the Short Film?

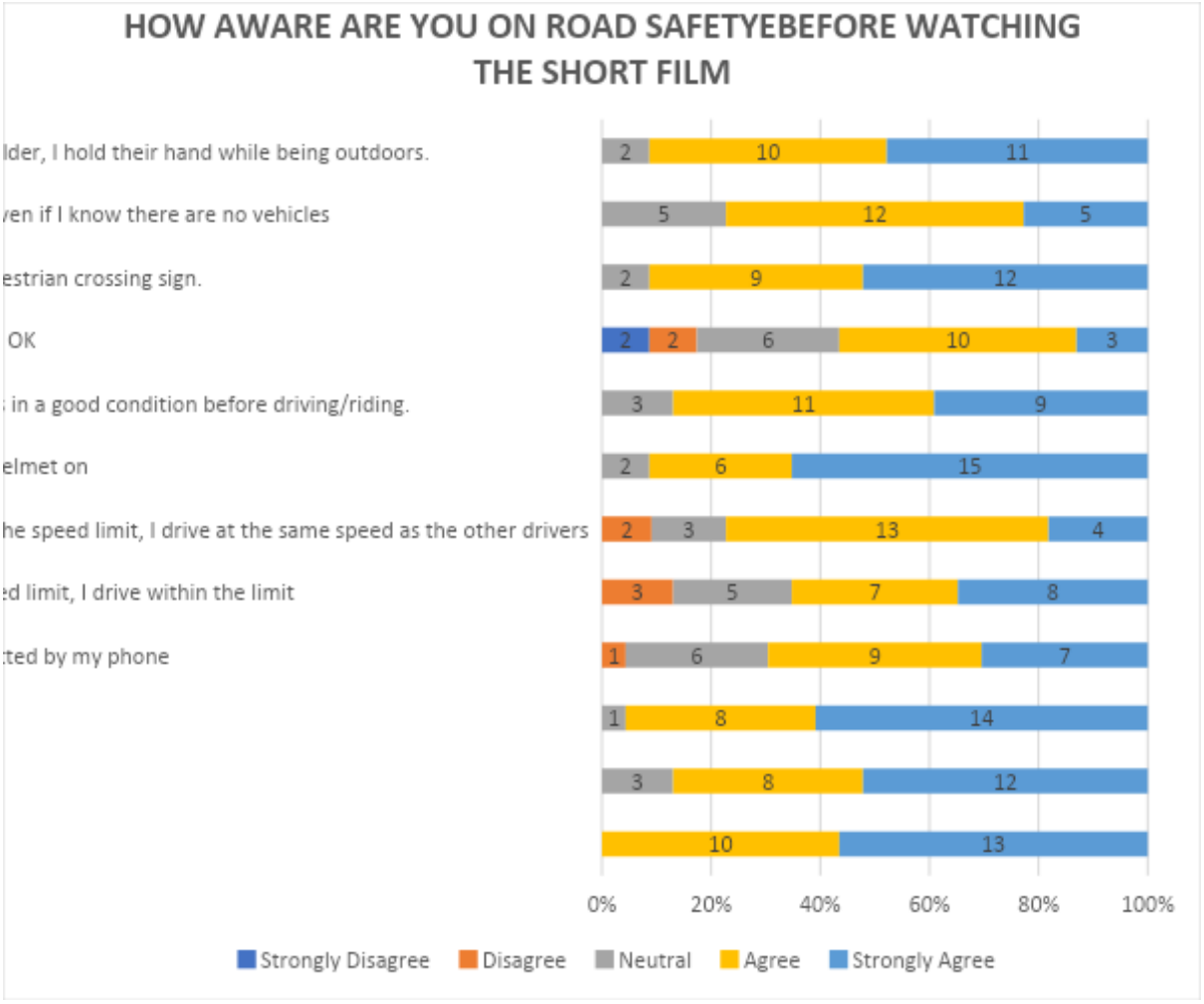
In Part C of the findings, we explore how students perceived the 2D Animated Short Film. A significant 78.3% found the film easy to understand, but 4.3% disagreed, possibly due to its rough animation and lack of color.

Regarding the clarity of the message, a majority of 78.3% strongly agreed, and the rest simply agreed, indicating the film's effectiveness in raising awareness. Impressively, 73.9% reported learning something new, with only 4.3% holding a neutral opinion.

In terms of character appeal, around 78.3% strongly agreed that the characters were interesting, sparking curiosity about the film's developments.

For sound and audio, 69.6% strongly agreed that they were appropriate, highlighting the importance of audio in creating the right atmosphere, even without voice acting.

Regarding video length, 60.9% strongly believed it was appropriate, while 13% expressed neutrality. Some students suggested the video could benefit from being slightly longer or shorter.



Graph 2. How Aware Are You of The Road Safety?

After completing the demographics section (Part A), respondents were asked about their awareness of road safety (Part B) before watching the short film (Part C).

When questioned about driving carefully and safely, approximately 56.5% of students strongly agreed, while the rest simply agreed. This indicates that both genders are aware of the importance of responsible driving.

About 52.2% of students strongly agreed that road safety rules are crucial, with 13% expressing neutrality and 34.8% simply agreeing. This partially correlates with the higher percentage of students who have experienced road accidents, highlighting the importance of adhering to road safety rules.

Concerning seatbelt usage, only 4.3% of students held a neutral stance, while the majority agreed (34.8%) and strongly agreed (60.9%) on its importance.

It's concerning that around 39.1% of students agreed that they would be distracted by their phones, with only 4.3% disagreeing. This aligns with the higher percentage of students reporting road accidents, suggesting that distractions may contribute to these incidents.

Regarding speed limits, approximately 34.8% of students agreed that they would drive within the limit, with 13% disagreeing. When students do not notice the speed limit sign, about 60.9% drive at the same speed as other drivers/riders, which can contribute to consistent driving distances between vehicles.

In terms of motorcycle helmet usage, 8.7% of students held a neutral stance, while about 65.2% strongly agreed on its importance. The neutral stance may be related to shorter distances or certain zones where helmet usage is perceived differently.

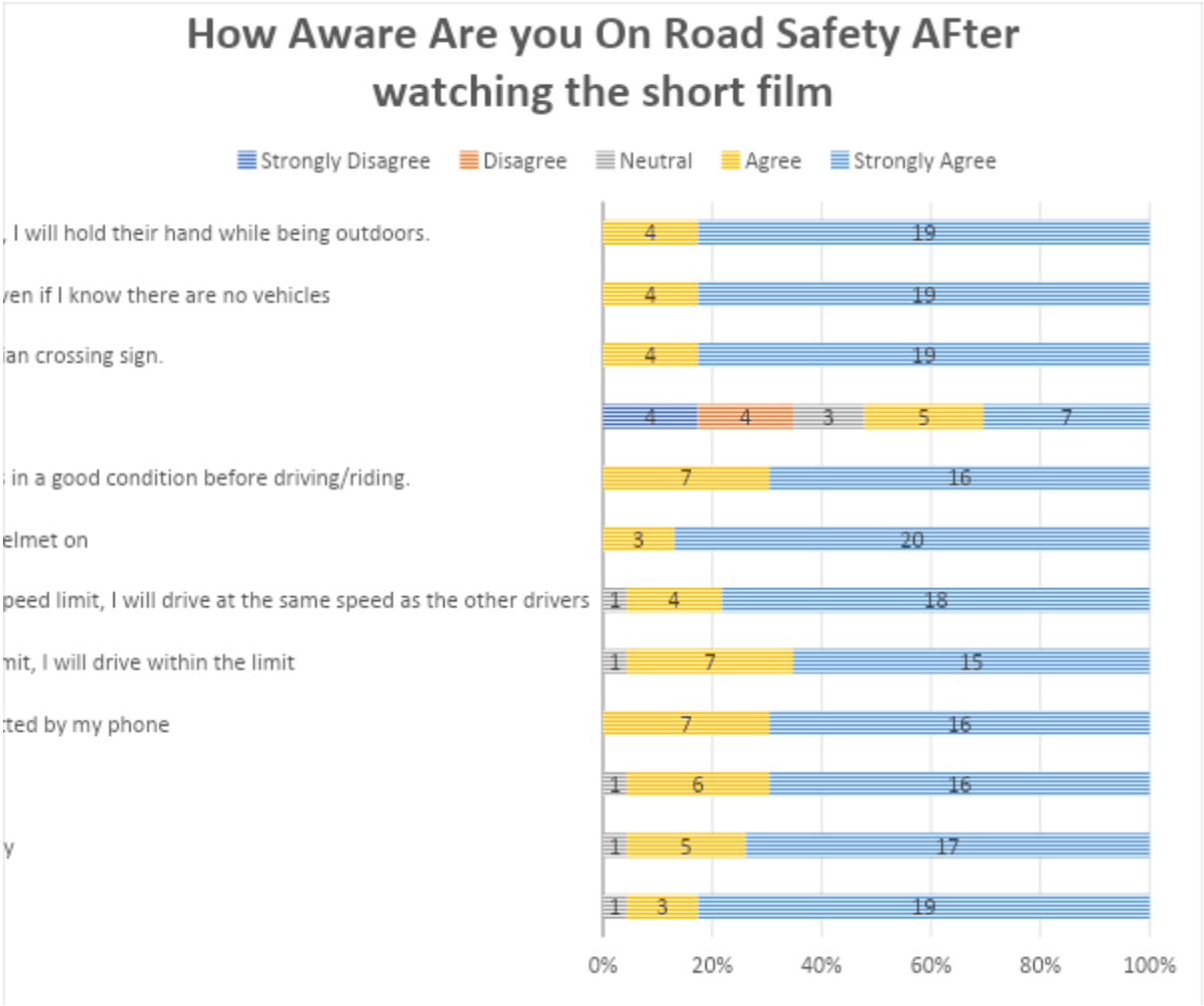
Around 47.8% of students agreed to check their vehicles before hitting the road, with only 13% having a neutral stance. However, most students are more likely to check their tires than their engines due to modern technologies and mindsets.

About 43.5% of students agreed that a bit of vehicle damage is acceptable, while 8.7% strongly disagreed, suggesting that minor damage, such as light scratches, might not concern them.

Fortunately, approximately 52.2% of students would slow down when they see a pedestrian crossing sign, indicating an awareness of pedestrian safety.

For focusing on their surroundings when no other vehicles are present, approximately 54.5% of students agreed, while those with a neutral stance and strong agreement had the same percentage, about 22.7%. This is concerning because students with a neutral stance on this matter, including phone distractions, may increase the risk of road accidents and near-death experiences.

Regarding holding hands with a child or elder while outdoors, only 47.8% of students agreed, with 8.7% holding a neutral stance. This is a concern, particularly since children tend to be at higher risk of road accidents even in school zones.



Graph 3. How Aware Are You On The Road Safety After Watching The Short Film

While the changes observed are not drastic, they do indicate some positive effects, as well as a few negative or divisive shifts in opinion.

Starting with the first effect, a significant increase (82.6%) in students now strongly agreeing that they should drive more carefully and safely compared to the initial percentage of about 56.5% suggests that witnessing the characters' unfortunate outcomes had an impact on their understanding of responsible driving/riding.

Regarding learning more about road safety and increased agreement on wearing seatbelts, it is reassuring to note these changes. A notable 69.6% of students now express their commitment to driving without distractions from their phones, which is a crucial focus in the short film and a leading cause of accidents.

There is a considerable growth in the percentage of students (about 65.2%) who now drive within the speed limit recommendations, signifying an increase in responsible driving behavior. Furthermore, a substantial increase in strong agreement (78.3%) with driving at the same speed as other drivers, along with zero disagreements on this matter, suggests a positive shift in collective driving behavior.

The significant growth in the percentage (87%) of students willing to wear helmets while riding motorcycles is a positive sign. This message is particularly important given the higher risk of accidents among motorcyclists.

On the positive side, a higher percentage (69.9%) of students now ensure that their vehicle is in good condition before driving/riding. However, there is also a worrying increase (30.4%) in

students strongly agreeing that a little vehicle damage is acceptable, which may not align to ensure vehicle safety.

The remarkable increase in students (82.6%) strongly believing in slowing down when they see pedestrian crossing signs, compared to the initial percentage of 52.2%, suggests a heightened awareness of pedestrian safety.

The substantial increase (82.6%) in students strongly agreeing to focus on their surroundings while driving is a positive change that may contribute to safer driving habits.

Finally, maintaining the same percentage (82.6%) of strong agreement in holding hands with a child or elder is a positive sign, as it promotes safety, especially in outdoor settings.

Conclusion

The research project has notable weaknesses in its execution. The lengthy questionnaire may have discouraged some participants, and the rough animation and lack of color in the short film could have made it less enjoyable. Question structure confusion was evident, with a student questioning if Part B and Part E were repeated or new questions.

Despite these weaknesses, the project offered insights for improvement. Enhancements like better storytelling flow, improved storyboard direction, additional context, and clearer art direction could address animation quality issues. Visual improvements are needed, addressing criticisms about the lack of a clear background or sense of place.

Simplifying the questionnaire and providing clarifications for uncommon words would improve participant engagement. However, some participants had a positive experience, finding the film impactful and praising character diversity and intriguing designs. Feedback on sound and audio was mostly positive, though some participants mentioned challenges in following the storyline due to the absence of voice acting.

Despite its rough edges, the 2D animation film garnered attention on YouTube and conveyed its message effectively. With polished animation and improved storytelling, the project could reach a broader audience, especially young adults, and have a more significant impact on road safety education.

In conclusion, despite its modest impact, this type of project can play a crucial role in educating Malaysians about road safety. Any positive impact on awareness and education about this important issue is significant.

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Design a Digital Transformer for Learning Module in Electrical Circuits

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Abstract. The digital transformer trainer is an electrical instrument used to demonstrate a transformer functioning in the Electrical Circuits laboratory. The design of a digital transformer learning module for teaching and learning in an Electrical Circuits course is given in this study. The trainer was built to understand transformer operations such as step-up and step-down transformers, as well as the effect of resistive load over the secondary winding and voltages and currents for step-up and step-down transformer measurements. Previously, the practical work was completed by simulation using the multi-sim open-source tool. However, students are unable to understand the practical concept of voltage and current measurement. This proposed practical module shows how students learn the fundamentals of electrical engineering.

Keywords: Learning module; Step-up transformer; Step-down transformer; Voltage measurement; Current measurement

Introduction

Electrical Circuits (DET20033) is a course that teaches students about alternating current waveforms and sinusoidal steady-state circuit analysis. This course also covers three-phase system applications as well as the functioning of various transformer types. A transformer is a static device that consists of a winding or two or more connected windings, with or without a magnetic core, that is used to create mutual coupling between circuits [1]. A transformer uses electromagnetic induction to transfer power between circuits at the same frequency, normally with changing voltage and current levels [2].

The process of teaching and learning is crucial for developing highly skilled and educated students [3]. By the end of this experiment, students should be able to understand the operations of a transformer, its characteristics, as well as the effect of a resistive load across the secondary winding. Furthermore, practical work is one of the assessments that students must do to complete a course. Through practical activities, students learn about electrical circuits and apply their theoretical knowledge in a real situation. In order to accomplish the course learning goal, students must also demonstrate their ability to work as a team to complete the assigned tasks within the time frame specified.

Part of the practical work involves analyzing step-up and step-down transformer foundations. A step-up and step-down transformer's primary and secondary voltages and currents can be measured by the student. However, due to the lack of lab equipment, this practical work is currently done entirely through Multism's free online simulator. The input and output are stated as the main and secondary, which are stated as transformer design parameters in Multisim. Students utilise Multisim to create the schematic circuit for the transformer. The students then use voltage and electricity measurement tools to measure voltage and current on the circuit. The disadvantage is that the results are the same as the calculations because the transformer is assumed to be in its ideal condition. This is not the case when performing real-world training using real-world measuring equipment.

This project is based on practical work 5 during the semester 2, Electrical Circuits course, which focuses on step-up and step-down transformers. Students and teachers will benefit greatly from transformer modules while undertaking practical work with step-up and step-down transformers. The students are then able to examine output voltage and ampere readings and record all data rapidly. The focus of electrical testing is on the safety of the test objects as well as safety [4] during and after the test. It is important to provide a safe practical teaching module by thoroughly investigating all possibilities.

The purpose of this research is to design a learning module that will allow students to understand the operation of a step-up and step-down transformer successfully. Then, students might learn physically in the laboratory with the lecturer's supervision based on this module. Furthermore, this project will help electrical engineering students learn the Electrical Circuits course effectively. This project is beneficial to the students and lecturers in terms of easier to handle and more efficient teaching and learning processes [5].

Regardless of what has been shown thus far, transformer trainers have been observed to employ the same methodology and approach. Although the structure is superior, the expensive cost makes it unsuitable in comparison to this existing project with a considerably cheaper cost. Previously, various aspects of step-up transformers and step-down transformer modules were not much related to the project about the transformer module. The investigation will look at the characteristics and operation of the two-winding ideal transformer with and without a load. The primary and secondary induced voltages are measured, revealing the variables on which they are dependent. The ratio of primary to secondary voltage has been proven to be dependent on the number of turns in the two windings. The significance of researching such a transformer will be emphasized. One of the most crucial parts of any electrical system is the transformer. In essence,

it continuously shifts the voltage level from one value to another. However, the efficiency of a transformer might be as great because it is a static machine.

This learning module is unquestionably beneficial. It simplifies the division and multiplication of voltage and current in alternating current circuits. Long-distance transmission of electric power is now possible due to the transformer's ability to "step-up" AC voltage and "step-down" current for decreased wire resistance power losses along power lines connecting producing stations with loads. Transformers reduce voltage levels at both ends (generator and loads) for safer operation and less expensive equipment.

Method and Material

The laboratory module guides students through the completion of practical activities. The laboratory module, when properly constructed, will fully coordinate all architectural and engineering systems, assisting students in achieving topic-based teaching. This learning module aims to help facilitate students' practical implementation of Chapter 5 for the title of transformer. Students will undertake practical work independently in laboratory groups and may submit a laboratory report based on practical exercises at the end of the module.

Method. The trainer is designed that able to generate step-up and step-down voltage. This trainer learning module supplied by 230V input, includes a 9V power supply, 9V to 12V step-up transformer, 9V to 5V step-down transformer, and a digital display for input and output voltage and current for primary and secondary transformer as illustrated by the flow chart in Fig.1. Step-up transformers can be found in electronic and electrical equipment that requires a voltage boosting. However, due to their reduced weight and size, circuits are increasingly being utilized in modern electronic products. This project design only used 9V step-up to 12V. On the other hand, a step-up and step-down transformer is intended to reduce the voltage from primary to secondary. Step-down transformers reduce incoming voltage by increasing electrical current. In this project, the voltage is configured to fix at 9V step-down to 5V just in the secondary winding.

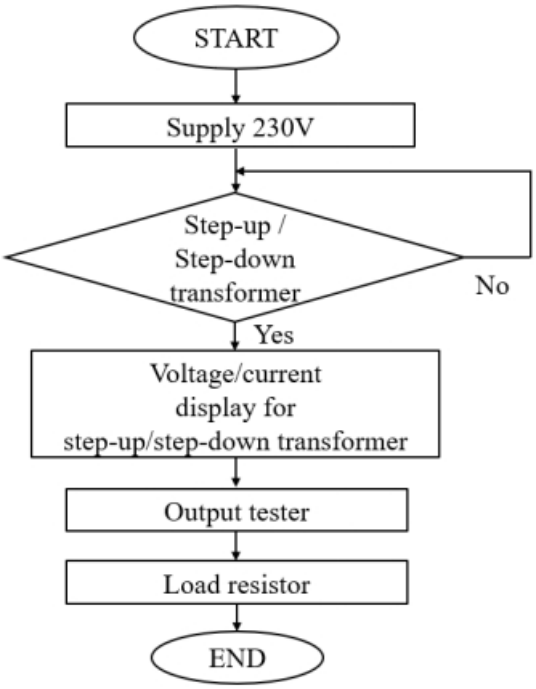
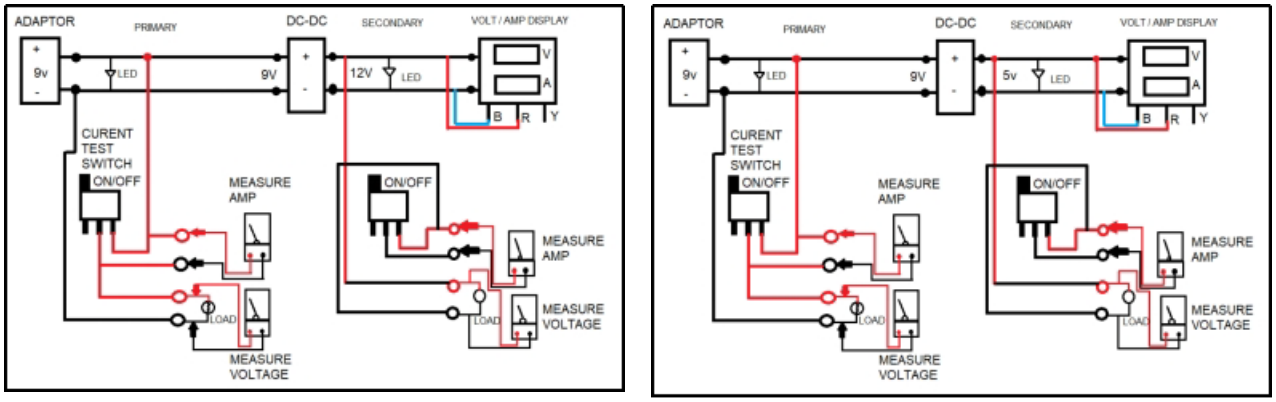


Fig 1. Flowchart of the module.

Material. The IPV6 waterproof enclosure boxes are used by the transformer learning module for Electrical Circuits. The transformer trainer is made of a banana socket with a 12mm connector that allows students to connect electronic circuits without having to solder the components. As a result, utilizing a multi-meter to make measurements to check the device's accuracy is simple. To protect the trainer from overcurrent flow, the module is also protected with a glass fuse 3A.



(a) (b)

Fig 2. Schematic circuit (a) step-up transformer (b) step-down transformer.

According to Fig. 2, a transformer is designed to increase or decrease AC voltage between circuits while retaining current frequency. The differences between these two diagrams are that Fig. 2(a) is composed of a 9V power supply and a step-down transformer 9V to 12V, whereas Fig. 2(b) is built up of a step-down transformer 9V to 5V. A transformer is a major component that is an electrical device that transfers energy from one electric circuit to another using the principle of electromagnetic induction. A transformer's underlying premise is the occurrence of mutual induction between two windings connected by a shared magnetic flux. The kVA of the load determines transformer size. Load voltage, also known as secondary voltage, is the voltage required to power the load. The voltage from the source is known as line voltage or primary voltage. Single-phase operates with two lines of AC power circuitry.

Ratio. The voltage produced by the secondary coil is mostly determined by the transformer's turn ratio. The following Eq. 1 and Eq. 2 represent the relationship between the number of turns, the voltage and current [1].

$$\frac{Voltage\ (input)}{Voltage\ (output)} = \frac{Number\ of\ primary\ turns}{Number\ of\ secondary\ turns} = \frac{Current\ (output)}{Current\ (input)} \quad (1)$$

$$\frac{V_{p(input)}}{V_{s(output)}} = \frac{N_{p(input)}}{N_{s(output)}} = \frac{I_{s(output)}}{I_{p(input)}} \quad (2)$$

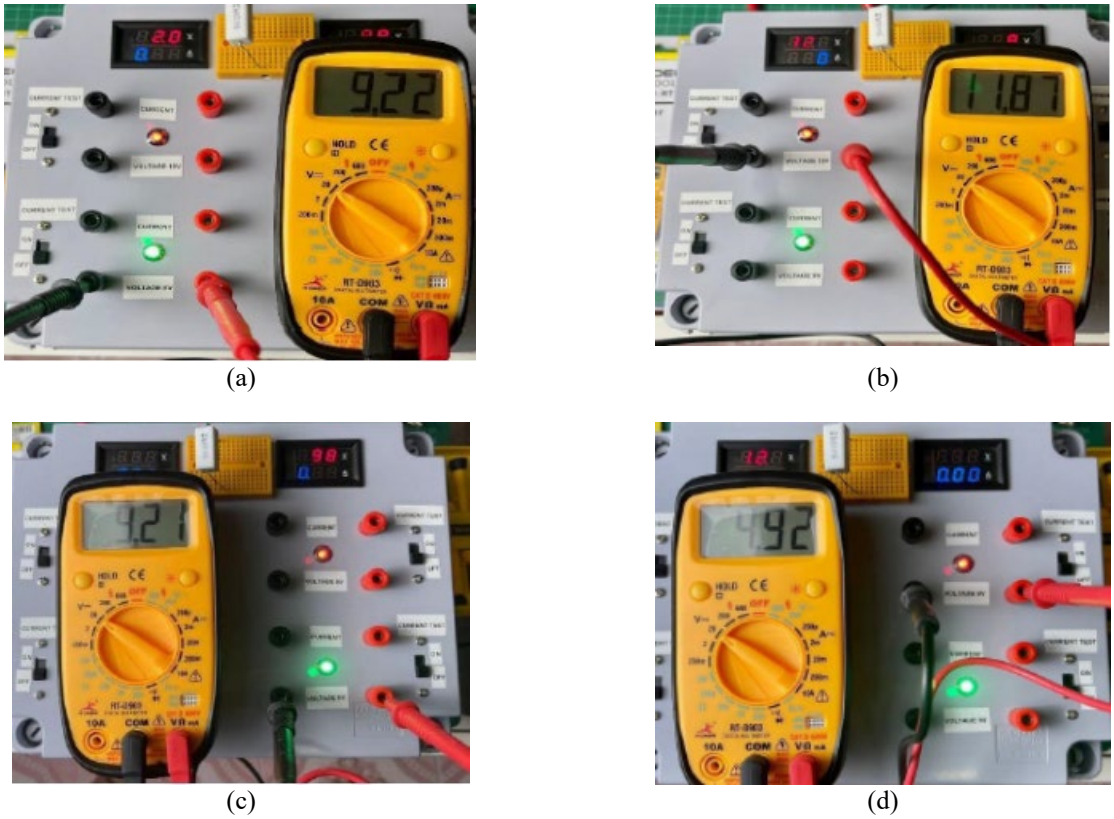
Result and Discussion. In the laboratory, students will learn the fundamentals of electrical transformers including testing and maintaining power transformers safely. Students and lecturers will benefit greatly from transformer modules when conducting practical training because they will be able to test voltage and output readings and record the data easily. When performing electrical testing, the emphasis is very much on the safety of the test objects, as well as safety during and after the test. The provision of safe modules is critical, and all hazards have been considered. Fig. 3 shows the final product design of Digital Transformer for Learning Module in Electrical Circuits.

Fig 3. Final product of Digital Transformer

Table 1. Results for step-up and step-down transformer.

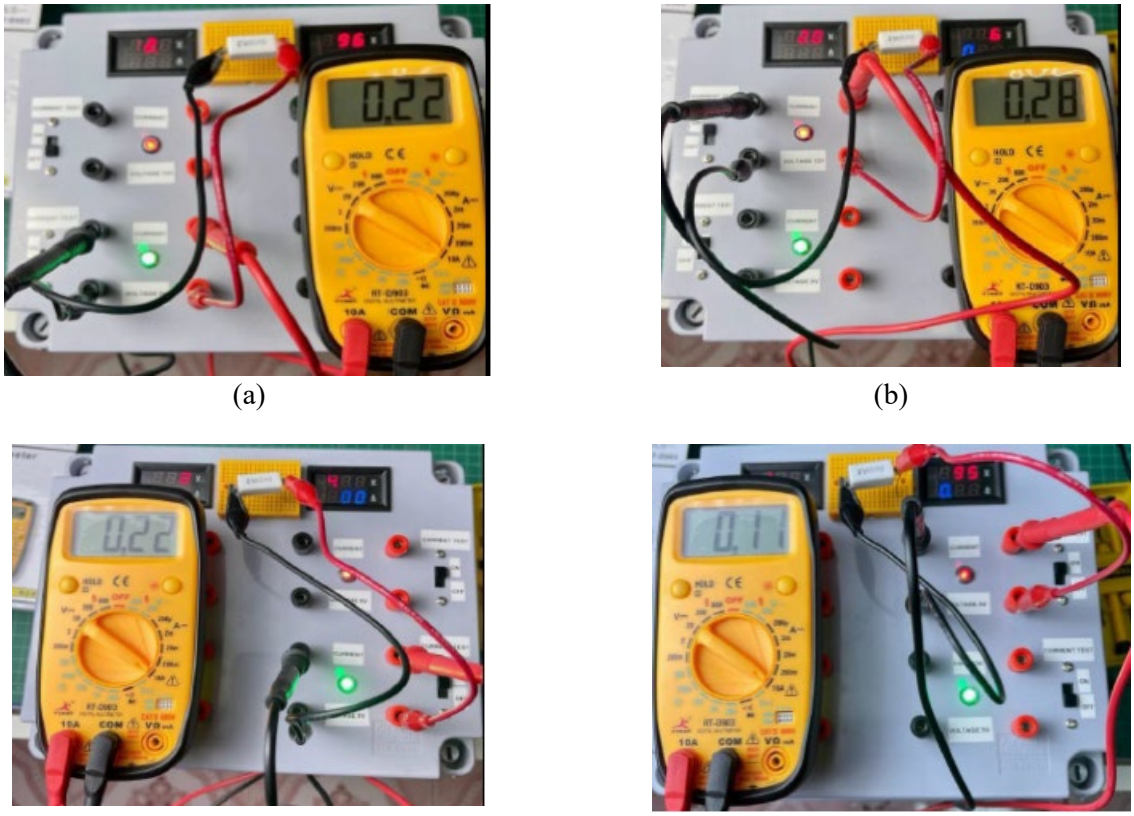
Type of Transformer	Calculated Value				Measurement Value			
	Primary Voltage, V_1	Secondary Voltage, V_2	Primary Current, I_1	Load Current, I_2	Primary Voltage, V_1	Secondary Voltage, V_2	Primary Current, I_1	Load Current, I_2
Step-up Transformer	9V	12V	0.23A	0.31A	9V	11.8V	0.20A	0.28A
Step-down Transformer	9V	5V	0.23A	0.13A	9V	4.8V	0.21A	0.11A

The result of this project for step-up and step-down transformer module is shown in Table 1. The measurement results are limited by the precision and accuracy of the measuring instrument along with many factors. In industry, if two electrical systems operate at different voltage levels in step-up and step-down, the conversion from one voltage level to another voltage level incurs some power losses, which vary depending on the working point of the DC-to-DC converter (voltage and current) and the kind of converter. The efficiency might range from 75% to 95% or higher. Fig. 4 depicts the voltage measurement result, while Fig. 5 depicts the ampere measurement for the module. According to the diagram, the primary display is on the upper left display of the trainer, while the secondary display is on the other side of the display.



(a) (b) (c) (d)

Fig 4. Voltage measurement (a) Primary step-up (b) Secondary step-up (c) Primary step-down (d) Secondary step-down



(a) (b)

(c) (d)

Figure 5. Current measurement (a) primary step-up (b) secondary step-up (c) primary step-down (d) secondary step-down

DC-to-DC converters work on a simple principle. The presence of an inductor in the input resistance results in an unanticipated shift in the input current. If the switch is held high (on), the inductor will channel and store energy from the input as magnetic energy. The energy is discharged if the switch is set to low (off). The output capacitor is intended to be large enough to support the time constant of the RC (resistor-capacitor) on the output. Generally, operating conditions such as input and output parameters determine the appropriate exterior parts and components. As a result, the standard circuit design must be altered per the specification standards. Step-up and step-down DC-to-DC converters are useful in situations when the battery voltage is greater than or less than the regulator output voltage. To provide a consistent load voltage across the whole battery voltage range, the DC-to-DC converter must be able to serve as a step-up or step-down voltage supply.

Conclusion

In conclusion, this project can make the teaching and learning process more efficient and successful. This module can assist students in doing practical work easily and practically, as opposed to using software, where students may not learn the measurement procedure effectively. This initiative is beneficial to students and lecturers in the teaching and learning process, hence enhancing student knowledge.

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Development Of Augmented Reality To Improve Tourist Experience During Their Visit To Historical Attractions In Malacca.

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Abstract. The use of modern technology is becoming a necessity for many destinations to stay competitive and attractive to the modern tourist. A new form of technology that is being used increasingly in the public space is virtual- and Augmented Reality (AR). The project aims to leverage new multimedia technologies, such as augmented reality, to offer fresh interactive experiences for visitors to historic buildings. This ongoing research and development will encourage more people to visit Malacca's historic landmarks, boosting the local tourism industry and showcasing the city's unique cultural heritage. A total of fifteen voluntary participants, both international and domestic, participated in the testing sessions and completed the survey questionnaire. Their input was invaluable in assessing the effectiveness of the AR application and the research's success. The project has been successful in this regard, but areas for improvement include outdoor scanning, content expansion, and visual-audio congruence. In conclusion, AR applications have significant potential to enhance tourism at historical attractions. This may lead to smarter cities and more interactive applications in the future.

Keywords: Augmented Reality; Heritage Tourism; Melaka.

Introduction

Malacca is a UNESCO World Heritage city that illustrates 500 years of cultural and trade exchange between the East and West (Heritage., 2008). There are numerous museums and historical sites in Malacca that are remarkable and attract tourists to the city. (Findbulous Malaysia, n.d.). However, the tourism industry is becoming increasingly competitive, and surviving as well as marketing a destination has become a challenge (Mirosław Mika, 2012). The lack of engagement and monotony in museums and heritage sites can deter many young visitors. Whilst museums have already begun to preserve and use media to enhance the visitor experience (Karen O'Connor, 2022), the approach of pushing information lacks the interactive aspect for tourists. For example, the Immersive Van Gogh Exhibit (PanasonicCanada, 2021) and the Anglo-Sikh Museum's collection of virtual objects offer more interactive experiences (Sikh & Museum, 2020).

Technology has not yet been studied thoroughly enough to present a valid model for implementation at the Malacca Museum. However, the use of AR for tourism purposes has been attempted in various ways, such as designing a mobile application for the Malacca travel guide to enhance tourist mobility (Chia, 2017). The results reveal that mobile apps can influence the behavior of tourists by adding special features such as AR. This finding can also be seen in the study by (Kim et al. 2020), where Augmented Reality was used for navigation and map scanning in the field of tourism. The result of the project, which solved the issue of map complexity and improved the navigation function, has resulted in a powerful tourism application that is set to dominate the industry. The Adidas company produces an application that allows customers to virtually try on shoes (Gezelle, 2021). This application enables users to preview what a pair of shoes might look like on their feet, as well as how they would appear when walking or running. This can help customers choose the right product safely from their homes.

Based on our search on the scientific research database, Scopus, only a few AR applications are used to popularize the history of Malacca's attractions and to offer innovative interactions with visitors study. With the keyword "Augmented Reality" OR "AR", museum AND Melaka OR

Malacca, we found two related papers from Siang et al. (2019) and Hai et al. (2018). Therefore, this research is conducted in the context of tourism and aims to develop an AR application that allows tourists to scan cultural heritage areas and study their experiences. The AR application will enable tourists to visualize the historical sites of Malacca and improve their interactive experience. This means that visitors can download an Adobe Aero app and then use the camera on their phone to explore the stories about historical buildings. These stories have been turned into two-dimensional animations that visitors can interact with.

Literature Review

Augmented reality is an enhanced version of the real physical world that is achieved using digital visual elements, sound, or other sensory stimuli and delivered via technology. Industries include healthcare, public safety, tourism, and marketing. The biggest advantage of Augmented Reality is that it creates unique digital experiences that can be defined as a technology that overlays virtual objects into the real world (Akçayır & Akçayır, 2017). This study chooses AR to present 2D animation videos because it only requires mainstream smartphones and mobile apps to experience Augmented Reality. Additionally, AR is a new technology, so its use in buildings can provide visitors with new experiences and entertainment. Augmented Reality shows high potential to become a mainstream technological tool in tourism soon due to its practical usefulness.

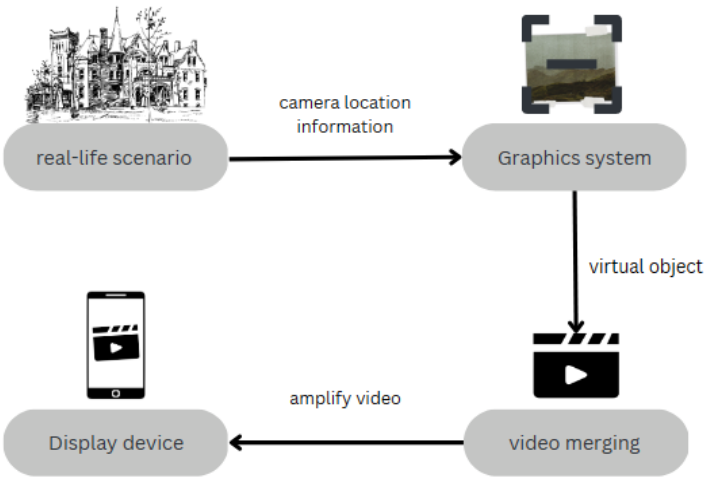


Fig. 1. The process of AR work

Type of Augmented Reality. Marker-based augmented reality as a QR code or an image, to trigger the display of digital content on a device. The marker is detected by a camera and the device uses computer vision algorithms to recognize the marker and overlay digital content on top of it (Gherghina et al., 2013). This type of augmented reality is often used in applications such as advertising, education, and entertainment, where the marker can be placed on a physical object or in a specific location to provide additional information or interactive experiences to the user.

For example, the project A Marker-Based Augmented Reality System for Mobile Devices shows that the proposed system is a general-purpose augmented reality application that can be used in any scenario where rich and dynamic content can be overlaid over a QR code.(Gherghina et al. 2013)

Augmented Reality as A Tourism. Augmented reality can provide gamification and navigation, which can make the tour and the tourist attractions more interesting. AR presents a massive

opportunity for travel brands and agents to give potential tourists an even more immersive experience before they travel. An illustrative case is the use of AR applications in the field of tourism, particularly in Urban Heritage Tourism. Research reveals a series of vital considerations when employing AR applications in Urban Heritage Tourism. These considerations encompass the necessity for access to current and localized information, the value of integrating social networking and user-friendly navigation, as well as the crucial role played by multi-language support and the application's speed (Han et al., 2013).

Augmented Reality as A Marketing. Augmented reality supports a special type of marketing known as Augmented Reality Marketing (ARM). AR is an innovative and latest technology form as adopted by many business enterprises to strategize heir marketing campaigns. AR is applied as a combination of both online and print advertising (Marzouk et al., 2019). AR empowers customers with the ability to visualize and customize products in 3D when shopping. For instance, the Amazon AR View application serves as an in-app tool assisting consumers in virtually visualizing products within their homes before committing to a purchase. With AR View, consumers could position objects on various surfaces, and subsequently manipulate and adjust the objects within their surroundings (Amazon, 2017).

Tourism Guidance Using Augmented Reality. This project introduces the concept of creating a mobile application that integrates the tourism industry with cutting-edge AR technology. Current tourism apps often underutilize various facets of AR technology, such as AR navigation, map scanning, and 3D modeling of structures. During this research, the proposed application successfully fulfilled all the specified criteria, with a particular focus on core AR navigation and map scanning functionalities. As a result, the research has effectively showcased the potential of augmented reality in enhancing the overall tourism experience. (Kim et al., 2020).

Augmented Asbury Park. Augmented Asbury Park does a great job of showing people the history of the place. As people scan a marker with the app, they have an opportunity to see what this building looks like and where it is located. This AR tourism application places the image of the building on top of the real-world scenery where it used to be in the past. (Johnston, 2016)

The Smithsonian's Skin and Bones. A great example of this is The Smithsonian's Skin and Bones app. This app allows you to see live representations of extinct animals, by scanning the skeletons in their natural history museum. Many buildings and historical sites have also enabled this. So, you can know what's inside without wasting time deciding where to go next. (Smithsonian's National Museum of Natural History, 2015).

Smart City of Melaka. This project is motivated by several factors. Firstly, the continuous advancements in AR technology in recent years have opened significant opportunities for its application in the field of tourism. This is especially relevant in a place like Malacca, often referred to as the ancient city. Secondly, our project aligns with the initiatives of our country's government, particularly the "Smart Melaka Blueprint 2035" plan. Our goal is to support this plan by catalysing Melaka's digital transformation while preserving its unique cultural heritage and promoting inclusive, vibrant, and thriving tourism. We see tremendous potential in leveraging the rapid growth of virtual and augmented reality technologies in the creative industries, which aligns perfectly with Melaka's distinct identity. As a result, the primary outcome of our research is the development of an AR application tailored to the tourism industry in Melaka. (Unit Perancang Ekonomi Negeri, 2022)

Research Authenticity of The Content. Emerging from the core function of this AR application, which predominantly employs 2D images and animated elements for narrating the origin and history of the building to visitors. Consequently, before developing the system, to ensure the authenticity and accuracy of the content featured in the AR application took visits to museums in Melaka, such as

Stadthuys and Melaka Fort Gallery, to collect historical information about different locations. Additionally, the researcher the exhibition showcased in the application. This effort aids in ensuring clarity and minimizing any potential misinformation for visitors, thereby enhancing the quality of this AR program.

(a) (b)

Fig. 2. Images of the picture (a) and (b) are the exhibits of Stadthuys Melaka.

Methodology

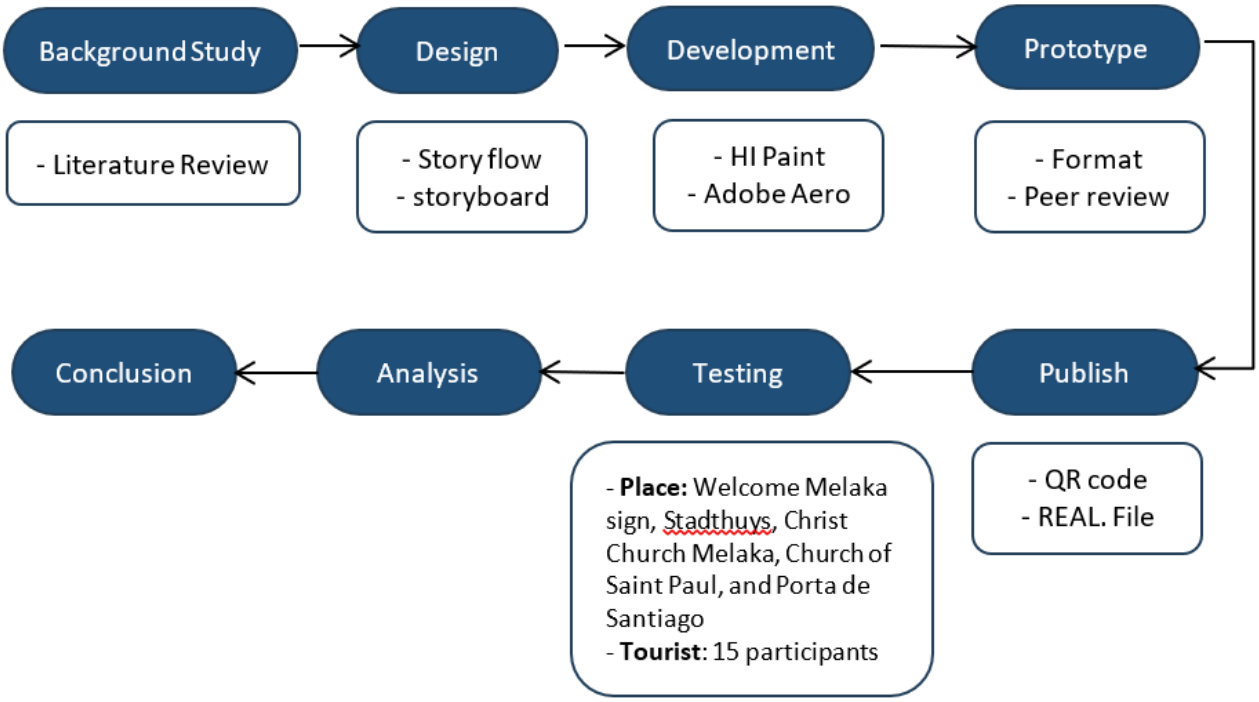


Fig. 3. Project Methodology

To create a tourism application, we must consider various factors such as interaction, convenience, and engaging features. In the realm of technology, we have chosen to utilize AR techniques to develop content that delves into the historical background of buildings. AR technology effectively caters to the interaction needs of tourists, allowing them to gain a deeper understanding. AR enables tourists to view historical content within their real surroundings and instantly engage with it. Within this project, AR provides a unique avenue for storytelling regarding the origins of historical buildings,

adding an element of excitement. Tourists can even access 2D animations to facilitate easier memorization of historical facts, like a public kiosk.

This tool is designed for creating captivating AR experiences. This tool facilitates the seamless integration of virtual objects, animations, and interactions into real-world settings through a straightforward drag-and-drop interface. With features like real-time previewing, integration with Adobe Creative Cloud assets, and optimization for performance, Aero empowers designers, educators, and marketers to craft immersive AR content. This content can be effortlessly shared and experienced on iOS devices, making it a versatile solution for enhancing learning, storytelling, and engagement.

Design and Development Process. In the context of system architecture, our primary objective is to enhance the user-friendliness and interactivity of these AR applications designed for tourists. The developmental process encompasses several key stages, including 2D sketching, object coloring, animation integration, sound effects incorporation, and the compilation of all elements and typography within Adobe Aero.

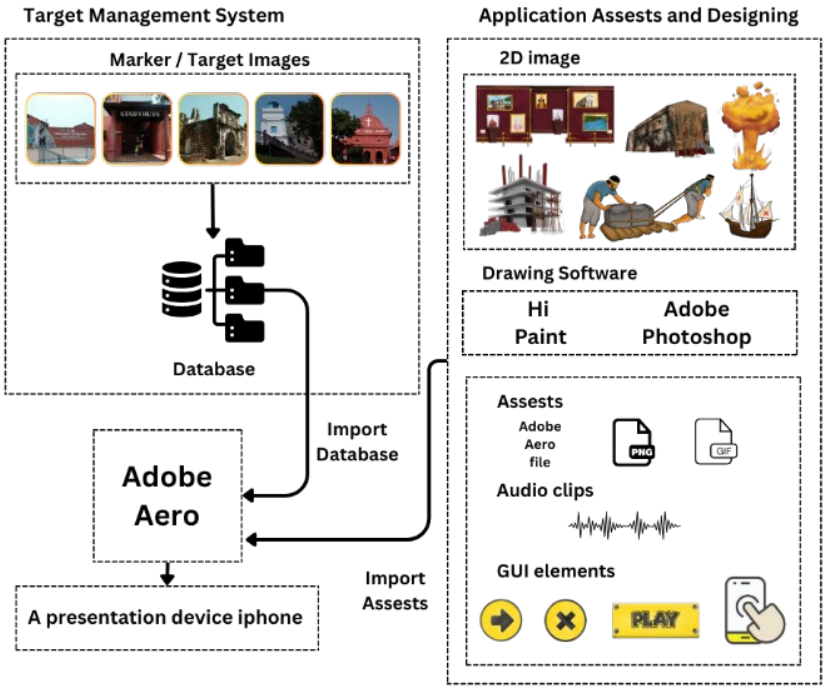


Fig. 4. Design and development phases of the applications

As shown in Fig. 4, this project started with the section of a target or marker, a target such as the Welcome Melaka sign, Stadthuys, Christ Church Melaka, Church of Saint Paul, and Porta de Santiago. These landmarks serve as image anchors, essentially 2D images that act as targets for the AR experience. To upload AR application image targets to Adobe Aero, ensure both the digital and physical versions of the image maintain the same aspect ratio. The image anchor assigns a rating to each target image based on feature points. Designing 2D images for this purpose is typically done using drawing software, such as Hi Paint. All design and developmental content for the AR application is seamlessly integrated within the Adobe Aero Application.

Application Workflow. These applications showcase virtual historical narratives within the real-world environment when image targets come into the view of smartphones or tablets' cameras. This approach enables tourists to view and engage with virtual 2D animations and images integrated into the physical world, allowing them to interact with the augmented environment related to historical

buildings' image targets. The entire workflow of these applications is illustrated in the accompanying Fig. 5.

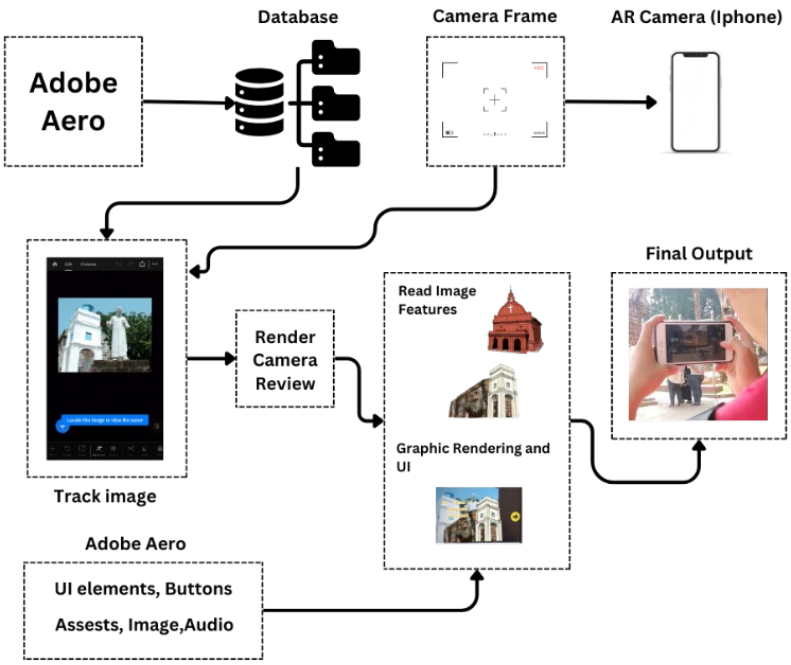


Fig. 5. Design and development phases of the applications

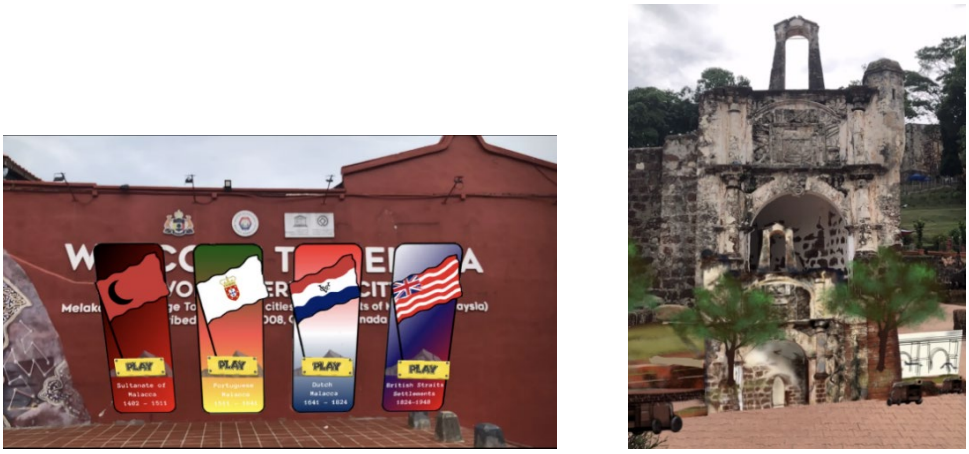
Process of Using AR Application. There are four steps involved in experiencing augmented reality in this application. Here are the steps:

1. The target building is scanned using an iOS device (iPhone).
2. The features of the target building are saved in the database.
3. When there is a match between the features and the database, the application superimposes virtual content onto the surface of the image target.
4. The AR application displays learning content and graphics by overlaying them onto the image captured by the device.

To utilize the system, a smart device must have a compatible application installed. Screenshots in Fig. 6. showcase the application's interface, featuring a 2D image seamlessly integrated into a real-world environment.

(a) (b)

Fig. 6. Image of pictures (a) and (b) the screenshot of the iPhone when using the AR application at the Christ Church Melaka location.



(a) (b)

Fig. 7. Image of the picture (a) is the screenshot of the iPhone when using the AR application at the Welcome Melaka Sign location and (b) is at Porta De Santiago.

Publish. The project was saved as a . REAL file, which iPhone users can download and open using Adobe Aero. When the features match the database, the app overlays virtual content onto the image target. Alternatively, the project can be republished as a QR code, making it easier for users to scan and be directed straight to the Adobe Aero application. Once there, users can scan the surface anchor to access the AR scene.

Fig. 8. QR code for the AR application

Testing. During the Testing phase, multiple testing sessions were conducted to assess both the effectiveness of the AR application in conveying knowledge to visitors and its usability. These aspects were chosen with the primary objectives of the "Augmented Reality to Improve Tourist Experience During Their Visit to Historical Attractions In Malacca" project in mind. The project's key innovations include rejuvenating historical buildings attracting a broader and younger audience of visitors and enhancing the engagement among visitors to buildings. Consequently, the testing sessions primarily focused on assessing the user experience of the AR interactive application and imparting valuable knowledge to the participants.

Participants and Procedures. Furthermore, an additional goal was to validate the AR clips, identify potential pain points, and, simultaneously, pinpoint the most successful and effective elements in conveying information to the visitors. The test participants were tourists from five different locations, encompassing the Welcome Melaka sign, Stadthuys, Christ Church Melaka, Church of Saint Paul, and Porta de Santiago. In total, fifteen voluntary participants took part in the testing sessions at these historical attractions. These tourists originated from various places, and they were specifically invited to experience and evaluate the AR scenes at the respective locations. For instance, tourists visiting Stadthuys had the opportunity to engage with the AR scene within its premises. At the outset of the user testing session, participants were instructed to use the AR interactive application. Although the AR experience was designed to be non-sequential, as each AR clip presented self-contained content,

most participants independently followed the numerical sequence of the AR clips, guided by both instructional stickers and the application's user interface.

Following their interaction with the application, participants were requested to individually complete a survey questionnaire. This questionnaire aimed to gather background information essential for analyzing the collected data and evaluating the overall AR experience. Upon completing the questionnaire, participants received a postcard as a token of appreciation for their valuable contribution to the survey. As part of the survey process, video recordings were employed as evidence to validate the authenticity of the data regarding participants' reactions and emotions while using the AR application. The entire testing activity lasted approximately 20 minutes for each participant.

(a) (b) (c) (d)

Fig. 9. Image of pictures (a), (b), (c), and (d) is the evidence of the testing event.

Result Analysis

The information regarding participants' backgrounds, gathered through the survey questionnaire, is depicted in Fig. 11. These data were acquired via a questionnaire distributed to participants before the experience. The questionnaire was administered in a paper-based format and consisted of two sections: one comprising closed-answer questions related to demographics, and the other focused on the functionality of AR applications. The survey comprised 15 questions designed using a 5-point Likert scale. This scale allowed participants to express their level of agreement by choosing options such as "strongly disagree," "disagree," "neutral," "agree," "strongly agree," "Yes," "Not sure," and "No."

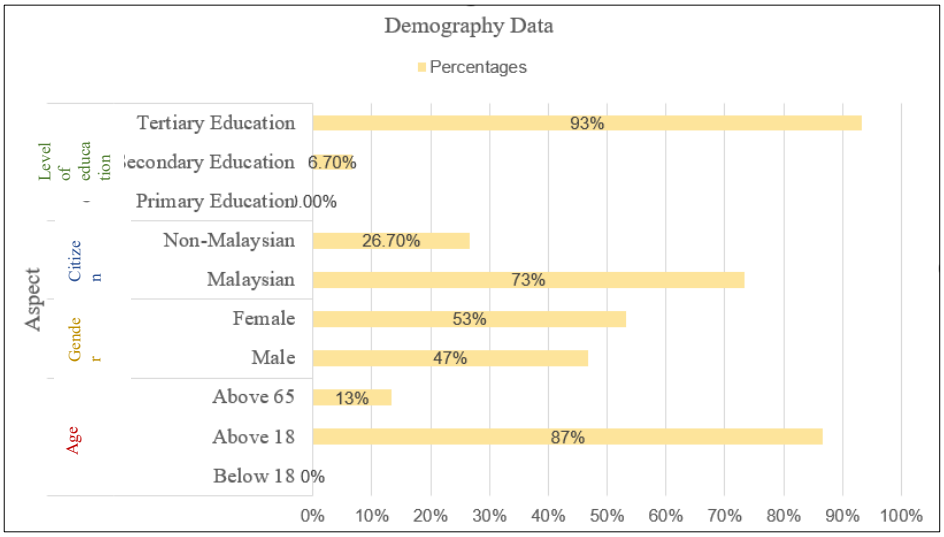


Fig. 11. Demographic participant data

Fifteen participants partook in the tests, with ages ranging from 18 to 65. Gender distribution was even, with 7 males and 8 females, and the majority held tertiary-level education qualifications. Among this diverse group of participants, 11 were nationals of the country, while a smaller fraction consisted of foreigners, totaling 4 individuals.

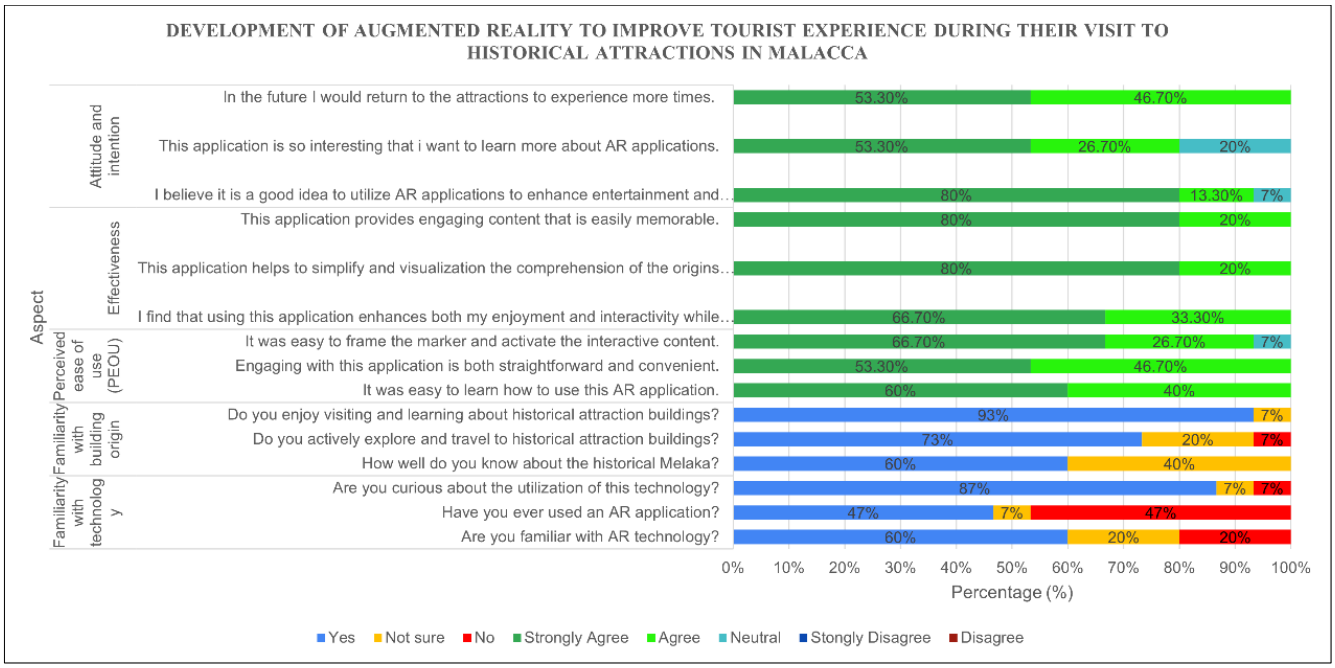


Fig. 12. Result Questionnaire

Focusing on the participants' familiarity with AR technology 9 participants had little knowledge about AR technology, it accounted for more than half, exceeding 60%. Only a few participants already tried this technology, but several declared to be very curious about AR. Therefore, participants, when asked whether they have used AR, mostly responded with a majority of 53.3%, which is a total of 8 people. This is also one of the minor objectives of this project, taking the opportunity to promote AR technology and explore its potential application in enhancing the historical attraction of buildings. Many participants are curious about the use of AR technology, with a high proportion of 86.7%. This also demonstrates that AR technology has good appeal and can attract tourists by using novelty as a point of attraction.

In addition, through our investigation, we found that more than half of the tourists are very knowledgeable about Malacca, with over 60%, and there were no participants who did not choose this option. We also learned that tourists are very eager to explore and visit historical landmarks and buildings, as the percentage is as high as 73.3%. Almost all participants have a strong interest in visiting and learning about historical landmarks and buildings. Therefore, Malacca, known as the ancient city, narrates the history of a hundred years ago and plays an important role in the development of our country's tourism industry. Thus, we are carrying out this project in the hope of continuously enhancing the interactivity of historical architectural sites in Malacca with AR technology.

The next focuses on participants' perception of the overall AR effectiveness experience and its usability. Focusing on the questionnaire assessing the overall AR experience depicted in Fig. 12. participants conveyed a high level of perceived ease of use regarding the application. They found it straightforward to learn and operate that AR application, without the need for significant mental exertion. Data analysis supports this consensus, with 60% strongly agreeing and the remaining 40% in agreement. This positive experience can be attributed to the implementation of user-friendly

actions, visually appealing icons, and clear instructions within the app's interface. Users simply require a mobile device and a touch on the screen.

Furthermore, participants reported that framing the markers to activate augmented content was an uncomplicated task. Data analysis revealed that most respondents, constituting 66.7%, strongly concurred with this notion, while an additional 26.7% agreed. This agreement was based on consistently calibrated and easily identifiable markers, where visitors only needed to use their cameras to scan these structures, much like taking photographs. However, 7% remained neutral, possibly due to external factors like lighting conditions.

The information gleaned from the questionnaire reflects a high level of perceived quality. Participants find that using this application enhances both their enjoyment and interactivity while exploring historical attractions. This consensus is further supported by data analysis, with 66.7% strongly agreeing and the remaining 33.30% in agreement. Furthermore, participants regarded the educational content of the application as trustworthy and clear. Moreover, they noted that the application effectively simplifies and enhances the visualization of the origins and historical background of buildings due to its engaging and memorable content. This consensus is further supported by data analysis, with 80% strongly agreeing and the remaining 20% in agreement. Hence, it can be confidently stated that the AR application effectively conveyed historical story content and values, enhancing users' experiences at the historical attraction buildings.

The prevailing consensus is that employing AR applications to elevate the entertainment and interactivity of exploring historical landmarks constitutes a favorable concept. A significant proportion of participants, approximately 53.30% strongly agree, while 46.70% simply agree, indicating a high willingness to revisit these attractions for multiple experiences. Participants strongly agreed, with a 53.30% consensus, that the application could encourage them to delve deeper into learning about AR.

Conclusion

The research is carried out within the realm of tourism, to craft an AR application geared towards allowing tourists to scan cultural heritage sites. This AR application will allow tourists to intuitively understand the historical landmarks of Malacca, enhancing their interactive experience. The utilization of AR applications will breathe fresh life into historical structures, effectively creating a novel digital journey. As previously introduced, a dedicated AR interactive application was meticulously developed and subjected to numerous user testing sessions. The analysis of the data collected unequivocally confirms the project's success in enhancing the tourist experience during their visits to historical landmarks in Malacca especially concerning the information provided through augmented reality and interactions with the digital content.

However, based on the analysis of the collected data, some improvements will be carried out in the future. The first improvement concerns the visitor’s position when visiting the historical buildings because some participants find it difficult to scan and capture the location of each AR clip within buildings when outdoors due to factors such as distance, lighting, and foot traffic, the focus will be shifted towards effectively highlighting the position of each AR clip with buildings through identifiable pathfinding assets. Furthermore, the participants' suggestions aim to expand and include additional scenes in the content, enriching the overall story and ensuring a more accurate portrayal of historical events. In addition, the congruence between the visual and audio stimuli provided by the application should be maximized to facilitate the understanding process by reinforcing the communication of the information.

The development of AR applications can significantly enhance the delivery of information and effectively improve the tourist experience when visiting historical attractions in Malacca. Furthermore, this project offers valuable historical content to visitors, igniting their interest and potentially encouraging return visits, which is pivotal for the tourism industry. This project successfully harnesses cutting-edge multimedia technology, such as augmented reality, to create innovative interactive experiences for visitors exploring historical landmarks. With ongoing research and technological advancements, we anticipate that the integration of augmented reality in the tourism sector will play a substantial role in the evolution of cities into smart destinations, paving the way for future interactive applications.

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Development Of Environmental Simulation in Virtual Reality Application for Road Ethics Education

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Abstract. The use of Virtual Reality (VR) has gained widespread acceptance due to its advanced technology, offering numerous applications in this project. Utilizing the Technology Acceptance Model (TAM), aims to determine whether the computer system developed through simulations will be accepted by its potential users, specifically children aged 7 to 12 years old. Employing Virtual Reality Simulation to educate children about road safety has proven to be highly beneficial. Road accidents, especially those involving children, have become increasingly common each year, whether they are pedestrians, crossing streets, or passengers in vehicles. Therefore, emphasizing road safety education is crucial to ensure their awareness of and adherence to safe practices. The introduction of VR simulations into Road Ethics Education empowers children to comprehend and adhere to road safety guidelines, whether they are alone or with friends. Utilizing Virtual Reality Google Cardboard headsets within the classroom setting introduces them to innovative learning methods that incorporate advanced technology, 3D models, and animations. The projects were completed in a single day, with all the children wearing VR headsets and engaging in educational games. This approach allows them to gain practical experience and enhance their situational awareness. The outcomes of the projects have not only boosted their confidence but also deepened their understanding of road safety. Furthermore, the development of these projects has effectively integrated road safety education into their daily lives, promoting safe behavior on the roads. Categorizing the design and development phases of the applications based on the TAM factors, including usefulness, ease of use, attitude towards use, and intentions to use, ensures valuable feedback from respondents.

Keywords: Virtual Reality (VR); Animations; Road Safety Education; Children; Technology Acceptance Model (TAM)

Introduction

Every year, road accidents result in the deaths of approximately 1.3 million people, with vulnerable road users such as pedestrians, cyclists, and motorcyclists accounting for over half of all traffic-related fatalities. Traffic accidents are the primary cause of fatalities among individuals aged 5-29 years (World Health Organization, 2022). In 2021, there were 370,286 recorded accidents in Malaysia, marking an 11.5% decrease from 2020. However, there was a startling 58% increase in accidents in 2022, with almost 32% of these accidents occurring in 2021 (Ministry Of Transport Malaysia, 2022). The issue of accidents persists despite the widespread use of roads by licensed drivers. These accidents can involve individuals of all ages, including children, teenagers, and the elderly. Children, especially pedestrians, are particularly vulnerable, with road crashes being a leading cause of injury and death among children aged 1-4 and 5-9 years (Mohamed et al., 2011). Road accidents involving pedestrians among different age groups also vary, with the highest incidence observed among the age group 10-14 years old (18.5%), followed by age groups 5-9 years old (16.5%) and 15-18 years old (16.1%). (Mohamed et al., 2011)

The increase in road accidents involving children requires the urgent need to prioritize child safety on the roads. Failure to do so puts young pedestrians at risk. Similarly, a report from Berita Sinar Harian details an accident involving a male child crossing the road with his sister in front of SK Padang Matsirat, Langkawi, which resulted in an accident when a motorcycle approached them

(Nurul Hidayah Hamid, 2023). Most recently, an 8-year-old child was killed in an MPV accident while riding a bicycle and suddenly crossing from left to right; the proximity prevented the MPV driver from avoiding the collision (Nik Amirulmumin Nik Min, 2023).

The rising number of road accidents involving children highlights the urgent need to educate youngsters about road safety. Therefore, the project focuses on children aged 7 to 12 years old as its target. VR is incorporated in this project as research has shown that Virtual Reality headsets can enhance learning by providing an authentic and highly interactive virtual environment that encourages active experimentation and allows learners to observe and reflect on instant feedback and results (Li et al., 2021). Additionally, VR technologies for educational purposes have gained traction across various research domains, demonstrating their potential to enhance teaching and learning (Radianti et al., 2020). Hence, this project aims to address child safety by utilizing VR technology, specifically Google Cardboard, to provide children with immersive road safety education in a metaverse VR environment. In addition, Google Cardboard offers an accessible and cost-effective way to deliver these experiences by creating a 3D virtual environment. This project employs software such as Blender and Unity. Blender software will be used to create 3D models while Unity set up the metaverse world and create animations for the project.

Literature Review

Virtual Reality (VR). VR technology is known for its ability to create immersive, three-dimensional computer-generated simulations that users can interact with by wearing a VR headset. VR displays an environment completely detached from the users' physical surroundings and offers an expanded field of view. These displays effectively eliminate ambient light to enhance the immersive experience.

VR experiences come in various types, including fully immersive, semi-immersive, and non-immersive. Fully immersive VR aims to create a system where users are entirely immersed in computer-generated worlds. Semi-immersive systems provide users with a partially virtual environment, often used for educational and training purposes. Non-immersive simulations, like video games such as Dota 2 and Minecraft, offer varying levels of immersion. Desktop VR is chosen mainly due to the much lower cost that it incurs as compared to immersive VR. Despite its lower cost, desktop VR is equally powerful in creating life-like virtual environments for users to explore (Chuah et al., 2009). Identifying practical applications of virtual reality that promote generalized learning. (Rusch et al., 1997).

This project involves the application of VR in education, utilizing a specific technology that requires the use of a Virtual Reality Google Cardboard and mobile phones. These mobile phones are equipped with 3D animation, sound, audio, and environmental elements, providing a unique way to visualize information and immerse users in VR worlds. Users interact with this virtual environment by wearing a VR headset, enabling them to manipulate objects within it. Head movements primarily control interaction as the Actions within the VR world occur in near real-time, giving users control over their perspective. The VR environment relies on processes like physical simulation and script-based animations for its immersive quality. The application has been developed to transform and enhance computer interactions. Applying various applications of virtual reality in education enables to promote of maximal learning (Rusch et al., 1997).

Environment Simulation Virtual Reality. This project, Virtual Reality (VR) was implemented to educate children on road safety. VR was used to provide the platform to depict various road environments, that can allow the users to observe and interact with different types of road signs and scenarios. The project's primary objective is to utilize VR technology and animations to enhance road safety awareness among Malaysian children. The Virtual Reality (VR) 3D of the projects shows the environment and imitative learning could be well achieved, as the acts and movements of a 3D animation will guide the children (Khan et al., 2021). In the Malaysian context, the development of VR application in educating children on road safety increase children's engagement in their learning process.

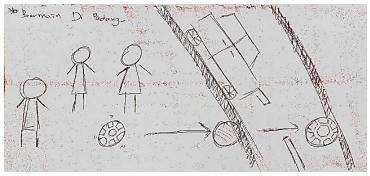
Thus, this project involves evaluating the acceptance of this VR application among children as an effective educational tool for promoting road safety awareness. Students can be encouraged to adopt modern technologies to extract the benefits of such technologies based on the degree of agreement between the expectations associated with the course materials and assessment results (Mazrur et al., 2023).

Every child's road safety skills are not yet fully developed, and they lack of knowledge and experience on how to behave and act correctly when they face different traffic situations. (Khan et al., 2021). Therefore, by implementing the animations in low-poly 3D environments, learners can immerse themselves and engage with road safety as if they were in the real world. The next aspect involves road sign recognition. The VR environment enables children to learn through interactive exercises, allowing them to test their comprehension of safety measures and proper road safety practices based on the different types of situations.

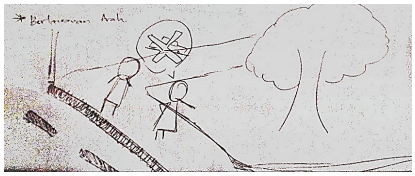
The project is designed for classroom use, where students simply wear VR headsets. This approach is practical for managing many students in a single classroom. Emphasizing road safety knowledge among students is crucial and imperative. Many students lack awareness of the correct behaviours and practices for road usage. This knowledge gap poses risks, especially to students' safety. Cureton (2023), based on his study found that VR significantly aids in maintaining student's attention in the classroom and indirectly provide a fourfold increase in learner retention. In addition, the different kinds of gameplay in VR enables to stimulate learners' emotions and thoughts in their learning process (Abdul Jabbar & Felicia, 2015).

In implementing VR in this project, learners navigate the low-poly 3D virtual streets, identifying the meanings and appropriate actions associated with various road signs. Virtual reality demonstrates that interactive experiences can facilitate physical learning, allowing users to interact with virtual road signs. However, conducting this kind of learning simulation in the real world can be time-consuming, labor-intensive, dangerous, and subject to disruption from poor weather and a lack of traffic situations of the types required (Chuah et al., 2009). This type of learning includes scenarios where users experience both correct and incorrect actions. The interactive animations enable users to experience real-life road safety situations safely. VR applications have been used regularly to teach certain skills, especially those that require declarative knowledge and procedural–practical knowledge (Radianti et al., 2020).

(a) Melintas Jalan



(b) Bermain Di Padang



(c) Salah Lawan Arah Jalan

Fig. 1. Example of storyboard

Methodology

This development of the Virtual Reality Application consisted of eight stages. As shown in Fig. 2, these stages started with a background study, followed by the design phase, development, prototyping, publishing, testing, analysis, and culminate with results and achievements. The background study comprises three segments namely literature review, problem statement, and VR introduction. The literature review part focused on road accidents among children due to a lack of road safety awareness and introduction to the concept of VR in education.

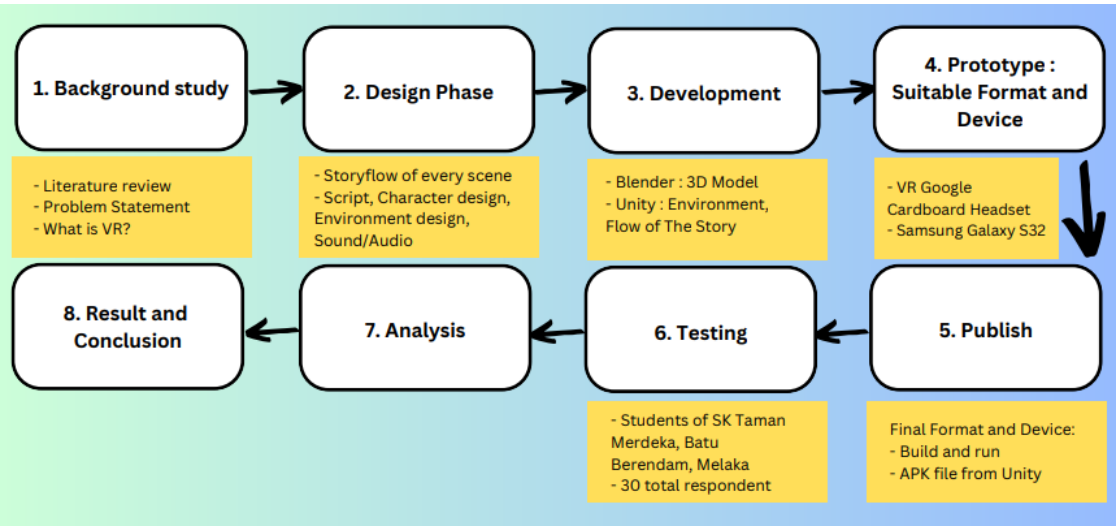


Fig. 2. Process methodology in the projects.

The Design phase involved the development of the plot for every scene, script, character design, environment design, and sound and audio. The plot for the VR projects is specifically designed for children, focusing on teaching them about road safety through simulations. The plot is designed with a simple moral approach, for instance, the appropriate ways to cross the street, the function of zebra crossings, and to understand the traffic lights function and usage. This approach aims to educate all users, especially children and parents, about keeping safe while on the street. The project's script is in the Malay language therefore learner's able to engage in the learning process and ensure the story is easily comprehended. Characters in the VR are designed to resemble the children to make the content relatable. Due to the time constraint, this project utilized the free resources available in software like Maximo and Sketchfab for 3D models, character movement and animations. For the sound, this project opted for Text-to-Speech technology. The script was converted into AI-generated Malay voice-overs to enhance the project's audio.

Additionally, Blender and Unity serve as the primary development tools. Blender facilitates the creation of 3D models, including signs, benches, trees, buildings, shops, streetlights, and natural elements. Unity is employed for constructing the environment and narrative, seamlessly integrating animation, sound, and character movements. 3D images with audio to fully reflect the actual environment (C. -W. Yang et al., 2016). The project's prototype necessitates a Virtual Reality Google Cardboard and Android mobile phones, preferably models like the Samsung Galaxy S32. Post-completion, the project is built and run in Unity, resulting in an APK file compatible with other Android phones. Unity was the main workstation of our project. All the development aspects, including characters and scripts, were integrated into this phase and an intelligent system was further built to support the VR (Khan et al., 2021).

During the prototype phase of developing this VR project, extensive research has been conducted to understand the essential requirements and processes needed to make this project successful within the given timeframe. One crucial aspect is the creation of 3D models, which is a fundamental component of the project. After creating the application, then opted to utilize VR Google Cardboard as the platform for exporting the project. However, there is uncertainty about the choice of devices, as it was vital to select compatible and easily accessible devices for users. In conducting the research, there is an issue of determining application compatibility with VR. It is found that, only high-end device such as Samsung Galaxy S32, is suitable for experiencing VR projects effectively.

Publishing is the last phase of this project, after the 3D design, storyline, animations, and sound, using Unity. Reviewing the settings and configuring for VR Google Cardboard, is an essential step in ensuring the application is ready for mobile deployment. In Unity's build and run settings, it is important to choose the proper APK format for the final build. APK files are easily transferable between different devices, simplifying the distribution process.

Furthermore, the project involved testing in Melaka. Before it was tested in Malacca, the sample, research instruments and procedures based on Fig. 8 and 9 were constructed and finalized. Analysis, based on the TAM, included components such as usefulness, ease of use, attitude toward use, and intentions to use. Gender-segregated responses were considered due to varying levels of prior VR experience among the children. Despite some confusion, assistance was provided throughout the testing session, and the results were presented based on the children's responses.

During the analysis phase, all the feedback was gathered from students at Taman Merdeka National School in Batu Berendam, Melaka. The children enthusiastically provided their opinions, answering questions about the VR project. It was interesting to note that most of them had never worn or experienced VR Google Cardboard, and their knowledge about Virtual Reality varied. Some children already have some understanding of what Virtual Reality entails. Their feedback was based on their personal preferences and opinions, highlighting what they liked and disliked about the VR project.

The feedback has provided valuable insights for the improvements of the project, to provide a more quality and enjoyable experience for all users. Overall, the 'Development of Environmental Simulation in Virtual Reality Application for Road Ethics Education' project has been a great success, meeting the satisfaction of the users. It has effectively aided children in understanding the principles of road safety.

Methods. This project focuses on the simulation and interactive learning experience via the implementation of a VR application. Learners can further enhance their understanding by interactive learning through the simulation presented in the VR. The simulation consists of three different types of situations for the learners to respond. It allows the learners to choose and select based on their understanding of the given simulation. Therefore, having this interactive kind of learning experience will further enhance learner's engagement and indirectly stimulate their critical thinking and evaluation.

Meanwhile, for the existing system, the user will be the main character and given the option to make the choice when they face a situation like a crossroad, allowing them to experience the consequences of their action. The difference between these two is that the focus of the character itself and the animation shows how the children should choose the right way to face the situation wisely.

Virtual Reality applications were primarily designed for children through this project to help them gain educational knowledge about road safety. It should be noted that this project has the potential to enhance students' academic performance when they encounter real-life situations. Virtual reality applications could play a crucial role in fulfilling students' learning needs and promoting the acceptance of this technology within the world's educational systems. The incorporation of VR into the educational system can significantly improve children's behavior by enabling them to learn interactively through games. Unfortunately, some children still lack knowledge about road safety, which can put them at risk and increase the number of accidents. Therefore, the VR application can be a valuable tool for them to explore the benefits and enhance their learning.

In this VR project, games become more engaging as children learn safety tips and techniques. They can immerse themselves in a low-poly environment, feeling as though they are right there alongside the animated characters. They can hear the sounds and freely move their heads to explore their surroundings as they follow the characters. This project utilized both Blender and Unity to develop virtual reality experiences. Blender and Unity are well-suited for creating 3D simulations in VR applications. These technologies serve as the initial steps in creating an environment where children can use VR Google Cardboard to experience virtual worlds, surroundings, and animations.

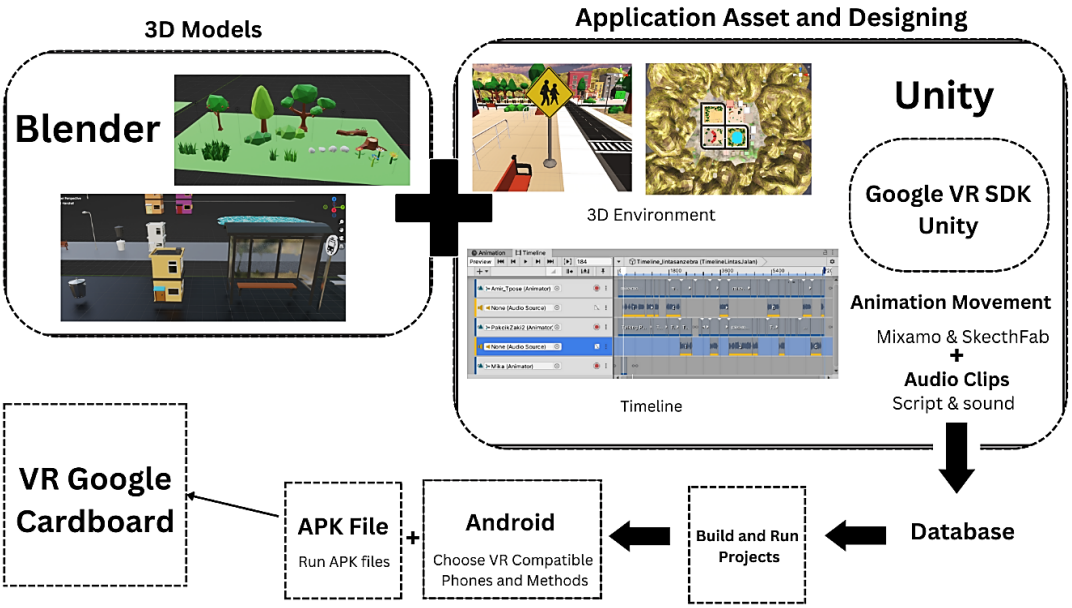


Fig. 3. Design and Development Phases of the Applications.

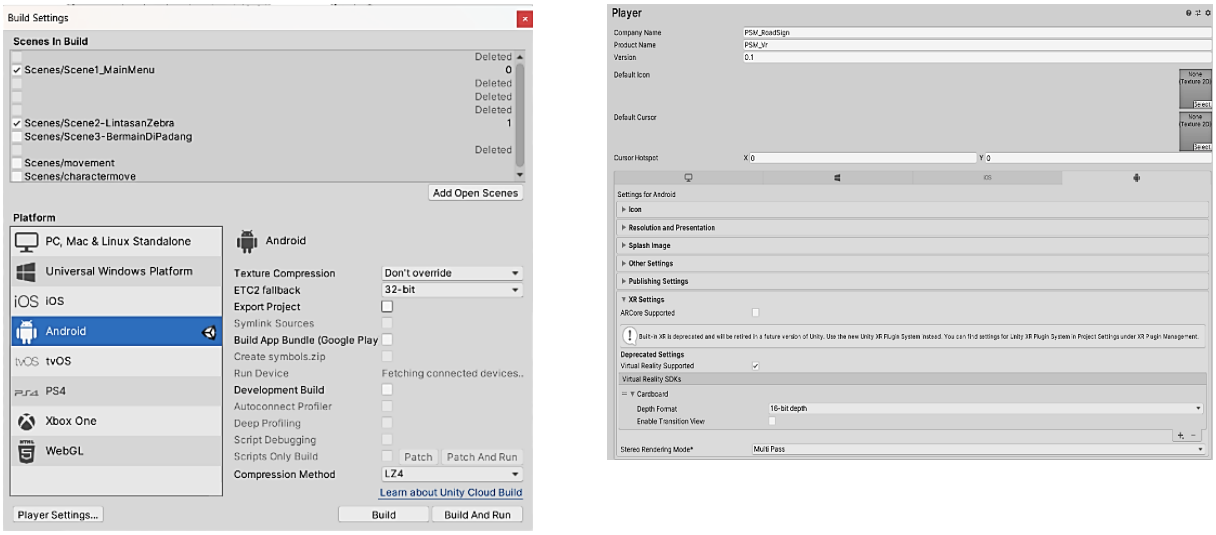
Fig. 3 illustrates the essential steps in developing a virtual reality application. Various software tools were employed to ensure the project's success, including Blender, Unity, Google VR SDK, Mixamo, and Sketchfab. The project incorporates elements such as animations and sound, making the use of VGRC essential. Next, in creating 3D models, Blender software was utilized as it is highly suitable for crafting detailed models with textures and other elements. Examples of objects embedded in this project that are created by using Blender are buildings, lights, road signs, rocks, water features, pedestrians, and bushes.

In Unity, there are several tasks to be performed, including configuring the correct formats to connect the APK files for importing to mobile phones, organizing, and editing the environment by importing 3D models from Blender, and configuring it to resemble a city. Further, road signs were prominently placed for easy visibility by users.Google VR SDK for Unity plugin was used to establish the connection with virtual reality through a mobile phone. As for the timeline Unity, it is used for creating animations throughout the story, The timeline allows animations to work seamlessly with audio and background sound. With the timeline in Unity, the markers were ser from one point to another, enabling adjustments to the movement and rotation along the x, y, and z axes.

Mixamo and Sketchfab were used in creating characters, opting for rigging and movement as children find them adorable and easier to understand, making them more engaging in the story. Thus this project utilized free assets due to the budget constraint. Furthermore, for audio, text-to-speech technology was implemented in this project.

The next step of this project is to develop the original script for the storyline and convert it into a webpage with text-to-speech functionality. The same approach was taken with sound effects, such as kicking sounds, children laughing in the background, and environmental sounds.

After completing the storyline arrangement, the next focus was on APK files. These files can be imported to other Android mobile phones for users to experience the VR application. Android phones were preferred for this project due to their ease of use and compatibility. Users can then play the VR application through the Unity application on their phones.



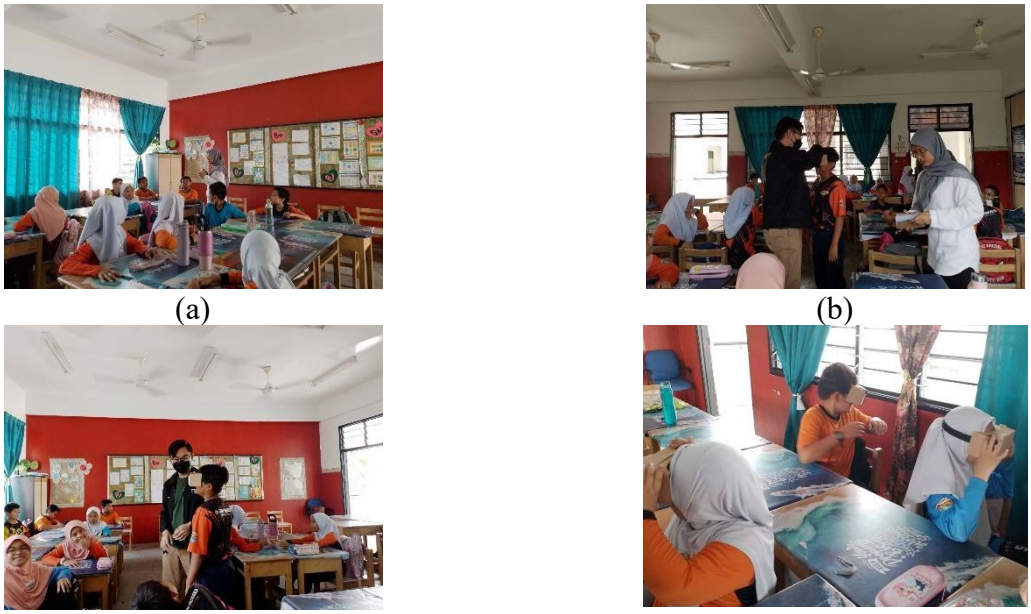
(a) (b)

Fig. 4. Images (a) and (b) show the APK files settings to be compatible with mobile phones.

(a) (b)

Fig. 5. Images (a) and (b) show the scenes of “Melintas Jalan” and “Bermain Di Padang”.

Testing. The testing took place on 25th August 2023, to assess the acceptance and effectiveness of a VR simulation application developed as an educational tool for road safety among children. Thirty (30) students aged between 7 and 12 years from Taman Merdeka National School in Batu Berendam, Melaka were selected as the respondents for this study. 15 female students and 15 male students were randomly selected from the class roster as the respondents. The test consisted of two sessions namely Session 1 which focused on task-based testing while Session 2 included a survey after they completed playing the VR application. A brief presentation on "Child Safety on the Road" and the introduction of the VR equipment were conducted beforehand to provide them with deeper insights into the test. For Session 1, Each respondent took turns using the Virtual Reality device, to interact with three different scenarios: "Crossing the Zebra Crossing," "Playing in the Field," and "Opposite Direction." The average time spent by each student playing ranged from a minimum of 5 minutes to a maximum of 10 minutes. Session 2 requires the respondents to answer a set of questionnaires related to their experiences after using the VRGC equipment. The questionnaire consisted of 4 sections, including "Demographic Data," "Perceptions of Ease of Use," "Perceptions of Usefulness," "Attitude Towards Usage," and "Intent to Use." These questions were assessed using a 3-point Likert scale, with response options labelled as "Disagree," "Uncertain," and "Agree."



(a) (b)

(c) (d)

Fig. 6. The testing process at the 4 USM class, Sekolah Taman Merdeka, Batu Berendam

Result

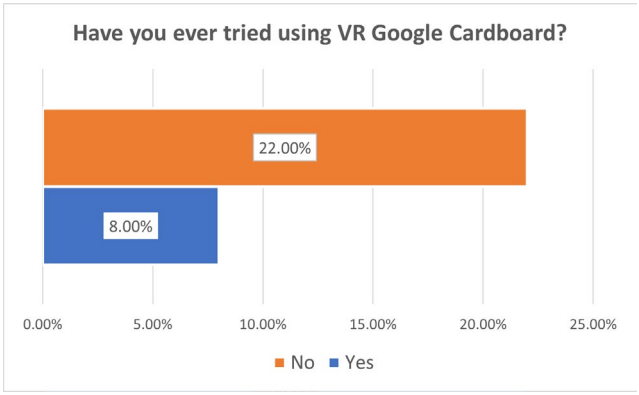


Fig 7. Experience with VR Google Cardboard

The results show that 8% of the respondents have experience with VR, while 22% have never tried it. This indicates that the technology of VR is not widely recognized. After testing VR, they realized that it offers many useful features and could be beneficial for their learning.

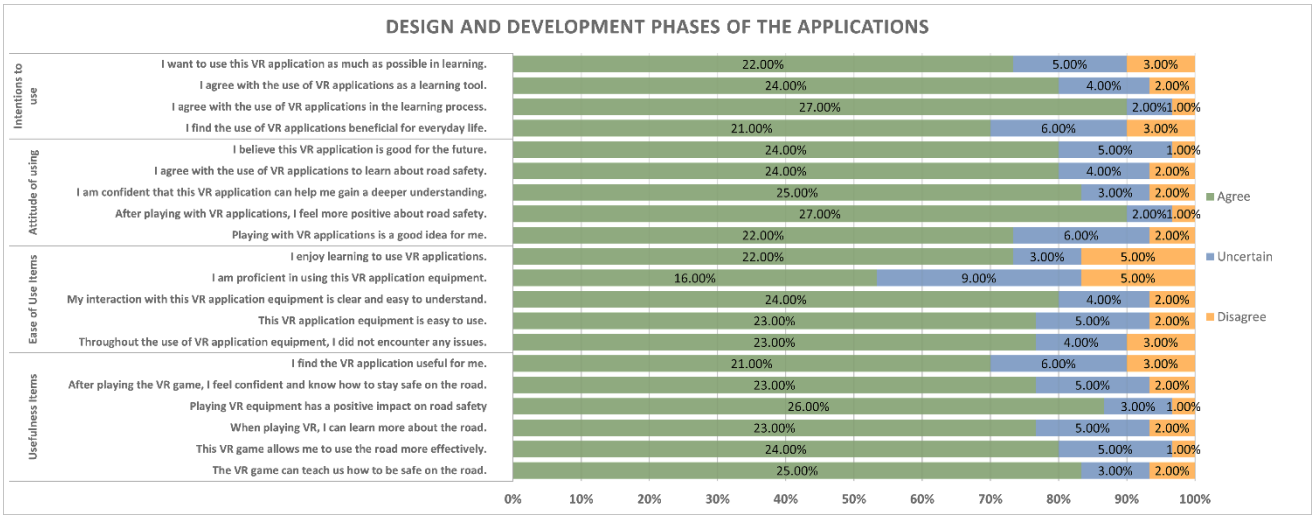


Fig. 8 Design and Development Phases of the Applications

For the design and development phases of the applications, there are four categories based on the usability of the TAM namely 'Intention to Use', 'Attitude of Using, 'Ease of Use Items' and 'Usefulness Items'. Each category is embedded in the construction of the questionnaires. The results of the survey for this aspect are depicted in Figure 8.

In the 'Intention to Use' category, the highest percentage of respondents agreed with using VR applications for learning, surpassing those who disagreed. Consequently, the highest percentage of disagreement was observed for using VR applications in everyday life, surpassing agreement.

Then, on to 'Attitude of Using,' the highest percentage of agreement was found for the statement: 'After using VR applications, I feel more positive about road safety,' surpassing disagreement. The statement 'I believe this VR application is beneficial for the future' had the highest percentage of disagreement compared to agreement.

Next, in the 'Ease of Use Items' category, the highest percentage of agreement was associated with the statement: 'My interaction with this VR application equipment is clear and easy to understand,' surpassing disagreement. This shows, that the statement 'This VR application equipment is easy to use' had the highest percentage of disagreement compared to agreement.

In the 'Usefulness Items' category, the highest percentage of agreement was observed for the statement ‘Playing VR equipment has a positive impact on road safety,’ surpassing disagreement. Conversely, the statement 'This VR game allows me to use the road more effectively' had the highest percentage of disagreement compared to agreement.

Conclusion

In conclusion, the project titled 'Development of Environmental Simulation in Virtual Reality Application for Road Ethics Education' has been successful and has helped children gain a better understanding of road safety. However, several improvements are required for the project, such as better tone and colour selection, variation of situations, visual and audio upgrading for the scene's storyline, animations and sound. Overall, the project has the potential to achieve its purpose and goal as an alternative approach for creating road safety awareness among children.

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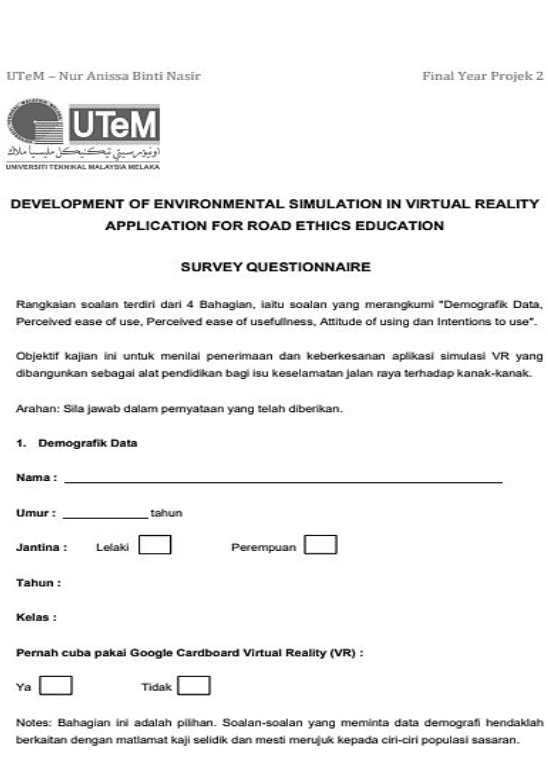
(a) (b)

Fig 8. Research instrument and procedures



UTeM – Nur Anissa Binti Nasir Final Year Projek 2

UTeM
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF ENVIRONMENTAL SIMULATION IN VIRTUAL REALITY APPLICATION FOR ROAD ETHICS EDUCATION

SURVEY QUESTIONNAIRE

Rangkaian soalan terdiri dari 4 Bahagian, iaitu soalan yang merangkumi "Demografik Data, Perceived ease of use, Perceived ease of usefullness, Attitude of using dan Intentions to use".

Objektif kajian ini untuk menilai penerimaan dan keberkesanan aplikasi simulasi VR yang dibangunkan sebagai alat pendidikan bagi isu keselamatan jalan raya terhadap kanak-kanak.

Arahan: Sila jawab dalam pernyataan yang telah diberikan.

1. Demografik Data

Nama : _____

Umur : _____ tahun

Jantina : Lelaki ☐ Perempuan ☐

Tahun :

Kelas :

Pernah cuba pakai Google Cardboard Virtual Reality (VR) :

Ya ☐ Tidak ☐

Notes: Bahagian ini adalah pilihan. Soalan-soalan yang meminta data demografi hendaklah berkaitan dengan matlamat kaji selidik dan mesti merujuk kepada ciri-ciri populasi sasaran.

3

(a)

UTeM – Nur Anissa Binti Nasir Final Year Projek 2

Soalan-soalan ini merangkumi 4 bahagian. Sila jawab berdasarkan ruang yang telah disediakan.

Bahagian A : Kemudahan penggunaan produk - *(Usefulness Items)*

Arahan: Sila nyatakan tahap persetujuan atau ketidaksetujuan anda terhadap setiap pernyataan berkenaan aplikasi simulasi VR ini. Letakkan tanda " / " dalam kotak jawapan anda.

	Soalan yang sudah diubah kepada respoden:	Tidak Setuju	Tidak Pasti	Setuju
1	Permainan VR boleh mengajar kita cara yang selamat di jalan raya.			
2	Permainan VR ini membolehkan saya untuk menggunakan jalan raya dengan lebih baik.			
3	Apabila bermain VR, saya dapat mengetahui lebih banyak mengenai jalan raya.			
4	Bermain peralatan VR ini memberi kesan yang baik tentang keselamatan di jalan raya.			
5	Selepas bermain permainan VR, saya berasa yakin dan ketahui cara yang selamat ketika berada di jalan raya.			
6	Saya rasa aplikasi VR berguna untuk saya.			

Bahagian B : Kemudahan kegunaan produk – *(Ease of Use Items)*

Arahan: Sila nyatakan tahap persetujuan atau ketidaksetujuan anda terhadap setiap pernyataan berkenaan aplikasi simulasi VR ini. Letakkan tanda " / " dalam kotak jawapan anda.

	Soalan	Tidak Setuju	Tidak Pasti	Setuju
1	Sepanjang pemakaian peralatan aplikasi VR, saya tidak mengalami sebarang masalah.			
2	Peralatan aplikasi VR ini mudah digunakan.			
3	Interaksi saya terhadap peralatan aplikasi VR ini jelas dan mudah difahami.			
4	Saya mahir dalam menggunakan peralatan aplikasi VR ini.			
5	Saya berasa suka belajar menggunakan aplikasi VR.			

4

(b)

Fig 9. Sample of Questionnaire

Bahagian C : Sikap terhadap kepenggunaan produk – *(Attitude of using)*

Arahan: Sila nyatakan tahap persetujuan atau ketidaksetujuan anda terhadap setiap pernyataan berkenaan aplikasi simulasi VR ini. Letakkan tanda " / " dalam kotak jawapan anda.

	Soalan yang sudah diubah kepada respoden:	Tidak Setuju	Tidak Pasti	Setuju
1	Bermain dengan aplikasi VR adalah idea yang baik bagi saya.			
2	Setelah bermain dengan aplikasi VR, saya merasa lebih positif tentang menjaga keselamatan di jalan.			
3	Saya yakin aplikasi VR ini dapat membantu saya memahami lebih mendalam.			
4	Saya setuju dengan penggunaan aplikasi VR untuk mempelajari keselamatan di jalan.			
5	Saya percaya aplikasi VR ini bagus untuk masa depan.			

Bahagian D : Niat untuk keggunaan produk – *(Intentions to use)*

Arahan: Sila nyatakan tahap persetujuan atau ketidaksetujuan anda terhadap setiap pernyataan berkenaan aplikasi simulasi VR ini. Letakkan tanda " / " dalam kotak jawapan anda.

	Soalan yang sudah diubah kepada respoden:	Tidak Setuju	Tidak Pasti	Setuju
1	Saya merasa penggunaan aplikasi VR bermanfaat untuk diterapkan dalam kehidupan sehari-hari.			
2	Saya setuju dengan penggunaan aplikasi VR dalam proses pembelajaran.			
3	Saya setuju dengan penggunaan aplikasi VR sebagai alat pembelajaran.			
4	Saya ingin menggunakan aplikasi VR ini sebanyak mungkin dalam pembelajaran.			

Terima kasih kerana berkongsi pemikiran anda dengan kami dan meluangkan masa untuk menjawab kaji selidik ini. Kekalkan keselamatan!

(c)

The Elements of Islamic Art in the *Songket* Motifs

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Abstract. *Songket*, also known as *'Ratu Kain'*, is a wonderful and adaptable garment. The motifs are a testament to the beauty of Songket. The skill of Malay weavers is represented by the aesthetic of Songket motifs. Malays use Songket motifs to represent their traditions, heritage, *adat resam*, and beliefs. Malay ancestors used Songket motifs to symbolize their mystical and spiritual perception. Many authors have analyzed Songket motifs, but their structure and connection to Islamic art have not been thoroughly discussed. The majority of these writings are highly descriptive and informative, with a focus on history, process, technique, and the use of Songket. The purpose of this study is to comprehend the structure and significance of the Songket motif in Islamic Art. The objectives of this study are to overview the structure of the Songket motifs, the meaning of the Terengganu Songket motifs and to further discuss the elements of Islamic aesthetics in the Songket motif. Islamic art principles and theories by Ismail Al-Faruqi, Erwin Panofsky, and Zakaria Ali are included in the content. The history of Songket, the components of the Songket theme, and the Songket motif are the main topics of the overrview. This result of the overview revealed the significance of the motif, which reflects the belief of ancestors and the expression of sincerity towards God in Islam. The repetition, abstraction, modular structure, and symmetry processes have also contributed to the structure of Songket motifs. The Songket motif's structure is derived from a sample of creativity and artistic activity in human life and behaviour. Thus, the Qur'an is the embodiment of Allah's words, not human intellectual caliber worshipping the glory of the divine through intellectual and artistic human art.

Keywords: Songket; Motifs; Islamic Art; Structure of Songket Motifs; Weaving.

Introduction

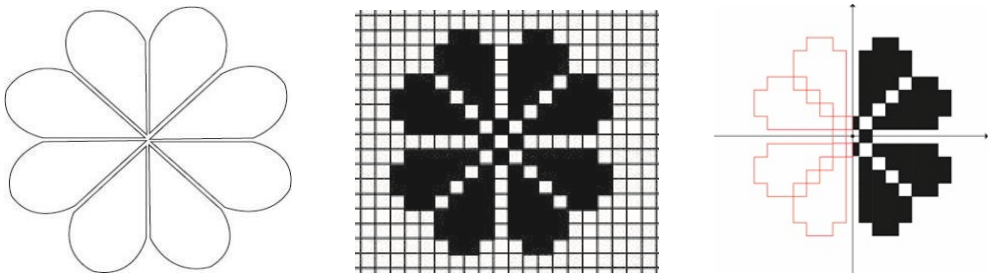
During the early 15th century, Songket was introduced to Tanah Melayu and rapidly became popular, especially in Terengganu and Kelantan. In Terengganu, Songket is a fabric that is commonly used. The aristocrats, the royal family, and the inhabitants of the country are the only ones who utilize it. The subtlety and complexity of weaving Songket motifs is a sign of someone with a high rank and position in the dignitary community. The history of Songket cannot be ascertained precisely, but the origin of the word is said to derive from Songket. ‘menyungkit’ means in Siam, ‘kek’ means ‘menyungkit’ and apart from that, ‘songkok’ is from China means the same thing. Most of Songket is produced individually, however some are produced in clusters. Songket's quality and identity are unique. The weaving process of each songwriter will be guided by specific motifs, such as plant motifs including Pucuk Rebung, Bunga Raya, Bunga Teratai, Tapak Manggis, and many others. Songket motifs can be found in animals, buildings, Kuih-muih, logos, and other areas depending on the customer's preference (Siti Zainon Ismail, 1997).

Songket is a textile art that requires both physical and mental skills, making it one of the most outstanding textile arts. Songket motifs can be produced using natural resources as a source of material thanks to the development of human civilization. The motifs used in Songket are derived from plants, animals, flora and fauna, objects, and kuih-muih. Creative patterns can be applied to embroidered motifs by weavers with good imagination and skill. Line, color, appearance, shape,

weaving, and space are some of the elements that can be used as references to produce art. The impact of each of these elements is different based on how they are utilized. Furthermore, Songket depicts Malaysian culture and heritage as well as the belief in spiritual awareness. It is embellished with a variety of motifs including those of plants, animals, the cosmos, the sky, still life, and objects. Songket production needs very creative weavers with excellent recall. The initiative of contemporary weavers and new designers has made it possible to document old motifs and make them a valuable reference.

Methodology

Principle of Islamic art. Based on a sample from the National Textile Museum, the Songket motif is interpreted using an Islamic art principle. Using this technique, the motif's structure is examined, and its interpretation and perception are related to Islam. The principles of Islamic art are applied via abstraction, stylization, repetition, modular structure, and symmetry.



(a) (b) (c)

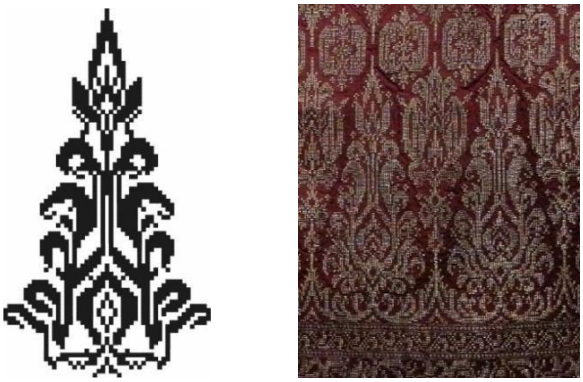
Fig. 1. After the process of abstraction and stylization (a) modular structure (b) and symmetry (c)

Ismail R. Al-Faruqi. The interpretation can be broken down into three levels: the Qur'an as the source of Tawhid of Transcendence, the Qur'an as an artistic model, and the Qur'an as artistic iconography. He added that Islamic art upholds the Tawhid (Oneness) principle, according to which there is only one God and Muhammad is His messenger, as well as the Qur'an. This study applied Islamic interpretation and judgment to the Songket theme philosophy and construction using Ismail Al-Faruqi's interpretation of the God's creation to artistic abstraction.

(a) (b) (c)

Fig. 2. Construction process from the God's creation to artistic abstraction (a, b, c)

Erwin Panofsky. Three ideas that can aid in the interpretation and analysis of art. There are three ways to understand Erwin Panofsky's theory: primary or natural subject matter, secondary or conventional subject matter, or tertiary or intrinsic meaning or content. These three perspectives were inspired by the environment in which people live and by their experiences as naturalists. One of the sources for the Songket motif is nature; it is connected to primary or natural subject matter from Erwin Panofsky theory, while tertiary or intrinsic meaning or content relates to each Songket motif, which has an intrinsic meaning that reflects the Malaysian culture and tradition (Erwin Panofsky,2016).



(a) (b)

Fig. 3. Natural subject matter for Songket motif is nature (a ,b)

Zakaria Ali. Through Zakaria Ali's principles of art, the Songket motif highlights symbolism, refinement, flexibility, balance, and unity. It has been demonstrated that Islamic interpretation can be found in Malay art and craft.

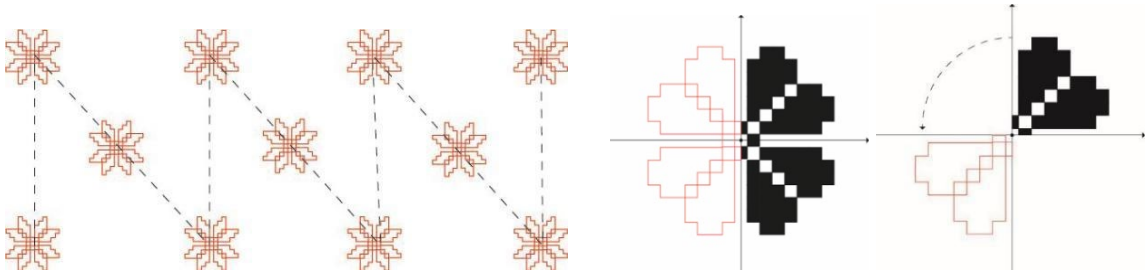
(a) (b)

Fig. 4. Mangosteen (a) and Tampuk Manggis (b)

He added that Malay ancestral art is based on symbols with a distinctive appeal, such as the Tampuk Manggis motif through the song titled *Joget Hitam Manis* (1991) by Abdullah Chik and Yusni Hamid. This motif has been used as decoration on the Songket which were originally worn by royalty and nobility. The Tampuk Manggis motif underwent both a stylization and imitation of the nature process (Alam Zahir), as a result, the motif became more organized and geometric (Dzul Haimi Md. Zain, 2012).

Result and Discussions

The Songket motif structure evolved from the Alam Zahir (abstract and stylized from nature) based on Islamic art to a geometric design. The philosophy and purpose of the motifs as well as their structure and an explanation of how to understand Songket motifs from an Islamic perspective. Songket motif, Tampuk Manggis, Bunga Bintang, and Pucuk Rebung. These motifs were examined by utilizing the analytical techniques that are fundamental to Islamic art. The motif's structure includes artistic elements including line, shape, space, value, and form that are influenced by Islamic art. The Songket motif's design is based on a natural motif that has been stylized into a geometric pattern. A geometric pattern consists of regular lines and recurring shapes. To produce a pattern, a geometric design can be repeated or rotated. After calligraphy and arabesque, geometric shapes are one of the primary components of Islamic art (Ismail Al-Faruqi and Lamya L. Al-Faruqi, 1986). A modular structure is part by part process combined to become a complete form. The combinations have a relation between the parts or elements of something complex. Songket motif modular structure follows the arrangement of basic shapes to create a pattern through the process of repetition, reflection, and rotation.



(a) (b) (c)

Fig. 5. Repetition (a) reflection (b) and rotation process (c)

This principle can create a sense of movement and can establish pattern and texture. Repetition of the motif shows the succession of motifs in Songket and the systematic arrangement of the motifs, it also produces unity and diversity in nature. In Islamic terms, patterns are drawn by using repetition style to resemble human, who is always in remembrance of Allah S.W.T as a creator (Zakaria Ali,1994).

> *"God is Beautiful and He loves beauty... (Hadith, recorded by Muslim, Ibn Maja, Tirmidhi)...Surely hearts find peace in remembrance of God: .joyful bliss for them and a beautiful returning! (Koran 13:28-29)" (James Winston Morris, 2000)*

Conclusion

The aesthetics of the motifs, the motif's structure, and how Islamic art components are interpreted in Songket motifs. Basic structural elements from nature (Alam Zahir) and through the processes of abstraction and stylization are included in this analysis of the Songket theme. A philosophy that is closely tied to Malay culture is contained in Songket motifs. Three often used motifs in the Songket industry will be examined in this examination. Tampuk Manggis, Bunga Bintang, and Pucuk Rebung are the names of these three motifs. According to an Islamic interpretation, the design of these three motifs depicts behavior (Akhlak) that adheres to the laws and norms of human life. The repetitive motifs in Songket represent the sequence and cycle of Muslim life, which is prayer (Solat). It also emphasizes the fundamental form that has developed through the process from the central point, which denotes the source of unity (Tawhid), which is described as a link to a healthy relationship (Silaturahim). The main focus reflects how Muslims regard the Qur'an and Sunnah as their ultimate authority and source of guidance in daily life. Muslims' confession of faith, known as the (Shahadah), states that there is only one God and that Muhammad is His messenger.

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