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"DIGITAL HORIZON: NAVIGATING THE FUTURE OF EMERGING TECHNOLOGY"

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PENGARAH PUSAT PENYELIDIKAN DAN INOVASI, JPPKK

Salam Sejahtera dan Salam Malaysia Madani.

Persidangan *"2nd National Digital Technology and Education Conference 2024"* (NaDiTEC'24) adalah sebuah persidangan yang dibuka kepada semua individu dalam bidang Pendidikan dan Latihan Teknikal dan Vokasional (TVET) serta bidang pendidikan tinggi yang lain, khasnya yang melibatkan teknologi digital dari seluruh Malaysia. Pelaksanaan persidangan ini adalah amat bertetapan dengan kemunculan teknologi terkini seperti kecerdasan buatan (*Artificial Intelligent*), *blockchain*, realiti maya mahupun keselamatan siber yang semakin berkembang pesat.

Melalui persidangan NaDiTEC'24 ini, himpunan kertas penyelidikan yang dibentangkan seterusnya diterbitkan dalam bentuk prosiding agar dapat memberi manfaat kepada semua komuniti akademik, badan industri, majikan, agensi berkaitan, pelajar dan pihak lain yang berkepentingan. Tahniah dan syabas diucapkan kepada para pembentang yang telah menghantar manuskrip kajian masing-masing ke NaDiTEC'24 kerana telah menyahut cabaran ke arah membentuk masyarakat yang berilmu, dinamik dan berkemahiran serba boleh.

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Assalamu'alaikum Warahmatullahhi Wabarakatuh dan Salam Malaysia Madani.

Alhamdulillah, syukur kepada Tuhan Yang Maha Esa atas kurniaan rezeki kejayaan merealisasikan "*2nd National Digital Technology and Education Conference 2024"* (NaDiTEC'24). Sebanyak 20 kertas penyelidikan daripada subtema *Emerging Technology, Digital Transformation, Data Security, Sustainability & Engineering Technology, Innovation and Entrepreneurship, TVET Education* telah berjaya diterbitkan dalam prosiding ini.

NaDiTEC'24 menjadi platform mempersembahkan hasil kerja keras dan dedikasi dari pelbagai penyelidik, ahli akademik, dan profesional yang telah menyumbangkan pengetahuan, waktu, dan usaha mereka untuk menghasilkan penyelidikan dan karya ilmiah yang komprehensif dan bermanfaat. Sekalung tahniah dan syabas diucapkan kepada para peserta dan pembentang yang berjaya menyertai persidangan NaDiTEC'24 tahun ini. Iltizam anda dalam menjalankan penyelidikan amatlah dikagumi dan diharapkan perkongsian ilmu dan hasil penyelidikan tersebut dapat memantapkan lagi sistem pendidikan negara terutamanya dalam bidang Teknikal & Pendidikan Vokasional dan Latihan (TVET).

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PENGENALAN

NaDiTEC'24 merupakan persidangan penyelidikan yang kali kedua diadakan dengan mengetengahkan Teknologi Digital sebagai tema utama. Tema ini dilihat sangat relevan dengan situasi semasa di mana penggunaan teknologi digital telah menjadi norma baharu, malah telah menjadi kemestian dalam kehidupan seharian. Kami menjangkakan impak persidangan akan menjadi pencetus untuk penyelidikan berkaitan dan penambahbaikan teknologi termasuk aktiviti pendidikan yang amat perlu kepada penggunaan teknologi digital bagi menjamin kelangsungan penyebaran ilmu. Selain dari itu, cabaran aktiviti pengajaran dan pembelajaran (PdP) yang agak mencabar terutamanya kepada pelajar aliran Pendidikan dan Latihan Teknik dan Vokasional (TVET) yang lebih memerlukan kepada aktiviti PdP secara hands on. Justeru, perkongsian ilmu daripada para akademia berkaitan tema ini turut dialu-alukan dalam persidangan NaDiTEC ini.

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"DIGITAL HORIZON: NAVIGATING THE FUTURE OF EMERGING TECHNOLOGY"

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02	Digital Transformation
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04	Innovation and Entrepreneurship
05	TVET Education
06	Management and Leadership

KATEGORI 01

EMERGING TECHNOLOGY

(AI, BLOCKCHAIN, VR, AR, IOT)

EXPLORING AI-DRIVEN GRAPHIC DESIGN: INNOVATIONS IN CRAFTING TRENDY CARTOONY IMAGES.

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ABSTRACT

Artificial intelligence (AI) has completely changed the graphic design industry, especially when it comes to producing trendy cartoony images. This study examines developments in AI-driven graphic design between 2019 and 2023, with an emphasis on approaches like Generative Adversarial Networks (GANs). This study will employ a quantitative approach to provide a comprehensive understanding of the topic. Quantitative methods will be used to analyze data on the usage and effectiveness of AI-driven graphic design tools. Additionally, it looks at how AI might be used as current challenges in instructional multimedia, with a focus on crafting trendy cartoony images and ways to improve learning resources and experiences. The research was conducted in Politeknik METrO Tasek Gelugor (PMTG) where students, alumni and lecturers are respondents for quantitative data collection via a questionnaire. In the end, this study provides insightful information about how AI is expected to influence graphic design in the future, laying the groundwork for future research and educating professionals in the field, academics, and educators about the opportunities and potential consequences that may arise.

Keywords: *AI-Driven graphic design tools, artificial intelligence, cartoony pictures, Generative Adversarial Networks (GANs), graphic design and instructional multimedia.*

INTRODUCTION

The combination of graphic design and artificial intelligence (AI) has revolutionized creative processes and results in today's digital world. This shift is especially noticeable in the field of creating trendy cartoon graphics, where AI-powered tools present new possibilities and methods. The researcher investigates this emerging topic within the framework of graphic design as an academician with a focus on instructional multimedia and a keen interest in the integration of technology and creative expression.

The traditional limits of efficiency and creativity have been reinterpreted with the introduction of AI-powered graphic design tools. These technologies incorporates machine learning algorithms to evaluate enormous datasets of current patterns, fashions, and trends enabling designers to produce cartoon images at a speed and accuracy never before possible (Brown & Sung, 2020). Furthermore, AI algorithms are able to learn from and adjust to user preferences and input, which allows for iterative refinement of the design process (Frick & Grundy, 2021).

AI-driven graphic design is becoming more and more popular due to its potential to democratize creativity. These tools facilitate the production of visually engaging content for people with different degrees of design skills by providing simple interfaces and automating repetitive operations (Todorovski & Daskalovski, 2022). In addition to promoting diversity within the design community, this democratization stimulates innovation by supporting a range of viewpoints and concepts.

A variety of industries, including marketing, advertising, entertainment, and education, will be significantly impacted by the rise of AI-generated cartoon graphics. AI-driven design solutions can be utilized by brands to create memorable and captivating characters and images, helping them to stand out in a congested digital landscape (Smith et al., 2019). In the same way, educators can make use of these resources to produce visually appealing teaching materials that grab students' interest and improve understanding (Chen & Chen, 2023).

However, there are many ethical and aesthetic issues to consider in addition to the benefits that AI-driven graphic design presents. Authorship, originality, and cultural representations become greater concerns when AI algorithms create designs on their own using learnt patterns and preferences (Williams & Gupta, 2020). Consequently, a fine line must be drawn between maintaining the human element and creativity necessary to build genuine connections with audiences and utilizing AI's skills to expedite creative workflows (Lee & Kim, 2022).

Taking these factors into consideration, this investigation seeks to explore the subtleties of AI-driven visual design, specifically about creating trendy cartoon graphics. This study aims to provide insights that inform practice and pedagogy within the field of instructional multimedia by looking at the technology breakthroughs, creative implications, and ethical dimensions of this changing landscape.

LITERATURE REVIEW

A new era of creativity and invention has been generated in graphic design by the combination of artificial intelligence (AI) with approaches to design. The way graphic designers visualize, produce, and edit visual contents has been completely transformed by AI-driven tools that are driven by complex machine learning algorithms and neural networks. These tools such as Adobe Sensei, Canva's Design AI, and Runway ML use AI algorithms to analyze massive amounts of design elements, such as layout compositions, color schemes, and typography, to give designers automatic suggestions and even produce fully realized visual compositions on their own (Wang & Liu, 2020).

AI has the potential to revolutionize graphic design in ways that go beyond simple automation and include a greater understanding of user preferences and visual aesthetics. AI algorithms can discover underlying patterns and trends in visual aesthetics by examining massive databases of photos and design elements. This allows designers to produce visually stunning and culturally relevant graphics (Jones & Smith, 2021). AI-powered tools that provide designers with insights about color theory, composition strategies, and visual storytelling principles have been developed as a result of this data-driven approach to design optimization. These tools enable designers to create more visually compelling and effective content (Li & Chen, 2023).

Additionally, the field of design involves dynamic and interactive media in addition to static pictures caused by AI technologies. Using tools like DeepArt and DeepDream, which use neural networks and image processing algorithms, designers can create interactive visualizations and animated cartoons (Garcia et al., 2022). The combination of AI with design has created new opportunities for experimentation and creative expression, allowing designers to investigate cutting-edge approaches to user interaction and storytelling in digital media.

However, there are ethical issues and difficulties that accompany these technological developments. The ethical implications of AI-driven design methods are called into question by concerns about algorithmic bias, data privacy, and the displacement of human designers (Wong & Kim, 2023). Furthermore, talks regarding attribution, intellectual property rights, and the place of human agency in the creative process have been spurred by worries about the authenticity and originality of AI-generated work (Smith & Johnson, 2021).

The combination of AI, graphic design, visual aesthetics, and cartoony imagery keeps encouraging innovation and affects the direction of visual communication in spite of these obstacles. It is crucial

to consider the consequences of AI-driven design for creative practice, aesthetics, and society at large as academicians and practitioners continue to explore its potential.

METHODOLOGY

This study employs a thorough research methodology with the goal of providing important insights into the exploration of AI-driven graphic design, with a specific emphasis on the creation of trendy cartoony visuals and their implications for educational contexts and instructional multimedia. The study plan will use a quantitative approach to analyze data on the effectiveness and utilization of AI-driven graphic design tools for a comprehensive understanding of the topic. It also examines how AI could be applied to the present problems in educational multimedia, with an emphasis on creating trendy cartoon graphics and methods to enhance learning materials and experiences. The quantitative data collection involves a total of 12 lecturers and 112 students from Politeknik METrO Tasek Gelugor (PMTG).

Purposive sampling used in the sampling process included participants from a range of demographic categories namely students and Alumni from Diploma in Video and Films Studies and lecturers from Academic Department (Design and Visual Communication) Politeknik METrO Tasek Gelugor, Pulau Pinang. Descriptive statistics, analysis of the overall mean and standard deviation methods were used in the quantitative analysis of the data gathered. Voluntary participation, informed consent, confidentiality, and a clear explanation of participant's rights and data handling procedures are among the ethical factors that was be taken into consideration. The use of AI-driven graphic design tools may have obstacles, such as sample bias and self-reporting bias. Measures were taken to reduce these through open reporting of results.

RESULTS AND DISCUSSIONS

The participants answered questionnaires via Google Forms to identify the effectiveness and utilization of AI-driven graphic design tools to give readers a comprehensive understanding of the topic. This questionnaire also gathers information on how AI could be applied to the present problems in educational multimedia. The questionnaire consisted of three sections:

a) Part A: Demographics (name, age, and gender).

b) Part B: The effectiveness and utilization of AI-driven graphic design tools to give readers a comprehensive understanding of the topic. The details of measured items are described in Table 1.

c) Part C: The information on how AI could be applied to the present problems in educational multimedia. The details of these measured items are described in Table 2.

All the participants were requested to respond to a close-ended questionnaire by choosing one option from a four-point Likert scale: 1) strongly disagree, 2) disagree, 3) agree, and 4) strongly agree. In other words, the highest point is 4 and the lowest point is 1 (Nee & Yunus, 2020). Data collection items were simplified so that all participants could understand and respond. In general, for a questionnaire about the usage and effectiveness of AI-driven graphic design tools and current challenges in instructional multimedia, with a focus on crafting trendy cartoony images and ways to improve learning resources and experiences demonstrated positive feedback from the participants as reported in Table 1 and 2.

Table 1: Summary of the effectiveness and utilization of AI-driven graphic design tools to give readers a comprehensive understanding of the topic.

Question	Sub Question	SD	D	A	SA
Usage of AI-driven Graphic Design Tools.	AI-driven graphic design tools enhance my creativity and productivity.	1%	3%	34%	62%
	I found AI-driven graphic design tools easy to integrate into my workflow.	2%	3%	54%	41%
	Using AI-driven graphic design tools has improved the quality of my designs.	2%	2%	31%	65%
	I feel confident in my ability to use AI-driven graphic design tools effectively.	2%	6%	55%	37%
	AI-driven graphic design tools have become essential in my design process.	2%	8%	56%	34%
Effectiveness of AI-driven Graphic Design Tools.	AI-driven graphic design tools have significantly improved the speed of my design process.	1%	2%	36%	60%
	AI-driven graphic design tools have helped me overcome creative blocks and generate new ideas.	0%	1%	46%	53%
	I find that AI-driven graphic design tools provide accurate and relevant design suggestions.	2%	3%	61%	34%
	The integration of AI-driven graphic design tools has enhanced the overall efficiency of my design workflow.	3%	9%	48%	40%

I believe that AI-driven graphic design tools are essential for staying competitive in the design industry.	2%	2%	44%	52%

SD=Strongly Disagree, D= Disagree, D= Agree, SA=Strongly Agree

From the data shown in Table 1, 42 respondents (34%) agreed and 77 (62%) respondents strongly agreed that AI-driven graphic design tools enhance their creativity and productivity. A total of 67 respondents (54%) agreed and 51 (41%) respondents strongly agreed that AI-driven graphic design tools easy to integrate into their workflow. 38 respondents (31%) agreed and 81 (65%) respondents strongly agreed that using AI-driven graphic design tools has improved the quality of designs. 68 respondents (55%) agreed and 46 (37%) respondents strongly agreed that they feel confident in their ability to use AI-driven graphic design tools effectively. Similarly, 69 respondents (56%) agreed and 42 (34%) respondents strongly agreed that AI-driven graphic design tools have become essential in their design process. Total of 45 respondents (36%) agreed and 75 (60%) respondents strongly agreed AI-driven graphic design tools have significantly improved the speed of their design process.

Data showed 57 respondents (46%) agreed and 66 (53%) respondents strongly agreed AI-driven graphic design tools have helped their overcome creative blocks and generate new ideas and 76 respondents (61%) agreed and 42 (34%) respondents strongly agreed that they found that AI-driven graphic design tools provide accurate and relevant design suggestions. Finally, 59 respondents (48%) agreed and 50 (40%) respondents strongly agreed the integration of AI-driven graphic design tools has enhanced the overall efficiency of their design workflow and 55 respondents (44%) agreed and 64 (52%) respondents strongly agreed that they believe that AI-driven graphic design tools are essential for staying competitive in the design industry.

Table 2: Summary on how artificial intelligence (AI) could be applied to the present problems in educational multimedia.

Question	**Sub Question**	**SD**	**D**	**A**	**SA**
How AI might be used as current challenges in instructional multimedia, with a focus on crafting trendy cartoony images and ways to improve learning resources and experiences.	Offering specialized training sessions or workshops for educators on how to effectively integrate trendy cartoony images into instructional materials.	1%	3%	43%	53%

Integrating trendy cartoony images into instructional multimedia can enhance learners' visual engagement and retention of content.	0%	2%	52%	47%
Offering tutorials or training sessions on cartoon illustration techniques can empower educators to create their own trendy cartoony images.	0%	0%	44%	56%
Continuous updates and additions to the library of trendy cartoony images in instructional multimedia resources are essential to keep content fresh and relevant.	2%	8%	54%	35%
Developing user-friendly software tools specifically designed for educators to create custom cartoony images without extensive design knowledge.	0%	0%	45%	55%

SD=Strongly Disagree, D= Disagree, D= Agree, SA=Strongly Agree

From the data shown in Table 2, 53 respondents (43%) agreed and 66 (53%) respondents strongly agreed that offering specialized training sessions or workshops for educators on how to effectively integrate trendy cartoony images into instructional materials. A total of 64 respondents (52%) agreed and 58 (47%) respondents strongly agreed that integrating trendy cartoony images into instructional multimedia can enhance learners' visual engagement and retention of content. Similarly, 54 respondents (44%) agreed and 70 (56%) respondents strongly agreed that offering tutorials or training sessions on cartoon illustration techniques can empower educators to create their own trendy cartoony images. A total of 67 respondents (54%) agreed and 44 (35%) respondents strongly agreed that continuous updates and additions to the library of trendy cartoony images in instructional multimedia resources are essential to keep content fresh and relevant. Finally, a total of 56 respondents (45%) agreed and 68 (55%) respondents strongly agreed that developing user-friendly software tools specifically designed for educators to create custom cartoony images without extensive design knowledge.

Table 3: Summary on mean and the standard deviation of the scoring was based on the 4 Likert-scale ratings.

Question	Sub Question	M	SD
Usage of AI-driven Graphic Design Tools.	AI-driven graphic design tools enhance my creativity and productivity.	3.57	0.6
	I find AI-driven graphic design tools easy to integrate into my workflow.	3.35	0.63
	Using AI-driven graphic design tools has improved the quality of my designs.	3.60	0.62
	I feel confident in my ability to use AI-driven graphic design tools effectively.	3.27	0.65
	AI-driven graphic design tools have become essential in my design process.	3.21	0.69
Effectiveness of AI-driven Graphic Design Tools.	AI-driven graphic design tools have significantly improved the speed of my design process.	3.56	0.59
	AI-driven graphic design tools have helped me overcome creative blocks and generate new ideas.	3.52	0.52
	I find that AI-driven graphic design tools provide accurate and relevant design suggestions.	3.27	0.60
	The integration of AI-driven graphic design tools has enhanced the overall efficiency of my design workflow.	3.25	0.75
	I believe that AI-driven graphic design tools are essential for staying competitive in the design industry.	3.46	0.63
How AI might be used as current challenges in instructional multimedia, with a focus on crafting trendy cartoony images and ways to improve learning resources and experiences.	Offering specialized training sessions or workshops for educators on how to effectively integrate trendy cartoony images into instructional materials.	3.48	0.60
	Integrating trendy cartoony images into instructional multimedia can enhance learners' visual engagement and retention of content.	3.45	0.53
	Offering tutorials or training sessions on cartoon illustration techniques can empower educators to create their own trendy cartoony images.	3.56	0.50
	Continuous updates and additions to the library of trendy cartoony images in instructional multimedia resources are essential to keep content fresh and relevant.	3.23	0.70
	Developing user-friendly software tools specifically designed for educators to create custom cartoony images without extensive design knowledge.	3.55	0.50

M=Means, SD= Standard Deviation

The mean and the standard deviation of the scoring reported in Table 3 was based on the 4 Likert-scale ratings of 15 questions from Table 1 and Table 2. Descriptive statistics such as mean and

standard deviation were used where mean values of all attitude aspects were averaged to get the overall attitude (Mazana et al., 2019).

As presented in Table 3, both lecturers and students have a positive response, where the mean score value above 3.0. The scores vary between 3.21 and 3.60 for usage of AI-driven Graphic Design Tools. The highest mean score is using AI-driven graphic design tools has improved the quality of my designs, mean = 3.60, standard deviation = 0.62, while the lowest mean score is for AI-driven graphic design tools have become essential in my design process, mean = 3.21, standard deviation = 0.69.

Similarly, the mean score shows the value above 3.0 for the effectiveness of AI-driven Graphic Design Tools where the scores vary between 3.25 and 3.56. The highest mean score is AI-driven graphic design tools have significantly improved the speed of my design process, mean = 3.56, standard deviation = 0.59, while the lowest mean score is for the integration of AI-driven graphic design tools has enhanced the overall efficiency of my design workflow, mean = 3.25, standard deviation = 0.75.

Finally, on how AI might be used as current challenges in instructional multimedia, with a focus on crafting trendy cartoony images and ways to improve learning resources and experiences also show the mean score value above 3.0. The scores vary between 3.23 and 3.56. The highest mean score is offering tutorials or training sessions on cartoon illustration techniques can empower educators to create their own trendy cartoony images, mean = 3.56, standard deviation = 0.50, while the lowest mean score is for the continuous updates and additions to the library of trendy cartoony images in instructional multimedia resources are essential to keep content fresh and relevant, mean = 3.23, standard deviation = 0.70.

CONCLUSION

In summary, the conclusion emphasizes how AI has had a significant influence on graphic design, especially when it comes to producing trendy, cartoony pictures. While AI has the revolutionary potential to improve graphic design productivity and creativity, it also brings up ethical questions. Although it necessitates close consideration of ethical norms, the incorporation of AI-driven technologies into instructional multimedia shows potential for enhancing educational materials. For educators, it will help to expand their knowledge in creative ways for the teaching and learning process and make learning sessions more engageable and memorable. Heading forward,

maximizing the advantages of AI while guaranteeing responsible use will require interdisciplinary cooperation and ethical understanding. Ultimately, the graphic design industry can continue to develop in novel and significant ways by using AI technology while upholding ethical integrity.

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STUDENT PERCEPTIONS OF ARTIFICIAL INTELLIGENCE (AI) TOOLS: POLYCC STUDENTS PERSPECTIVE

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ABSTRACT

Artificial Intelligence (AI) has become a disruptive trend in education and other fields of society. Understanding how students view AI tools becomes critical as educational institutions use new technologies to improve teaching and learning. Investigating how students view and interact with AI tools provides important information on the viability and adoption of these tools in learning environments. With its ability to provide personalized learning, improved decision making, and tailored learning experiences, the use of AI tools in education has the potential to completely transform current teaching practices. However, end users' attitudes and perceptions especially those of students are crucial to the adoption and successful usage of these AI technologies. Even while AI tools are becoming more and more common in education, little is known about how students view and interact with these tools, especially in the context of specialized educational institutions like Jabatan Pendidikan Politeknik dan Kolej Komuniti (PolyCC). This paper aims to explore PolyCC students' awareness and attitude of artificial intelligence (AI) tools between programs. The methods used in this study is conducting quantitative survey of a set of questionnaires distributed to 252 respondents who were randomly selected in 8 polytechnics and 2 community colleges. Participants completed an online questionnaire that included open-ended responses, scaled items, and finite questions. Overall, there is significant result on awareness between ICT and Commerce with slightly different at mean value. Mean results also show students also unfamiliar with AI concept but have experience in using AI Tool-ChatGPT. Future research will involve surveying the board of management to find out whether they would be interested in creating guidelines for using AI Tools specifically for PolyCC.

***Keywords**: Student Perceptions, Artificial Intelligence Tools, Student Perspective*

INTRODUCTION

A rapid changing of computer technologies really helps human to complete most of a routine task recently. The computer technologies ease every human business that give many benefits to everybody and help human at all ages. One of the famous computer technologies that use widely today known as Artificial Intelligence or AI. AI-based technologies have reported to improve human life quality, making life easier, safer and more productive (Ali et al., 2023). Established as an academic discipline in the 1950s, AI remained an area of relative scientific obscurity and limited practical interest for over half a century (Bozkurt et al., 2023).

The rise of Machine Learning and Big Data also play the main roles to improve a computing power and especially AI. AI also often call as Machine Intelligence and it is revolving around the intersection of cognitive science and computer science until now. AI always attract interest because of the practical successes in Machine Learning and AI always have a strong linkage to explain ability, thus known as a program with common. AI is a knowledge project that takes knowledge as the object, acquires knowledge, analyzes and studies the expression methods of knowledge, and employs these approaches to achieve the effect of simulating human intellectual activities including learners' mental health (Lei et al., 2023) and (Ajlouni et al., 2023).

AI is currently viewed by many as a driver that is integral to the fourth industrial revolution, and it may trigger the fourth revolution in education (Zhai et al., 2021). As stated previously education field also affected because of the use of this AI technology widely by academicians and students. One of the suitable examples is Generative Pre-Trained Transformer or known as ChatGPT. Teacher, lecturers and students may use this AI technology to gain more or new information and knowledge, and also use that technology to complete any tasks such as reports and assignments. In the end of 2022, OpenAI an American AI research organization company, released the public version of ChatGPT, and further attracts worldwide attention because this technology responding to any human requests which can just be described in natural language(Rahman & Watanobe, 2023).

According to (Firat, 2023), AI was developed by OpenAI and released to the public in November 2022, ChatGPT has become widespread at an impressive speed, so much so that it reached one million users in five days. The availability of ChatGPT to perform and complete any simple to really complex tasks is a key of success of this technology. This technology still ongoing and evolve around, that is for sure it can give much more benefits in education and human in future.

PROBLEM STATEMENT

Ethical concerns in using AI tools at learning environment are highlighted in several researches (Fütterer et al., 2023) and (McGrath et al., 2023). However, studies also shows AI affect student engagement and learning outcomes positively (Woithe & Filipec, 2023). Due to AI potential, PolyCC has actively promotes AI generative tools applications to educators and students. There are some academicians and students misused AI and not using AI in proper way (McGrath et al., 2023), and this action will cause low quality of graduation from the education system. Furthermore AI program for bachelor degree is expected to be developed starting July 2024 as mentioned in curriculum interpretion workshop by Curriculum Division, PolyCC. This provide opportunity to study on the perceptions on AI and AI tools to students at different program in PolyCC since lack of research reviews students different learning background are published.

RESEARCH AIM

This research aims to compare AI perception focusing to awareness and attitude between programs offered in polytechnic and community college focusing on commerce, information, communication and technology (ICT), engineering and others.

RESEARCH QUESTION

Do different programs affect AI perception especially ChatGPT in the classroom.

LITERATURE REVIEW

Artificial Intelligence (AI) has emerged as a significant area of interest across various fields, including education. The goal of integrating AI into education is to make learning easier, increase the efficacy of instruction, and give students a more effective and individualized education. The possible impacts of integrating AI into education is on engagement, learning results, educator-student relationships, and classroom dynamics as (Bitzenbauer, 2023) claims that incorporating ChatGPT into the educational system can improve student learning results, highlighting the necessity for legislators to encourage the use of AI tools like ChatGPT in the classroom in order to raise student performance and prepare them for a future driven by AI. Based on the analysis of survey data, the study found that ChatGPT had a substantial impact on students' motivation and participation in the learning process. While (Grassini, 2023) stated that incorporation of artificial intelligence (AI) tools into education has the potential to alleviate educators' burdens, freeing them up to concentrate on creative lesson ideas, professional growth, and individual coaching. These

will eventually improve learning results for the students since educators able to focus more on lesson creation and delivery.

A developing teaching pedagogy with AI, uses technology and artificial intelligence to improve the teaching and learning process examines the application of AI technologies such as ChatGPT in curriculum design and instructional techniques. It investigates cutting-edge instructional techniques and approaches made possible by AI. This has been proven by studies by (Chan, 2023) highlighted essential topics for developing an AI policy for universities, with a focus on operational considerations, ethical usage of AI, and pedagogical adaptability. This emphasizes the necessity of integrating AI responsibly into higher education. While (Ajlouni et al., 2023) finds out that students seem to be responding well to ChatGPT, as seen by the 81.9% of respondents who thought it was a useful learning tool for counseling and mental health. More than 83% of students said that ChatGPT's responses, comments, and virtual experience improved their learning, which helped them complete their assignments.

Research on educational technology has looked into how AI technologies affect student engagement and learning outcomes. (Woithe & Filipec, 2023) observed that emotional and cognitive effects on learning, with AI support boosting students' enthusiasm and inventiveness as well as possibly increasing their engagement. While Medicine was the field that had the most replies about the substantial influence of AI, with 80.2% of participants acknowledging its potential in healthcare (Idroes et al., 2023). Meanwhile (Valova et al., 2024) find out that technology is thought to be a tool for making academic writing and research easier, which could increase productivity and efficiency in educational settings. (Mogavi et al., 2023) convince that as an AI-based tool in educational contexts, ChatGPT helps users with activities like sentiment analysis, annotation, and text-based data analysis, demonstrating how it can improve learning outcomes. A subset of educators indicated that they would be open to using class time to work with AI technologies to help students learn, albeit their willingness varied depending on the situation (McGrath et al., 2023). (Firat, 2023) described participants acknowledged the difficulties and obstacles that may occur from integrating AI in education while also highlighting the potential advantages, such as tailored learning experiences and the development of soft skills.

A wide range of ethical concerns are considered by using AI in education, including prejudice, safety, privacy, responsibility, justice, and the effects of AI systems on society. According to

(Fütterer et al., 2023), ChatGPT generated a lot of attention on Twitter, particularly the conversation included anything from cheating to more extensive educational options. Sentiment research, however, indicated conflicting opinions toward AI in education. Discussions about ChatGPT on social media usually touch on issues of efficiency, ethics, and productivity, which reflects the varied perspectives of early adopters of the AI technology (Mogavi et al., 2023). Meanwhile (McGrath et al., 2023) conclude that educators voiced doubts and anxieties over artificial intelligence (AI) in higher education, emphasizing issues with accountability, justice, and a lack of resources and expertise to integrate AI into lesson plans.

Studies on learner attitudes and perceptions about the employment of AI in learning settings have been conducted in the field of educational technology. For example, (Mogavi et al., 2023) state that **e**arly adopters' value ChatGPT's promise to democratize access to education, deliver quick feedback, and tailor learning experiences. Learners with special needs and those from varied backgrounds stand to gain the most from these features. According to (Chan, 2023), instructors and students alike have a favorable opinion of incorporating AI technology into higher education because they see their potential to improve teaching and learning results. In contrast to the average value they assigned to AI in general concluded that students thought ChatGPT was a useful tool for a variety of reasons (Bitzenbauer, 2023). While (Idroes et al., 2023) described students think that artificial intelligence (AI) can improve time management and safety in hazardous situations and help solve social problems in a variety of disciplines, including education, agriculture, and medical. Meanwhile (Valova et al., 2024) noted that students perceived ChatGPT as an effective tool for improving their educational experience; some even see it as a way to get information and support for their studies quickly and easily. Based on (Almaraz-López et al., 2023), students majoring in education, business management, economics, and management think AI will have a big impact on their careers and want to learn more about it. (Ngo, 2023) stated, university students thought highly of ChatGPT's learning application, citing advantages including time-saving, access to a variety of material, individualized instruction, and writing support.

Nonetheless, major obstacles to acceptance were also found to be worries about restrictions, dangers, privacy, and data security. (Almaraz-López et al., 2023) stated **s**tudents studying business management and economics are more concerned than students studying other subjects about the possibility of AI technologies in their sector replacing workers. While (Valova et al., 2024) conclude that the **s**tudents are worried about the dangers of relying too much on ChatGPT, such

as the possibility of biased information, academic dishonesty, and disinformation. The survey's findings show that there is a serious risk that students may accept generated information without conducting enough verification, which could result in problems like plagiarism, cheating, and academic fraud. Meanwhile (Idroes et al., 2023) note that students acknowledged the advantages of AI, but they also voiced concerns about job losses brought about by the technology, giving this belief an average value of 3.40. While (Chan, 2023) conclude that students' actions and ideas diverge; some use AI systems to cheat even if they think it is wrong, while others support the revolutionary potential of generative AI in education. (Ngo, 2023) stated students noted a number of obstacles to utilizing ChatGPT, including as uncertainty about the validity and dependability of the sources, proper citation, word substitution, and idiomatic usage. Although many master's degree students in computer science were aware of ChatGPT, they did not frequently utilize it for educational objectives, suggesting a disconnect between knowledge and real-world use (Singh et al., 2023). Students also voiced doubts regarding ChatGPT's beneficial effects on educational activities, highlighting the need for further guidance and instruction on the platform's proper usage in academic settings (Singh et al., 2023). Students noted that there could be risks related to ChatGPT, like academic fraud, a decline in critical thinking, and an excessive dependence on artificial intelligence. Students clearly expressed a need for more detailed instructions and education about when and how to utilize ChatGPT for educational purposes, showing that they want organized assistance in making the most of the tool (Singh et al., 2023).

It is evident from a summary of earlier research on artificial intelligence in education that the findings have nothing to do with the opinions of PolyCC students. The extent to which PolyCC students are utilizing AI tools is unclear, despite positive impressions and results of AI in other institutions. Understanding how PolyCC students view AI technologies is essential to staying up to date with developments in the field and improving teaching practices. Examine how students' perspectives and experiences with AI tools change over time, particularly for those who are using them for the first time, in order to comprehend the long-term advantages and effects of incorporating AI tools into the classroom. Research should aim to diversify the sample population to include a broader range of students from different academic backgrounds and educational levels to provide a more comprehensive understanding of the role of AI in PolyCC institution.

METHODOLOGY

Questionnaires (Petricini et al., 2023) consisting 21 questions measuring AI perceptions are distributed to eight (8) polytechnics and two (2) community colleges. Questionnaires contained two sections. Section 1 consisted Likert scale questions about familiarity and experiences with generative AI and ChatGPT. Section 2 contained Likert scale questions focusing with benefits and risks of using generative AI in higher education. Sixteen (16) questions are positive statement questions and five (5) are negative statements questions. Initially, reliability for all questions are tested. Result shows Cronbach's alpha coefficient is less than 0.7, thus it is required revised the questions and decision is made to remove all negative questions to increase reliability result.

Table 1 shows Reliability testing is conducted to positive questions and result for Cronbach's alpha coefficient is more than 0.7. This shows questions are reliable and valid for further analysis.

Table 1: Reliability Testing Result

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.799	0.790	16

Sample size of less than 10% is applied with the estimation of population more than 1000 students. This is because of researchers lack of time and resource to increase number of respondents.

Figure 1 shows distribution of respondents for each engineering, commerce, ICT and Others. 37.30% (94) commerce students participated in the research, follows by 36.51% (92) ICT students, 15.47% (39) from engineering students and 10.72% (27) from others. Total of respondents are 252.

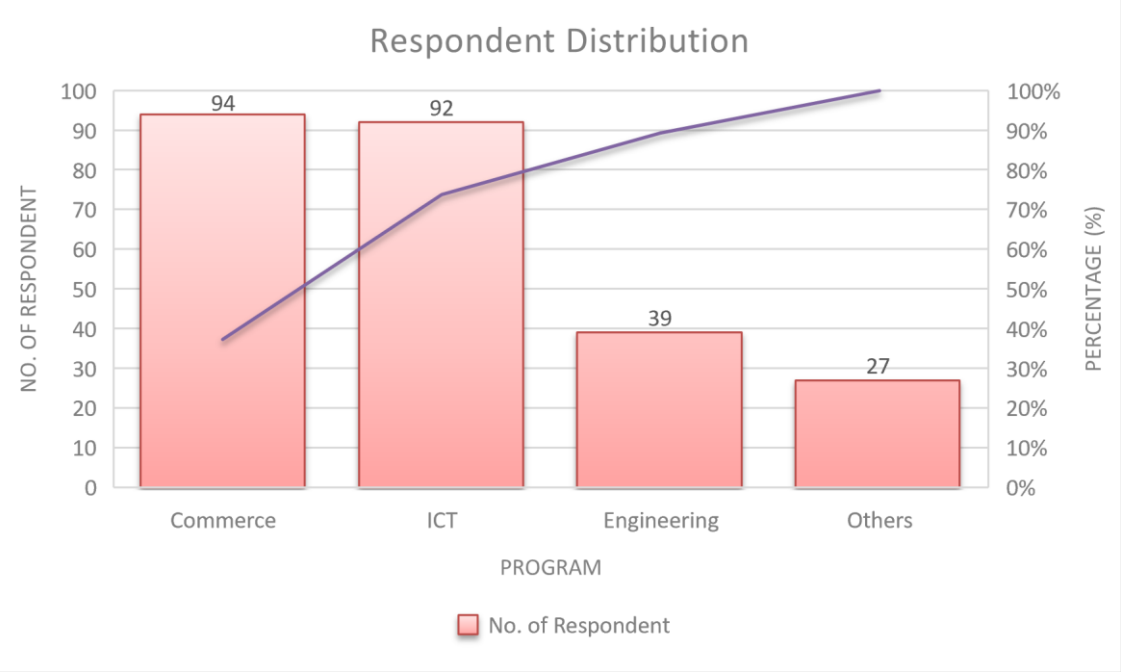

Figure 1: Respondent Distribution

RESULTS AND DISCUSSION

This research applied mean comparison analysis between variable for students' perception on awareness and attitude towards AI at different program. Average results for awareness in using AI generative tools especially ChatGPT for all questions are shown in Table 3.

Table 3: Average (mean) Result for Awareness and Attitude in Perception

No.	Question	Average (mean)	Perception
Q1	I am familiar with the concept of AI	1.079	Awareness
Q2	I am familiar with ChatGPT	3.770	
Q3	I have experience using ChatGPT	3.941	
Q4	My lecturers have addressed the use of AI especially ChatGPT and other text and image generation tools in my courses.	3.884	
Q5	My lecturers have integrated AI generators like ChatGPT in to their instruction.	3.302	
Q6	I plan to use ChatGPT or similar tools for my coursework in the future.	3.083	
Q7	I would be open to receiving instructions about how to use ChatGPT or similar tools.	3.500	
Q8	Students use of AI text generation tools to complete course is prevalent in higher education.	3.183	Attitude
Q9	Students use of AI text generation tools to complete coursework is inevitable.	3.504	

No.	Question	Average (mean)	Perception
Q10	Artificial intelligence has value in education.	2.969	
Q11	Students should not be restricted from using AI for coursework.	3.718	
Q12	The use of AI in education is very prevalent.	3.532	
Q13	AI is used in education for good and helpful reasons.	3.496	
Q14	Instructors use AI well in academic settings.	2.980	
Q15	I would feel confident knowing an instructor was using an AI created syllabus.	3.377	
Q16	I trust AI in grading my assignments and assessments for my courses instead of my instructor.	3.214	

Referring to mean results, it shown students are strongly disagree to familiarity with the concept of artificial intelligence with lowest score of 1.079, however they are aware with AI by having experience to use ChatGPT with highest mean score of 3.941. In terms of attitude, students disagree with artificial intelligence has value in education with mean score of 2.969, however they agree with the statement of the AI use in education should not be restricted with highest score of 3.718.

This result suggests activities to create more awareness towards AI to students are required for example webinar series, short courses or workshop with AI-tools usage conducted. This result suggests, students have some experience with using ChatGPT. However, interestingly students disagree with AI giving values to education contradict to agree that AI should not be restricted from being applied to coursework. It is suggested students are acknowledged with advantages of having AI but does not really understand AI values to their learning growth.

Table 4: Average (mean) Result for Perception at Different Programs

Perception	Program		N	Average (Mean)	Std. Deviation
Awareness	Information, Communication & Technology		92	3.304	0.469
	Engineering		39	3.337	0.534
	Commerce		94	3.104	0.577
	Others		27	3.190	0.555
Attitude	Information, Communication & Technology		92	3.368	0.410
	Engineering		39	3.422	0.477
	Commerce		94	3.241	0.448
	Others		27	3.379	0.532

Referring to Table 4, students undergo commerce program have lowest mean score for awareness and attitude towards AI tools and ChatGPT. However, students undergo engineering course have the highest mean score for awareness and attitude. Only slightly different of mean score calculated display students at different programs are aware with AI and have positive attitude towards AI in their learning institution.

These results show that, on average, the level of awareness and attitude towards AI tool and usage lean slightly skewed towards positive (agree) perception. AI tool usage in giving feedbacks or suggestions fast response to questions may impact to this result as stated by (Mogavi et al., 2023). Both awareness and attitude mean calculated to ICT, engineering, commerce and others show similar level of agreement to perception.

Researchers have performed one-way ANOVA to compare any significant result between programs and perception as shown in Table 5.

Table 5: ANOVA Result for Perception at Different Programs

Perception		Sig
Awareness	Between groups	**0.035
	Within Groups	
	Total	
Attitude	Between groups	0.101
	Within Groups	
	Total	

**p=0.05

Table 5 displayed there is significant results in students' awareness between different program with significant value is less than 0.05. However, there is no significant result for students' attitude between different values with significant value is more than 0.05.

Table 6: Multiple Comparison Between Program

Perception	**Program**		**Sig**
Awareness	Information, Communication & Technology	Engineering	0.988
		Commerce	*0.053
		Others	0.761
	Engineering	Information, Communication & Technology	0.988
		Commerce	0.101
		Others	0.688
	Commerce	Information, Communication & Technology	*0.053
		Engineering	0.101
		Others	0.881

	Others	Information, Communication & Technology	0.761
		Engineering	0.688
		Commerce	0.881
Attitude	Information, Communication & Technology	Engineering	0.925
		Commerce	0.217
		Others	1.000
	Engineering	Information, Communication & Technology	0.925
		Commerce	0.153
		Others	0.981
	Commerce	Information, Communication & Technology	0.217
		Engineering	0.153
		Commerce	0.499
	Others	Information, Communication & Technology	1.000
		Engineering	0.981
		Commerce	0.499

*p=0.1

Referring to Table 5 and 6, results shows significant value of $p>0.05$ and $p\leq0.1$ are calculated for ICT and Commerce for awareness, however there is no significant values calculated for attitude at any groups. This result show low assumption on perception at different program for AI perception. This also suggest students are aware to AI generative tools especially ChatGPT usage in classroom. Similar mean score calculated for attitude towards AI in classroom for different programs also suggested students are positive to AI usage in education.

This result show there is significant value for awareness in AI between ICT and Commerce but non-significant value for attitude. Results for engineering and others does not show any significant value between groups. Assumptions could be made by similar average results calculated for all questions expect familiarity in using AI with lowest score.

This research shows AI perception between ICT and commerce program reflects slightly different perception for students. The different may reflected by familiarity of using ChatGPT to assist in their courses or any related activities in the classroom.

CONCLUSION AND FUTURE WORKS

This research provides general result on PolyCC students perception with AI tools. In relation to efforts by Curriculum Department to design AI program for bachelor degree; may support to design policy to monitor ChatGPT or other AI generative tool application to students learning outcome. The advantages for having AI tool cannot be denied but the authenticity of the learning results provide by students needs to be detailed more carefully.

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NAVIGATING THE VIRTUAL LEARNING LANDSCAPE: CHALLENGES AND OPPORTUNITIES OF INTEGRATING VR TECHNOLOGY IN HIGHER EDUCATION

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ABSTRACT

Immersion Virtual Reality (VR) technology is a rapidly developing topic that has enormous potential applications in higher education. This paper examines the potential and difficulties that come with navigating the virtual learning environment in higher education. It explores VR's transformative potential to enhance teaching and learning processes while acknowledging other obstacles to wider acceptance, including technological ones, worries about the quality of the information, and ethical issues. VR provides chances for individualized education, group interactions, and hands-on learning despite these challenges. Teachers and educational institutions can use VR's revolutionary power to mold instructional excellence and equip students for success in an increasingly digital world by carefully negotiating these challenges. Aiming its insights for educators, policymakers, and academics looking to incorporate VR into higher education settings, this study adds to the conversation on immersive technology in education. The research was conducted in Politeknik METrO Tasek Gelugor (PMTG) where students, alumni and lecturers are respondents for quantitative data collection via a questionnaire. The finding provided information to assist relevant parties on considering VR technology as part of a new pedagogical approach for a better higher education quality.

Keywords: Virtual Reality (VR), Higher Education.

INTRODUCTION

Immersion Virtual Reality (VR) technology integration has become a captivating frontier in the ever-changing environment of higher education, presenting opportunities and challenges for educators and institutions alike. An in-depth analysis of the opportunities and problems associated with integrating VR technology into higher education institutions is done in this study as it sets out on a full exploration of the complex terrain of navigating the virtual learning landscape.

VR technology has been rapidly gaining popularity in a variety of industries over the past few years, and education is no different. VR is becoming more widely acknowledged as a powerful tool that can improve teaching and learning and reshaping traditional educational norms.

The integration of virtual reality technology into higher education environments is not without challenges, despite the technology's potentially revolutionary possibilities. Major challenges arise from technical limitations for limited resources institutions. High equipment costs and demanding system requirements often impede widespread adoption (Wu et al., 2013). To further enhance the integration of VR technologies into educational frameworks, considerable attention and continuous research are required due to issues over content quality, pedagogical effectiveness, and ethical considerations. In the end, virtual reality (VR) provides a route to immersive learning, influencing a future in which creative learning settings encourage student engagement and academic success.

LITERATURE REVIEW

VR technology presents numerous chances to improve teaching and learning in higher education. Through the use of virtual reality (VR) and immersive learning environments, students can connect theoretical knowledge with real-world applications. This enhances the educational process by promoting experiential learning and skill development (Freeman et al., 2017). The collaborative nature of VR platforms fosters interdisciplinary collaboration and cross-cultural exchanges, enriching the educational experience and preparing students for the demands of a globalized workforce (Wang et al., 2023). The main effect on increasing the VR-thinking was the immersive VR learning materials that the students could use during the preparation phase. These environments had a motivating and creativity-enhancing impact on the design of the VR environments.

A major challenge educator face in the classroom is delivering information that students find easy to understand. Most students may find it difficult to concentrate in class due to disinterest and shorter attention spans. Therefore, educators need to find an effective alternative method of teaching in order to gain students' motivation, attention and engagement, and no longer rely on traditional methods (Ahmad et al., 2019). Virtual reality also enables customized and flexible learning experiences that accommodate a variety of learning preferences and methods. Interactive

simulations and customizable content enable educators to meaningfully engage students, encouraging active learning and knowledge retention (Kulkarni & Goswami, 2021). Furthermore, virtual reality systems allow for collaborative learning experiences to transcend geographical limitations. In shared virtual environments, students can participate in immersive group projects and activities that develop the communication and cooperation skills necessary for success in the digital age (Huang, 2020). Empirical studies investigating the impact of VR-enhanced learning environments have highlighted the potential of immersive experiences to engage students and improve learning outcomes. For instance, a systematic review by Smith and Brown (2019) analyzed a wide range of empirical studies and found consistent evidence suggesting that VR technology enhances knowledge retention, improves problem-solving skills, and fosters deeper levels of engagement among students. Similarly, Johnson et al. (2020) explored the use of immersive learning environments in higher education, emphasizing the transformative potential of VR in facilitating experiential learning and providing students with opportunities to apply theoretical knowledge in practical contexts.

The use of Virtual Reality (VR) technology in education also attracts educators and scholars' attention to enhance students' learning experience and engagement (Radianti et al., 2019). Jin, Liu, Yarosh, Han, and Qian (2022) interviewed 18 students and faculty members at a university in the United States regarding the educational potential of virtual technology in higher education. The results showed that the participants believed virtual reality would provide several educational benefits. These advantages include enhancing social interaction, providing access to challenging learning environments, enhancing the understanding and retention of spatial and visual information, facilitating experiential learning, and engaging students with creative ideas. The application of virtual reality technology not only strengthens students' practical skills but also cultivates their innovative thinking and cross-cultural communication abilities, providing new possibilities for cultivating students with comprehensive development (Song Yan, 2023).

Despite the promise of VR technology, its integration in higher education is not without challenges. Technical barriers, including the high cost of VR hardware and software, limited accessibility, and infrastructure requirements, pose significant obstacles to widespread adoption and implementation (Clark & Johnson, 2021). Additionally, concerns about the pedagogical efficacy of VR-based instruction persist, as educators grapple with questions regarding the

alignment of immersive experiences with learning objectives and the integration of VR into existing curriculum frameworks (Garcia et al., 2022).

Lege, Ryan & Bonner, Euan. (2020) conclude in their research that digital delivery of lessons through video conferencing software now has become an educational norm. VR has now begun this transition from a fringe technology to a technology capable of being used in mainstream practice. The VR of 5 years ago is radically different from the VR of today, meaning that beliefs and common assumptions about the technology may in actuality be entirely false. Educators would do well to stay abreast of advances to the technology and avoid dismissing VR as a gadget for only the "tech teachers." VR has matured to a point where it is not only theoretically useful for educational purposes but has clear practical applications.

METHODOLOGY

This study employed a research methodology with the goal of providing important insights into the Virtual Reality challenges and opportunities to integrate in a higher education environment. This survey research used a quantitative approach to analyze data in order to provide readers a comprehensive understanding of the topic. The questionnaire instrument was developed based on previous studies (Salameen et al., 2023, Lege, Ryan & Bonner, Euan. 2020). Questionnaires with the purpose of collecting quantitative data were sent to every respondent. Purposive sampling was used in the sampling process to choose participants from a range of demographic categories, including 90 students and alumni from Diploma in Video and Film Studies and 7 lecturers from Academic Department (Design and Visual Communication) in PMTG ($n=97$). Lecturers and students were chosen for data collection and acknowledged their willingness to participate in the study voluntarily and provided consent, knowing their information were used anonymously. Descriptive statistics, analysis of the overall mean and standard deviation methods were used in the quantitative analysis of the data gathered. Voluntary participation, informed consent, confidentiality, and a clear explanation of participant rights and data handling procedures are among the ethical factors that were taken into consideration.

RESULT AND DISCUSSION

The survey consisted of 12 quantitative Likert-scale questions with four levels of agreement, ranging from strongly disagree (1) to strongly agree (4) (see Table 1). The Likert-scale questions provide information about using virtual reality as a learning tool and the value students perceived

in virtual reality. The instruments were implemented through Google Forms. The questionnaire consisted of three sections:

a) Part A: Demographics (name, age, and gender).

b) Part B: Virtual Reality opportunities to integrate in a higher education environment. The details of measured items as described in Table 1.

c) Part C: Virtual Reality challenges to integrate in a higher education environment. The details of measured items as described in Table 2.

All 97 respondents were requested to respond to the close-ended questionnaire by choosing one option from the four-point Likert scale: 1) strongly disagree, 2) disagree, 3) agree, and 4) strongly agree. In other words, the highest point is 4 and the lowest point is 1 (Nee & Yunus, 2020). Data collection items were simplified so that all participants could understand and respond. Findings for this questionnaire about the Virtual Reality challenges and opportunities to integrate in a higher education environment disclosed positive feedback from the participants as reported in Table 1 and Table 2.

Table 1: Summary of the Virtual Reality opportunities to integrate in a higher education environment.

Question	Sub Question	SD	D	A	SA
Opportunities to integrate Virtual Reality (VR) in a higher education environment.	The process of learning using this new Virtual Reality (VR) Teaching & Learning method helps enhance students' engagement and motivation to learn	4%	7%	60%	29%
	Virtual Reality (VR) integration in Teaching & Learning encourages creativity and gets students equipped with emerging technologies	4%	7%	61%	28%
	Virtual Reality (VR) provides cooperative learning opportunities that develop communication and teamwork skills.	2%	15%	59%	24%

	Virtual Reality (VR) simulations provide safe, realistic environments for practicing real-world scenarios	4%	4%	47%	44%
	Utilizing Virtual Reality (VR) technology may improve learning outcomes compared to traditional methods.	3%	14%	49%	33%

SD=Strongly Disagree, D= Disagree, D= Agree, SA=Strongly Agree

From the data shown in Table 1, 58 respondents (60%) agreed and 28 (29%) respondents strongly agreed that the process of learning using this new Virtual Reality (VR) Teaching & Learning method helps enhance students' engagement and motivation to learn. A total of 59 respondents (61%) agreed and 27 (28%) respondents strongly agreed that VR integration in Teaching & Learning encourages creativity and gets students equipped with emerging technologies and 57 respondents (59%) agreed and 23 (24%) respondents strongly agreed that VR provides cooperative learning opportunities that develop communication and teamwork skills. A total of 46 respondents (47%) agreed and 43 (44%) respondents strongly agreed that VR simulations provide safe, realistic environments for practicing real-world scenarios and 48 respondents (49%) agreed and 32 (33%) respondents strongly agreed that Utilizing VR technology may improve learning outcomes compared to traditional methods.

Table 2: Summary of the Virtual Reality challenges to integrate in a higher education environment.

Question	Sub Question	SD	D	A	SA
Challenges to integrate Virtual Reality (VR) in a higher education environment.	I find Virtual Reality (VR) technology is easy to use	3%	6%	56%	35%
	Institutions should have sufficient technological resources available to enable the integration of VR in education.	4%	9%	56%	31%
	Virtual Reality (VR) technology integration in higher education has more advantages than disadvantages.	4%	8%	53%	35%

Question	Sub Question	SD	D	A	SA
	Virtual Reality (VR) is more effective than traditional methods in delivering educational content	2%	4%	59%	35%
	There is sufficient content available to support Virtual Reality (VR)-based learning activities in our field of study.	2%	10%	61%	27%
	There are adequate technical resources available to support Virtual Reality (VR) integration in our institution	2%	13%	55%	30%
	I believe Virtual Reality (VR) integration in higher education will significantly expand in the next 5-10 years.	3%	4%	52%	41%

SD=Strongly Disagree, D= Disagree, D= Agree, SA=Strongly Agree

Based on the data shown in Table 2, 54 respondents (56%) agreed and 34 (35%) respondents strongly agreed that they find Virtual Reality (VR) technology is easy to use and 54 respondents (56%) agreed and 30 (31%) respondents strongly agreed that institutions should have sufficient technological resources available to enable the integration of VR in education. A total of 51 respondents (53%) agreed and 34 (35%) respondents strongly agreed that VR technology integration in higher education has more advantages than disadvantages with 57 respondents (59%) agreed and 34 (35%) respondents strongly agreed that VR is more effective than traditional methods in delivering educational content. There were 59 respondents (61%) agreed and 26 (27%) respondents strongly agreed that there is sufficient content available to support VR-based learning activities in our field of study. The questionnaire showed 53 respondents (55%) agreed and 29 (30%) respondents strongly agreed that there are adequate technical resources available to support VR integration in our institution and 50 respondents (52%) agreed and 40 (41%) respondents strongly agreed that they believe VR integration in higher education will significantly expand in the next 5-10 years.

Table 3: Summary on mean and the standard deviation of the scoring was based on the 4 Likert-scale ratings.

Question	Sub Question	M	SD
Opportunities to integrate Virtual Reality (VR) in a higher education environment.	The process of learning using this new Virtual Reality (VR) Teaching & Learning method help enhances students engagement and motivation to learn	3.14	0.72
	Virtual Reality (VR) integration in Teaching & Learning encourages creativity and gets students equipped with emerging technologies	3.14	0.72
	Virtual Reality (VR) provides cooperative learning opportunities that develop communication and teamwork skills.	3.04	0.69
	Virtual Reality (VR) simulations provide safe, realistic environments for practicing real-world scenario	3.33	0.75
	Utilizing Virtual Reality (VR) technology may improve learning outcomes compared to traditional methods.	3.13	0.77
Challenges to integrate Virtual Reality (VR) in a higher education environment.	I find Virtual Reality (VR) technology is easy to use	3.23	0.70
	Institutions should have sufficient technological resources available to enable the integration of VR in education.	3.14	0.75
	Virtual Reality (VR) technology integration in higher education has more advantages than disadvantages.	3.19	0.76
	Virtual Reality (VR) is more effective than traditional methods in delivering educational content	3.27	0.64
	There is sufficient content available to support Virtual Reality (VR)-based learning activities in our field of study.	3.13	0.67
	There are adequate technical resources available to support Virtual Reality (VR) integration in our institution	3.13	0.71
	I believe Virtual Reality (VR) integration in higher education will significantly expand in the next 5-10 years.	3.35	0.75

M=Means, SD= Standard Deviation

Based on the four Likert-scale assessments of the 12 total items (see Table 1 and Table 2), Table 3 reports the mean and standard deviation of the scoring. Descriptive statistics such as mean and

standard deviation were used where mean values of all attitude aspects were averaged to get the overall attitude (Mazana et al., 2019).

The means and standard deviations for responses to the opportunities to integrate Virtual Reality (VR) in a higher education environment were computed. The respondent most

favorably agreed that the VR simulations provide safe, realistic environments for practicing real-world scenarios (M=3.33, SD=0.75), followed by the next rank which agreed that the process of learning using this new VR teaching and learning method helps enhance students' engagement and motivation to learn (M=3.14, SD=0.72). The findings aligned with the findings of previous studies that showed that VR technology has a significant positive impact on student engagement and motivation. (Kazu, Ibrahim & Kuvvetli, 2023). The respondents responded least opportunities for VR to provide cooperative learning opportunities that develop communication and teamwork skills. (M=3.04, SD=0.69). The majority of respondents mostly believed that VR integration in higher education will significantly expand in the next 5-10 years (M=3.35, SD=0.75) while least agreed to both challenges on sufficient content available to support VR-based learning activities in their field of study (M=3.13, SD=0.67) and also adequate technical resources available to support Virtual Reality (VR) integration in the institution (M=3.13, SD=0.71) indicating that they still did not experience organizational and technical support to use virtual technology.

Overall, the results reflect that participants showed their positive feedback towards VR in a way of teaching and learning approach. Feedback from participants also showed that VR could be beneficial for teaching and learning. Educators can expose and encourage their students to create learning content together via producing short films in VR as part of their learning activities. Students perceived to be more focused, able to memorize content in a relaxing way during teaching and learning time. Some participants also raised their views about the limited time to experience and explore the VR settings as they may need to share one device per group. Hence, improving the quality of students is a continuous effort to improve the ability of students by exploring new fields to produce knowledgeable and trained human capital to face the current changes that are more challenging. The use of multimedia and virtual reality technology in education can lead to more effective teaching and improved student performance.

CONCLUSION

In conclusion, there are advantages and disadvantages to integrating virtual reality (VR) technology into higher education. Considering technological limitations and moral concerns, the study has demonstrated the revolutionary potential of virtual reality to enhance teaching and learning environments. In order to provide relevant learning experiences and pedagogical innovation in the digital age, joint efforts and continuous research are essential for moving forward. Educators, instructional designers, and technology specialists must work together to address issues related to content quality and alignment with education goals. Through careful consideration of these issues and the utilization of virtual reality's transformative power, educational institutions and instructors can open up new creative directions and improve student engagement. Learning through VR is exciting and accommodates different kinds of learning scenarios to the students and motivates them to explore more about the content afterwards. For educators, it will give an idea to expand their knowledge in creative ways for teaching and learning purposes and no longer rely on traditional methods. They were able to maintain the positive benefits of VR, such as motivation and engagement, while still achieving the same learning outcomes when they included summary activities in between VR sessions. The difficulties, which range from pedagogical and content issues to technical and resource limitations, highlight the necessity of careful planning and execution. Innovative solutions are needed to overcome technical obstacles like expensive systems and high costs in order to guarantee equal access to VR-enhanced learning opportunities. Planning educational experiences requires careful consideration of both the cognitive demands placed on the learner and the learning outcomes. As a result, immersive learning experiences will be at the spotlight of pedagogical excellence in the future, preparing students for academic success in a rapidly changing digital environment.

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HYBRID SOLAR AIR CONDITIONER OPTIMIZATION

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ABSTRACT

In hot countries, such as Malaysia, a significant portion of electric energy consumption goes to running compression cycle air conditioning units. For individuals and businesses wishing to reduce the amount of money spent on air conditioning, there are relatively few options, apart from improving the energy efficiency of the building. One option is to install solar photovoltaic panels to provide electric power for the air conditioning units. One of the synergies of solar-powered air conditioning systems is that sunlight is generally the original source of most heat in a building, and is also the source of power for the air conditioning system. Thus, when there is heat, there is also power available to combat that heat. Additionally, the solar panels are typically mounted on the roof of the building being cooled, thereby shading it, and helping to reduce somewhat the peak heating.

Keywords : *solar panel, air conditioning, energy efficiency*

INTRODUCTION

Cooling system, namely air-conditioning unit, takes major part of household energy expenditure. In a survey done, several questions were asked relating to house architecture, air conditioning and the monthly electric bill. A strong correlation was noticed between the monthly electric bill number and the number of air conditioning units in a house. As shown in Figure 1, the average monthly bill for residences in Malaysia is RM 69 for houses without air conditioning units.

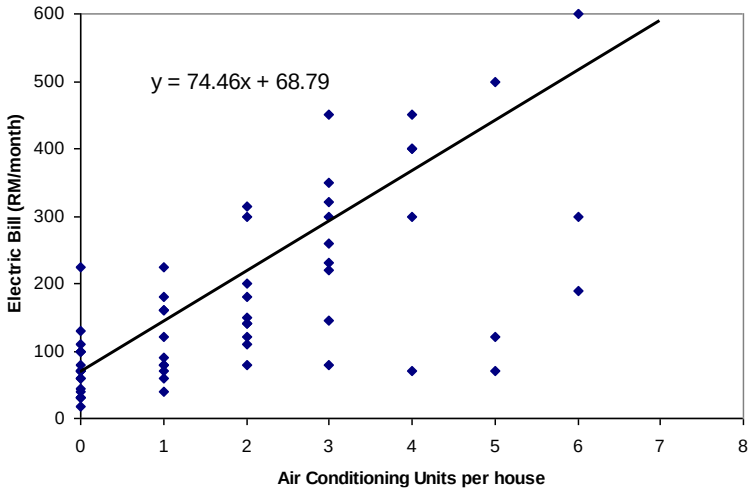

Figure 1 : Monthly residential electric bill versus number of air conditioning units in the house.

For each air con unit installed in the house the average monthly bill increases by RM 75. On average, the houses surveyed had about 2 units of 1 hp air conditioning units installed, resulting in a monthly electric bill of RM 218, about 68% increase in the monthly bill of which goes towards powering the air conditioning units. While the houses surveyed in this study may not represent all of Malaysia exactly, it serves as an order of magnitude indicator of the economic problem faced due to the proliferation of compression-cycle air conditioning units (Liu et al., 2013).

The average household size from the survey was 5 members per household, thus with a total population of 30 million, we can calculate that there are approximately 6 million houses in Malaysia, each spending about RM 75 per month per air conditioning unit. This results in a total annual expenditure of over RM 10 billion per year for the whole country. With an average residential electricity price of 0.30 RM/kWh, we can calculate the total annual electricity usage for residential air conditioning of 32 billion kWh. Taking the emissions factor of 0.645 kg CO2/kWh (Malaysian Green Technology Corporation, 2017) we get a total of 21 million tons of CO2 emitted annually attributable to residential air conditioning. With a total annual emission of around 300 million tons of CO2, residential air conditioning represents about 7% of the total emissions of the country (World Resources Institute, 2017).

One of the alternatives to the conventional air conditioning unit is a solar air conditioning system that uses solar photovoltaics to power the air conditioning unit. There are many different configurations of solar air conditioning systems exist including:

a) **Standalone DC** – Where the solar power system drives the air conditioning unit directly from the solar panels and/or a battery bank (Kumar et al., 2020).
b) **Standalone AC** – Where the solar power system drives the air conditioning unit via a DC-AC Inverter. Generally, this will require at least some batteries for compressor startup (Huang et al., 2016).
c) **Hybrid** – Where the air conditioning unit can either be driven by the solar power system, or the mains voltage (Chen et al., 2007).
d) **Net Metering** – Where the solar power is pumped back onto the grid, reducing the electric bill. The air conditioning unit still takes grid power to run (Wen et al., 2023).

Each of these systems has their advantages and disadvantages. The standalone DC system is primarily used for off-grid applications. It has the advantage of theoretically being more efficient than the standalone AC system, as it excludes the inverter. The DC air conditioning is much less common, therefore tends to be more expensive than AC units. The standalone AC system is the same as the DC system, but uses on inverter to convert the DC voltage (from the battery or solar panel) to AC, and thus can use the more common, and less expensive, AC motor.

The Hybrid system is basically the same as the stand-alone AC system, where in times of darkness where there is still a need for air conditioning the system is run from the grid power. It requires a relatively simple switching unit to select solar/battery/inverter power or line voltage (Nejabatkhah & Li, 2015). If most of the air conditioning usage corresponds to times of strong sunlight, the battery capacity can potentially be reduced. While it is possible for DC systems to be run from line voltage in times of no solar power, it is much more common with AC systems.

Net metering systems can function like hybrid systems, and do not require battery systems, but they do require a rather expensive "reverse tariff" inverter/meter. Also as the system is grid connected it requires certified installation, significantly increasing the price. The fundamental disadvantage of this system, however, is that the "feed in tariff" for electricity (i.e., how much the power company pays the user for power supplied to the utility from the user) is often much less than the cost of electricity delivered by the utility to the consumer. For example in Malaysia the "feed in tariff" is 17sen/kWh, where as residential electricity tariff is 30 sen/kWh and industrial tariff is 50sen/kWh. Increasing the feed in tariff is one of the ways the government could actively encourage the proliferation of clean energy technologies (Grover & Daniels, 2017).

We will be taking a closer look at the DC Standalone system used as a hybrid (grid power backup) and an optimized AC hybrid system. Figure 2 gives the main components of a hypothetical 1 horsepower (750W) air conditioning system.

System	Solar Panel Power (W)	Batteries	Inverter Peak Power (W)	Switch	Air Con Voltage	Air Con Current (A)
Conventional	None	None	None	NA	240 AC	3
Standalone DC	750	48V 150Ah	None	NA	48 DC	15
Standalone AC	800	48V 160Ah	4000	NA	240 AC	3
Hybrid AC Solar	800	48V 160Ah	4000	AC	240 AC	3
Net Metering	1000*	None	1000*	NA	240 AC	3
Hybrid DC	750	48V 7Ah	None	DC	48 DC	15
Hybrid Solar Optimized	800	48V 7Ah	1000	AC	240 AC	3

Figure 2 : A comparison of the main components in various air conditioning systems

* On Net Metering systems the power is typically much higher as it isn't cost-effective to install a small system, but we'll use these numbers for comparison. Also, the inverter will generally be a rather expensive unit as it must meet the grid power quality requirements.

The conventional system consists of a typical 1hp air con unit running from 240V AC, and drawing about 3A. This system requires no solar panel, battery backup, inverter or power switch-over gear, and is our "baseline" case for comparison. The standalone DC system consists of a solar 750W PV panel charging a 48V, 150Ah battery and/or directly running a special 48V DC air con unit. At 750W the current draw from the battery pack will be about 15A. If the battery is a lead acid type, then the maximum discharge would be limited to about 40% of the Ah capacity, or about 60Ah, giving about 4 hours of air con usage per full charge. Removing more charge from the battery than this will severely limit the battery's lifespan.

The standalone AC system uses a slightly higher power solar panel and battery, as it has to power the AC air con unit via an inverter. The Hybrid AC unit is the same as the standalone AC, except it also has a power switch over the relay allowing the air con unit to run from either line voltage or the solar/battery/inverter.

The net metering system consists of a solar panel, and a line synchronizing "charge reversing" meter, allowing power from the solar panel to be pumped back onto the grid. This theoretically does not require battery backup, as the solar power is "stored" on the grid.

The Hybrid DC system is the same as the stand-alone DC system, but with a smaller battery pack, and an AC switch-over unit allowing operation from a DC power supply powered by line voltage. When the air con is needed and the sun is shining, the DC air con will operate directly from the solar panel. If a cloud momentarily interrupts the panel's power, it will operate from the batteries. If the solar power interruption lasts longer than a few minutes, the air con unit will be switched over to the DC power supply, fed from line voltage. The cost of the batteries will be significantly less, but it will require a high current (15A) AC-DC power supply and switchover relay. The "optimized" Hybrid AC system is exactly the same as the hybrid AC system, except that the battery capacity has been reduced, and the inverter peak power is also reduced. When starting an AC induction motor, as found in AC air con units, the startup current is much higher than the operating current, perhaps six times higher. This requires the inverter to be greatly oversized in order to allow startup of the air con unit from the inverter. With the "optimized" hybrid AC system the air con unit will always be started on line voltage, then switched over to the inverter once it is running, thereby allowing use of a much lower peak power unit. Also, as with the hybrid DC unit, the batteries are only intended for temporary backup power, such as during temporary shading from a cloud.

Each of these systems will have a different cost, Figure 3, based on its components and installation. We are assuming that the solar panel installation will be approximately the same for each system, and they are all very close in terms of power. Additionally, the electronic gear and wiring will be relatively simple, with perhaps the conventional system coming out the cheapest as it requires nothing more than a standard high current socket. As mentioned that net metering systems will be somewhat more expensive owing to the requirements for grid feed in connection and certified installers (Ostia et al., 2017; Alhamad, 2018). While there may be some differences between the

stated numbers, and what can be found in the field, we will use these numbers for approximate costing analysis.

System	Solar Panel	Batteries	Inverter	Switch	Air Con	Total (RM)
Conventional	-	None	-	-	1000	1000
Standalone DC	1000	1800	-	-	1250	4050
Standalone AC	1100	2000	500	-	1000	4600
Hybrid AC Solar	1100	2000	500	50	1000	4650
Net Metering	1500	-	2500	-	1000	5000
Hybrid DC	1000	200	-	100	1250	2550
Hybrid Solar Optimized	1100	200	250	-	1000	2550

Figure 3 : Approximate costs of the various 1hp air con systems (in RM)

According to this analysis the conventional system is clearly the lowest cost to install. The "hybrid" systems with smaller batteries have a cost advantage over the systems with the larger batteries, and the net metering system is the most expensive (Ordóñez et al., 2022). A more important question is what are the long-term costs and resulting ROIs of the various systems.

SUN POWER AND COOLING REQUIREMENTS OF DIFFERENT BUILDINGS

Solar radiation is maximum around noon when the sun is highest in the sky (Rich et al., 1993). Photovoltaic (PV) solar systems have their peak power production within a few hours of solar noon. The ambient outside temperature, however, does not follow this solar radiation curve exactly, as the solar radiation continually heats the environment, resulting in higher temperatures in the afternoon. Additionally, building temperatures tend to further lag the ambient temperature as they are generally insulated to some extent, and may have a fairly high thermal mass (Garrido et al., 2014).

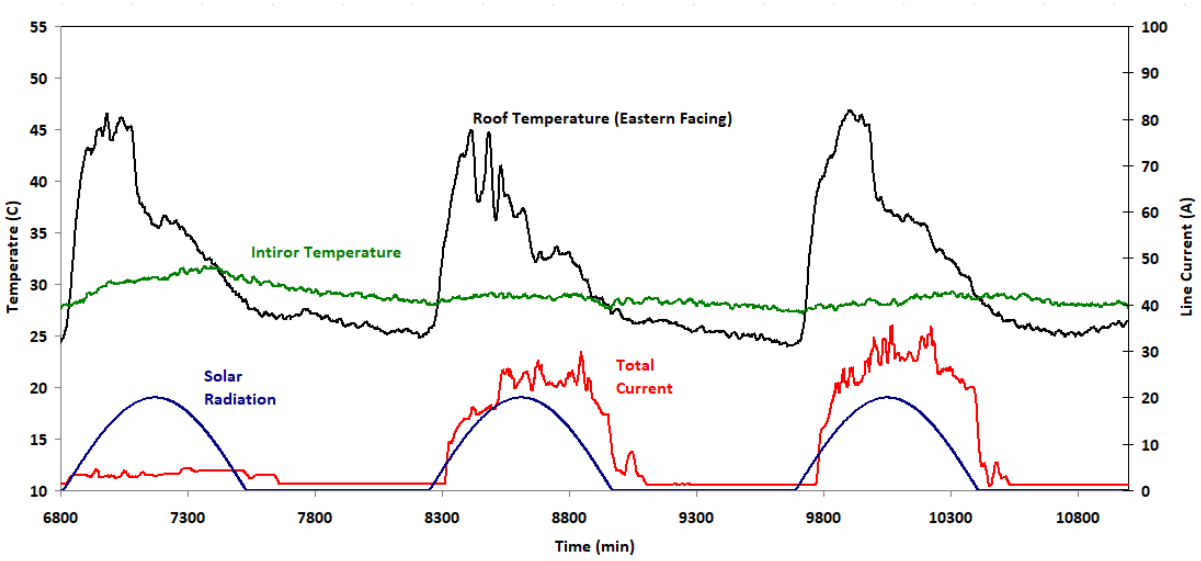

Figure 4 : Roof temperature (east facing half), interior temperature, and total current draw of the Focus Applied Technologies head quarters in Penang, Malaysia. Also shown is the theoretical solar radiation on a horizontal surface (unit less).

Figure 4 shows the interior and roof temperatures of a well insulated office building, along with the total current consumed by the building, and the theoretical solar radiation hitting a horizontal surface for reference. The data covers three days of operation from Sunday morning, to Tuesday evening. The roof temperature is mounted on the eastern facing surface of an "A-frame" roof, thus the roof temperature is highest just before noon, then cools off, following the ambient temperature after that. On the first day air conditioning is not being used, and the interior temperature reaches a maximum of about 31C just before sunset (i.e., when the solar radiation curve hits zero). As soon as the outside temperature goes below the interior temperature, the interior temperature begins dropping. In can also be noticed that the interior temperature is approximately 3C hotter than the outside temperature just before sunrise.

Office workers enter the building an hour or so after sunrise, turning on lights and other equipment and air conditioning units, as evidenced by the sharp rise in the building's current consumption. Most of the current is utilized for air conditioning, so as the building heat loading rises, the current also rises. The current load can be seen to lag the solar radiation, with relatively high current consumption until just after sunset.

The data for Monday (the center section) shows intermittent drops in the roof temperature caused by clouds. On this partly cloudy day the current consumption of the air conditioning units was significantly less than Tuesday, which was mostly clear.

As shown above office buildings will have a cooling demand that lags the solar irradiation by a couple of hours because the building is initially fairly cool in the morning, while, in the absence of air conditioning, it tends to remain fairly warm for several hours after sunset (Tan & Fwa, 1992). Houses, if unoccupied during the day, will tend to require air conditioning much later in the day, when the occupants begin arriving home from work or school. An unattended house will achieve its peak temperature right around sunset, much like the office above did on the first day shown.

BUILDING ANALYSIS

We will analyze two different building scenarios for how well each of the solar air conditioning systems will satisfy their requirements, namely an office building where the air conditioning is needed from 10:00 to 18:00, and a household where cooling power is required from 18:00 to 22:00 in the evening. For the PV power we will assume that solar power is relatively abundant within 3 hours of solar noon, that is from 09:00 to 15:00.

For the "home" solar systems battery storage will be required for work/school days when occupants are out of the house all day long. The hybrid systems won't be totally useless, as they can be used, basically free of charge, during the peak solar hours to cool the unoccupied house. If it is well insulated and has a fairly high thermal mass, this will reduce the late afternoon interior temperatures by a few degrees: not enough for complete comfort, but it will reduce the subsequent air con demand by "pre-cooling" the house.

The office system, on the other hand, can take advantage of solar power for most of its cooling needs throughout the day. Battery or line operation of the air con unit will only be required for the last few hours of operation, i.e., from 15:00 to 18:00.

For the home systems the sun is can power the large battery or net metering system for 4.5 hours per day. The battery systems as designed can be used for the full 4 hour per day AC usage on weekdays, but can only supply half of the required air con needs on the weekend. The micro-hybrid systems will be idle during the week because their small battery packs are insufficient to store significant power, but they are almost fully utilized on the weekend, where 4.25 hours of solar power overlap the required air con time. Net metering systems will generate whenever the sun is shining, and either be reverse charged to the power company, or displace the current consumption of a single air con unit. Adding up all the power company sullied current (minus the

reverse charged power of the net metering system) we come up with the annual savings for the various systems in a residential setting as shown in Figure 5.

System Savings	HOME	OFFICE
Standalone DC	420	562.5
Standalone AC	420	562.5
Hybrid AC Solar	420	562.5
Net Metering	310	607.75
Hybrid DC	97.5	531.25
U-Hybrid AC	97.5	531.25

Figure 5 : Electric bill savings (RM/year) compared with conventional air conditioning from the various systems

As can be seen, the stand-alone systems save the most for both systems as they can take advantage of several hours of sun per day. The micro-hybrid systems don't save much for the home system, as they are only useful on the weekends due to lack of storage capacity. The net metering system falls in between the large battery and small battery systems. For office use the net metering system saves slightly more than the standalone systems, but as there is a large overlap between the solar power available and the required air conditioning, the micro-hybrid systems now save almost as much as the large battery systems.

If we now take the incremental cost of the systems (their cost minus the cost of the conventional system) and divide this be the annual savings, we can calculate the Return On Investment time in years, as shown in Figure 6.

System ROI	HOME	OFFICE
Standalone DC	7.3	5.4
Standalone AC	8.6	6.4
Hybrid AC Solar	8.7	6.5
Net Metering	12.9	6.6
Hybrid DC	15.9	2.9
Hybrid Solar Opt	15.9	2.9

Figure 6 : Time to Return On Investment (years) of the systems compared with conventional air con

For the home system, as expected, the large battery systems have the shortest ROI, however it is still fairly long, 7 to 9 years. The net metering system comes in with a fairly long ROI of almost 13 years, while the micro-hybrid systems have the longest ROI as they can not support the majority of the air con demand due to the schedule. For the office system, in contract, the hybrid systems

give the fastest return on investment of less than three years. The large battery systems have ROIs only slightly better than the net metering system.

The "micro-hybrid" systems will be a good match for any setting where the air conditioning needs significantly overlap the solar power, such as offices, retail outlets and factories. For systems where the air con requirements deviates from the solar power generation hours, more batteries will be required, driving the cost of the system up, but improving the ROI compared to the micro-hybrid systems.

Another interesting result of this analysis is that the net metering system results in very long return on investment times for residences, partially because of the lower residential electric tariff, and partially because of the offset between the solar power production and air con power need. Even in the office setting the net metering system wound up with a fairly long ROI despite the high electrical tariff. This highlights the fact that the current net metering systems are exceptionally expensive. This is not a case of supply and demand, or the actual cost of the hardware so much as it relates to the increase in the cost of both parts and installation due to the "official" nature of net metering systems, and the low electric power buy back tariff. The next step in this work will be to assemble each of the various systems and test them long term to refine the cost and ROI predictions, as well as investigate their reliability

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THE OPERABILITY STUDY OF CUTTING BLADE USED ON THE LEAF SHREDDING MACHINE

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ABSTRACT

Generally, trees drop dry leaves according to a certain time and season. Usually, it will be collected and disposed of in a final landfill or simply burnt. According to the EPA, open burning will produce harmful particles and hydrocarbons. So, it has recommended a recycling program where dry leaves and organic waste are converted into organic fertilizers through the composting process. But, naturally, leaves can only decay within 1-6 months. So, machines are used to shred leaves from large or medium size to small or fine pieces. Thus, a shredder that uses an elongated hexagon-shaped blade only needs 30 minutes to crush dry leaves compared to 6 months for the conventional method. The presence of such blades in the developed machine has accelerated the process of crushing leaves by cutting, shearing and using impact force every time the leaf collides with the drum wall. With that, the period to turn dry leaves into compost can be shortened tens of times. The size of the pieces produced is around 6 mm to 8 mm and close to the size of previous research.

***Keywords**: Blade, Shredding, Effectiveness*

INTRODUCTION

Malaysia is blessed with very fertile soil and a good climate thus creating the best environment for the growth and reproduction of flora and fauna. Such a situation also leads to the existence of a more shady and cooler surrounding. Usually, trees will drop dry leaves and other rotten parts at certain times and seasons. Those wastes were collected and disposed of at the final disposal site. In addition, dry leaves are also collected and then burned until they become ashes. In the opinion of some people, the said method is easy and quick to clean piles of leaves, although the method not only causes air pollution but also brings various other problems such as the spread of smoke that disturbs other people which can ultimately affect a person's health.

The number of trees that are too dense in one area can cause other problems if not managed properly and systematically. Trees that drop dry leaves simultaneously, for example in the dry season, can have a bad effect and disfigure the surroundings. Traditional dry leaf management requires a lot of labor and a long process. In the Seberang Perai Polytechnic campus and Riau Islamic University (Syawaldi, 2019), many trees are planted and almost every area of the campus is filled with dry fallen leaves. Dry leaves are collected manually and bagged before being sent to the landfill. However, as per (Oladejo et al., 2020) and (Pavankumar et al., 2018), burying organic waste in landfills also faces major problems such as site location and size limitation. According to the EPA (Eastern Research Group & Area Sources Committee, 2001), burning leaves in open areas will produce particles and hydrocarbons that contain some toxic and carcinogenic compounds that eventually cause cancer.

In mitigating this issue, a suggestion from the EPA should be given kind consideration. It has recommended a recycling program by which dry leaves and organic waste are converted into organic fertilizer through the composting process. It is well known that composting is the safest, best and most environmentally friendly method. The use of compost in agriculture can improve soil structure and supply the best nutrition to the plants. As per (Khoironi et al., 2020) and (Kumar and Kumar, 2015), compost is an organic fertilizer resulting from a biological process by the activity of decomposer microorganisms (bacteria and worms) in decomposing or breaking down organic matter into humus. All materials containing carbon and nitrogen, such as animal waste, domestic waste, and agricultural waste can be composted. Composting allows leaves and other organic matter to break down naturally, disposing of them without putting foul odors into the air.

However, the composting process would take a long period, so it is necessary to design and build machinery to shred dry leaves effectively. Naturally, the leaves can rot within 1-6 months, depending on the type and condition of the leaves. Thinner, wetter leaves will usually rot faster than thicker, drier ones. In general, the machine is used to shred leaves from large or medium sizes into small or fine pieces or flakes eventually it can be easily decomposed into organic fertilizer (Sreenivas et al., 2017), (Syawaldi, 2019) and (Pavankumar et al., 2018). Traditionally, dry leaves were parted into pieces by putting them in a woven bag and rolling over them with a bullock cart or simply thrashing them directly on the ground. The smaller-size waste will decompose faster than the larger-size waste since shredding the leaves into small flakes would increase the sectional area per volume of leaves and finally boost aerobic

degradation activities (Ganesh et al., 2017). Thus, this study focuses on the most suitable mechanism to crush the dry leaves to make compost.

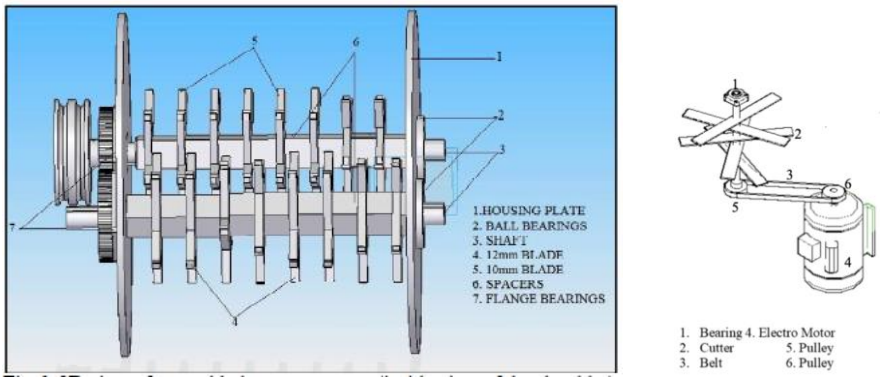
LITERATURE REVIEW

Given the urgent need for effective management of dry leaves, many parties have come up with various inventions and innovations regarding how to crush the leaves into flakes before entering the composting process. (Khoironi et al., 2020) has developed a leaf shredding machine driven by an electric motor, with the addition of a 7 mm leaf filtering system to facilitate the composting process. As in Figure 1(a) and 1(b), the design uses knife-type blades arranged horizontally apart at 5 different locations. The small and even shearing products allow the process of decomposition into organic fertilizers to be easier and more efficient, thereby shortening the period of fertilizer production. The size of the flakes obtained is around 6.3 mm.

(a) (b)

Figure 1: (a) Shredding blades used and (b) final product of flakes

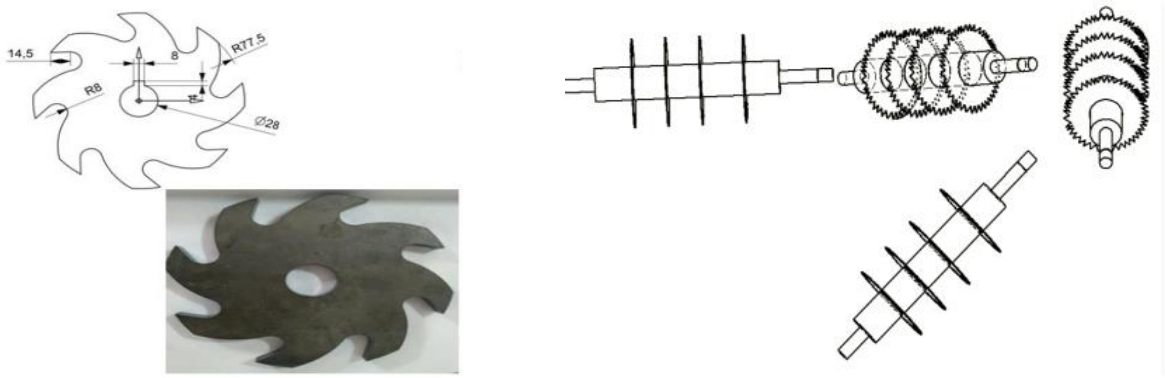
(Ganesh et al., 2017) identified that two forces were acting on the cutter blades which are tension force and shear force. (Sreenivas et al., 2017) built a shredding machine for agricultural waste by which two sets of cutters, of different sizes were positioned on separate shafts for crushing the agricultural waste as in Figure 2(a) below.



(a) (b)

Figure 2: Shredding blades (a) arranged horizontally and (b) arranged vertically

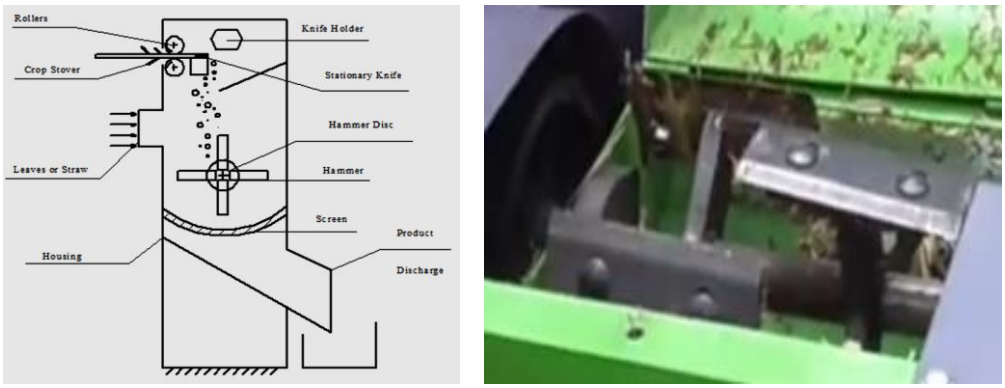
Meanwhile (Syawaldi, 2019) built a dry lead shredder with vertical rotating blades. There were 10 blades positioned at three different heights as in Figure 2(b) above. The final flake size of 5 – 10 mm and an efficiency of 92% was achieved but high vibration was found on the model due to the imbalance forces acting on the rotating shaft. (Pavankumar et al., 2018) produced an organic waste shredding machine as in Figure 3(a). In that design, the cutter used is of multiple teeth type and made from high-carbon steel. (Oladejo et al., 2020) introduced a shredding system with 4 pieces of circular disc put together on the same shaft. There are 40 teeth for every single disc cutter as in Figure 3(b).



(a) (b)

Figure 3: (a) Single circular shedding blade (b) Circular disc cutting blade

Different cutter designs have been developed by (Ganesh et al., 2017) which used both the stationary and rotary cutters simultaneously and arranged in vertical direction, as in Figure 4 (a). In addition to supplying shear force to the cutting process, the blade used also supplies throwing force to enable the cut leaves to exit the machine. The efficiency of around 93% was reported. Some fabricators are trying to develop leaf shredders such as Mahkota (Karya Delitama, 2019) who build a machine using a 6.5 HP petrol engine and using 6 cutting blades as in Figure 4 (b). However, the resulting flakes are too large and not suitable for composting purposes. Likewise with a machine that has been developed by an entrepreneur (A6_90 uji mesin_Official, 2024) uses a petrol engine but the resulting flakes are larger than 20 mm. A machine which developed by Syedila (Syedila Group Sdn Bhd, 2020) but the design of the machine and the processes involved are very complicated and complex.



(a) (b)

Figure 4: (a) Cutting blades arrangement (b) Blades used by Mahkota

METHODOLOGY

Main Component of Machine

Table 1: Main Component of the Machine

No.	Component	Quantity
1.	Main Frame (Mild Steel)	1
2.	AC Motor (220 V, 600 W)	1
3.	Expanded Wire Mesh (9 x 29 mm)	1
4.	Cutter Blade (Stainless Steel, 500 mm)	1
5.	Voltage Regulator (220 V)	2
6.	Main Drum (Φ 560 mm, Mild Steel)	1
7.	Drum Cover (Mild Steel)	1
8.	Flakes Collector (mild steel)	1

Design of Shredding System

Based on the previous studies and process flow, it was decided to install the hopper vertically at the top of the machine and almost all the machines that have been developed before, used such a design because those arrangements facilitate the process of introducing the dry leaves into the machine and help the dry leaves move towards the edge of the cutter by gravity thus further optimizing the crushing and cutting process. The cutting blade, which is driven by an electric motor, is mounted on a shaft so that it rotates vertically and coaxially with the longitudinal axis of the drum. With such an arrangement, the dry leaves coming in from the top of the machine will be cut and sheared evenly by the cutting blade while experiencing high impact force when it collides with the drum wall. The combination of these two force elements converts the dry leaves into small flakes. The size of the cutting blade is 500 mm in length and made from stainless steel. An expanded wire mesh of 9 mm x 29 mm size is installed at the bottom of the machine to filter

leaf dust to ensure that the flakes that come out are really small in size before the shredded leaves go into the final flakes' collector. Details of the shredding machine and its cutting blade are shown in Figure 4(a) and 4(b) below.

(a) (b)

Figure 5. (a) Picture of the machine (b) photo of the cutting blade

Machine Operation

The leaves shredding process starts when the ON button on the panel is pressed. Immediately after that, the motor will rotate the shredding blade according to the set speed, which is controlled through a voltage regulator. Then, the operator manually puts the dry leaves into the drum of the machine. Next is the process of cutting and shredding dry leaves with a blade. The operator needs to occasionally open the drum cover to ensure that the dry leaves have been cut into small pieces. The resulting flakes finally enter a specially designed container for storage. once finished, the machine is turned off by pressing the OFF button. The operator needs to remove the storage container from the machine to go through the next process, which is decomposition into compost.

Testing

The effectiveness of the cutting blade in cutting and shredding dry leaves had been done in two sets of tests. For the first test, dry leaves were collected in a landfill and left exposed to the surrounding conditions. For the second test, 2 kg of dry leaves are put into a machine that has been built to go through the size reduction process.

RESULT AND DISCUSSION

From the data in Table 2, it was found that the shredder needed only 30 minutes to crush dry leaves compared to 6 months for the conventional method. In the conventional method, the leaves are crushed only due to factors such as hot weather, humidity, the action of insects and bacteria and

the weight of the leaf itself. However, the presence of an iron blade in the developed machine has accelerated the process of crushing the leaves by cutting, shearing and applying the impact force whenever the leaves collide with the drum wall. With those, the period for converting dry leaves to compost can be shortened tens of times. The size of the flakes produced is around 6 mm to 8 mm and close to that of (Khoironi et al., 2020).

Table 2: Result of Shredding

Test	A	B
Condition	Open	Shredding Machine
Time	6 months	30 second
Size	10 – 15 mm	6 – 8 mm

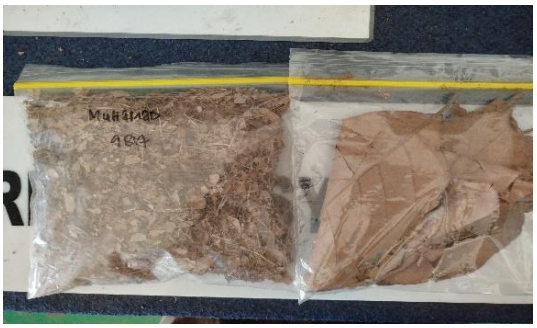


Figure 6: Samples of dry leaves and flakes

CONCLUSION

In conclusion, it was found that the dry leaf shredder machine that operates using elongated hexagon-shaped blade has successfully cut, shredded and crushed leaves to make compost. The blade installed horizontally and rotating coaxially with the longitudinal axis of the drum has shown its effectiveness in the process of shredding leaves. The shearing and impact forces provided by the cutting blade have helped to obtain flakes that are small and even around 6 – 8 mm. Thus, the period for converting dry leaves to compost can be shortened tens of times.

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PENGGUNAAN *OptiSystem* BAGI KURSUS *FIBER OPTIC COMMUNICATION SYSTEM* DI POLITEKNIK BALIK PULAU (PBU)

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ABSTRAK

Kabel gentian optik kini telah menjadi aspek penting dalam landskap sistem komunikasi di Malaysia. Untuk memastikan pelajar Politeknik Balik Pulau (PBU) mendapat pendedahan yang cukup terhadap teknologi gentian optik terkini, kursus Fiber Optic Communication System (DFN 40232) telah ditawarkan kepada pelajar semester empat sebagai kursus elektif. Dalam kursus ini, pelajar tidak hanya diajar secara teori, tetapi juga diberikan latihan praktikal untuk memperkukuhkan pemahaman mereka terhadap sistem komunikasi gentian optik ini. Walau bagaimanapun, terdapat cabaran dalam menyediakan latihan amali bagi beberapa topik tertentu disebabkan oleh kos peralatan dan bahan yang diperlukan adalah tinggi. Objektif utama kajian ini adalah untuk memberi pendedahan kepada pelajar tentang kerja di lapangan melalui rekabentuk sistem optical power link budget melalui perisian OptiSystem. Seterusnya, pengkaji ingin mengkaji persepsi pelajar terhadap penggunaan perisian tersebut dalam proses pengajaran dan pembelajaran (PdP) mereka melalui tinjauan set soalan soal selidik yang diedarkan. Metodologi kajian ini adalah menggunakan perisian komputer dalam proses pembelajaran bagi kursus tersebut dengan membangunkan sistem optical power link budget menggunakan perisian OptiSystem. Dalam kajian ini, terdapat dua kumpulan sample iaitu kumpulan eksperimen dan kumpulan kawalan. Kumpulan eksperimen adalah kumpulan yang menggunakan perisian OptiSystem dalam PdP di bilik kuliah. Manakala, kumpulan kawalan adalah sebaliknya. Hasil dapatan diperolehi dari ujian-t sampel berulangan yang dilakukan, terdapat peningkatan min bagi kumpulan eksperimen (Min = 76.10 , S.P.= 15.12) berbanding dengan kumpulan kawalan (Min = 50.10 , S.P.= 24.31). Bagi tinjauan persepsi pula, dapatan menunjukan penggunaan perisian OptiSystem dalam proses PdP adalah positif Dengan pengenalan pendekatan ini, diharapkan graduan politeknik mempunyai nilai tambah dengan keupayaan praktikal yang kukuh

dalam merekabentuk dan mengendalikan sistem komunikasi gentian optik, disamping meningkatkan kebolehlaksanaan mereka di pasaran pekerjaan yang semakin mencabar

Keywords: *OptiSystem, optical power link budget, gentian optik, amali secara simulasi*

PENGENALAN

Kabel gentian optic telah mengambil tempat dalam sistem komunikasi pada masa kini bagi menggantikan talian penghantaran sedia ada. Ini ekoran beberapa ciri istimewa yang ditawarkan termasuklah data dihantar lebih pantas, data boleh dihantar dalam jarak yang jauh, penjimatan kos bagi satu tempoh masa yang lama dan ketahanan kepada perubahan cuaca di Malaysia. Oleh yang demikian, Politeknik Balik Pulau menawarkan kursus *Fiber Optic Communication System* (DFC40232) sebagai kursus elektif bagi pelajar Diploma Teknologi Digital (Rangkaian) sebagai nilai tambah kepada pelajar untuk menempuh alam pekerjaan kelak. Di dalam kursus tersebut, terdapat 5 topik utama, iaitu *Introduction to Fiber Optic Characteristics, Components in Optic System, Optical Fiber Digital Line System, Optical Measurement* dan *Fiber Optic System Design*. Akan tetapi hanya topik 2, 4 dan 5 sahaja yang akan di nilai dalam penilaian amali. Justeru, pengkaji bependapat satu amali secara simulasi perlu dibangunkan untuk meningkatkan kefahaman pelajar dalam topik 5, selain memenuhi kehendak kurikulum. Dengan wujudnya simulasi amali ini, pelajar dapat merekabentuk satu sistem gentian fiber yang setara seperti di lapangan. Pelajar perlu memilih parameter yang sesuai termasuklah penghantar cahaya (*Optical Transmitter*), bilangan penyambung yang digunakan, panjang kabel gentian fiber yang dibenarkan, jenis penderia cahaya dan penapis yang akan digunakan.

Dalam topik 5 iaitu *Fiber Optic System Design*, pelajar didedahkan dengan faktor-faktor yang mempengaruhi rekabentuk sebuah sistem komunikasi gentian optic. Antaranya ialah jarak atau panjang kabel yang dibenarkan (km), bilangan penyambung, jenis kabel gentian optik (SMF atau SMF), jenis data dihantar (NRZ atau RZ), jenis isyarat penghantar (1310nm, 1550nm, 850nm atau 1300nm), kepekaan penderia dibahagian penerima dan margin selamat yang digunakan. Dengan kekangan yang ada dalam makmal *Structure Cabling Lab* (SCL) di PBU, pengkaji mengambil inisiatif untuk menjalankan kerja amali bagi topik 5 ini secara simulasi komputer dengan menggunakan perisian *OptiSystem* bagi meningkatkan kefahaman pelajar. Kemudian, pelajar akan membandingkan jawapan pengiraan dengan jawapan simulasi komputer serta membuat kesimpulan berdasarkan perbandingan kedua-dua jawapan tersebut.

Tujuan Kajian

Penggunaan perisian *OptiSystem* dalam kursus *Fiber Optic Communication System* (DFN40232) di PBU diguna sebagai alat bantu mengajar (ABM) dalam usaha meningkatkan kefahaman para pelajar. Penggunaan perisian ini memberi mereka pengalaman praktikal yang penting dalam pemahaman konsep yang dipelajari di dalam bilik kuliah. Ia dirasakan dapat membantu pelajar dalam meningkatkan kefahaman dalam rekabentuk sistem *optical power link budget* yang sebelum ini hanya pengiraan secara manual. Oleh itu satu kajian perlu dilakuan untuk mengetahui:

i. Mengenal pasti sama ada terdapat perbezaan nilai min pencapaian bagi pelajar yang menggunakan perisian *OptiSystem* dengan pelajar yang tidak menggunakan perisian *OptiSystem* bagi topik *optical power link budget*
ii. Menilai persepsi pelajar terhadap penggunaan perisian ini dalam amali rekabentuk *optical power link budget*

Persoalan kajian

Bagi menjawab tujuan kajian yang dijalankan, kajian ini cuba mencari jawapan bagi soalan-soalan kajian berikut:

i. Adakah terdapat perbezaan nilai min pencapaian bagi pelajar yang menggunakan perisian *OptiSystem* dengan pelajar yang tidak menggunakan perisian *OptiSystem* dalam pembelajaran mereka.
ii. Apakah persepsi pelajar terhadap penggunaan perisian *OptiSystem* dalam sesi pembelajaran mereka

TINJAUAN LITERATUR

Latarbelakang Kajian

Secara umumnya, sebuah sistem komunikasi mestilah terdiri dari tiga blok utama iaitu blok talian pemancar, blok medium penghantaran dan blok talian penerimaan. Dalam blok pemancar, isyarat digital akan ditukarkan daripada isyarat jenis elektrik kepada isyarat cahaya oleh laser diode (LD) atau *Light Emitting diode* (LED). Isyarat ini seterusnya akan dihantar ke talian penerimaan yang terdiri dari penderia cahaya dengan melalui kabel gentian optic sebagai medium penghantar. Isyarat yang dihantar dalam talian penghantar akan dimudulasi ke dalam dua bentuk iaitu *return-to-zero* (RZ) dan *nonreturn-to-zero* (NRZ). Di blok penerimaan, penderia cahaya terdiri daripada *photo intrinsic diode* (PIN) atau *avalanche photo diode* (APD) yang akan menukar semula isyarat cahaya kepada isyarat elektrik.

Kecekapan sebuah sistem komunikasi gentian optic dipengaruhi oleh beberapa faktor fizikal lain termasuklah kehilangan (*loss*) yang terdapat pada kabel atau penyambung dalam sistem yang dibangunkan. Kepekaan penderia cahaya yang digunakan juga mempengaruhi kepada kecekapan sebuah sistem komunikasi gentian optik. Penderia yang dipilih mestilah berupaya untuk mengesan isyarat yang tiba di bahagian talian penerimaan atau kepekaan penderia (P_{SEN}) mestilah lebih tinggi daripada kuasa isyarat yang tiba di bahagian talian penerimaan (P_{RX}) . Hubungkait antara kepekaan penderia (P_{SEN}) dan kuasa talian peneriamaan (P_{RX}) ditunjukkan dalam persamaan 1. dimana T_{LL} adalah jumlah kehilangan dalam sistem yang berpunca dari penyambung dan kehilangan dalam kabel, P_M margin selamat (kebiasaan 6dB) yang diambil kira dalam merekabentuk sistem komunikasi gentian optic dan T_G adalah jumlah penguat

$$P_{RX} \geq P_{TX} - T_{LL} - P_M + T_G \qquad (1)$$

Merekabentuk sistem *Optical Power Link Budget* terdiri daripada tiga bahagian utama, iaitu pemancar, talian penghantar dan penerima. Satu sistem komunikasi gentian optic dengan kuasa pemancar 5dBm, 10dBm dan 15dBm dipancarkan ke penderia di bahagian penerima melalui kabel gentian optic. Laser dengan panjang gelombang 1550nm dan non-return-zero (NZR) penjana digunakan pada pemancar pada sistem yang dibangunkan. Manakala, pada bahagian penerimaan pula PIN photodiode dengan Kuasa penderia -30dBm dan hingar haba disetkan pada 8.9e-24W /Hz untuk 2.5GB/s digunakan. Di talian penghantar, panjang kabel gentian optik dilaraskan dari 20km ke 100km dengan kehilangan 0.19dBm untuk setiap 1km dengan tiga penyambung digunakan, kehilangan 0.5dBm setiap satu penyambung.

Penggunaan Perisian *OptiSystem*

OptiSystem adalah satu perisian yang dibangunkan oleh syarikat Optiwave yang bertujuan membantu para pengkaji, pelajar dan cendiakwan dalam merekabentuk sistem komukasi gentian optik. Perisian ini membolehkan pengkaji merekabentuk sistem komukasi gentian optik dan menguji sistem yang direkabentuk tersebut. Disamping, perian ini dilengkapi dengan pangkalan data untuk komponen-komponen pasif dan aktif untuk sebuah gentian optik seperti julat panjang gelombang dan kuasa pemancar, julat kehilangan (dBm) dan parameter-parameter lain. Perisian *OptiSystem* membolehkan sebuah sistem komunikasi gentian optik direkabentuk mengikut spesifikasi sebenar sesebuah sistem kerana perisian ini mennyediakan persekitaran simulasi dan komponen sebenar. Perisian *OptiSystem* juga digunakan untuk mensimulasi rangkaian optikal fiber bagi mencari *power link budget* dan *rise time budget* bagi memenuhi standard minima *fiber to the home* (FTTH) dengan jarak yang paling jauh iaitu daripada sentral bandaraya di Indonesia

kepada pengguna akhir. Tambahan pula, hasil analisa reka bentuk simulasi menggunakan perisian *OptiSystem* dan pengiraan menggunakan *Power Link Budget* bagi FTTH memperolehi keputusan yang hampir sama dengan pengiraan, hasil kuasa maksimum dan margin kuasa, menunjukkan perisian ini sangat sesuai digunakan untuk simulasi bagi sistem komunikasi gentian optic (Utami et al., 2023).

Perisian *OptiSystem* sebagai Alat Bantu Mengajar (ABM)

Selari dengan revolusi Industri 4.0, kaedah pembelajaran berpusatkan pelajar dilihat sebagai satu pendekatan pembelajaran yang perlu diberikan tumpuan pada masa kini. Bersesuaian dengan generasi abad ke-21, para pelajar memerlukan satu medium pembelajaran yang lebih sesuai dalam meningkatkan pemahaman, motivasi belajar dan seterusnya meningkatkan pencapaian akademik. Menurut Ishak et al. (2017), perubahan pedagogi pengajaran harus dilakukan bagi memastikan pembelajaran lebih kondusif dan sesuai dengan pembelajaran abad ke-21. Ini disokong dengan kajian pakar pendidikan Mook Soon Sang (2008), yang menyatakan bahawa 75% daripada maklumat yang diperoleh oleh manusia adalah melalui deria penglihatan, 13% daripada deria pendengaran dan selebihnya melalui deria sentuh, rasa dan bau.

Pemilihan sesuatu alat bantu mengajar yang bersesuaian juga memainkan peranan yang penting dalam memastikan objektif pengajaran dan pembelajaran bagi sesuatu kursus itu tercapai semasa pelaksanaan pendekatan pembelajaran berpusatkan pelajar. Hubbard (2009), menyatakan bahawa prinsip dan kaedah pemilihan bahan bantu mempunyai beberapa ciri. Antara ciri yang penting ialah menimbulkan rangsangan dan keinginan pelajar untuk menimba pengalaman pembelajaran, memenuhi aspirasi pembelajaran yang cekap dalam persekitaran aktif dan dinamik, mempunyai unsur afektif, sikap, minat dan tingkah laku dan mempunyai sifat yang selari dengan aspirasi falsafah pendidikan negara.

Penggunaan alat bantu mengajar yang sesuai tidak hanya melibatkan kaedah konvensional sahaja seperti buku, nota, artikel dan rencana, tetapi boleh juga melibatkan alat bantu mengajar berbentuk multimedia dan penggunaan teknologi. Alat bantu mengajar berbentuk penggunaan teknologi, internet dan multimedia membolehkan maklumat pengajaran dan pembelajaran dapat diakses oleh pelajar dengan lebih cepat, mudah dan berkesan. Kajian Zamri dan Nur Aisyah (2011) yang menyatakan bahawa perisian multimedia membantu memudahkan kaedah pengajaran pensyarah daripada strategi berpusatkan pensyarah kepada strategi berpusatkan pelajar. Ini selari dengan

hasil kajian Hawa (2019), yang menunjukkan keberkesanan penggunaan aplikasi 'Plickers' dalam membantu pelajar lemah menguasai Bahasa Arab di Universiti Sultan Azlan Shah.

Pembelajaran berasaskan simulasi merupakan antara kaedah yang digunakan di dalam pengajaran dan pembelajaran berpusatkan pelajar. Penggunaan perisian simulasi ini membenarkan pelajar merancang, merekabentuk dan menguji sesuatu sistem sebelum melaksanakan amali sebenar. Kajian Marimuthu et al. (2021), menunjukkan bahawa pembelajaran berasaskan simulasi terhadap analisis litar resonan menggunakan perisian P-Spice dapat meningkatkan pemahaman pelajar dalam topik litar resonan. Ini disokong oleh kajian Omar dan Ibrahim (2021), yang menunjukkan keberkesanan penggunaan aplikasi Livewire terhadap peningkatan tahap prestasi, motivasi serta membantu mengurangkan bebanan kognitif pelajar dalam mata pelajaran RBT di sekolah menengah. Penggunaan perisian *Optisystem* dalam bidang pendidikan sangat penting kerana ianya dapat memberikan gambaran jelas tentang situasi sebenar. Namun begitu, penggunaan sistem komunikasi optik adalah mahal dan konfigurasi semula dalam beberapa kes adalah mustahil atau tidak ekonomik. Oleh sebab itu, eksperimen dan simulasi sistem telah menjadi keperluan untuk meramal dan mengoptimumkan prestasi sistem, tambahan pula membolehkan pelajar membangunkan pemahaman intuitif optik dengan cara yang pantas.

Selain itu, perisian *Optisystem* membantu para pensyarah mencipta set eksperimen makmal untuk meniru pengajaran persekitaran makmal. Ini kerana, perisian digunakan untuk kelas makmal maya, e-pembelajaran dan pengalaman tangan maya bagi peralatan yang terletak di makmal di kampus. Percubaan mempunyai penerangan, tugasan, soalan dan manual penyelesaian. Oleh itu, pelajar boleh belajar dari jauh di bawah sebarang keadaan yang terputus seperti pandemik COVID atau situasi berkaitan cuaca (Atieh & Raytchev, 2023).

Dengan penggunaan perisian *OptiSystem*, para pengajar dapat menunjukkan simulasi bunyi dan impak herotan pada isyarat optik, serta pembangunan peranti yang mampu mengurangkan kesan ini. Kajian menunjukkan bahawa semakin besar panjang, semakin besar pengecilan dan semakin rendah kualiti isyarat yang tiba di penerima (Hasan, 2023). Selain itu, gabungan rekabentuk GPON bersaman generasi baru seperti NG-PON1 dan NG-PON2 yang telah disimulasi dan dianalisis menggunakan perisian *OptiSystem* telah menghasilkan ralat bit yang minimum, tetapi faktor kualiti rangkaian maksimum, serta anggaran kuasa yang berpatutan yang dapat memenuhi kehendak pelanggan (Khadir et al., 2014).

METODOLOGI KAJIAN

Reka Bentuk Kajian

Untuk mengenal pasti keberkesanan penggunaan perisian *OptiSystem* dalam proses pembelajaran dalam topik *optical power link budget* di Politeknik Balik Pulau, pengkaji menggunakan reka bentuk kuasi eksperimental kawalan ujian pra – ujian pasca. Reka bentuk ini disimpulkan dalam Jadual 1. X mewakili rawatan (*treatment*) yang diberi kepada kumpulan eksperimen yang mana proses pembelajaran yang menggunakan perisian aplikasi *OptiSystem*. "sempang" mewakili rawatan (*treatment*) yang diberi kepada kumpulan kawalan yang mana proses pembelajaran yang tidak menggunakan perisian *OptiSystem*. Manakala perwakilan O_1 dan O_2 adalah pengukuran yang dilaksanakan sebelum dan selepas rawatan (*treatment*) diberikan.

Jadual 1: Reka bentuk kajian

Kumpulan	Ujian Pra	Rawatan	Ujian Pasca
Eksperimen	O_1	X	O_2
Kawalan	O_1	-	O_2

Untuk menjawab objektif kajian kedua, menilai persepsi pelajar terhadap penggunaan perisian *OptiSystem* dalam amali rekabentuk *optical power link budget*, set soalan soal selidik digunakan.

Sampel

Sampel kajian melibatkan 30 orang pelajar dari semester 4 bagi sesi Jun 2020 yang dijadikan sebagai kumpulan kawalan dan 30 orang pelajar dari sesi Jun 2022 yang dijadikan sebagai kumpulan eksperimen.

Instrumen

Instrument kajian terdiri daripada perisian *OptiSystem*, set soalan ujian pra dan set soalan pasca serta set soalan soal selidik. Pengkaji telah membangunkan manual amali merekabentuk *optical power link budget OptiSystem* untuk kegunaan pelajar kumpulan eksperimen.

Untuk mengukur kefahaman pelajar dalam topik *optical power link budget*, set soalan dibina telah dihasilkan. Soalan-soalan dibina berdasarkan aras kesukaran yang sama untuk kedua-dua kumpulan kawalan dan eksperimen. Ujian pencapain ini dibina untuk mengkaji pencapaian min bagi kedua-dua kumpulan eksperimen dan kumpulan kawalan.

Soal selidik persepsi pelajar terhadap kesesuain perisian *OptiSystem* merupakan soalan berbentuk tinjauan dengan menggunakan skala likert dengan pemberat 1 hingga 4. Nilai 1 mewakili penyataan 'Sangat tidak setuju', nilai 2 mewakili penyataan 'Tidak setuju', nilai 3 mewakili penyataan "setuju" dan nilai 4 mewakili penyataan 'Sangat setuju'. Soal selidik ini terdiri daripada dua bahagian iaitu bahagian A dan bahagian B. Bahagian A adalah maklumat asas responden. Manakala, bahagian B terdiri daripada 9 soalan berkaitan persepsi pelajar terhadap kesesuaian perisian aplikasi *OptiSystem* tersebut digunakan sebagai ABM kursus DFN40232. Soal selidik ini diadaptasi daripada Salbiah et al. (2013).

Prosedur Kajian

Kajian dibuat terhadap 30 orang pelajar bagi dua sesi yang berbeza iaitu sesi Jun 2021 dan sesi Jun 2022. Kumpulan eksperimen iaitu pelajar yang diberi pendedahan terhadap perisian *OptiSystem* adalah pelajar yang mendaftar kursus DFN40232 pada sesi Jun 2022, mankala kumpulan kawalan adalah pelajar yang mendaftar pada sesi Jun 2021. Kedua-dua kumpulan ini akan diberi ujian pra dan pasca dari set soalan yang sama aras kesukaran. Selepas ujian pra dijalankan, kumpulan eksperimen diberi pendedahan secara amali menggunakan perisian *OptiSystem*. Manakala, proses PdP bagi kumpulan kawalan dilaksanakan secara konvensional iaitu tanpa menggunakan perisian *OptiSystem*.

Ujian pasca dijalankan selepas 3 jam pendedahnan secara amali dijalankan bagi kedua-dua kumpulan eksperimen dan kumpulan kawalan. Ia diperkenalkan kepada pelajar-pelajar iaitu selepas rawatan dijalankan. Peningkatan pencapaian akademik diukur berdasarkan perbezaan pencapaian dalam ujian pra dan ujian pasca.

Untuk menilai keberkesanan penggunaan perisian *OptiSystem* bagi topik *optical power link budget*, set soal selidik telah diedarkan kepada kumpulan eksperimen sahaja. Ini memastikan dapatan adalah benar dan sah.

Prosedur analisis data

Statistik inferinsi iaitu ujian-t digunakan untuk membandingkan min skor pencapaian pelajar bagi kumpulan kawalan dan kumpulan eksperimen. Paras signifiken untuk membuat keputusan ditetapkan pada aras 0.05. Hipotesis nol yang mengatakan tidak terdapat perbezaan pencapaian min bagi pelajar yang menggunakan perisian *OptiSystem* berbanding dengan pelajar yang tidak

menggunakan perisian tersebut dalam proses pembelajaran mereka akan ditolak sekiranya nilai p yang diperolehi adalah kurang dari pada 0.05.

Bagi menentukan persepsi pelajar, dapatan dari soal selidik dikelaskan kepada persepsi positif dan persepsi negative melalui pengiraan peratus secara statistik deskriptif. Jadual 2 merumuskan pengkelasan tahap persepsi pelajar terhadap perisian aplikasi *OptiSystem*

Jadual 2: Tahap persepsi

Peratus	Persepsi
"Setuju" dan ' Sangat setuju' >50%	Positif
'Tidak setuju' dan 'Sangat tidak setuju' >50%	Negatif

DAPATAN KAJIAN

Jadual 3: Ujian-t perbandingan ujian pra dan pasca antara dua kumpulan

Kumpulan	Min (S.P)		P
Kawalan	Ujian pra	Ujian pasca	
	40.12 (18.12)	50.10 (24.31)	0.001
Eksperimen	Ujian pra	Ujian pasca	0.000
	38.40 (17.60)	76.10 (15.12)	

Merujuk jadual 3, dapatan kajian menunjukkan pencapaian min ujian pra kumpulan kawalan dan kumpulan eksperimen adalah rendah iaitu 40.12 bagi kumpulan kawalan dan 38.40 bagi kumpulan eksperimen dengan sisihan piawai (S.P) masing-masing adalah 18.12 dan 17.60. Walau bagaimanapun, pencapaian min bagi kumpulan eksperimen meningkat dengan ketara kepada 76.10 berbanding dengan nilai min kumpulan kawalan iaitu 50,10 setelah rawatan dijalankan. Disamping itu, nilai S.P bagi kumpulan eksperimen menurun kepada 15.12. Ini menunjukkan penggunaan perisian *OptiSytem* memberi impak positif terhadap pemahaman pelajar bagi topik dengan mencatat peningkatan nilai min dan penurunan nilai S.D ujian pasca yang dijalankan.Ujian-t menunjukan terdapat perbezaan yang signifiken dalam peningkatan pencapaian min di antara kedua-dua kumpulan, $p<0.005$.

Jadual 4: Persepsi pelajar terhadap kesesuaian modul terhadap pembelajaran

Bil.	Soalan	Peratus			
		STS	TS	S	SS
1.	Perisian *OptiSystem* membantu saya memahami topik *optical power link budget*	-	-	-	100
2.	Perisian *OptiSystem*ini membantu proses pembelajaran saya	-	-	13.33	86.67
3.	Paparan perisian *OptiSystem* ini mudah diikuti	-	-	16.67	83.33
4.	Isi kandungan manual *OptiSystem* mudah diikuti	-	-	33.33	66.67
5.	Isi kandungan manual *OptiSystem* ini menarik minat saya untuk memahami topik *optical power link budget*	-	16.66	16.66	66.67
6.	Saya memahami maklumat yang disampaikan dalam perisian aplikasi *OptiSystem* ini	-	-	40	60
7.	Struktur ayat yang digunakan dalam *OptiSystem* ini mudah difahami	-	-	-	100
8.	Saya berasa seronok mempelajari topik *optical power link budget* melalui perisian ini	-	16.66	16.66	66.66
9.	Saya akan mencadangkan kepada individu lain untuk menggunakan perisian *OptiSystem.*	-	-	40	60

Nota: Sangat Tidak Setuju (STS), Tidak Setuju (TS), Setuju (S), Sangat Setuju (SS)

Dapatan soal selidik adaptasi daripada Salbiah et al. (2013), pelajar memberi persepsi yang positif penggunaan perisian OptiSystem dalam proses pembelajaran mereka dalam topik *optical power link budget.* Terdapat lima orang pelajar yang tidak bersetuju dengan item ke-5 dan item ke-8 soal selidik yang diberikan. Kesimpulannya, kesemua item soal selidik adalah positif iaitu dengan mengambil kira jumlah item "Setuju" dan 'Sangat setuju' >50%.

Menurut kajian yang dilakukan oleh Strain dan Pearce (2001) yang dipetik dari Salbiah et al. (2013), aktiviti-aktiviti yang seronok dan mudah dalam proses pembelajaran lebih digemari oleh pelajar untuk mengikuti proses pembelajaran tersebut. Dengan itu, penggunaan perisian aplikasi ini di dalam kelas mampu memudahkan pelajar memahami kursus DFN4023.

KESIMPULAN

Hasil kajian menunjukan bahawa penggunaan perisian *OptiSystem* mampu meningkatkan kefahaman dalam topik *optical power link budget* bagi kursus DFN40232. Ini dapat dibuktikan dengan peningkatan *Course Learning Outcome 1* (CLO 1) dimana, pada sesi semester pendek 2023, CLO 1 yang diperolehi ialah 79.3%, manakala CLO 1 pada sesi 2:2022/2023 telah meningkat kepada 85.4%. Domain CLO 1 dalam kursus DFN40232 bertujuan untuk menguji kebolehan pelajar menerangkan sifat-sifat teknologi gentian optik dan *link budget* dengan kemahiran praktikal mengendalikan peralatan pengukuran secara sistematik.

Pelajar dari kumpulan eksperimen, iaitu pelajar yang menggunakan perisian *OptiSystem* memperolehi nilai min yang lebih tinggi serta nilai sisihan piawai (S.P.) yang lebih rendah berbanding dengan pelajar dalam kumpulan kawalan dalam ujian pasca. Daripada soal selidik yang dijalankan juga menunjukan persepsi yang positif terhadap kesesuaian perisian *OptiSystem* terhadap proses pembelajaran topik *optical power link budget*. Diharap dapatan ini dapat memberi galakan kepada warga pendidik dalam menggunakan dan menghasilkan perisian pendidikan untuk subjek-subjek yang lain dalam usaha meningkatkan kefahaman pelajar.

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ENHANCING COGNITIVE PERFORMANCE: STRATEGIES FOR OPTIMIZING BRAIN FUNCTION

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ABSTRACT

In the pursuit of educational excellence, understanding and optimizing brain function is imperative. The primary purpose of this study is to identify and synthesize strategies that enhance cognitive performance by optimizing brain function within the academic setting of Politeknik Sultan Salahuddin Abdul Aziz Shah. By harnessing the latest findings in neuroplasticity and cognitive science, this paper investigates the multifaceted approaches that can be employed to improve memory, attention, and problem-solving skills among students and faculty. The procedures involve a systematic review of empirical studies and meta-analyses focused on dietary impacts, exercise, sleep quality, and the educational integration of digital tools that support cognitive health and learning. The conclusions of this study highlight the effectiveness of a holistic approach, where combined interventions in diet, physical activity, mental health, and educational technology significantly contribute to enhanced cognitive functions. Moreover, practical guidelines are offered for implementing these strategies within educational curricula and daily routines, aiming to foster an environment that not only supports academic success but also promotes a long-term improvement in brain health and function. Furthermore, the paper identifies critical areas for future research, such as the long-term effects of these interventions on brain function, the interaction between genetic predispositions and lifestyle factors, and the scalability of successful strategies across diverse educational settings.

Keywords: *Cognitive Enhancement, Educational Technology, Neuroplasticity, Optimal Brain Function*

INTRODUCTION

Background

The continuous quest for educational excellence necessitates a profound understanding of brain function and its optimization. This research aims to explore and synthesize effective strategies to enhance cognitive performance within the academic context of Politeknik Sultan Salahuddin Abdul Aziz Shah (PSA). The institution is committed to fostering an environment conducive to academic excellence. This study was initiated to explore and implement evidence-based strategies for brain function optimization. By leveraging the latest advancements in neuroplasticity and cognitive science, the researchers aim to improve memory, attention, and problem-solving abilities among students and faculty.

Research Objectives

The specific objectives of this research are as follows:

a) To identify the key factors influencing cognitive performance:

- Examine the role of diet, exercise, sleep, and educational technology in cognitive function.

b) To synthesize effective strategies for enhancing cognitive performance:

- Review and compile findings from existing empirical studies and meta-analyses.

LITERATURE REVIEW

Neuroplasticity and Cognitive Function

Neuroplasticity refers to the brain's ability to reorganize itself by forming new neural connections throughout life. This adaptability is fundamental for learning and memory. Studies have shown that engaging in activities that challenge the brain can significantly improve cognitive function (Kolb & Whishaw, 1998).

Dietary Impacts

Nutrition significantly affects brain health and cognitive performance. Diets rich in antioxidants, good fats, vitamins, and minerals provide the necessary nutrients to maintain brain health. For instance, omega-3 fatty acids found in fish are essential for brain function and development (Gomez-Pinilla, 2008). A Mediterranean diet, characterized by high consumption of fruits,

vegetables, nuts, and olive oil, has been associated with improved cognitive function and reduced risk of cognitive decline (Scarmeas et al., 2006).

Similar to the Mediterranean diet, many Asian diets are rich in fish and seafood, which are excellent sources of omega-3 fatty acids. These nutrients are crucial for maintaining brain health and enhancing cognitive function. For example, **soy products**: foods like tofu, tempeh, and miso are staples in many Asian diets. Soy products are rich in isoflavones, which have been shown to have neuroprotective effects and may help improve cognitive function (Lee et al., 2020). Besides that, **green tea**: widely consumed across Asia, green tea contains catechins, particularly epigallocatechin gallate (EGCG), which have antioxidant properties that protect brain cells from oxidative stress. Regular consumption of green tea has been associated with better cognitive function and lower risk of cognitive decline (Kuriyama et al., 2006).

On top of that, Asian diets often incorporate a variety of herbs and spices, such as turmeric, ginger, and garlic. Turmeric, in particular, contains curcumin, which has anti-inflammatory and antioxidant properties that may benefit brain health and reduce the risk of neurodegenerative diseases (Small et al., 2018). Furthermore, high consumption of a wide range of vegetables and fruits, such as leafy greens, cruciferous vegetables, and berries, provides essential vitamins, minerals, and antioxidants that support cognitive health. These foods are rich in phytochemicals that help combat oxidative stress and inflammation in the brain. Last but not least, asian diets typically include whole grains like brown rice, barley, and millet, as well as legumes such as lentils and beans. These foods are high in fiber, vitamins, and minerals, and have a low glycemic index, which helps maintain stable blood sugar levels and provides sustained energy for brain function.

Exercise

Physical activity has a profound impact on brain health. Regular exercise increases blood flow to the brain and promotes the growth of new neurons, particularly in the hippocampus, which is crucial for memory and learning (Erickson et al., 2011). Aerobic exercises, such as running and swimming, have been shown to enhance cognitive function more effectively than non-aerobic exercises (Hillman et al., 2008).

Sleep Quality

Adequate sleep is essential for cognitive processes such as memory consolidation and problem-solving. Sleep deprivation negatively impacts attention, working memory, and executive function (Walker, 2009). Strategies to improve sleep hygiene, such as maintaining a regular sleep schedule and creating a conducive sleep environment, are critical for optimizing cognitive performance.

Educational Technology

The integration of digital tools in education can significantly enhance learning experiences. Educational software, online resources, and interactive platforms support active learning and critical thinking (Means et al., 2009). Gamification and adaptive learning technologies have also shown promise in improving engagement and learning outcomes (Hamari et al., 2014).

METHODOLOGY

This research methodology involved a systematic review and synthesis of existing empirical studies and meta-analyses to identify and evaluate strategies for enhancing cognitive performance. The following steps outline the detailed process:

Literature Search

To identify relevant studies, we conducted a comprehensive literature search across multiple databases, including PubMed, PsycINFO, Web of Science, and Google Scholar. The search strategy will include keywords and phrases such as "cognitive enhancement," "brain function," "diet and cognition," "exercise and brain health," "sleep and cognitive performance," and "educational technology."

Inclusion Criteria

- Peer-reviewed articles published in the last 20 years.
- Studies focusing on human participants.
- Research involving dietary interventions, physical exercise, sleep quality, and educational technology.
- Studies reporting measurable cognitive outcomes such as memory, attention, and problem-solving skills.

Exclusion Criteria

- Studies involving non-human subjects.
- Articles not available in English.
- Research lacking clear methodology or measurable cognitive outcomes.

Screening and Selection

The initial search results underwent a screening process to ensure they met the inclusion criteria. The screening process involved:

i. Title and Abstract Screening

- Two independent reviewers assessed the titles and abstracts of the identified articles for relevance.
- Articles that do not meet the inclusion criteria were excluded.

ii. Full-Text Review

- The remaining articles underwent a full-text review to confirm their eligibility.
- Discrepancies between reviewers were resolved through discussion or consultation with a third reviewer.

iii. Data Extraction

For the selected studies, we extracted the following data:

- Study characteristics: Author(s), year of publication, study design, sample size, and population demographics.
- Intervention details: Type of intervention (diet, exercise, sleep, educational technology), duration, and intensity.
- Cognitive outcomes: Measures of memory, attention, problem-solving skills, and other relevant cognitive functions.
- Results: Key findings, effect sizes, and statistical significance.

iv. Quality Assessment

The quality of the included studies was assessed using standardized tools such as the Cochrane Risk of Bias Tool for randomized controlled trials (RCTs). The assessment criteria included:

- Methodological rigor.
- Sample size and representativeness.
- Validity and reliability of cognitive measures.

- Statistical analysis and reporting.

v. Data Synthesis

The extracted data was synthesized to identify common themes, patterns, and gaps in the literature. The synthesis process involves:

Narrative Synthesis:

- Summarized the findings of the included studies in a narrative format.
- Highlighted the key strategies and interventions identified for cognitive enhancement.
- Discussed the mechanisms through which these interventions influence cognitive performance.

vi. Evaluation of Applicability

To evaluate the applicability of the identified strategies within the academic setting of Politeknik Sultan Salahuddin Abdul Aziz Shah, we conducted:

Contextual Analysis:

- Conducted a needs assessment to understand the specific challenges and opportunities within the institution.
- Gathered input from stakeholders, including students, faculty, and administrators, through surveys and focus groups.

Feasibility Study:

- Implemented pilot interventions based on the synthesized strategies.
- Monitored the implementation process and collected data on outcomes, resource requirements, and potential barriers.

Stakeholder Engagement:

- Involved stakeholders in the planning and execution of the interventions.
- Collected feedback to refine the strategies and ensure their cultural and contextual relevance.

vii. Development of Practical Guidelines

Based on the findings from the literature review and feasibility study, we developed practical guidelines for implementing the cognitive enhancement strategies:

- Created detailed, step-by-step recommendations for incorporating dietary, exercise, sleep, and educational technology interventions into daily routines and curricula.

- Included best practices, case studies, and practical tips for successful implementation.

Guideline Development:

Resource Allocation:

- Identified and recommended resources needed for implementation, such as nutritional support, fitness facilities, sleep hygiene programs, and digital tools.
- Guided sourcing and allocating these resources within the institution.

Training and Support:

- Develop training programs for educators, administrators, and students to ensure effective implementation.
- Offer ongoing support and professional development opportunities to enhance knowledge and skills.

DISCUSSION

The synthesis of findings from the reviewed literature suggests that a holistic approach, incorporating diet, exercise, sleep, and educational technology, is most effective in enhancing cognitive performance. Below are detailed insights and implications drawn from the key strategies:

Dietary Adjustments

Omega-3 fatty acids, primarily found in fish, have been shown to improve cognitive function and slow cognitive decline (Gomez-Pinilla, 2008). Antioxidants, vitamins, and minerals found in fruits, vegetables, and nuts support brain health by reducing oxidative stress and inflammation, which are linked to cognitive impairment (Joseph et al., 2009). The Mediterranean diet, which emphasizes the intake of whole grains, fruits, vegetables, nuts, and olive oil, is associated with better cognitive function and a lower risk of neurodegenerative diseases (Scarmeas et al., 2006). Implementing dietary changes within an educational setting requires collaboration between nutritionists, educators, and food service providers. Practical steps include revising cafeteria menus to include brain-boosting foods, educating students and faculty on the importance of nutrition, and providing resources for healthy meal planning.

Regular Exercise

Aerobic exercises such as running, swimming, and cycling are particularly effective in enhancing cognitive functions, including memory, executive function, and processing speed (Hillman et al.,

2008). Exercise promotes neurogenesis, especially in the hippocampus, which is crucial for memory formation and retention (Erickson et al., 2011). Physical activity increases the release of neurotransmitters such as serotonin and dopamine, which improve mood and cognitive function (Cotman et al., 2007). Incorporating regular physical activity into the daily routine of students and faculty can be achieved through structured physical education programs, extracurricular sports, and promoting active lifestyles. Creating a supportive environment that encourages regular exercise, such as accessible sports facilities and organized fitness events, is essential.

Improved Sleep Hygiene

Sleep is crucial for cognitive processes such as memory consolidation, emotional regulation, and problem-solving (Walker, 2009). Sleep deprivation negatively impacts cognitive functions, including attention, working memory, and executive function (Durmer & Dinges, 2005). Good sleep hygiene practices, such as maintaining a consistent sleep schedule, creating a restful sleep environment, and reducing screen time before bed, are effective in improving sleep quality and cognitive performance (Hirshkowitz et al., 2015). Educating students and faculty about the importance of sleep and providing strategies for improving sleep hygiene can significantly enhance cognitive performance. Institutions can support this by creating policies that encourage healthy sleep habits, such as later start times for classes and providing resources for stress management and relaxation techniques.

Integration of Educational Technology

Educational technology, including interactive software, online resources, and adaptive learning platforms, supports active learning and critical thinking (Means et al., 2009). Gamification of educational content can increase engagement and motivation, leading to better learning outcomes (Hamari et al., 2014). Digital tools that offer personalized learning experiences help cater to individual learning styles and paces, enhancing cognitive engagement and retention (Pane et al., 2014). The integration of educational technology requires strategic planning and investment in digital infrastructure. Training for educators on effective use of technology in the classroom, along with continuous assessment of the impact on student learning, is essential. Additionally, ensuring equitable access to technological resources is crucial to avoid widening the digital divide.

Comprehensive Impact of Combined Interventions

The holistic approach, combining dietary improvements, regular physical activity, adequate sleep, and educational technology, creates a synergistic effect that significantly enhances cognitive performance. These interventions not only improve individual cognitive functions but also contribute to a supportive and health-conscious educational environment.

Challenges and Considerations

Implementing comprehensive programs in educational settings often faces several challenges and considerations. One of the primary barriers is resistance to change among students and faculty, who may be accustomed to traditional methods and hesitant to adopt new approaches. Additionally, limited resources can hinder the execution of extensive programs, making it difficult to ensure consistency and sustainability of interventions. To overcome these challenges, incremental implementation of changes can be effective, allowing all stakeholders to adapt gradually. Seeking external funding and partnerships can also help allocate the necessary resources for successful implementation. Moreover, continuous monitoring and feedback are crucial to refine and sustain interventions, ensuring they remain effective and relevant over time.

CONCLUSION

In conclusion, optimizing brain function through a holistic approach is not only feasible but essential for both academic and personal development. By addressing the challenges and employing strategic solutions, we can enhance cognitive performance and promote long-term brain health. Future research should focus on exploring the long-term effects of these interventions, understanding the interaction between genetic predispositions and lifestyle factors, and assessing the scalability of successful strategies across diverse educational settings. By continuing to innovate and adapt, we can create a more supportive and effective learning environment for all students.

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KATEGORI 02

DIGITAL TRANSFORMATION

ASSESSING POTENTIAL ANXIETY IN LEARNING WITH SMART ATTENDANCE SYSTEM

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ABSTRACT

Educators often overlook crucial student learning experiences when tracking course outcomes, relying on generalized exit surveys that may miss contextual factors that are crucial for personalized learning interventions. This study proposes a smart attendance system to assess student experiences, incorporating a "Potential Anxiety Index" derived from student's feedback submitted via smartphone or computer right after the teaching sessions. Tested over two semesters with 226 students, the system effectively captured fluctuations in anxiety levels, highlighting its ability for effective monitoring mechanism. This approach provides valuable insights into individual learning journeys, stressing the significance of personalized and contextual data in supporting student well-being and academic success. The smart attendance system offers a novel and effective means of gathering comprehensive student experience data, empowering educators with deeper insights into factors influencing learning outcomes. By harnessing this technology, policymakers can prioritize student well-being and academic success, advancing data-driven approaches in education policy towards digital transformation in education sector.

Keywords: *student's anxiety, smart attendance system, student's wellbeing*

INTRODUCTION

In the fast-paced landscape of modern education, the focus has expanded beyond mere academic achievement to encompass the holistic well-being of students. Anxiety has emerged as a prevalent concern, with its detrimental effects on learning outcomes and overall student welfare. Traditional methods of assessing student well-being or anxiety often rely on subjective observations or retrospective self-reporting, presenting significant limitations in accuracy and timeliness for effective intervention strategy. In response to these challenges, this research proposes a novel approach that integrates smart attendance systems with anxiety assessment mechanisms. By harnessing the power of technology, this study aims to assess potential anxiety in learning through smart attendance systems.

LITERATURE REVIEW

Academic Anxiety

In higher education, academic anxiety is a prevalent and multifaceted phenomenon that significantly impacts students' academic performance, emotional well-being, and overall educational experience. Academic anxiety is characterized by feelings of apprehension, agitation, and unease regarding academic tasks and achievements in an educational setting. Academic anxiety can arise from various sources, including fear of failure, perfectionism, high academic workload, and social comparison(Pekrun, 2006). Moreover, situational factors such as high-stakes assessments, competitive academic environments, and lack of social support can exacerbate anxiety symptoms (Jerrim, 2023).

As we advance in our efforts to address academic anxiety, it becomes increasingly imperative to undertake more experimental studies to better understanding the dynamic and complexity of academic anxiety itself. Apart of knowledge contribution, it is essential for educational policy development and practical adoption towards effective intervention strategy in teaching practice, to better support students in their learning.

Smart Attendance System

Smart attendance systems are technological solutions designed to automate and optimize the process of taking attendance in educational settings. These systems typically utilize various technologies such as Radio Frequency Identification (RFID)(Zhao et al., 2022), biometric recognition such as fingerprint(Maurizfa & Adiono, 2021), facial recognition(Alhanaee et al., 2021), voice recognition(Soewito et al., 2017) or mobile applications or cloud-based applications such as QR-code to accurately track students' attendance. Table 1 provides a comprehensive overview of the existing technologies utilized in smart attendance systems.

Table 1: Comparison of Existing Smart Attendance Systems

Technology	Advantages	Limitations
RFID (Zhao et al., 2022)	Efficient data recording	Costly.
Fingerprint (Maurizfa & Adiono, 2021)	Highly reliable method	Costly.
Face recognition (Alhanaee et al., 2021)	Efficient data recording.	Depends on the ambient light condition and image quality (computer vision).

Near Field Communication (NFC)(Zuhedy Zay et al., 2016)	Efficient data recording.	Dependency on Device Compatibility.
QR-Code(Elaskari et al., 2021)	Efficient data recording.	Depends on the ambient light condition and image quality (computer vision).

Based on the reviewed literatures, our research question in this study are:

RQ1: How feasible is it to design a smart attendance system that also assesses potential learning anxiety among students?

RQ2: How does the Potential Anxiety Index influence students' CLO Perceived Attainment in educational sessions?

METHODOLOGY

In our research, our aim is to develop a streamlined attendance system that minimizes the need for extra hardware or software. Leveraging the cloud collaboration platform already in use on our campus, Microsoft Teams, proved to be an efficient solution. With every student and staff member registered and their details managed by authorized IT personnel, their identities are easily verified through their official email addresses. To record attendance, we utilized Microsoft Form, a cloud service seamlessly integrated with Microsoft Teams, allowing us to design an online form for this purpose.

System Design

Figure 1 illustrates the flow and classification of cloud services within the system, as well as their interactions with one another.

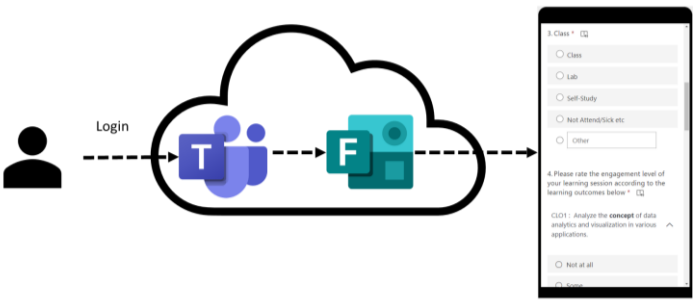

Figure 1 : System Design

This system's data model consists of four key components: student profile, engagement profile, learning reflection, and learning experience. These elements' associated data types are outlined in Figure 2. All the key components are being designed and collected through an online form that can be integrated in our official learning management system (LMS) or any other collaboration tools since it is in the web-based form.

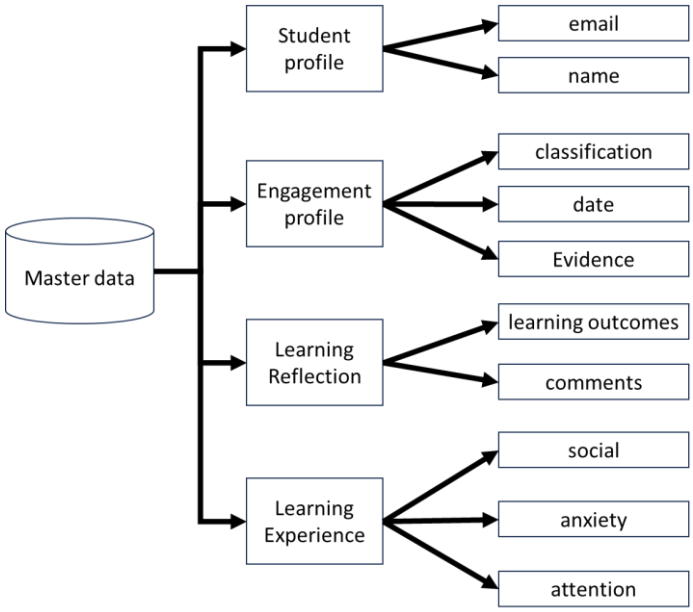

Figure 2 : Data Model

The value proposition of our proposed system is based on the following elements:

- The settings allow to automate the capture of students' full names and email addresses, eliminating the need for them to manually input this information when filling out the attendance form as shown in Figure 3.

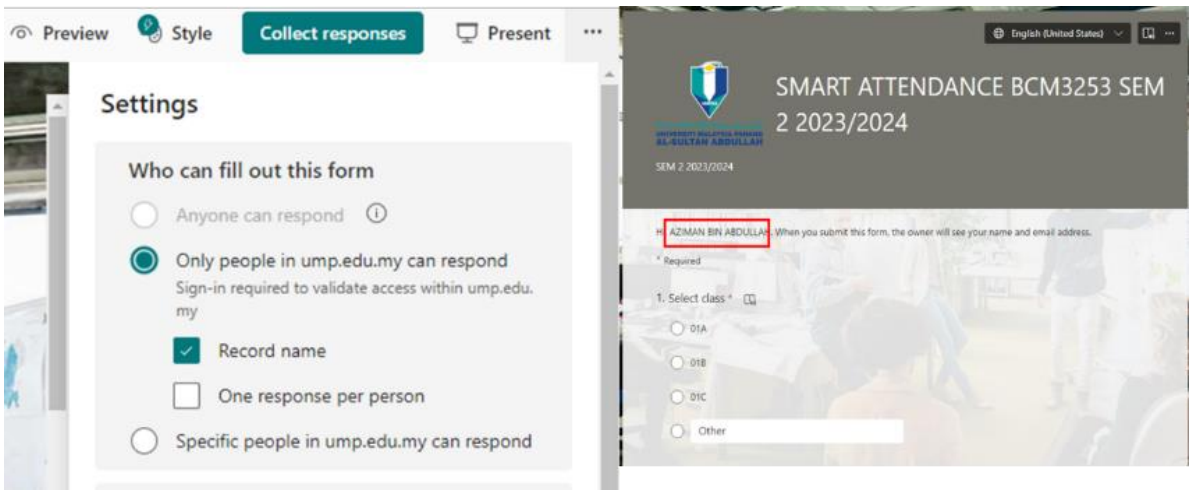

Figure 3 : Automated Identification

- The learning engagement profile offers a personalized, flexible, and self-directed tool for students to express their levels of participation or disengagement in the course, providing educators with invaluable insights into how the learning session influences students within their specific contexts.
- Reflective by self-assess the impact of learning session on the course learning outcomes as shown by Figure 4. Every session that students engaged in either through instructor-led or self-pace learning, they need to rate how much what they learn during that session contributed to their learnings outcomes attainment at the point of time.

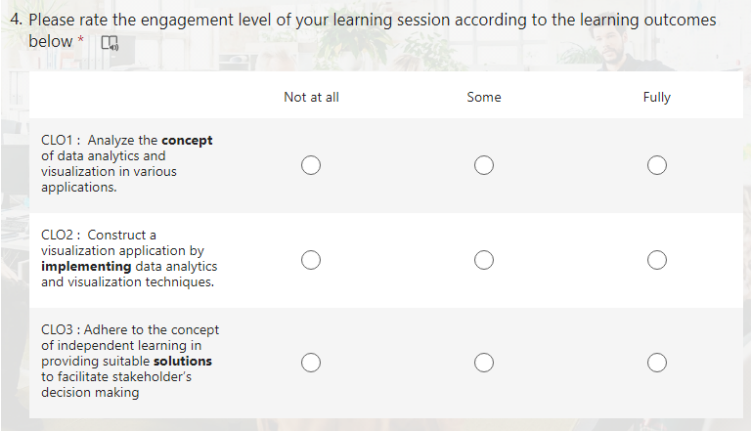

Figure 4 : Reflective Feedback on Course Learning Outcomes

- Simplifies the process with straightforward indicators that resonate with students' learning experiences, enhancing usability and relevance. Indication of potential anxiety in learning experience as shown in Figure 5.

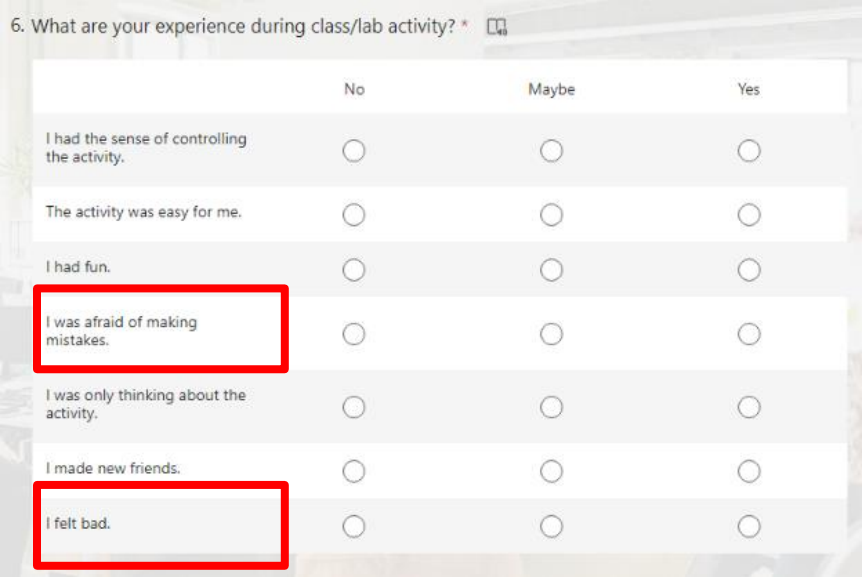

Figure 5 : Potential Anxiety Indicator

RESULTS & DISCUSSION

The "*Data Analytics and Visualization*" course served as the testing ground for the system, which was used by 226 students for two semesters. Through the pre-configured analysis and visualization tools available in Microsoft Form, educators can extract valuable insights into the effects of learning sessions or activities on student engagement. Figure 6 presents the potential of learning anxiety of the whole student cohort for two semesters with 1764 responses for the Semester 1 2023/2024 and 1312 responses for the Semester 2 2022/2023.

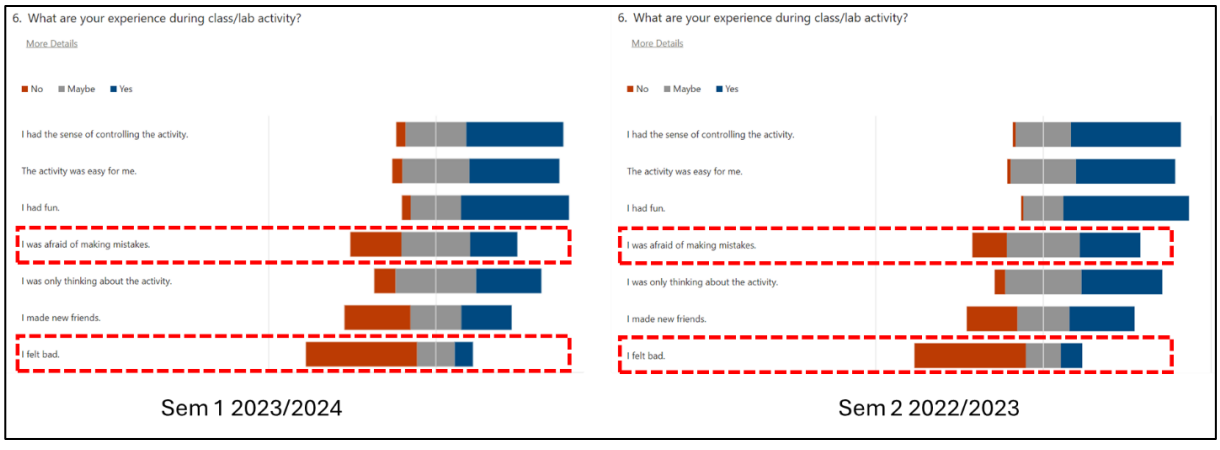

Figure 6 : Potential Anxiety in Learning

The findings depicted in Figure 6 indicate that the system effectively captures students' learning experiences, including potential anxiety levels across varying degrees. While these results validate the system's ability to detect potential anxiety, the generalized analysis falls short in supporting personalized intervention strategies for educators. It does not facilitate the identification of individual students who may require additional support or targeted teaching interventions due to anxiety-related learning challenges. Therefore, this study further analyzes the quantify the level of potential anxiety for each student shown by Table 2.

Table 2: Personalized Potential Anxiety Index

	I was afraid of making mistakes.			I felt bad.			Potential Anxiety Index	Level
Student	0.5 Maybe	0 No	1 Yes	0.5 Maybe	0 No	1 Yes		
Student 1	2	-	1	-	3	-	0.33	Q3
Student 2	5	2	-	-	7	-	0.18	Q4
Student 3	-	-	1	-	-	1	1.00	Q1
Student 4	5	1	1	1	5	1	0.36	Q3
Student 5	1	-	2	-	1	2	0.75	Q1

We invent the potential anxiety index based on the level of student learning experience for the anxiety-related experiences and quantify the ratio of it against the total of individual student's engagement. Based on the potential index, we cluster the level into four different levels with Q1 representing the index from 0.75 to 1.00, Q2 for index from 0.5 to 0.74, Q3 for 0.25 to 0.46 and Q4 for the index from 0 to 0.24.

While experiencing fear and discomfort during learning is prevalent in educational environments, accurately measuring their influence on student learning outcomes has not been adequately assessed through empirical analysis. We then further quantify the index of perceived learning outcomes for each individual student similarly based on the weight for every level of attainment and the occurrence or frequency of experience as shown in Table 3.

Table 3: Perceived Learning Outcomes Attainment Index

Student	CLO1			CLO2			CLO3			CLO Index
	1	0	0.5	1	0	0.5	1	0	0.5	
	Fully	Not at all	Some	Fully	Not at all	Some	Fully	Not at all	Some	
Student 1	3	-	-	3	-	-	3	-	-	1
Student 2	4	-	3	3	-	4	3	-	4	0.74
Student 3	-	-	1	-	1	-	-	-	1	0.33
Student 4	6	1	-	6	1	-	6	-	1	0.88
Student 5	3	-	-	3	-	-	3	-	-	1

In our analysis, we focus on the interplay between students' Potential Anxiety Index and their self-perceived learning outcomes during the educational session, as illustrated in Figure 8. Upon dividing the graph into four quadrants based on these two metrics, we observe a notable trend within the red dashed rectangle. This area signifies a segment where a higher Potential Anxiety Index, ranging roughly from 0.5 to 1 which is associated with a lower CLO Perceived Attainment, which spans from 0 to 0.25. This quadrant of the graph merits further investigation to understand the factors contributing to this inverse relationship and to develop strategies that could enhance learning outcomes despite the presence of anxiety.

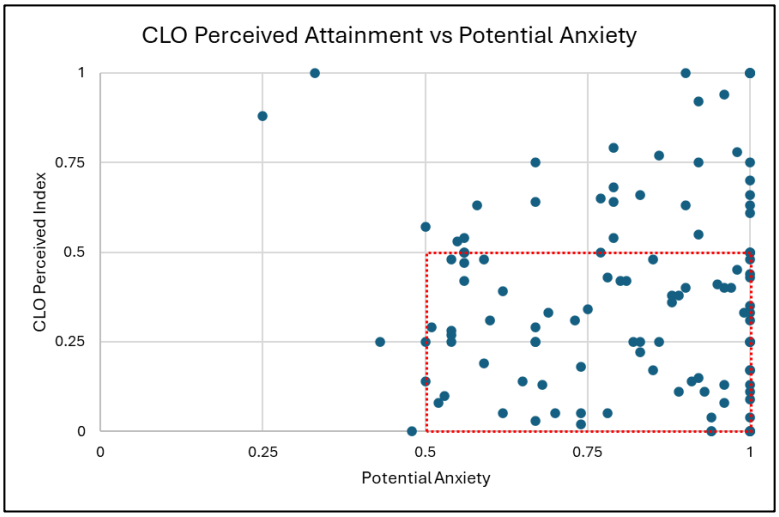

Figure 7 : Clustering of CLO Perceived Attainment and Potential Anxiety

CONCLUSION

This study explored the feasibility of designing a smart attendance system that also assesses student anxiety and examined how anxiety affects learning outcomes. It found that integrating anxiety assessment features into smart attendance systems is promising but requires careful consideration of ethical and privacy issues. Additionally, a significant inverse relationship was found between anxiety levels and perceived learning outcomes, indicating that higher anxiety is linked to lower academic performance. These findings suggest the need for technological and

educational strategies to monitor and reduce student anxiety to enhance learning experiences and how it effectively impacts the actual learning outcomes attainment.

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APPETITE FOR CONVENIENCE: EXPLORING THE FEATURES OF FOOD DELIVERY APPS

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ABSTRACT

This study sheds light on the unique characteristics of successful food delivery apps in Malaysia, providing valuable insights for app developers and restaurants. By understanding the key features and offerings of these apps, developers can enhance user experience and drive innovation in future app developments. This research using a mixed-methods approach, combining quantitative and qualitative analysis by analysed user rating from the App Store platform and app features to identify key characteristics of the food delivery apps. Features such as point collection methods, diverse payment options and tailored delivery services contribute to higher user satisfaction and broader market reach. For restaurants, optimizing their presence on these platforms is crucial to attract more customers and improve service delivery. The integration of special offers, memberships and environmentally conscious options like Grab Food's Carbon Neutral Fee can appeal to different customer segments. This synergy between app developers and restaurants not only enhances operational efficiency but also ensures a seamless and satisfying experience for users. Future research should focus on consumer behaviour analysis and technological advancements to further improve food delivery services in Malaysia, ensuring sustained growth and adaptation to evolving market demands.

***Keywords**: Food delivery apps; apps features; ratings*

INTRODUCTION

The food delivery industry has experienced unprecedented growth worldwide, driven by the increasing demand for convenience and proliferation of food delivery apps. This trend has been further accelerated by the Covid-19 pandemic, which led to widespread lockdowns and social distancing measures, forcing many consumers to rely on food delivery services for the meals (Poon & Tung, 2023; Mat Nayan & Hasan, 2020).

In Malaysia, the food delivery market has witnessed significant growth, with a plethora of food delivery apps competing for market share. The pandemic has acted as a catalyst, accelerating the adoption of food delivery apps among Malaysian. According to Statista (2024), the platform delivery market in Malaysia is projected to reach a revenue of US$ 387.10 million and user penetration in the market is projected to be 17.5% in 2024.

The food delivery business model revolves around connecting customers with restaurants and food establishments through an online platform or apps (Ramesh et al., 2021). Figure 1 shown the basic food delivery app business model. Among the companies is FoodPanda, the first delivery service in Malaysia to grow rapidly (Chai & Yat, 2019). Other food delivery providers in Malaysian market include Grab Food, ShopeeFood, Bungkusit, Just Eat, Halo Delivery, Baijia Delivery, FoodTime, Misi and Foodora.

Aside from that, the majority of well-known restaurant and beverage specialists such as KFC, McDonalds, ZUS Coffee, Tealive, Domino's and many more also has their own apps. That shows the food and beverage in Malaysia are seeing a new development.

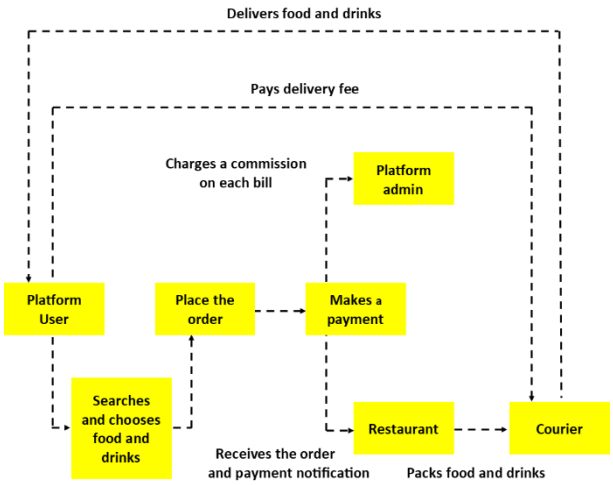

Figure 1: Food Delivery App Business Model

By shedding light on the unique characteristic of successful food delivery apps in Malaysia, this study aims to provide valuable insights for app developers, restaurants and policymakers to enhance the user experience and drive innovation in the food delivery industry.

METHODOLOGY

Despite the growing popularity of food delivery apps, there is limited research on the characteristics that contribute to their success in the Malaysia Context. This paper seeks to fill this gap by examining the key characteristics of food delivery apps.

To achieve this goal, we employ a mixed-methods approach, combining quantitative and qualitative analysis. We conducted a comprehensive review of existing literature on food delivery apps and analysed user rating from the App Store platform and app features to identify key characteristics.

Our research focusses on FoodPanda, Grab Food and ShopeeFood, despite Grab Food and ShopeeFood being apart of the larger Grab and Shopee Apps, which fall under different categories like travel and shopping in App Store. This focus is because FoodPanda, Grab Food and Shopee Food are the specific segments of these larger apps that directly relate to food delivery services. These segments are distinct and have separate functionalities, user interface and user experiences tailored specifically for food delivery. Therefore, by focusing on these specific segments, we can better analyse and understand the characteristics and user perceptions unique to food delivery apps, which is primary focus of our research.

This selection may introduce a bias if these apps are not representative of the broader range of food delivery apps available in the market. Other apps with different characteristics or user bases may be overlooked, limiting the generalizability of the findings.

RESULTS AND DISCUSSION

Table 1 shown the comparison of food delivery app ratings and categories in the App Store as of 7 May 2024.

Table 1: Comparison of Food Delivery App Ratings and Categories

Apps	FoodPanda	Grab	Shopee
Rating	4.6/5	4.7/5	4.6/5
User Base	1,023,124	664,832	762,608
Category	Food & Drink	Travel	Shopping
Chart	2	1	2

The analysis revealed that Grab has the highest user rating of 4.7/5, followed closely by FoodPanda and Shopee, both with a rating of 4.6/5. Food Panda has the largest user base, with over 1,023,124 raters, followed by Shopee with 762,608 and Grab with 664,832 raters. All three apps are categorized differently in the App Store. FoodPanda is categorized under "Food & Drink", which aligns with its primary function as a food delivery app. Grab on the other hand, is categorized under "Travel", which may lead to confusion among users looking specifically for food delivery services. Shopee is categorized under "Shopping", indicating its integration within the broader Shopee platform.

Table 2: Comparison of Key Features in Food Delivery App

Apps	Food Panda	Grab Food	Shopee Food
Points collection	Panda Points	Grab Rewards	Shopee Coins
Membership / Special Offer	Pandapro & Vouchers	GrabUnlimited & Vouchers	Super deals, Pickup 50% OFF! & Vouchers
First Restaurant Page			
Rating	Available	Available	Available
Reviews	Available	Available	Available
Distance	Available	Available	Available
Estimate time delivery	Available	Available	Available
Available offers	Available	Available	Available
Popular/ most ordered food	Available	Available	Not Available
Restaurant Food categorise	Available	Available	Available
Minimum order/small order Fee	Available	Available	Not Available
Payment/Confirm Order Page			
Delivery option	Standard, priority & scheduled	Direct, standard, saver, order for later	Standard
Pick-up	Available	Available	Available
Payment method	Cash, credit/debit card, Aplle Pay, Boost, Touch 'n Go eWallet & online banking	GrabPay Wallet, Cash, credit/ debit card, GX Account, PayLater, PayPAl, Alipay, AlipayHK & Kakao Pay	Credit/ debit card,SPayLater, Cash on Delivery, Apple Pay, Shopee Pay & online banking
Order Summary	Available	Available	Available

Apps	Food Panda	Grab Food	Shopee Food
SST	Available	Available	Available
Contactless Delivery	Available	Not Available	Not Available
Cutlery	Available	Available	Not Available
Carbon Neutral Fee	Not Available	Available	Not Available

Table 2 shows the comparisons of key features in three selected food delivery apps with is very useful for the app's users.

CONCLUSION

This study sheds light on the unique characteristics of successful food delivery apps in Malaysia, providing valuable insights for app developers and restaurants. Better service delivery and a seamless integration will benefit both parties (Chen et al., 2022).

User rating indicates a high level of user satisfaction across all three apps. The high ratings suggest that users are generally pleased with the service quality, app functionality and overall experience provided by these apps. FoodPanda has a larger user base shows a wider reach and is more widely used compared to the two apps. A larger user base can lead to faster delivery times and more options for users due to increased demand.

Grab holds the top position in the chart, indicating its popularity and market dominance. FoodPanda and Shopee both hold the second position in their respective chars. Charts position reflects app performance and popularity, influencing user choice and industry trends. All three apps offer point collection methods for customer based on their orders or review contributions after completing the orders. Besides that, special offers for all platforms but only FoodPanda and Grab Food have their membership or subscription for their customers.

All three apps also provide crucial information like restaurant ratings, reviews, distance, estimated time for food preparation and delivery, and available offers. Popular or most ordered food, restaurant food categories, and minimum order or small order fee on their first restaurant page or restaurant introduction page. This helps users make informed decisions.

All apps offer a pickup-up and a variety of payment options including cash on delivery, credit or debit card, eWallet, and online banking. Besides that, FoodPanda and Grab Food offer multiple

delivery options based on the user's desired speed delivery level and the willingness of the user to pay more for faster service.

Only FoodPanda offers contactless delivery options possibly due to the need during Covid19 pandemic to avoid the spread of disease or maybe for user privacy, while Grab Food with FoodPanda also offers cutlery for every order provided by the restaurant. FoodPanda and Grab Food offer a wider range of payment options, while Shoppe Food provides a slightly more limited selection. Grab Food stands out with its Carbon Neutral Free option, appealing to environmentally conscious consumers. Shopee Food's focus on super deals and vouchers may attract budget-conscious customers.

By understanding the key features and offerings of these apps, developers can enhance user experience and drive innovation in future app developments. Restaurants can also benefit by optimizing their presence on these platforms to attract more customers. Future research should focus on consumer behaviour analysis and technological advancements to further improve food delivery services in Malaysia.

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KATEGORI 03

DATA SECURITY

UNDERSTANDING CYBERSECURITY PERCEPTIONS AND PRACTICES: A SURVEY OF POLITEKNIK BALIK PULAU STUDENTS

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ABSTRACT

Due to the increasing emphasis on digital technology in today's educational world, the Internet has been optimally utilized for daily activities. However, cybersecurity has now become a major concern for students as lack of cybersecurity knowledge can leave a negative impact on them as users. This study aims to identify the area in cybersecurity which can improve awareness among students. The main objectives are to gather data on basic knowledge of cybersecurity, cyberbullying, personal information, internet banking, internet addiction, and self-protection and to investigate the perceptions and practices related to cybersecurity among students in Politeknik Balik Pulau. A quantitative methodology was employed to gather the data with a group of 37 students enrolled in the Secure Mobile Computing course for Session 2 2023/2024. The preliminary result shows that students' basic knowledge of cybersecurity varies widely and is well understood in cyberbullying personal information, and internet addiction. However, the perception of Internet banking and self-protection among students shows awareness at a moderate level. The findings indicate a strong need for a dedicated cybersecurity awareness program to enhance students' preparedness against cyber threats and be able to avoid the growing threat of cybersecurity nowadays.

Keywords: *Cybersecurity Awareness, Cybersecurity Knowledge, Information Security, Questionnaire study.*

INTRODUCTION

The usage of the Internet has increased recently in parallel with society's ongoing growth (Li, 2024). It has become increasingly vital in various aspects, from personal use to broader applications, including electronic wallets for shopping, remote medical diagnoses, and online education for students. Our daily activities nowadays are technology-based including socializing, financing, business, education, medication, etc. All of these activities are adapted from the young generation to adults and all of us are exposed to be the victim of cybercrime. For cybercriminals, the internet has become a primary medium for conducting various cybercrime activities. Research indicates that a significant factor contributing to the rise in online attacks is the widespread lack of awareness regarding cybersecurity threats and attacks (Garba et al., 2022).

The internet has drastically transformed how people learn, obtain information, and build knowledge. This new approach has also introduced a novel way for people to communicate and participate in societal activities (Garba et al., 2020). Despite these advantages, improper use of the internet by users also brings negative consequences. The Internet has introduced numerous cyber-related risks, including cyberbullying, personal information, internet banking, internet addiction, and self-protection. Extended internet use can make students vulnerable by exposing them to online risks and threats. In any business, the weakest link is often its regular users, who typically receive minimal security awareness training as the organization expands (Ferdous et al., 2023).

These gaps can be leveraged to develop targeted awareness initiatives and programs aimed at enhancing cybersecurity preparedness and reducing the risks linked to cyber threats (Sarkar, 2024). Security awareness should be one topic that needs to be considered by all the generations as most of the devices used are connected to the internet (Ferdous et al., 2023). Educating the younger generation is a crucial step towards the successful implementation of security features.

This cybersecurity awareness study covers basic cybersecurity knowledge, such as their understanding of cybersecurity concepts, and their security practices towards email handling, applications, and browsers. These measures could involve making the environment less attractive to potential attackers, identifying critical locations and sensitive information, implementing preventive controls to make attacks costly, and enhancing attack detection, reaction, and response capabilities.

LITERATURE REVIEW

Modern technology has made it possible for people to connect in a variety of ways, whether they are in the same location or not. However, it has also made it possible for attackers to attack personal data or organization information. The relevant research on cybersecurity awareness in the field of education is briefly described in this section. Attackers will employ a variety of platforms, including network traffic, email, and user profiling (Garba et al., 2020; Moallem, 2019). Besides, using the internet comes with risks, particularly for students and those with little to no knowledge of cybersecurity (Garba et al., 2020). If users cannot identify unreliable websites, the potential or risk for disclosure of personal information to irresponsible parties is high (Alqahtani, 2022). Users must take urgent action by raising cybersecurity knowledge to prevent the release of personal data, since cyberattacks are growing more and more violent.

Access to the internet enables individuals to engage in a multitude of activities from the comfort of their homes, including shopping, learning, and socializing in virtual spaces (Riega-Virú et al., 2023). Most young people, including students, use social media applications to interact with people worldwide in addition to accessing the internet for academic purposes. Despite many of the benefits that can be obtained, it also brings unexpected consequences (Beluce et al., 2023), such as watching pornographic, spreading fake videos, engaging in 'puppy love' that leads to sexual crimes, and running away from home. Additionally, students may get involved in the culture of cyberbullying because of using social media. Cyberbullying is the term for someone who is subjected to online or digital technology and is harassed, intimidated, degraded, or shamed by another person (Wan Ali et al., 2020). Negative psychological and physical effects are more likely to occur for victims of cyberbullying. Adolescents who are impacted may experience psychological anguish, difficulty in school, loneliness, and a decline in well-being right away. (Vismara et al., 2022; Aparisi et al., 2021).

However, the rise in internet use among teenagers and young adults has been connected to various forms of online behavioral addictions, such as smartphone, internet, social media, and online gaming addictions. This issue is commonly known as 'problematic internet use' (PIU) (Sserunkuuma et al., 2023). Based on Spada, (2014), PIU refers to internet usage that leads to psychological and social challenges in an individual's life, such as negatively affecting their relationships, job, or education. Considering that students often spend more time on social media than on academic pursuits; This results in distractions from the learning environment and negatively affects students' academic progress (Bekalu et al., 2019; Kolhar et al., 2021).

Many researchers concentrate on designing cybersecurity awareness programs to enhance knowledge of cybersecurity, as previously mentioned, while others focus on evaluating the effectiveness of these programs (Garba et al., 2020). Overall, the literature highlights the necessity of cybersecurity awareness across different groups and underscores the importance of targeted awareness initiatives and programs to enhance cybersecurity knowledge and preparedness. Conducting Cybersecurity Awareness Surveys can help to identify gaps in cybersecurity awareness and develop effective risk mitigation strategies. By prioritizing cybersecurity awareness and preparedness, organizations can prevent cyber-attacks, protect sensitive information, and address the underlying factors that influence cybersecurity behavior (Sarkar, 2024). It has become essential for everyone to learn basic techniques to protect their personal information in today's cybersecurity landscape.

METHODOLOGY

This research used a quantitative approach which is based on 23 questions of online-based questionnaire. The study was designed to measure the level of cybersecurity awareness of students who are enrolled in to course Secure Mobile Computing in Politeknik Balik Pulau in session 2 2023/2024. The total population (N) of students enrolled for this session is 37 students and they are the survey's focus. There are two sections of measurement involved, the first is the evaluation of basic knowledge of cybersecurity where the questions were adopted from a study on security awareness among university students in Nigeria (Garba et al., 2020), while the second section is the security practices towards self-protection from the daily usage of online application adopted from the study security awareness among Northeastern University students in Nigeria (Garba et al., 2022). This survey is important for the researcher to assess their level of cybersecurity awareness, as these students are potential future employees in computer science and other IT industries.

RESULT AND FINDING

This section discussed the feedback from the questionnaires. The analysis was done based on the section on basic knowledge of cybersecurity and the security practices towards the usage of online applications. The security practices towards the usage of online applications consist of a few sub-sections including awareness of internet banking, awareness of self-protection, awareness of cyberbullying, and awareness of internet addiction. A total of 37 students enrolled Secure Mobile Computing course in session 2 2023/2024 are the respondents of this study.

Basic knowledge of cybersecurity

Based on the survey done on 37 respondents, the feedback shows that 94.59% of respondents who are students of the Secure Mobile Computing course have an idea about the concept of cybersecurity. However, there is a small percentage still do not have an idea about cybersecurity and there is a need to improve this gap in terms of cybersecurity knowledge.

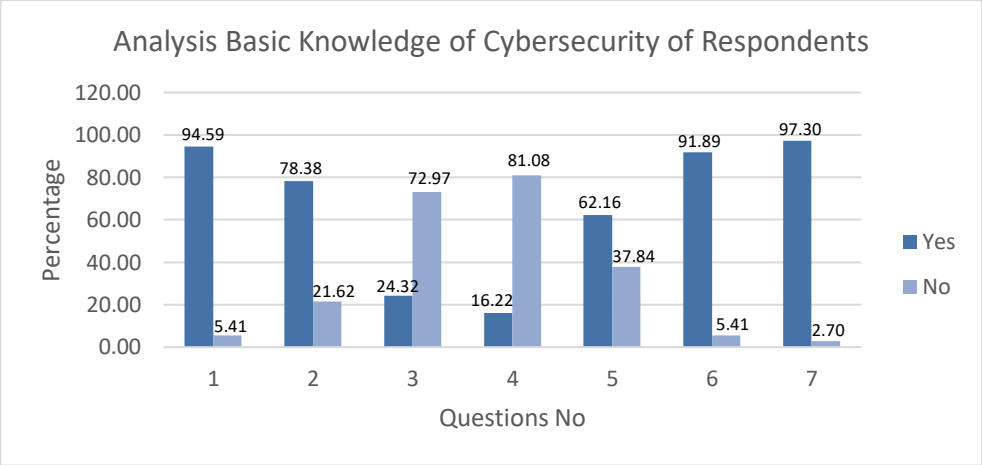

Figure 1: Response to Basic Knowledge Concept of Cybersecurity

Based on a study of cybersecurity awareness among students at the University of Kalyani, they found that there is still a gap that can be improved in Two-Factor Authentication (2FA) (Sarkar, 2024). This outcome is also shown in this study as there is 21.6% (Q2: Do you know what Two-Factor Authentication (2FA) is, and do you use it?) of students here still do not know and apply the 2FA.

Apart from 2FA knowledge, the study also received a response of only 72.97% who did not open the email from an unfamiliar sender. This result shows that 24.32% of those who are not aware of the phishing concept even 97.3% of respondents said 'Yes' to the question "Q7: Do you know what the meaning of the concept phishing is". The email may contain some suspicious links and malicious files which can contribute to accidentally clicking on those links or opening those files. Furthermore, 16.22% responded as 'Yes' to questions that asked about the sending of credential information through email. Therefore, there is a need to expose students more to phishing like how it looks like, the consequences, and the way to avoid being the victim of phishing.

This section can conclude that there is still a gap that the students may need to fill with advanced security knowledge either through additional cybersecurity seminars or workshops to improve

their knowledge in security and the best practices in handling their email, internet banking, and socializing.

Awareness of Internet Banking

The awareness of Internet banking was chosen to be one of the survey questions because it is part of our daily activity for us nowadays. Based on the survey results in Table 1, the mean for Q1 is 4.46, while Q2 and Q3 are 4.27 respectively. This shows that the perceptions of students toward these items are satisfied as most of them are aware of the online purchase and advertisement security-related. The mean value for Q4 is 2.46 which proves that students are strongly aware that should not provide the credentials via a phone call as it can be a scam. However, there is still a small gap in this item as students who are completing the course should achieve a better understanding.

Table 1: The question about awareness of Internet banking

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Q1. I will only make an online purchase after inspecting the seller's background.	2.7%	0%	13.5%	16.2%	67.6%
Q2. I will not make any online purchases if I find the quality of the goods unreliable.	5.4%	2.7%	10.8%	21.6%	59.5%
Q3. I am worried when I receive any suspicious online advertisement.	2.7%	2.7%	16.2%	21.6%	56.8%
Q4. I will provide my personal information whenever I receive calls from banking organizations.	40.5%	8.1%	27%	13.5%	10.8%

Awareness of Self-Protection

Being the user of the Internet, regardless of entertainment, socializing, business, or education, we should know how to protect ourselves from being the victim of cybercrime. The mean value for Q5 is 4.24 showing a high percentage of strongly agreeing to add new friends to social media after knowing their backgrounds and in conjunction with adding new friends, the mean for Q6 consideration of meeting new online friends alone is just 2.56. This shows that students are aware of self-protection, however, the remaining 51.8% of students still considered meeting new online friends alone, and this group of students should be exposed more to the impersonation of social media users which can lead to cybercrime. The mean values for Q7 and Q8 are 4.05 and 4.51 respectively. Most of the students agreed to not share their contact number with a person newly known and 86.5% agreed to inform their parents if they want to meet up with new online friends.

Table 2: The question about awareness of self-protection

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Q5. I will only add new friends to my social media after inspecting their backgrounds.	5.4%	2.7%	10.8%	24.3%	56.8%
Q6. I think I will consider meeting my new online friend alone.	32.4%	16.2%	29.7%	10.8%	10.8%
Q7. I will not share my contact number with a person whom I newly know when asked.	5.4%	2.7%	16.2%	32.4%	43.2%
Q8. I will inform my parents when my online friends want to meet me up.	0%	0%	13.5%	21.6%	64.9%

Awareness of Cyberbullying

Cyberbullying can be a serious problem that might left a negative impact on victims if no parties manage it properly (Iileka et al., 2023). Based on the survey, the mean value for Q9 asking if they felt unsatisfied with some, they will never express to social media is 4.46 while the mean value response to Q10 and Q12 is 4.54 and 4.41 respectively. This outcome shows the students have a good awareness of not expressing their negative feelings through social media. The percentage of respondents who agreed to the Q11 question shown in Table 3 is 75.7%. It was considered moderate as there are 24.3% of respondents who are still neutral agree with the statement in Q11. Thus, some programs related to the cyberbullying consequences should be carried out to increase this kind of awareness among students.

Table 3: The question about awareness of cyberbullying

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Q9. Although I felt unsatisfied with someone, I will never express it through social media.	2.7%	0%	10.8%	21.6%	64.9%
Q10. I think giving harsh comments to my friends on social media is not a good thing to do.	0%	0%	13.5%	18.9%	67.6%
Q11. I think it is not acceptable to criticize someone when they upload their controversial photos.	0%	0%	24.3%	21.6%	54.1%
Q12. I will never express my anger to someone through social media.	2.7%	0%	13.5%	21.6%	62.2%

Awareness of Internet Addicted

Young adults are showing that their addiction to Internet usage keeps increasing along with the use of mobile devices (Lozano-Blasco et al., 2022). Based on the survey question in Q13, there

are 67.5% of respondents agreed that they are extra excited when they are on the Internet. Furthermore, 21.6% of respondents agreed with the question in Q16 where they will spend more time on social media instead of outdoor activities. However, 40.5% of respondents are neutral with the question in Q14, and the mean value for this question is 3.27 while the mean for Q15 is 2.73 showing moderate values where they are still able to enjoy even with no internet access. The overall analysis of the Internet addiction section can be concluded that most respondents choose to be neutral in answering the survey and show that there is a gap where students can be introduced to some cybersecurity program to increase their awareness on how to surf the Internet safely and misused. This is because the research done by Lubis and Handayani (2022) found that the increase in material available over the internet will lead to more cybercrime and decrease physical activities among users.

Table 4: The question about awareness of internet-addiction

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Q13. I will be extra excited when I use the Internet.	2.7%	5.4%	24.3%	32.4%	35.1%
Q14. The time spent without surfing the Internet is the most boring moment.	5.4%	16.2%	40.5%	21.6%	16.2%
Q15. Without the Internet, there is nothing I can do.	21.6%	21.6%	29.7%	16.2%	10.8%
Q16. I would spend more time on social media than having outdoor activities.	13.5%	24.3%	40.5%	13.5%	8.1%

RECOMMENDATION

Future work recommendations based on this research should focus on a dedicated cybersecurity awareness program to enhance students' preparedness against cyber threats and be able to avoid the growing threat of cybersecurity nowadays.

CONCLUSION

Based on the study conducted on 37 students enrolled for Secure Mobile Computing in session 2 2023/2024, it can be concluded that basic knowledge of cybersecurity among them is satisfied as they understand the given term in survey questions, however, there is a gap that we can improve their knowledge in cybersecurity by promoting some cybersecurity seminar or workshop which can expose them on how that cybersecurity can leave the impact on them.

This study also runs a survey on students' awareness with some specific sections including internet banking, self-protection, cyberbullying, and internet addiction. It is found that some respondents are confused about Internet banking part, especially regarding dealing with bank organizations via phone calls. Apart from impersonating bank organizations, some parties tried to call the victims and claim to be the National Scam Resource Centre (NSRC) and Malaysian Communications & Multimedia Commission (MCMC) officers, thus the public should be aware of these scammers by not revealing any personal credentials via the phone calls ("QuickCheck: Are Scammers Impersonating NSRC Officials via Phone Calls?," 2023), ("MCMC Advises Public to Be Wary of Calls Impersonating Its Officers," 2024). A good knowledge regarding impersonation and identity theft could help to decrease the chance of the public being the victims of this kind of cybercrime.

The study contributed to identifying the areas in which the students should improve their knowledge and need some initiative for some awareness program. This study can help the management team in designing or planning any related cybersecurity program to boost cybersecurity awareness and perceptions among students.

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KATEGORI 04

INNOVATION AND ENTREPRENEURSHIP

TAHAP PENGUASAAN KEMAHIRAN PEMIKIRAN KOMPUTASIONAL DAN KEMAHIRAN PENYELESAIAN MASALAH DALAM KALANGAN PELAJAR KOMPUTERAN

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ABSTRAK

Pemikiran komputasional merupakan elemen atau kemahiran asas penting yang perlu ada dalam diri setiap individu bagi membolehkan mereka menyelesaikan masalah dan membuat sebarang keputusan. Pemikiran komputasional adalah pengetahuan, kemahiran dan sikap yang merangkumi faktor algoritma, faktor penyelesaian masalah, faktor kreativiti, faktor koperatif dan faktor pemikiran kritikal. Lebih-lebih lagi, pemikiran komputasional juga ditekankan dalam Malaysia Digital Economy Blueprint. Ini menunjukkan betapa pentingnya elemen ini diterapkan dalam kurikulum sekolah. Kajian ini bertujuan untuk mengenal pasti tahap penguasaan kemahiran pemikiran komputasional dan kemahiran penyelesaian masalah dalam kalangan pelajar komputeran. Reka bentuk kajian adalah berbentuk kuantitatif jenis tinjauan. Instrumen kajian secara atas talian telah digunakan untuk mengumpul data. Terdiri daripada 29 item yang dikumpul berdasarkan lima faktor dan menggunakan skala Likert merangkumi lima faktor iaitu faktor algoritma, penyelesaian masalah, kreativiti, koperatif dan pemikiran kritikal. Seramai 237 orang pelajar daripada Universiti Pendidikan Sultan Idris terlibat dalam kajian ini. Data yang diperoleh dianalisis dengan menggunakan perisian SPSS 21 secara deskriptif dan inferensi. Hasil daripada dapatan kajian menunjukkan kemahiran pemikiran komputasional pelajar komputeran UPSI secara keseluruhan adalah pada tahap sederhana (min = 17.2). Dapatan kajian memaparkan para pelajar perlu didedahkan secara meluas mengenai kepentingan pemikiran komputasional supaya dapat meningkatkan kemahiran berfikir secara kritis dan kreatif.

Kata Kunci: *Pemikiran Komputasional, Kemahiran Penyelesaian Masalah, pelajar komputeran*

PENGENALAN

Pemikiran komputasional merupakan elemen atau kemahiran asas penting yang perlu ada dalam diri setiap individu untuk membolehkan mereka menyelesaikan masalah dan membuat sebarang keputusan. Pemikiran komputasional juga didefinisikan sebagai satu set kemahiran dan satu proses yang membolehkan pelajar menyelesaikan masalah yang kompleks (Murphy, 2019). Wing (2006) menyatakan pemikiran komputasional melibatkan penyelesaian masalah, reka bentuk sistem, dan juga memahami sikap atau tingkah laku manusia, dengan memaparkan konsep asas dalam sains komputer dan pemikiran komputasional juga adalah pemikiran secara berulang. Ini bermaksud pemikiran komputasional adalah salah satu kaedah alternatif yang digunakan dalam menjana penyelesaian masalah melalui blok mental dalam minda seseorang (Zaharin, Sharif dan Mariappan, 2018).

Pemikiran komputasional juga didefinisikan sebagai proses menyelesaikan masalah yang sukar dengan memecahkannya kepada masalah-masalah kecil dan kemudian diselesaikan berdasarkan pecahan tersebut. Oleh itu, pemikiran komputasional dipahami sebagai proses penyelesaian masalah yang melibatkan ciri - ciri yang memungkinkan penggunaan komputer dan alat lain untuk menyelesaikan masalah, menyusun data secara logik, menganalisis data, mewakili data melalui abstrak dan menyelesaikan masalah secara automatik melalui pemikiran algoritma (McClelland & Instructional, 2018).

Wang (2015) menyatakan pemikiran komputasional adalah kemahiran mental untuk menerapkan konsep dan penaakulan asas yang berasal daripada komputer digital moden dan sains komputer, merangkumi semua bidang termasuk aktiviti harian. Pemikiran komputasional adalah terinspirasi oleh kefahaman komputer dan teknologi maklumat, kelebihan, batasan dan masalah yang dibawa. Dengan adanya kemahiran pemikiran komputasional ini, dapat membantu individu dalam menyelesaikan masalah, meluaskan fikiran, meningkatkan kecekapan, menggelakkan kesilapan, berinteraksi dan berkomunikasi dengan lebih baik.

Berdasarkan Kajian Samudin, Looi dan Tham (2016), terdapat empat teknik utama di dalam pemikiran komputasional antaranya adalah teknik leraian, teknik pengecaman corak, teknik peniskalaan dan teknik pengitlakan. Teknik leraian melibatkan pemecahan sesuatu masalah yang besar atau kompleks kepada masalah kecil. Teknik pengecaman corak pula, unsur persamaan

dan perbezaan dalam sesuatu masalah yang telah dileraikan dianalisis dan diteliti. Teknik peniskalaan memfokuskan kepada suatu masalah yang penting sahaja. Seterusnya, teknik pengitlakan iaitu pembinaan model atau formula bagi masalah yang diselesaikan.

KAJIAN LITERATUR

Masalah adalah suatu keadaan atau perkara yang mewujudkan kesukaran dan memerlukan kepada penyelesaian (Dewan Bahasa dan Pustaka, 2019). Penyelesaian masalah pula adalah salah satu cara untuk menjana idea dan membangunkan penyelesaian dengan lebih berkesan dan praktikal (Tee et al., 2017). Kemahiran penyelesaian masalah pula adalah antara kemahiran yang diperlukan untuk menghadapi cabaran revolusi industri 4.0 yang perlu dibangunkan melalui proses pembelajaran (Hidaayatullaah et al., 2020).

Arnaud (2016) menyatakan, terdapat empat langkah dalam menyelesaikan masalah, iaitu langkah pertama, "Apakah masalah yang perlu diselesaikan?", langkah kedua, "Mengapa perlu berhadapan dengan masalah tersebut?", langkah ketiga, "Bagaimana masalah diselesaikan?", dan langkah terakhir ialah melaksanakan penyelesaian tersebut. Pendekatan ini adalah sistem pemikiran modular yang membolehkan seseorang menyesuaikan diri dengan keperluannya. Arnaud (2016) juga menyatakan bahawa masalah adalah sesuatu perkara yang boleh memberi cabaran untuk kepelbagaian sebab dan memerlukan kefahaman bagi membantu memilih arah untuk mencari penyelesaiannya.

Kemahiran penyelesaian masalah adalah antara kemahiran yang sangat penting kerana kemahiran ini membantu meningkatkan keyakinan diri, kreativiti dan gaya berfikir dalam diri seseorang individu. Lebih- lebih lagi kemahiran penyelesaian masalah yang boleh dibentuk melalui model pembelajaran aktif melibatkan pelajar dalam proses pembelajaran seperti Teori Penyelesaian Masalah TRIZ bagi membentuk pembangunan holistik individu (Che Wan Husna Syahirah et al., 2019). Oleh itu, kemahiran penyelesaian masalah adalah aktiviti yang memerlukan pengetahuan, kebolehan dan kaedah kognitif yang mencukupi serta pendekatan yang sistematik untuk menyelesaikan masalah. Ini kerana melalui kemahiran penyelesaian masalah para pelajar akan menganalisis masalah, mengumpulkan data, mengenal pasti penyelesaian yang berpotensi, menilai pilihan dan mencadangkan penyelesaian (Mahanal et al., 2022).

Berdasarkan kajian Proctor (2021), terdapat beberapa kemahiran dalam menyelesaikan masalah antaranya adalah mendengar, menyelidik, komunikasi, kreativiti, menganalisis, menilai, membuat keputusan dan kebolehpercayaan. Setiap kemahiran ini adalah penting kerana merupakan penentuan kepada sumber masalah dan penyelesaian masalah dengan berkesan. Proctor (2021) juga menyatakan terdapat empat cara untuk meningkatkan kemahiran penyelesaian masalah, iaitu pertama berlatih menilai masalah seperti menilai masalah dari pelbagai sudut dan mengumpul maklumat yang diperlukan sebanyak mungkin. Kedua, mengasingkan faktor-faktor, iaitu mengasingkan pelbagai komponen kausal dalam setiap masalah satu demi satu untuk menentukan apakah sumber masalah tersebut. Ketiga, berlatih menyelesaikan masalah dengan bermain teka teki dan senario adalah antara cara yang terbaik untuk meningkatkan kemahiran penyelesaian masalah. Keempat, mengasah kreativiti dengan kefasihan, fleksibiliti, penghuraian dan keaslian. Dengan mengamalkan setiap aktiviti tersebut, akan menghasilkan kemahiran kreatif dan penyelesaian masalah yang lebih baik dan berkesan.

Para pelajar pada abad ke-21 kini amat memerlukan kemahiran penyelesaian masalah. Mereka berhadapan dengan situasi di mana berbagai masalah muncul, dan mereka perlu menyelesaikan masalah tersebut sendiri. Kajian yang dilakukan oleh Chaudhry & Rasool (2012) di COMSATS Institution of Information Technology (CIIT) menunjukkan bahawa kemahiran penyelesaian masalah sangat penting bagi pelajar pra- siswazah sebelum mereka meninggalkan institusi akademik dan berhadapan dengan dunia sebenar. Kebanyakan majikan mengadu tentang kurangnya kemahiran penyelesaian masalah di kalangan pelajar yang memasuki dunia pekerjaan. Oleh itu, perlu mengkaji semula penstrukturan kursus yang ditawarkan kepada pelajar pra-siswazah agar mereka dapat mengembangkan kemahiran penyelesaian masalah mereka. Pelaksanaan kemahiran penyelesaian masalah dalam kalangan pelajar sains komputer perlu dititikberatkan berikutan para pelajar akan menghadapi masalah semasa mempelajari bahasa pengaturcaraan komputer. Antara masalah yang sering dihadapi adalah (i) kesalahan mekanikal, contohnya tiada semicolon (;) dan/atau kesalahan ejaan; (ii) pelajar memahami arahan/penyelesaian yang diberikan tetapi tidak boleh menterjemahkan kefahaman tersebut dalam bentuk algoritma atau tidak boleh menterjemahkan dalam bentuk pengaturcaraan (Chaudhry & Rasool, 2012).

Menurut Sentance & Csizmadia (2017), terdapat beberapa strategi yang berjaya digunakan oleh para guru di United Kingdom dalam pendekatan pengajaran komputeran dan penyelesaian masalah kepada para pelajarnya adalah dengan menggabungkan beberapa tema pengajaran, antaranya ialah belajar tanpa menggunakan komputer, belajar dalam kumpulan, pemikiran komputasional, pembelajaran kontekstualisasi dan latihan pengaturcaraan perancah. Namun untuk pengajaran berkaitan dengan pemikiran komputasional, terdapat panduan mengenainya berdasarkan Buku Panduan Pemikiran Komputasional untuk Guru (Csizmadia et al., 2015).

SOALAN KAJIAN

Kajian ini bertujuan untuk:

i. Mengenal pasti tahap penguasaan kemahiran pemikiran komputasional dan kemahiran penyelesaian masalah dalam kalangan pelajar komputeran.

ii. Mengenal pasti hubungan antara kemahiran pemikiran komputasional dengan kemahiran penyelesaian masalah dalam kalangan pelajar komputeran.

METODOLOGI

Reka bentuk kajian ini adalah berbentuk kuantitatif secara tinjauan dan kolerasi. Kaedah yang digunakan untuk mengumpul data adalah kaedah Soal Selidik *Computational Thinking Scales* dan Soal Selidik *Problem Solving Inventory* yang dijalankan secara atas talian dan diterjemahkan oleh pengkaji sendiri serta mendapat pengesahan pakar untuk soal selidik tersebut. Populasi kajian ini terdiri daripada pelajar-pelajar Universiti Pendidikan Sultan Idris (UPSI) semester 6 iaitu seramai 239 orang. Persampelan ini dilakukandengan menggunakan kaedah persampelan rawak berkelompok iaitu dengan memilih berdasarkan kepada kumpulan pelajar yang sedia ada daripada kumpulan pelajar teknologi maklumat di Universiti Pendidikan Sultan Idris (UPSI).

Hasil daripada kajian, menunjukkan dan membuktikan bahawa instrumen oleh Korkmaz et al., (2017) adalah kukuh berdasarkan skala pemikiran komputasional yang dikembangkan melalui proses analisis kebolepercayaan dan kesahan. Nilai kebolehpercayaan bagi instrumen ini yang mempunyai lima konstruk dinilai berdasarkan kepada pekali alpha Cronbach iaitu, 0.85 bagi faktor pemikiran algoritma, 0.83 bagi penyelesaian masalah, 0.86 bagi pemikiran kritikal, 0.90 bagi koperatif, dan 0.85 bagi kreativiti.

Data yang dikumpul telah diuji dengan Ujian Kenormalan Data (*Normality Test of Data*) untuk menentukan kenormalannnya. Menurut Soon & Mustafa (2018) tahap pemikiran komputasional dapat diuji berdasarkan nilai min populasi, μ dan sisihan piawai populasi, σ manakala X merupakan nilai min keseluruhan faktor kemahiran pemikiran komputasional dan data dikelaskan kepada tujuh tahap Pemikiran Komputasional. Nilai Had Atas dan Nilai had Bawah ditentukan daripada nilai minimum dan nilai maksimum. Analisis ke atas keseluruhan data kemahiran pemikiran komputasional menunjukkan nilai had atas adalah 25, nilai had bawah adalah 7.8, $\mu = 17.2$, $\sigma = 3.25$ dan nilai min keseluruhan, X ialah 18.98. Kemudian, nilai X dibandingkan dengan Jadual 1 di bawah, maka dapat disimpulkan bahawa tahap kemahiran pemikiran komputasional pelajar komputeran secara keseluruhannya adalah pada tahap sederhana. Tahap kemahiran pemikiran komputasional bagi setiap faktor ditunjukkan dalam Jadual 2 (Soon & Mustafa, 2018).

Jadual 1: Tahap-tahap Pemikiran Komputasional

Julat Min Sampel, X	Tahap Kemahiran Pemikiran Komputasional
$X < \mu - 3\sigma$	Sangat Rendah
$\mu - 3\sigma \leq X < \mu - 2\sigma$	Rendah
$\mu - 2\sigma \leq X < \mu - \sigma$	Sederhana Rendah
$\mu - \sigma \leq X \leq \mu + \sigma$	Sederhana
$\mu + \sigma < X \leq \mu + 2\sigma$	Sederhana Tinggi
$\mu + 2\sigma < X \leq \mu + 3\sigma$	Tinggi
$X > \mu + 3\sigma$	Sangat Tinggi

Jadual 2: Taburan Tahap Pemikiran Komputasional Setiap Faktor

Faktor	Had Atas	Had Bawah	μ	σ	X	Tahap
Pemikiran Algoritma	5.00	1.50	3.50	.66	3.57	Sederhana
Penyelesaian Masalah	5.00	1.00	4.00	.79	3.35	Sederhana
Kreativiti	5.00	2.50	2.50	.51	3. 97	Sederhana
Pemikiran Kritikal	5.00	1.80	3.20	.59	3.95	Sederhana
Koperatif	5.00	1.00	4.00	.70	4.14	Sederhana

DAPATAN KAJIAN

Seramai 239 orang pelajar komputeran daripada Universiti Pendidikan Sultan Idris (UPSI) telah menjawab soal selidik ini.

Tahap Pemikiran Komputasional

Analisis data bagi Pemikiran Komputasional telah menunjukkan nilai had atas adalah 25, nilai had bawah pula adalah 7.8, $\mu = 17.2$, $\sigma = 3.25$ dan nilai X = 18.98. Nilai X jika dibandingkan dengan Jadual 1, menunjukkan nilai X berada di tahap sederhana. Oleh itu, dapat disimpulkan bahawa tahap pemikiran komputasional pelajar UPSI secara keseluruhannya berada di tahap sederhana. Manakala tahap pemikiran bagi kelima-lima konstruk yang diuji ditunjukkan di dalam Jadual 2.

Hubungan Antara Tahap Pemikiran Komputasional dengan Kemahiran Penyelesaian Masalah

Hasil daripada ujian korelasi Pearson yang dilakukan, maka di dapati wujud hubungan yang signifikan antara kemahiran penyelesaian masalah dengan faktor pemikiran algoritma, $r(237) = .41$, $p < .05$, kemahiran penyelesaian masalah dengan faktor penyelesaian masalah, $r(237) = .09$, $p > .05$, kemahiran penyelesaian masalah dengan faktor pemikiran kritikal, $r(237) = .63$, $p < .05$, kemahiran penyelesaian masalah dengan faktor koperatif, $r(237) = .39$, $p < .05$, dan kemahiran penyelesaian masalah dengan faktor kreativiti, $r(237) = .63$, $p < .05$. Berdasarkan kepada analisis data ini, wujud hubungan signifikan yang kuat antara kemahiran penyelesaian masalah dengan pemikiran kritikal, kreativiti dan pemikiran algoritma. Manakala hubungan antara kemahiran penyelesaian masalah dengan koperatif adalah sederhana. Terdapat hubungan yang tidak signifikan antara kemahiran penyelesaian masalah dengan faktor penyelesaian masalah. Kekuatan hubungan nilai pekali korelasi ditunjukkan di dalam Jadual 3 di bawah berdasarkan (Cohen et al., 2007; Rowntree, 1981).

Jadual 3: Kekuatan Hubungan Mengikut Nilai Indeks Korelasi

Nilai Indeks Korelasi	Interprestasi Hubungan
0.00 – 0.20	Sangat Lemah
0.21 – 0.30	Lemah
0.31 – 0.50	Sederhana
0.51 – 0.80	Kuat
0.81 – 1.00	Sangat Kuat

Hasil daripada ujian korelasi yang dilakukan mendapati hubungan yang signifikan antara faktor kemahiran pemikiran komputasional dengan kemahiran penyelesaian masalah. Ujian ini dilakukan adalah untuk menjawab objektif kajian yang kedua iaitu untuk mengenal pasti hubungan antara kemahiran pemikiran komputasional dengan kemahiran penyelesaian masalah dalam kalangan pelajar komputeran. Jadual 4 menunjukkan hasil ujian korelasi Pearson yang digunakan dalam kajian ini.

Jadual 4: Korelasi antara Lima Faktor Kemahiran Pemikiran Komputasional dengan Kemahiran Penyelesaian Masalah

Faktor	1	2	3	4	5	6
1. Pemikiran Algoritma	-	.36**	.57**	.37**	.30**	.41**
2. Penyelesaian Masalah		-	.31**	.28**	.11**	.09**
3. Pemikiran Kritikal			-	.45**	.39**	.63**
4. Koperatif				-	.39**	.39**
5. Kreativiti					-	.63**
6. Kemahiran Penyelesaian Masalah						-

Analisis Regreasi Linear

Dalam kajian ini, ujian regreasi pelbagai Green & Salkind (2014) telah digunakan bagi menganggarkan peramal bagi kemahiran penyelesaian masalah. Hasil daripada analisis regresi mendapati lima faktor peramal dalam kemahiran pemikiran komputasional secara signifikan berkaitan dengan kemahiran penyelesaian masalah, R^2 = .539, R^2 diubahsuai = .529, F (5, 233) = 54.51, p = 0.00. Sampel pekali korelasi pelbagai ialah .539 dan ini menunjukkan anggaran 52.9% varians kemahiran penyelesaian masalah boleh dikira dengan menggabungkan secara linear semua faktor berkenaan.

Jadual 5: Jadual Analisis Regresi

R	R^2	Ubah Suai R^2	d*f*1	d*f*2
.734	.539	.529	5	233

Daripada analisis regresi ini, persamaan yang dapat dibentuk dalam kemahiran penyelesaian masalah ialah Kemahiran Penyelesaian Masalah = .083 (Pemikiran Algoritma) + 0.38 (Kreativiti) + 0.046 (Koperatif) +0.333 (Pemikiran Kritikal) -0.079 (Penyelesaian Masalah) + 0.784. Berdasarkan kepada analisis regresi ini, terbukti wujud hubungan signifikan antara kemahiran pemikiran komputasional dengan kemahiran penyelesaian masalah. Jadual 4.16 menunjukkan analisis regresi pelbagai (*Stepwise*): Penyumbang terhadap kemahiran penyelesaian masalah. Keputusan analisis data dengan menggunakan SPSS menunjukkan bahawa secara signifikan empat variabel peramal iaitu pemikiran kritikal (β = .33, $p<.05$), koperatif (β =.05, $p>.05$), Kreativiti (β =.38, $p<.05$) dan pemikiran algoritma (β = .08, $p>.05$) merupakan faktor kepada kemahiran penyelesaian masalah. Pengkaji menolak hipotesis nul dan melaporkan bahawa keempat-empat variabel peramal menyumbang sebanyak 53.9 peratus (r = .73) perubahan varians dalam kemahiran penyelesaian masalah. Dengan itu, berdasarkan keputusan analisis regresi dalam Jadual 4.16 di atas, menunjukkan bahawa pemikiran kritikal dan kreativiti merupakan faktor utama peramal kepada kemahiran penyelesaian masalah dalam kalangan pelajar komputeran Universiti Pendidikan Sultan Idris (UPSI).

KESIMPULAN

Hasil daripada kajian ini menunjukkan bahawa tahap penguasaan pemikiran komputasional dalam kalangan pelajar komputeran daripada Universiti Pendidikan Sultan Idris adalah di tahap sederhana. Oleh itu, Pemikiran komputasional adalah elemen atau kemahiran asas yang penting dalam individu untuk membolehkan mereka menyelesaikan masalah dan membuat sebarang keputusan. Itu sebagai set kemahiran dan proses membolehkan pelajar menyelesaikan masalah yang kompleks. Pemikiran komputasional juga didefinisikan sebagai proses menyelesaikan masalah yang sukar dan memecahkannya kepada masalah-masalah yang kecil dan diselesaikan berdasarkan pecahan tersebut. Inspirasi bagi pemikiran komputasional datang dari pemahaman tentang komputer dan teknologi maklumat, termasuk kelebihan, batasannya, dan masalah yang

dihadapinya.

Kemahiran pemikiran komputasional ini dapat membantu individu dalam menyelesaikan masalah, meluaskan fikiran, meningkatkan kecekapan, menggelakkan kesilapan dan berinteraksi serta berkomunikasi dengan lebih baik. Kemahiran pemikiran komputasional adalah teknik utama di dalam pemikiran komputasional antaranya adalah leraian, teknik pengecaman corak, teknik peniskalaan dan teknik pengitlakan. Leraian melibatkan pemecahan sesuatu masalah yang besar atau kompleks kepada masalah kecil. Pengecaman corak pula melibatkan pemecahan sesuatu masalah yang besar atau kompleks. Peniskalaan memfokuskan kepada suatu masalah yang penting sahaja. Kemahiran pemikiran komputasional adalah antara kemahiran yang diperlukan untuk menghadapi cabaran revolusi industri 4.0 yang perlu dibangunkan melalui proses pembelajaran. Kemahiran pemikiran komputasional adalah aktiviti yang memerlukan pengetahuan, kebolehan dan kaedah kognitif yang mencukupi dan sistematik untuk menyelesaikan masalah.

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KATEGORI 05

TVET EDUCATION

CRITICAL THINKING SKILLS OF POLYTECHNIC STUDENTS WITHIN THE OUTCOME-BASED EDUCATION CONCEPT

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ABSTRACT

This study investigates the perspectives of students about critical thinking (CT) skills in teaching and learning within the outcome-based education (OBE) concept. This study used a quantitative method by using a questionnaire as the instrument. A total of 111 respondents participated using purposive sampling. The collected data were analysed using descriptive analysis such as mean, standard deviation, and percentages. The findings show that the students are aware that CT skills are covered in their assessments and incorporated into their classroom learning. The engagement of students in the classroom by making practical solutions and using critical analysis skills is high. The findings also revealed that the students were confident in solving the problems of the assessment given by the lecturer in the class. However, students are still not confident in solving problems on their own, such as in examinations. Overall, the analysis shows that the students are aware of the CT skills in teaching and learning at the polytechnic. This study contributes to the academic department in terms of identifying methods to increase students' interest in problem-solving and critical thinking, thus enabling them to be competitive after graduation. Future research could identify critical thinking skills in non-practical courses at the polytechnic.

Keywords: *Critical thinking, CT skills, Outcome-based education, OBE, polytechnic student*

INTRODUCTION

The world is experiencing rapid technological growth in the digital era (Yusof et al., 2021; Yusof et al., 2022); therefore, every individual needs to be agile and able to solve a problem, especially in an organisation or industry. Evaluation of the shortcomings and advantages of an emerging technology requires individuals or communities to have problem-solving and innovation skills. It takes a strong foundation in critical thinking to meet this challenge. The education system in Malaysia also emphasises the importance of problem-solving for quality education. Such integration is to ensure that today's graduates are not only equipped with theoretical knowledge.

Thus, individuals need to be analytical thinkers who are prepared to examine, develop conclusions, and resolve issues significantly to contribute to the nation.

Therefore, critical thinking (CT) skills are important, and students need to be instilled with these skills so that they become more competent when they graduate from a higher education institution. CT aims to cultivate students who possess the analytical, perceptive, and proactive skills that are crucial for success in higher education, in addition to enhancing their knowledge (Syahrin et al., 2024). Fundamentally, critical thinking is the capacity to reason logically, to comprehend the connections between ideas, to evaluate claims, and to solve problems. (Abasaid & Fereira, 2022). However, the student's ability to break down complex ideas into more understandable parts is challenging (Syahrin et al., 2024). Generally, the students demonstrated limited mastery of CT skills (Al-Mahrooqi & Denman, 2020). Moreover, a previous study found that only a small proportion of students consistently show a high level of CT mastery in all areas (Kumar & James, 2015). Therefore, this study aims to investigate the perspectives of students about critical thinking (CT) skills in teaching and learning within the outcome-based education (OBE) concept.

According to Ali et al. (2024), outcome-based education (OBE) is a notable approach that requires educators and learners to focus on both the instructional outcomes and the intended objectives, as well as the entire range of educational practices or processes that support the achievement of the predetermined classroom outcomes. This study refers to the OBE framework as a guide for measurement, as in Norinpe et al. (2018), whereby the teaching and learning process consists of the course syllabus, pedagogies, learning process, and assessment. The measurement of the study comprises the course syllabus/course outline, students' engagement, assessment, and learning process. Thus, this study is important because it sheds light on the broader pedagogical landscape related to the application of CT abilities in academic programmes.

METHODOLOGY

The study was conducted using a quantitative method which used an online questionnaire as an instrument to obtain information from the sample. The group populations in this study were students who took programming courses such as Python programming, and Problem-solving and Program Design at Politeknik Balik Pulau (PBU). The total population is 131 respondents. Thus, a total of 111 respondents were selected using purposive sampling. Purposive sampling is used to obtain information that has the needed characteristics in the sample (Yusof et al., 2022). The study

sample refers to the sample size determination table provided by Krejcie and Morgan (1970), as discussed in Bukhari's (2021) study.

A survey was conducted using a questionnaire adopted from a study by Syahrin et al. (2024). The surveys were completely voluntary; therefore, the study complied with ethical principles. Every student was invited to submit their answers online. There were 20 items in the questionnaire, divided into four dimensions: Integration of CT skills, Students' Engagement in CT skills, Assessment with CT skills, and Learning process related to CT skills. The questionnaire was measured using a Likert scale. Thus, respondents had to mark their responses to the statement items based on a scale from 1 to 5 (Taherdoost, 2019). Descriptive statistics were the main focus of the analysis in this research. Table 1 below shows the mean score interpretation adapted from Yani et al. (2024) and Hamzah et al. (2016), referred to in this study.

Table 1: Mean score interpretation

Means score	Interpretation of mean score
3.668 – 5.000	High
2.334 – 3.667	Medium
1.000 – 2.333	Low

Notes: Adopted from Yani et al. (2024) and Hamzah et al. (2016)

Unit of Analysis

The unit of analysis is the person or thing whose quality will be measured (Kumar, 2018). The unit of analysis is an important part of research. Here are the main things that a researcher looks at in this study:

Table 2: Unit of analysis of the study

Research Problem/ Research Question	Unit of analysis	Data Collection	Unit of observation
To investigate the perspectives of students about critical thinking (CT) skills in teaching and learning within the Outcome-based education (OBE) concept	Individuals (students)	Survey of students	Individuals (students)

Notes: Adopted from Kumar (2018)

RESULT AND DISCUSSION

This section presents the statistical findings from the questionnaire distributed to polytechnic students who took programming courses such as Python programming and Problem Solving and Program Design. The frequency and percentage of each question were statistically calculated and presented in this section.

Demographic Information

The demographic information measured is gender, age, courses, and awareness of outcome-based education (OBE). A total of 111 students answered the survey. The majority of the respondents are male, 51.4% (57 respondents), followed by female, 48.6% (54 respondents). Most of the respondents' ages are between 19 and 20 years old, which is 95.5% of the population (106 respondents), and between 22 and 24 years old, which is 4.5% (5 respondents). Refer to Figure 1 for the gender and Figure 2 for the age of the respondents.

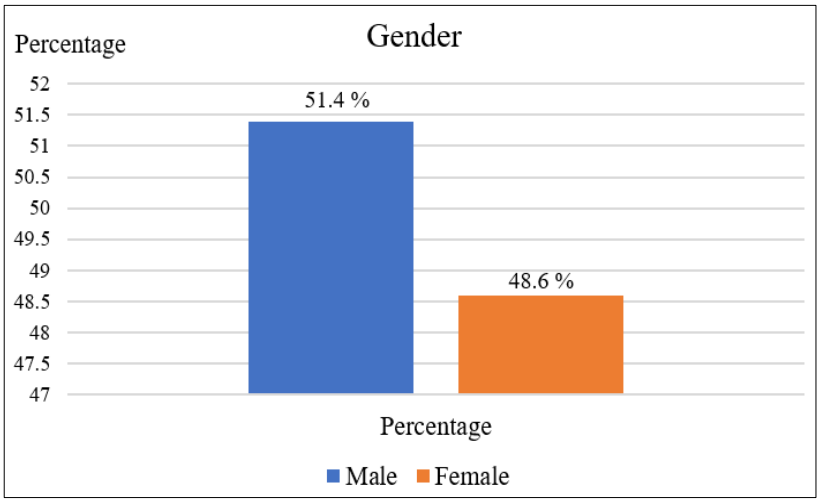

Figure 1: Gender of respondents

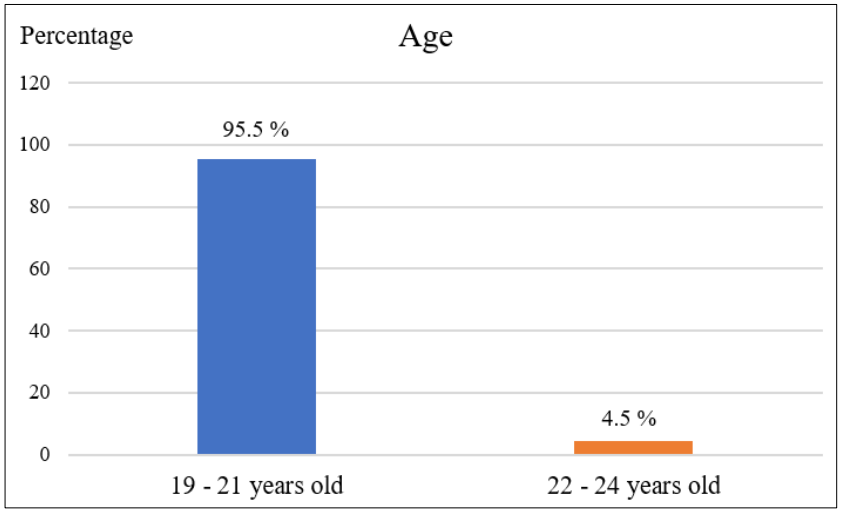

Figure 2: Age of respondents

Figure 3 shows the analysis of respondents who took Python programming and Problem Solving and Program Design in this study. There were 111 students who answered the survey. Out of the total, 91.9% of the respondents (102 respondents) took Python programming and 8.1% (9 respondents) took Problem Solving and Program Design.

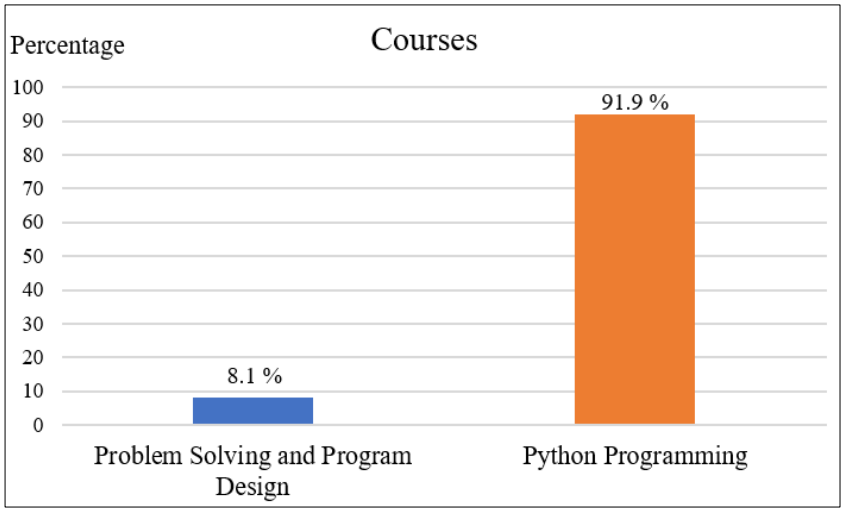

Figure 3: Courses taken by students (for measurement)

Moreover, Figure 4 shows that 100% of the respondents (111 respondents) are aware of OBE implementation in teaching and learning at the polytechnic.

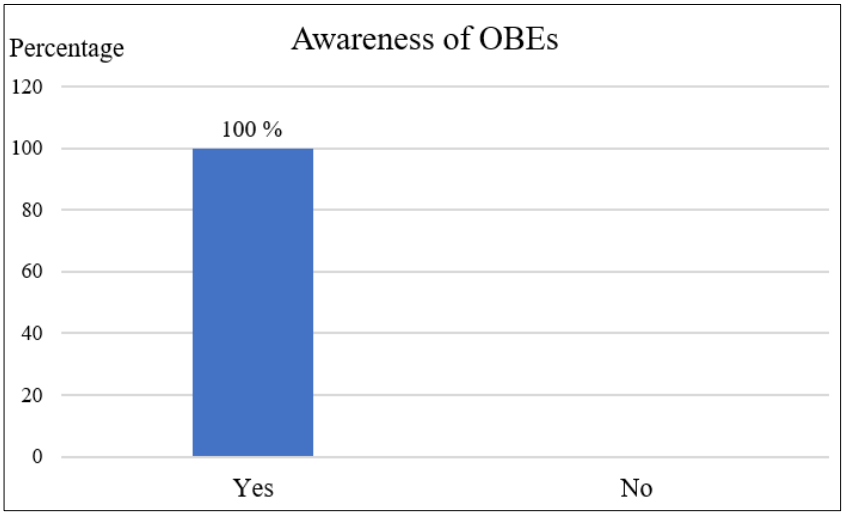

Figure 4: Awareness of Outcome-based education (OBE)

Critical Thinking (CT) Skills in Teaching and Learning at a Polytechnic

The result in this section discussed students' perspectives on CT skills in teaching and learning at a polytechnic. Table 3 shows the course lecturers explain the Course Outline at the beginning of the semester (M = 4.56, SD = 0.669), and they are aware that CT is mentioned or applied in the Course Outline (M = 4.43, SD = 0.708). The mean score for both items is relatively high based on the mean interpretation (Yani et al., 2024; Hamzah et al., 2016). The respondents are also aware that CT skills are covered in their assessments (i.e., quizzes/tests/assignments/projects) (M = 4.41, SD = 0.719) and incorporated into their classroom learning (M = 4.32, SD = 0.821).

Table 3: Integration of CT skills

Items	N	Mean	Std. Deviation
I am aware that Critical Thinking skills are incorporated into my classroom learning.	111	4.32	0.821
I am aware that Critical Thinking skills are covered in all my assessments (for example: quizzes/tests/assignments/projects)	111	4.41	0.719
I am aware that Critical Thinking is mentioned/applied in the Course Outline/ Syllabus.	111	4.43	0.708
My course lecturers explain the Course Outline at the beginning of the semester.	111	4.56	0.669

The findings show a high level of awareness regarding the role of critical thinking skills in enhancing their job prospects (M = 4.41, SD = 0.791) and the necessity of acquiring critical thinking skills before graduation (M = 4.37, SD = 0.674).

Based on Table 4, the students concur that they would rather commit notes to memory than work through critical thinking problems on exams or assessments. The important finding from the survey is that students would rather memorise notes than solve critical thinking questions in exams/tests (M = 4.06, SD = 0.984). Thus, this finding shows that students prefer to memorise notes rather than solve critical thinking questions in exams or tests. This finding is contrary to the study of Syahrin et al. (2024), where respondents gave diverse opinions on this statement. Meanwhile, the findings show that the course lecturer explained the course outline at the beginning of the semester. Therefore, the course instructors play an important role in emphasising and teaching related CT skills. It simultaneously meets the requirements of OBE in the implementation of teaching and learning.

Table 4: Students' Engagement in CT skills

Items	N	Mean	Std. Deviation
I enjoy working on tasks that require critical thinking skills.	111	4.23	0.808
I prefer memorizing notes than to solve critical thinking questions in exams/ tests.	111	4.06	0.984
My friends and I prefer exam questions with critical thinking skills.	111	4.10	0.824
The necessity of acquiring critical thinking skills before graduation.	111	4.37	0.674
The role of critical thinking skills in enhancing my job prospects.	111	4.41	0.791
The need for increased classroom activities focused on critical thinking skills.	111	4.30	0.710
The importance of more group work centered around critical thinking skills.	111	4.36	0.737

Based on Table 5, the respondents were aware that the assignment questions required them to assess or critique based on specific standards and criteria, for example, based on the rubric of the assessment (M = 4.36, SD = 0.737). The respondents are also aware that their continuous assessment or exam questions require deep CT rather than superficial inferences (M = 4.29, SD = 0.695).

Table 5: Assessment with CT skills

Items	N	Mean	Std. Deviation
I get assignments that have clear and easily identifiable purposes.	111	4.32	0.799
My assessments have aspect(s) that test the application of critical thinking.	111	4.26	0.782
My continuous assessment/exam questions require deep rather than superficial inferences.	111	4.29	0.695
My assignment questions require me to appraise or assess or critique based on specific standards and criteria.	111	4.36	0.737

Table 6 shows a high level of engagement in argumentation and reasoning skills in certain situations in class (M = 4.26, SD = 0.782). Moreover, the analysis also shows that the respondents like to engage in classes that involve practical solutions and critical analysis skills (M = 4.25, SD = 0.756), and they are confident and have the ability to solve task problems (problem-solving) that have a certain level of CT (M = 4.25, SD = 0.780). Therefore, this study shows that the respondents like to engage in a class by making practical solutions and using critical analysis skills, and they are confident enough to solve the assignment problems given by the lecturer. However, students are still not confident in solving a problem on their own, such as in examinations (as illustrated in Table 3).

Table 6: Learning process relates to CT skills

Items	N	Mean	Std. Deviation
I am enthusiastic and participate in any CT-shaped tasks.	111	4.14	0.807
I have the initiative to seek out CT exercises.	111	4.16	0.792
I like to engage in classes that involve practical solutions and critical analysis skills.	111	4.25	0.756
I engage in argumentation and reasoning skills in certain situations in class.	111	4.26	0.782
I am confident and have the ability to solve task problems (problem-solving) that have a certain level of CT.	111	4.25	0.780

On the other hand, based on Table 7, the high average mean for the dimensions in the measurement is an integration of CT skills in teaching and learning (M = 4.43, SD = 0.624), followed by Assessment of CT Skills (M = 4.31, SD = 0.659), Students' engagement in CT skills (M = 4.26, SD = 0.604), and Learning Process of CT skills (M = 4.21, SD = 0.690). Thus, the finding shows that the respondents are aware of the CT skills in teaching and learning, especially for programming courses.

Table 7: Average mean for four dimensions

Average Mean of Dimension	N	Mean	Std. Deviation
Integration of CT skills	111	4.43	0.624
Students' engagement in CT skills	111	4.26	0.604
Assessment of CT Skills	111	4.31	0.659
Learning Process of CT Skills	111	4.21	0.690

The result of this study shows that the mean of critical thinking skills of students taking programming courses is high. On the contrary, the work by Noni and Abdullah (2018) shows that the level of critical thinking skills of engineering students is at a medium level. Therefore, there is a difference in the mean level between students' critical skills in learning programming courses and engineering courses.

CONCLUSION

This study investigates the perspectives of students at a Politeknik Balik Pulau regarding the application of CT skills in teaching and learning within the outcome-based education (OBE) concept. The findings revealed that they are aware that CT skills are covered in their assessments and incorporated into their classroom learning. Moreover, the students like to engage in class by developing practical solutions and critical analysis skills. They are confident in solving the problems of the assessment given by the lecturer. In addition, the finding shows that the students prefer to memorise notes rather than solve critical thinking questions in exams or tests. Therefore, this situation shows that students are still not confident in solving problems on their own, such as in examinations.

The polytechnic or lecturers are recommended to emphasise critical thinking skills and enhance students' confidence to solve a problem in class, examinations, or external programs. The findings also show that the students are aware of the CT skills in teaching and learning for programming courses at the polytechnic. This study contributes to the ongoing discussion about critical thinking skills in the polytechnic academic environment by identifying methods to increase students' interest in problem-solving and critical thinking for polytechnic graduates to be competitive in the future. Future research could identify critical thinking skills in non-practical courses at the polytechnic.

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PENGETAHUAN DAN SIKAP TERHADAP ICT DALAM KALANGAN PENSYARAH KOLEJ KOMUNITI LIPIS

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ABSTRAK

ICT (Information and Communication Technology) memainkan peranan yang penting dalam pengajaran dan pembelajaran (PdP) pada abad ke-21. Penggunaan ICT bukan sahaja memberi kesan positif terhadap motivasi pelajar dalam mengikuti sesi pembelajaran bahkan juga membolehkan objektif pembelajaran bagi suatu bidang itu dapat dicapai secara optimum. Namun, kekurangan ilmu teknikal yang mencukupi dalam pengendalian peralatan ICT serta faktor kurang pengetahuan dan kemahiran ICT boleh menyebabkan seseorang pensyarah tidak mengaplikasikan ICT dalam pengajaran dan pembelajaran (PdP) di samping faktor kekangan lain seperti kekurangan peralatan ICT, makmal dan tempat. Justeru, kajian ini bertujuan untuk mengenal pasti tahap pengetahuan dan tahap sikap terhadap ICT dalam kalangan pensyarah Kolej Komuniti Lipis disamping itu, kajian ini juga untuk mengenal pasti perbezaan pengetahuan dan perbezaan sikap terhadap ICT berdasarkan jantina. Kajian melibatkan seramai 12 responden pensyarah Kolej Komuniti Lipis. Data kajian dikumpul dengan menggunakan instrumen soal selidik dan dianalisis dengan perisian "Statistical Package of the Sosial Sciences" (SPSS) 22.0. Hasil daripada analisis deskriptif menunjukkan bahawa tahap pengetahuan ICT berada pada tahap tinggi (min = 4.30 dan sp = 0.655) manakala tahap sikap terhadap ICT juga berada pada tahap tinggi (min = 4.47 dan sp = 0.658). Hasil analisis inferensi menunjukkan bahawa tidak terdapat perbezaan yang signifikan pengetahuan ICT berdasarkan jantina (t = -1.072 dan sig = 0.309) dan juga tidak terdapat perbezaan sikap terhadap ICT berdasarkan jantina (t = -0.754 dan sig = 0.468). Namun dari aspek carian maklumat secara on line menggunakan enjin pencari perlu dipertingkatkan lagi dalam kalangan pensyarah Kolej Komuniti Lipis memandangkan pencarian maklumat secara online adalah sangat penting untuk dijadikan sebagai bahan bantu mengajar supaya PdP pensyarah lebih menarik. Hasil kajian ini diharapkan dapat memberi makluman yang penting kepada pihak berkepentingan dalam usaha meningkatkan pengintegrasian ICT dalam proses PdP di kolej komuniti.

Kata Kunci: *pengetahuan, sikap, ICT, Kolej Komuniti Lipis*

PENGENALAN

ICT (Information and Communication Technology) memainkan peranan yang penting dalam pengajaran dan pembelajaran (PdP) pada abad ke-21. Teras Strategi 1 dalam Pelan Tindakan Pendidikan Tinggi Malaysia 2022 – 2025 iaitu mentransformasi sistem pengajaran dan pembelajaran dalam mendepani cabaran abad 21 bagi melahirkan bakat kalis masa hadapan dengan memperkenalkan program *National Digital Library* dan program Pembelajaran Anjal menunjukkan bahawa ICT adalah perkara terpenting dalam pembelajaran pada masa kini. (Pelan Tindakan Pendidikan Tinggi Malaysia 2022 – 2025).

Penggunaan ICT bagi sesi PdP bukan sahaja memberi kesan positif terhadap motivasi pelajar dalam mengikuti sesi pembelajaran bahkan juga membolehkan objektif pembelajaran bagi suatu bidang itu dapat dicapai secara optimum (Muhammad Fakhrurrazi & Hafizhah, 2023). Nur Aisyah &Hazrati (2022) menyatakan bahawa ICT bukan sekadar memberi manfaat kepada pelajar untuk belajar namun penggunaan ICT juga dapat meningkatkan kemahiran dan pengetahuan guru dalam bidang tersebut, secara tidak langsung, ICT juga memudahkan dan membantu pengajaran guru lebih berkualiti dan menarik minat murid untuk belajar. Sehubungan dengan itu, para guru hendaklah berusaha untuk meningkatkan pengetahuan dan kemahiran dalam penggunaan ICT agar proses PdP berjalan dengan lancar. Nor Halina et al. (2020) menyatakan bahawa perkembangan teknologi dari semasa ke semasa memudahkan sesuatu proses PdP dilaksanakan serta menjimatkan masa dan juga dapat menarik minat pelajar.

Isu Permasalahan

Pengetahuan dan sikap yang positif memainkan peranan penting dalam mengaplikasi ICT dalam proses PdP oleh para pendidik. Asnuurien Najma et.al (2008) menjalankan kajian tentang penggunaan ICT dalam pengajaran dan pembelajaran pensyarah di Politeknik Merlimau mendapati bahawa masih terdapat pensyarah yang tidak mempunyai ilmu teknikal yang secukupnya dalam mengendalikan peralatan ICT. Faktor kurang pengetahuan serta kurang kemahiran dalam penggunaan ICT di samping factor kekangan lain seperti kekurangan peralatan ICT, makmal dan tempat juga memberikan kesan kepada pensyarah dalam tidak menggunakan ICT kerana perlu membawa *laptop* dan LCD ke kelas.

Kajian yang dijalankan oleh Rodzah et al. (2011) tentang tahap pengetahuan dan penggunaan sistem CIDOS di kalangan pensyarah Politeknik Merlimau menyatakan bahawa antara faktor

pensyarah tidak menggunakan CIDOS ialah kerana peranan serta fungsi sistem CIDOS tidak jelas di samping kurang sambutan pelajar terhadap CIDOS.

Kajian yang dijalankan oleh Shah Rulbani et al. (2017) tentang Penggunaan ICT dalam Pengajaran dan Pembelajaran Pensyarah Pendidikan Islam di Politeknik Zon Selatan. Hasil daripada analisis deskriptif menunjukkan bahawa tahap penggunaan ICT dalam kalangan pensyarah Pendidikan Islam berada pada tahap tinggi namun dari aspek melibatkan penggunaan Curiculum Information and Document Online System (CIDOS) perlu dipertingkatkan lagi.

Nur Aisyah &Hazrati (2022) menyatakan bahawa sifat negatif dari segelintir pendidik yang menggunakan kaedah tradisional bagi proses PdP menjadikan pelaksanaan sistem ICT sebagai satu cabaran bagi mereka, perkara ini disebabkan sifat dalam diri mereka yang enggan mencuba untuk sesuaikan diri dengan revolusi teknologi dalam pendidikan. Bagi PdP secara dalam talian, guru yang mempunyai kemahiran ICT akan mudah melaksanakan proses PdP tersebut dan sebaliknya. Justeru itu, sikap positif guru dalam menggunakan ICT wajar dipertingkatkan agar proses PdP berjalan dengan lancar.

Pengetahuan dan kemahiran para guru berkenaan teknologi haruslah dipertingkatkan agar mereka dapat berkongsi idea serta membolehkan mereka menyediakan bahan pengajaran dengan lebih baik. Selain itu, faktor demografi seperti pengalaman mengajar juga memainkan peranan yang penting dalam mengaplikasikan ICT dalam PdP. Kajian Zulazizi et al. (2020) dalam Muhammad Fakhrurrazi dan Hafizhah (2023) mendapati bahawa, guru yang telah berkhidmat dalam tempoh yang lama kurang menggunakan ICT di dalam kelas berbanding guru yang baru berkhidmat.

Daripada dapatan kajian yang lepas juga, pengkaji menghadapi kesukaran dalam mengenal pasti sejauh mana tahap pengetahuan dan juga sikap terhadap ICT dalam proses PdP dalam kalangan pensyarah kolej komuniti. Keadaan ini berlaku disebabkan kajian-kajian yang lepas kebanyakannya memberi tumpuan kepada aspek pengetahuan, kemahiran, penggunaan ICT dan juga sikap terhadap ICT dalam kalangan pensyarah politeknik. Justeru, penulis mendapati bahawa satu kajian perlu dijalankan untuk mengkaji aspek pengetahuan dan sikap terhadap ICT dalam kalangan pensyarah di kolej komuniti. Oleh itu, kajian ini dijalankan untuk mengenal pasti aspek pengetahuan dan juga sikap terhadap ICT kalangan pensyarah Kolej Komuniti Lipis.

Tujuan Kajian

Tujuan kajian adalah untuk mengenal pasti tahap pengetahuan dan tahap sikap terhadap ICT dalam pengajaran pensyarah Kolej Komuniti Lipis. Kajian juga untuk melihat perbezaan konstruk berdasarkan jantina.

Objektif Kajian

Antara objektif kajian ialah:

1. Mengenal pasti tahap pengetahuan dan sikap terhadap ICT dalam kalangan pensyarah Kolej Komuniti Lipis.
2. Mengenal pasti perbezaan pengetahuan dan sikap terhadap ICT dalam kalangan pensyarah Kolej Komuniti Lipis berdasarkan jantina.

Soalan Kajian

Daripada tujuan kajian di atas, pengkaji mengutarakan persoalan-persoalan seperti berikut:

1. Apakah tahap pengetahuan dan tahap sikap terhadap ICT dalam kalangan pensyarah Kolej Komuniti Lipis?
2. Adakah terdapat perbezaan yang signifikan pengetahuan ICT dalam kalangan pensyarah Kolej Komuniti Lipis berdasarkan jantina?
3. Adakah terdapat perbezaan yang signifikan sikap terhadap ICT dalam kalangan pensyarah Kolej Komuniti Lipis berdasarkan jantina?

Hipotesis Kajian

Berikut adalah hipotesis kajian:

Ho1: Tidak terdapat perbezaan yang signifikan pengetahuan ICT dalam kalangan pensyarah Kolej Komuniti Lipis berdasarkan jantina.

Ho2: Tidak terdapat perbezaan yang signifikan sikap terhadap ICT dalam kalangan pensyarah Kolej Komuniti Lipis berdasarkan jantina.

KAJIAN KEPUSTAKAAN

Pengetahuan ICT dan sikap terhadap ICT

Tengku Nor Hayati (2015) menyatakan bahawa pengetahuan ICT meliputi aspek tahu tentang fungsi asas perkakasan komputer seperti monitor, skrin, audio, dan sebagainya. Pengetahuan juga melibatkan aspek keupayaan membina laman web, blog, dan sebagainya. Maimunah dan Rosseni (2007) dan Mohd Hasril (2007) menyatakan bahawa individu yang mempunyai pengetahuan yang baik tentang komputer akan mempunyai sikap yang lebih positif terhadap penggunaan komputer termasuk dalam proses PdP. Kenyataan ini turut disokong oleh kajian mengenai pengetahuan komputer dan internet, Harvey dan Wilson (1995) bahawa responden yang mempunyai pengetahuan akan mempunyai sikap lebih positif terhadap penggunaan komputer kerana mengetahui kelebihan yang diperolehi darinya. Hakikat ini diakui bahawa pengetahuan seseorang tentang ICT akan mendorongnya mengaplikasikan ICT dalam pengajaran dan pembelajaran di sekolah (Wan Khairuddin 2006).

Sikap memainkan peranan penting dalam penggunaan komputer kerana ia bukan sahaja sebagai permulaan kepada penerimaan seseorang terhadap ICT malah ia juga mempengaruhi tingkah laku seseorang untuk menggunakan komputer pada masa hadapan. Ini bermakna, jika seseorang tidak suka menggunakan komputer walaupun ianya telah direka bentuk dengan baik, maka mereka tetap tidak akan menggunakannya. Dalam erti kata lain, tidak kira betapa canggih dan berkuasanya sesuatu teknologi, keberkesanan penggunaannya masih bergantung kepada sikap positif pengguna terhadapnya (Norliza et.al 2011). Smith, Caputi & Rawstone (2000) dalam Norliza et.al (2011) menyatakan bahawa sikap terhadap komputer merujuk kepada penilaian umum seseorang atau perasaan menyokong atau tidak terhadap teknologi komputer dan aktiviti komputer yang spesifik.

Menurut kajian Kay (1990) pula sikap dan kesedaran terhadap ICT serta keupayaan untuk menggunakan aplikasi perisian komputer merupakan cara terbaik untuk menjangka dan meramal komitmen guru-guru terhadap penggunaan komputer dan pengurusan ICT di sekolah, manakala Davis, et. al, (1989) menyatakan bahawa sikap terhadap teknologi akan menjadi positif jika seseorang dapat mengawal teknologi tersebut berasa mudah dikendalikan dan membawa manfaat kepada mereka (Mohd. Anuar dan Ahmad 2008). Zainudin et.al (2008) menyatakan bahawa wujud perkaitan yang positif antara kemahiran ICT guru dengan sikap menggunakan kemudahan tersebut dalam pengajarannya. Dengan kata lain guru perlu mempunyai kemahiran ICT dapat

membina keyakinan dan sikap yang positif terhadap penggunaan ICT dalam pengajaran dan pembelajaran. Ini turut disokong oleh kenyataan Hazman (2009) menyatakan bahawa positif merupakan faktor pendorong dan sikap negatif merupakan faktor yang menghalang pengguna ICT dalam proses PdP dalam kalangan guru.

ICT dalam Pengajaran dan Pembelajaran

Asnuurien Najma et al. (2008) dalam kajiannya tentang penggunaan ICT dalam PdP di Jabatan Pengajian Am, Politeknik Merlimau mendapati bahawa tahap pengetahuan pensyarah di Jabatan Pengajian Am termasuk pensyarah Pendidikan Islam tentang ICT adalah tinggi, begitu juga tahap kemahiran pensyarah terhadap penggunaan ICT pada juga tahap yang tinggi. Tahap kemahiran ini melibatkan kemahiran penggunaan program Microsoft word, Microsoft Powerpoint, dan Microsoft Excel. Dari aspek kekerapan penggunaan peralatan ICT pula, didapati para pensyarah kerap menggunakan program Microsoft power point, Microsoft Word dan Microsoft Excel. Penggunaan ruang komunikasi seperti Yahoo Messenger, Face Book dan You Tube adalah sederhana, namun penggunaan e-mail berada pada tahap tinggi. Sementara kekerapan penggunaan Flash Multimedia, Software High Class dan CIDOS dalam kalangan pensyarah adalah pada tahap yang rendah. Hasil kajiannya membuktikan bahawa pensyarah mempunyai sikap sangat positif terhadap penggunaan ICT dalam PdP. Para pensyarah juga bersetuju bahawa penggunaan ICT untuk dalam proses PdP dapat memberikan satu bentuk motivasi baru, menambahkan lagi keseronokan serta menjadi dorongan kepada mereka dalam mencuba sesuatu yang baru di samping mewujudkan suasana pembelajaran yang lebih berkesan kepada pelajar. Kajian ini juga menyatakan bahawa antara faktor halangan penggunaan ICT yang telah dikenal pasti ialah faktor kekangan masa, kelas yang kurang sesuai, peralatan yang disediakan terhad, peruntukan pembelian peralatan, perkakasan dan perisian adalah mahal, kebanyakan peralatan yang disediakan tidak berfungsi atau rosak dan pelajar lebih berminat memberi tumpuan kepada audio atau visual yang dipaparkan daripada penerangan pensyarah.

Kajian yang dijalankan oleh Rodzah et al. (2011) tetang tahap pengetahuan dan penggunaan sistem *Curiculum Information and Document Online System* (CIDOS) CIDOS di kalangan pensyarah Politeknik Merlimau (PMM). Kajian ini melibatkan 64 orang pensyarah sebagai responden. Hasil kajian mendapati bahawa tahap pengetahuan dan juga tahap penggunaan sistem CIDOS di kalangan pensyarah PMM adalah tinggi. Sehubungan itu, kajian dapat membuktikan bahawa pensyarah PMM adalah antara pengguna teraktif. Kajian ini juga menyatakan bahawa

antara halangan penggunaan CIDOS dalam kalangan pensyarah adalah disebabkan kadar capaian sistem CIDOS perlahan, peranan serta fungsi sistem CIDOS tidak jelas, penggunaan CIDOS kurang mendapat sambutan dari pelajar, CIDOS menyediakan platform untuk menyimpan, menilai dan berkongsi kandungan digital secara online dan kekangan masa pensyarah dalam menggunakan sistem CIDOS.

Kajian yang dijalankan oleh Tengku Norhayati (2015) tentang Teknologi Maklumat dan Komunikasi (TMK) dalam Pengajaran dan Pembelajaran Guru Cemerlang Pendidikan Islam di Negeri Selangor. Kajian ini melibatkan 70 orang guru cemerlang Pendidikan Islam di negeri Selangor. Dapatan kajian menunjukkan bahawa pengetahuan dan sikap guru terhadap ICT berada pada tahap yang tinggi, manakala kemahiran dan penggunaan ICT berada pada tahap yang sederhana. analisis inferensi menunjukkan bahawa tidak terdapat perbezaan yang signifikan pengetahuan guru cemerlang terhadap ICT berdasarkan jantina, lokasi dan penggunaan komputer. Manakala terdapat perbezaan yang signifikan pengetahuan guru cemerlang terhadap ICT berdasarkan pengalaman mengajar. Berdasarkan kemahiran, tidak terdapat perbezaan yang signifikan kemahiran guru cemerlang terhadap ICT berdasarkan jantina, lokasi dan pengalaman mengajar. Manakala terdapat perbezaan yang signifikan kemahiran guru cemerlang terhadap ICT berdasarkan penggunaan komputer. Seterusnya berdasarkan penggunaan, tidak terdapat perbezaan yang signifikan penggunaan guru cemerlang terhadap ICT berdasarkan jantina dan lokasi. Manakala terdapat perbezaan yang signifikan kemahiran guru cemerlang terhadap ICT berdasarkan pengalaman mengajar dan penggunaan komputer. Berdasarkan sikap pula, tidak terdapat perbezaan yang signifikan sikap guru cemerlang terhadap ICT berdasarkan berdasarkan jantina, lokasi dan pengalaman mengajar. Manakala terdapat perbezaan yang signifikan sikap guru cemerlang terhadap ICT berdasarkan penggunaan komputer. Kajian ini juga menunjukkan tidak terdapat hubungan yang signifikan antara pengetahuan, kemahiran dan penggunaan ICT dengan sikap terhadap ICT.

Kajian yang dijalankan oleh Shah Rulbani et al (2017) tentang Penggunaan ICT dalam Pengajaran dan Pembelajaran Pensyarah Pendidikan Islam di Politeknik Zon Selatan. Kajian ini melibatkan sampel kajian ialah seramai 69 orang responden pensyarah Pendidikan Islam di tujuh buah politeknik zon selatan. Hasil daripada analisis deskriptif menunjukkan bahawa tahap penggunaan ICT dalam kalangan pensyarah Pendidikan Islam berada pada tahap tinggi manakala hasil analisis inferensi menunjukkan bahawa tidak terdapat perbezaan yang signifikan penggunaan ICT berdasarkan pengalaman mengajar. Namun dari aspek melibatkan penggunaan Curiculum

Information and Document Online System (CIDOS) perlu dipertingkatkan lagi supaya proses PdP mereka tidak hanya tertumpu di dalam bilik-bilik atau dewan-dewan kuliah semata-mata, penggunaan CIDOS juga penting dalam mewujudkan suasana budaya e-learning dilaksanakan di politeknik-politeknik.

Kajian dijalankan oleh Chew Le Yee dan Suziyani (2021) untuk mengenal pasti tahap kemahiran guru prasekolah di daerah Kuala Selangor dalam penggunaan teknologi. Kajian berbentuk kuantitatif ini melibatkan 80 orang guru prasekolah di daerah Kuala Selangor berdasarkan kaedah persampelan bukan rawak mudah. Hasil kajian menunjukkan guru prasekolah mempunyai tahap kemahiran menggunakan teknologi yang tinggi. Dapatan ini menunjukkan bahawa pentingnya para guru mengintegrasikan teknologi dalam pembelajaran kanak-kanak prasekolah yang mana kaedah ini sesuai dengan suasana pengajaran dan pembelajaran abad ke-21. Kajian yang dijalankan oleh Nur Ain Husna dan Anuar Ahmad. (2024) mengenai tahap penggunaan ICT dalam kalangan guru Sejarah Prauniversiti yang merangkumi aspek tahap pengetahuan dan tahap kemahiran. melibatkan guru Sejarah seramai 90 orang di sekitar negeri Kelantan. Hasil kajian menunjukkan bahawa penggunaan ICT dalam kalangan guru Sejarah adalah berada pada tahap yang tinggi. Kajian ini juga menyatakan bahawa kemahiran dan pengetahuan yang tinggi dalam penggunaan ICT oleh guru memberikan pengaruh kepada minat pelajar. Ini jelas ditunjukkan melalui hasil kajian, di mana tahap kemahiran dan tahap pengetahuan penggunaan ICT yang tinggi oleh guru Sejarah telah menjadikan tahap minat pelajar Prauniversiti terhadap penggunaan ICT di dalam subjek Sejarah meningkat. Tahap minat ini sememangnya berkait rapat dengan kefahaman pelajar untuk lebih memahami isu ataupun topik yang sedang diajar. Apabila pelajar menunjukkan minat dan penglibatan yang aktif, ianya sekaligus dapat menjayakan sesi pengajaran dan pembelajaran tersebut

METODOLOGI

Kajian ini menggunakan reka bentuk kuantitatif berbentuk kajian tinjauan dengan menggunakan borang soal selidik yang dibangunkan menggunakan Google Form sebagai instrumen. Penyelidik telah menggunakan satu set soal selidik yang mengandungi tiga (3) bahagian iaitu bahagian pertama untuk mendapat maklumat demografi responden, bahagian kedua ialah tahap pengetahuan ICT dan bahagian ketiga ialah sikap terhadap ICT. Soal selidik pengetahuan ICT telah diubah suai daripada Wan Khairuddin (2006) dalam Laporan Projek Sarjana yang bertajuk Penggunaan ICT dalam kalangan guru Pendidikan Islam di sekolah-sekolah Menengah Daerah

Rompin. Soal selidik sikap terhadap ICT telah diubah suai daripada Tengku Norhayati (2015) dalam tesis sarjana bertajuk "Teknologi Maklumat dan Komunikasi (TMK) dalam Pengajaran dan Pembelajaran Guru Cemerlang Pendidikan Islam di Negeri Selangor.

Borang soal selidik ini melibatkan semua pensyarah di Kolej Komuniti Lipis iaitu pensyarah dalam Program Pengembaraan Pelancongan dan juga pensyarah Unit Pengajian Am seramai 12 orang sebagai sampel kajian. Persampelan yang digunakan dalam kajian ini ialah *Convenience* sampel kerana kajian terbatas kepada pensyarah Kolej Komuniti Lipis sahaja untuk mengisi instrumen soal selidik ini, responden diarah untuk menanda pada ruang yang telah disediakan. Maklum balas persetujuan adalah seperti berikut:

Bahagian 2, 3, 4 dan 5
SKALA
Sangat Tidak Setuju
Tidak Setuju
Kurang Setuju
Setuju
Sangat Setuju

PROSEDUR PENGANALISISAN DATA

Analisis Deskriptif

Dalam kajian ini, data yang dikumpul daripada soal selidik diproses dan dianalisis menggunakan program SPSS iaitu "*Statistical Package For Social Sciences*" (Versi 22.0). Data-data daripada borang soal selidik dan pemerhatian dianalisis dengan menggunakan statistik deskriptif seperti peratus dan frekuensi. Skor min dibuat seperti dalam jadual 1.

Jadual 1 : Penilaian skor min

Skor min	Interpretasi
3.67 hingga 5.00	Tinggi
2.34 hingga 3.66	Sederhana
1.00 hingga 2.33	Rendah

Sumber : Sumarni dan Jamil Ahmad (2002)

DAPATAN KAJIAN

Berikut adalah dapatan kajian dan analisis kajian berdasarkan borang soal selidik yang diedarkan di Kolej Komuniti Lipis mengenai pengetahuan dan sikap terhadap ICT dalan kalangan pensyarah Kolej Komuniti Lipis.

Jadual 2 : Demografi pensyarah Kolej Komuniti Lipis

Demografi	Kekerapan	Peratus
Jantina		
Lelaki	5	41.7
Perempuan	7	58.3
Umur		
25-30 tahun	1	8.3
31-40 tahun	7	58.3
41-50 tahun	2	16.7
51-60 tahun	2	16.7
Kelulusan akademik		
Sarjana muda	8	66.6
Sarjana	4	33.3
Pengalaman mengajar		
1-5 Tahun	6	50
6-10 tahun	0	0
11-15 tahun	3	25
16-20 tahun	1	8.3
21 tahun ke atas	2	16.7
Adakah pernah mengikuti kursus berkaitan dengan ICT		
ya	12	100
tidak	0	0
Penggunaan Komputer		
1-5 jam	4	33.3
6-10 jam	3	25
11-15 jam	1	8.3
16-20 jam	2	16.3
21 jam ke atas	2	16.3

Jadual 2 menunjukkan bahawa seramai 12 orang responden yang terlibat dalam kajian ini. Berdasarkan jantina, lelaki seramai 5 (41.7%) orang dan perempuan seramai 7 (58.3%) orang. Berdasarkan umur, terdapat seorang berumur (8%) berumur 25-30 tahun, 7 (58.3%) orang berumur 31-40 tahun, 2 orang (16.7%) berumur 41-50 tahun dan dua orang (16.7%) berumur 51-60 tahun. Berdasarkan kelulusan akademik, 8 orang (66.6%) kelulusan sarjana muda manakala 4 (33.3) orang lulusan sarjana. Berdasarkan pengalaman mengajar, 6 (50%) orang antara 1-5 Tahun, 3 (25%) orang 11-15 tahun, seorang (8.3%) 16-20 tahun dan 2 (16.7%) orang 21 tahun ke atas. Berdasarkan kehadiran kursus berkaitan dengan ICT, Seramai 12 orang (100%) pensyarah menyatakan bahawa mereka pernah mengikuti kursus tersebut. Manakala berdasarkan penggunaan komputer dalam seminggu, 4 (33.3%) orang menggunakan antara 1-5 jam, 3 (25%) orang antara 6-10 jam, seorang (8.3%) antara 11-15 jam, 2 (16.3%) orang antara 16-20 jam dan 2 (16.3%) orang 21 jam ke atas.

Analisis deskriptif yang melibatkan min dan sisihan piawai dijalankan untuk menentukan pengetahuan orang awam mengikut bidang yang wujud di Malaysia. Hasil analisis deskriptif seperti Jadual 3 berikut:

Jadual 3 : Tahap pengetahuan ICT dalam kalangan pensyarah Kolej Komuniti Lipis

No	Item	Min	Sisihan Piawai	Interpretasi
1	Operasi asas komputer seperti skrin (monitor, LCD), Unit pemprosesan Pusat (CPU), papan kunci, (*keyboard*) dan pad sentuhan skrin (*mouse*).	4.41	0.668	Tinggi
2	Operasi lanjutan komputer seperti pencetak (*printer*), modem cakera padat (*hard disk*), cakera liut (*Floppy Disk*).	4.00	0.738	Tinggi
3	Portal pendidikan	4.1	0.717	Tinggi
4	Pengurusan fail	4.5	0.514	Tinggi
5	Menghasilkan bahan bantu mengajar menggunakan computer	4.2	0.753	Tinggi
6	Pemprosesan data (MS Word)	4.3	0.492	Tinggi
7	Persembahan Elektronik (MS Power Point)	4.5	0.514	Tinggi
8	Mel-elektronik (e-mail)	4.6	0.651	Tinggi
9	Penggunaan Internet	4.5	0.674	Tinggi
10	Carian maklumat secara *on-line* menggunakan enjin pencari (search engine)	3.7	0.866	Tinggi
11	Ruang komunikasi seperti *Facebook, Twitter* dll	4.4	0.792	Tinggi
12	Laman sesawang seperti *Blog*	4.6	0.492	Tinggi
	Keseluruhan	4.3	0.655	Tinggi

Jadual 3 menunjukkan bahawa setiap item pengetahuan pensyarah Kolej Komuniti Lipis terhadap ICT berada pada tahap tinggi. Terdapat dua item yang mempunyai min yang paling tinggi iaitu item "Laman sesawang seperti Blog (min = 4.6 dan sp = 0.492) dan item "Mel-elektronik (e-mail)" (min = 4.6 dan sp = 0.651). Item "Carian maklumat secara *on-line* menggunakan enjin pencari (search engine)" (min = 3.7 dan sp = 0.866) walaupun interprestasi item berada pada tahap tinggi namun ia berada pada kadar min yang paling rendah diantara semua min yang ada. Secara

keseluruhannya menunjukkan bahawa pengetahuan pensyarah Kolej Komuniti Lipis terhadap ICT berada pada tahap tinggi (min = 4.3 dan sp = 0.655).

Jadual 4 : Tahap sikap terhadap ICT dalam kalangan pensyarah Kolej Komuniti Lipis

No	Item	Min	Sisihan Piawai	Interpretasi
1	Selesa menggunakan ICT dalam pengajaran dan pembelajaran	4.45	0.607	Tinggi
2	ICT dapat membantu mengurus kerja saya	4.51	0.559	Tinggi
3	Seronok mempelajari perkara yang berkaitan dengan ICT	4.51	0.609	Tinggi
4	Penggunaan ICT menambah minat saya terhadap pekerjaan saya	4.54	0.608	Tinggi
5	ICT merangsang minat pelajar terhadap pengajaran dan pembelajaran	4.54	0.677	Tinggi
6	ICT menjimat masa pengajaran dan pembelajaran	4.57	0.606	Tinggi
7	Merasa tidak terancam dengan penggunaan ICT	4.26	0.816	Tinggi
8	Penggunaan ICT dalam PdP mengurangkan beban kerja saya	4.36	0.785	Tinggi
9	Saya berpendapat penggunaan ICT dapat membantu saya mempelajari kemahiran baru	4.52	0.609	Tinggi
10	Saya berkemampuan untuk menjadi seorang yang berkebolehan dalam ICT	4.35	0.703	Tinggi
11	Saya tidak merasa sudah terlambat untuk belajar tentang ICT	4.51	0.656	Tinggi
	Keseluruhan	4.47	0.658	Tinggi

Jadual 4 menunjukkan bahawa item sikap terhadap ICT dalam kalangan pensyarah Kolej Komuniti Lipis adalah berada pada tahap tinggi. Item yang mempunyai min paling tinggi ialah item "ICT menjimat masa pengajaran dan pembelajaran" (min = 4.57 dan sp = 0.606). Manakala item "Merasa tidak terancam dengan penggunaan ICT" (min = 4.26 dan sp = 0.816) walaupun interpretasi item berada pada tahap tinggi namun ia berada pada kadar min yang paling rendah diantara semua min yang ada. Secara keseluruhannya menunjukkan bahawa sikap terhadap ICT dalam kalangan pensyarah kolej Komuniti Lipis adalah pada tahap tinggi (min = 4.47 dan sp = 0.658).

Perbezaan pengetahuan ICT dalam kalangan pensyarah Kolej Komuniti Lipis berdasarkan jantina disokong oleh analisis secara *"Independent t-test"*. Hasil daripada analisis ini ditunjukkan pada jadual di bawah:

Jadual 5: Hasil analisis perbezaan pengetahuan ICT dalam kalangan Kolej Komuniti Lipis berdasarkan jantina

Jantina	N	Min	Sisihan Piawai	Levene's Test for Equality of Variances		t	df	Sig. (2-tailed)
				F	Sig.			
Lelaki	5	4.1	0.649	1.488	0.251	-1.072	10	0.309
Perempuan	7	4.4	0.378					

Jadual 5 menunjukkan keputusan *"independent t-test"* untuk perbezaan pengetahuan ICT dalam kalangan pensyarah Kolej Komuniti Lipis berdasarkan jantina. Hasil analisis menunjukkan bahawa tidak terdapat perbezaan yang signifikan pengetahuan ICT dalam kalangan pensyarah berdasarkan jantina dengan nilai t = -1.072 dan sig = 0.309 (p>0.05). Dari segi min menunjukkan bahawa pensyarah perempuan (min = 4.4) mempunyai pengetahuan ICT lebih tinggi berbanding dengan pensyarah lelaki (min =4.1). Ini menunjukkan hipotesis nol (Ho1) diterima, iaitu tidak terdapat perbezaan yang signifikan pengetahuan ICT dalam kalangan pensyarah Kolej Komuniti Lipis berdasarkan jantina.

Perbezaan sikap terhadap ICT dalam kalangan pensyarah Kolej Komuniti Lipis berdasarkan jantina disokong oleh analisis secara *"Independent t-test"*. Hasil daripada analisis ini ditunjukkan pada jadual di bawah:

Jadual 6: Hasil analisis perbezaan sikap terhadap ICT dalam kalangan Kolej Komuniti Lipis berdasarkan jantina

Jantina	N	Min	Sisihan Piawai	Levene's Test for Equality of Variances		t	df	Sig. (2-tailed)
				F	Sig.			
Lelaki	5	4.3	0.585	0.702	0.422	-0.754	10	0.468
Perempuan	7	4.6	0.513					

Jadual 6 menunjukkan keputusan *"independent t-test"* untuk perbezaan sikap terhadap ICT dalam kalangan pensyarah Kolej Komuniti Lipis berdasarkan jantina. Hasil analisis menunjukkan bahawa tidak terdapat perbezaan yang signifikan sikap terhadap ICT dalam kalangan pensyarah berdasarkan jantina dengan nilai t = -0.754 dan sig = 0.468 (p>0.05). Dari segi min menunjukkan bahawa pensyarah perempuan (min = 4.6) mempunyai pengetahuan ICT lebih tinggi berbanding

dengan pensyarah lelaki (min =4.3). Ini menunjukkan hipotesis nol (Ho2) diterima, iaitu tidak terdapat perbezaan yang signifikan pengetahuan ICT dalam kalangan pensyarah Kolej Komuniti Lipis berdasarkan jantina.

PERBINCANGAN

Analisis deskriptif menunjukkan bahawa tahap pengetahuan ICT pensyarah Kolej Komuniti Lipis adalah berada pada tahap tinggi. Ini memberi gambaran bahawa pensyarah mempunyai pengetahuan ICT yang baik. Faktor ini berkemungkinan disebabkan kesedaran pensyarah tentang kelebihan yang diperoleh daripada operasi asas komputer tersebut dalam membantu mereka melaksanakan proses PdP. Pernyataan ini adalah selari dengan pendapat Harvey dan Wilson (1995) bahawa responden yang mempunyai pengetahuan ICT akan mempunyai sikap lebih positif terhadap penggunaan komputer kerana mengetahui kelebihan yang diperolehi darinya. Dapatan kajian ini adalah selari dengan kajian Asnuurien Najma et al. (2008), Rodzah et al. (2011) dan Shah Rulbani et al. (2017) menyatakan bahawa tahap pengetahuan terhadap ICT adalah tinggi dalam kalangan pensyarah.

Analisis deskriptif juga menunjukkan bahawa sikap terhadap ICT dalam kalangan pensyarah Kolej Komuniti Lipis adalah berada pada tahap tinggi. Ini memberi gambaran bahawa pensyarah mempunyai sikap yang sangat positif terhadap ICT dalam proses PdP. Pensyarah menyatakan bahawa ICT menjimatkan masa pengajaran dan pembelajaran, menambah minat pensyarah terhadap pekerjaan sebagai pensyarah dan juga merangsang minat pelajar terhadap pengajaran dan pembelajaran. Hal ini sejajar dengan pendapat Davis et al. (1989) bahawa sikap terhadap teknologi akan menjadi positif jika seseorang dapat mengawal teknologi tersebut berasa mudah dikendalikan dan membawa manfaat kepada mereka. Dapatan kajian ini adalah selari dengan kajian Shah Rulbani et al (2017) bahawa tahap sikap terhadap ICT adalah tinggi dalam kalangan pensyarah.

Namun kajian ini juga mendapati bahawa pensyarah Kolej Komuniti Lipis kurang menggunakan carian maklumat secara on-line menggunakan enjin pencari (*search engine*) perlu diberi perhatian oleh para pensyarah memandangkan terdapat banyak maklumat dan bahan-bahan yang boleh dijadikan sebagai bahan bantu mengajar boleh diakses melalui enjin pencari tersebut. Dapatan kajian ini adalah sedikit berbeza dari kajian Asnuurien Najma et al. (2008) dan Shah Rulbani et al. (2017) yang lebih tertumpu dari aspek penggunaan CIDOS yang agak perlu diberi perhatian dan dipertingkatkan dalam kalangan pensyarah politeknik.

KESIMPULAN

Diharapkan kajian ini dapat membantu memberi impak yang positif kepada pensyarah Kolej Komuniti Lipis secara khasnya dari aspek meningkatkan penggunaan enjin pencari dalam meningkatkan mutu PdP pensyarah dan kepada para pendidik secara amnya. Dicadangkan kajian dari aspek kemahiran ICT dan penggunaan ICT dalam kalangan pensyarah kolej komuniti dijalankan sebagai kajian seterusnya. Hasil kajian ini diharapkan dapat memberi makluman yang penting kepada pihak berkepentingan dalam usaha meningkatkan pengintegrasian ICT dalam proses PdP di kolej komuniti.

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KEBERKESANAN KURIKULUM LATIHAN INDUSTRI TERHADAP KESEDIAAN PELAJAR UNTUK BEKERJA: PERSEPSI PELAJAR KOLEJ KOMUNITI CHENDEROH

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ABSTRAK

Dalam mengukur keupayaan kemahiran pelajar semasa Latihan Industri, penilaian tahap kompetensi kemahiran praktikal menjadi penting dalam membentuk kesediaan bekerja pelajar. Kajian ini bertujuan menguji impak kemahiran praktikal terhadap kesediaan bekerja pelajar dari empat program sijil di Kolej Komuniti Chenderoh yang baru menamatkan Latihan Industri pada semester akhir tahun 2023. Responden kajian terdiri daripada 114 pelajar dari program Sijil Kulinari, Sijil Operasi Perhotelan, Sijil Teknologi Elektrik, dan Sijil Seni Visual Kreatif. Analisis deskriptif digunakan untuk menilai keberkesanan latihan praktikal, sementara analisis regresi digunakan untuk menguji hipotesis H1 dan analisis ujian t sampel tidak bersandar digunakan untuk menguji hipotesis H2. Dapatan kajian menunjukkan adanya kesan signifikan latihan praktikal terhadap kesediaan bekerja, serta perbezaan dalam kesediaan bekerja antara pelajar lelaki dan perempuan. Hasil kajian ini dapat memberikan panduan kepada pihak pengurusan kolej dan industri untuk meningkatkan serta memperbaiki kurikulum latihan industri pelajar, dengan tujuan meningkatkan persediaan mereka untuk memasuki dunia pekerjaan.

Kata Kunci: *Latihan Industri, Kemahiran Praktikal, Kesediaan Bekerja*

PENGENALAN

Latihan industri (LI) adalah sebahagian daripada kurikulum pendidikan di institusi pengajian tinggi. Program latihan praktikal memberikan peluang kepada pelajar untuk menggabungkan pengalaman dan pengetahuan yang diperoleh di institut pendidikan tinggi dengan mengaplikasikannya dalam industri yang diawasi dan dirancang di persekitaran profesional sebenar (Kementerian Pemngajian Tinggi, 2010). Tujuan utama LI adalah untuk memperkukuhkan kemahiran yang diperlukan oleh industri, di mana ia memainkan peranan

penting dalam menyediakan tenaga kerja berkualiti dan profesional untuk masa depan. Matlamat LI juga merangkumi memenuhi tahap pendidikan tertier dan menghasilkan graduan yang cemerlang (*Malaysia Education Blueprint*, 2015-2025). Graduan ini perlu dilengkapi dengan kemahiran teknikal serta kemahiran kebolehkerjaan yang tinggi (Gili & Ambotang, 2019). Di kolej komuniti, program LI merupakan syarat untuk setiap pelajar yang ingin memperoleh sijil dalam program pengajian mereka. Tempoh latihan selama 4 bulan telah ditetapkan untuk mematuhi kriteria yang telah ditetapkan oleh Agensi Kelayakan Malaysia (Malaysian Qualifications Agency – MQA). Pelajar diberi peluang untuk memilih tempat LI yang sesuai bagi mengaplikasikan kemahiran yang mereka pelajari sepanjang tempoh pengajian.

Dalam mengukur keupayaan kemahiran pelajar semasa LI, penilaian terhadap tahap kompetensi perlu dilakukan supaya institusi dapat menghasilkan graduan-graduan berkualiti yang memenuhi pasaran kerja oleh majikan. Salah satu penilaian kompetensi pelajar dalam LI adalah kemahiran praktikal (psikomotor). Kemahiran praktikal melibatkan koordinasi gerakan fizikal dan penggunaan kemahiran motor, yang memerlukan latihan serta diukur dari segi kelajuan, ketepatan, jarak, prosedur, dan teknik (Jeganathan, 2016). Pembangunan kemahiran ini mencakupi aspek kecekapan teknikal yang merangkumi pengetahuan tentang bidang tugas, kemahiran menyelesaikan masalah, perancangan yang teliti, serta pengurusan kerja yang strategik (Rahman, 2020). Kecekapan teknikal adalah kemahiran yang penting pada masa kini dan masa depan kerana sektor perindustrian memerlukan pekerja yang mempunyai kecekapan teknikal yang tinggi untuk memudahkan mereka menyesuaikan diri dengan teknologi baru (Gordon, 2014).

Salah satu objektif penting LI adalah untuk memastikan kesediaan kerja di kalangan pelajar (Gili & Ambotang, 2019). Kesediaan yang diterangkan dalam konteks kajian ini merujuk kepada kesediaan untuk menghadapi kerja dalam industri sebagai sambungan aktiviti LI. Kesediaan bekerja merujuk kepada keadaan di mana graduan bersedia dan kemungkinan besar mendapatkan pekerjaan (Kapareliotis et al., 2019). Walaupun LI menyediakan pengalaman positif sebagai persediaan sebelum memasuki dunia pekerjaan, terdapat beberapa isu yang sering dikaitkan dengan sikap pelajar. Banyak graduan kolej merasa kurang bersedia untuk menghadapi cabaran dalam persekitaran pasaran tenaga kerja yang baru (Priyanto & Inderanata, 2020). Secara umumnya, persepsi selepas latihan industri memiliki nilai min yang lebih rendah berbanding dengan jangkaan sebelum LI untuk kebanyakan faktor kerjaya. Ini menunjukkan bahawa pelajar

tahun akhir, selepas menjalani LI, tidak bersedia mengenai pekerjaan masa depan mereka (Wendlandt & Rochlen, 2008).

Selain itu, institusi dan industri yang menyediakan pelajar dengan pengalaman praktikal yang melibatkan sedikit kemahiran psikomotor dan kurang keterampilan aplikasi turut menyumbang kepada faktor-faktor ketidaksediaan pelajar (Othman, 2012). Malah, struktur kurikulum program LI dinilai sangat lemah kerana tidak menyediakan pengetahuan dan latihan praktikal yang menyeluruh merangkumi semua bahagian dalam organisasi (Kim & Park, 2013). Dalam menangani isu-isu tersebut, penting bagi pelajar yang menjalani LI untuk memupuk sikap positif dan kesediaan terhadap tugas pekerjaan mereka. Oleh itu, berdasarkan penemuan kajian sebelum ini, penyelidik berhasrat untuk meneliti impak kemahiran praktikal terhadap kesediaan kerjaya, terutamanya dalam kalangan pelajar Kolej Komuniti Chenderoh. Maka, hipotesis berikut dicadangkan:

H1: Elemen kemahiran praktikal mempengaruhi kesediaan bekerja di kalangan pelajar KK Chenderoh.

H2: Terdapat perbezaan signifikan secara statistik antara pelajar lelaki dan pelajar perempuan berhubung dengan kesediaan bekerja selepas menamatkan latihan industri.

Di Malaysia, beberapa kajian telah dilaksanakan untuk menilai keberkesanan Program LI kepada pelajar (Yazit & Yahaya, 2003; Mokhtar 2019). Namun, kajian yang menilai kesediaan pelajar untuk bekerja masih terhad. Tambahan pula, kajian-kajian tersebut kebanyakannya dilakukan terhadap pelajar di institusi seperti Politeknik dan Kolej Vokasional, seperti kajian Sukmawati (2020) dan Gili & Ambotang (2019) Walaubagaimanapun, kajian yang dibangunkan ini berbeza kerana ia dilaksanakan di Kolej Komuniti Chenderoh. Oleh itu, kajian ini dibangunkan untuk mencapai objektif berikut:

i. Mengenal pasti tahap keberkesanan kemahiran praktikal yang diperoleh oleh pelajar Kolej Komuniti Chenderoh semasa menjalani Latihan Industri.
ii. Mengkaji pengaruh kemahiran praktikal terhadap kesediaan bekerja dikalangan pelajar Kolej Komuniti Chenderoh.
iii. Mengkaji perbezaan signifikan secara statistik antara pelajar lelaki dan pelajar perempuan berkaitan kesediaan bekerja setelah menjalani Latihan Industri.

METODOLOGI

Populasi untuk kajian ini merangkumi kesemua 114 pelajar Sijil Kolej Komuniti Chenderoh yang baru menamatkan program Latihan Industri. Kesemua pelajar ini telah mengikuti program Latihan Industri bermula dari tahun 2021 dan telah menamatkan pengajian pada tahun 2023. Kajian ini melibatkan pelajar dari pelbagai bidang / program iaitu Sijil Program Kulinari, Program Operasi Perhotelan, Program Teknologi Elektrik, dan Program Seni Visual Kreatif.

Penyelidikan ini menggunakan kaedah reka bentuk kuantitatif, di mana penyelidik menggunakan *Google Form* untuk mengumpul data. *Google Form* ini diedarkan dalam talian kepada semua 114 pelajar yang telah menamatkan Latihan Industri. Pensyarah memudahkan proses pengedaran pautan kajian melalui kumpulan *Telegram* dan *WhatsApp* kepada kesemua pelajar yang terlibat dalam kajian. Dengan pendekatan ini, penyelidik dapat mengumpul maklumat dengan sistematik dan menjana data kuantitatif daripada pelajar-pelajar tersebut.

Instrumen kajian untuk menilai keberkesanan latihan praktikal diadaptasi dari Borang Soal Selidik Kajian Keberkesanan Latihan Industri Program Pengajian Politeknik dan Kolej Komuniti Malaysia, manakala instrumen untuk mengukur kesediaan bekerja pelajar diadaptasi dari kajian Horwath & Morrison, (2005). Borang soal selidik ini terbahagi kepada tiga bahagian yang berbeza. Bahagian A merangkumi satu set soalan berkaitan dengan maklumat demografi pelajar. Sementara itu, Bahagian B mengandungi 5 soalan mengenai persepsi pelajar terhadap terhadap kemahiran praktikal, manakala Bahagian C, pelajar diminta memberi penilaian mereka mengenai kesediaan berkerja.

Jadual 1 menunjukkan nilai Alpha Cronbach bagi setiap konstruk dalam kajian ini. Nilai Alpha Cronbach berkisar antara 0.758 hingga 0.959, melebihi nilai syor 0.7. Kelebihan nilai ini menunjukkan kebolehpercayaan yang tinggi di antara item-item untuk semua pembolehubah peramal dalam kajian ini.

Jadual 1: Nilai Alpha Cronbach untuk Kajian Rintis (Cronbach's alpha ≥ 0.70)

Konstruk	***Cronbach's Alpha***
Kemahiran Praktikal	0.959
Kesediaan Bekerja	0.758

DAPATAN KAJIAN DAN PERBINCANGAN

Jumlah peserta kajian yang diperoleh adalah sebanyak 114 orang. Profil responden seperti jantina, umur dan program pengajian, telah direkod dan dianalisis lebih lanjut menggunakan perisian *Statistic Package for the Social Sciences* (SPSS) versi 27. Ujian kekerapan digunakan untuk menyediakan data mengenai profil demografi responden. Jadual 2 memaparkan keputusan analisis responden. Profil demografi 114 responden telah dikemukakan secara terperinci dalam Jadual 2. Sebahagian besar daripada mereka adalah pelajar lelaki, menyumbang sebanyak 51.7%, berbanding dengan hanya 48.2% pelajar perempuan. Dari keseluruhan responden, 85.0% berada dalam kategori umur kurang daripada 22 tahun, diikuti oleh pelajar yang berumur antara 22-25 tahun (11.4%). Selain itu, terdapat kumpulan pelajar yang berumur antara 26-29 tahun (1.75%) dan bawah 35 tahun (1.75%) yang jumlahnya sama. Keseluruhannya, sebahagian besar responden juga adalah pelajar dari program Sijil Kulinari, iaitu sebanyak 42.1%.

Jadual 2: Jadual Analisis Demografi Responden

	Pembolehubah	**Pelajar**	
		***N* = 114**	**%**
Jantina	Lelaki	59	51.7
	Perempuan	55	48.2
Umur	<22 tahun	97	85.0
	22 - 25 tahun	13	11.4
	26 – 29 tahun	2	1.75
	30 – 34 tahun	2	1.75
	>35 tahun		
Program Pengajian	Sijil Kulinari	48	42.1
	Sijil Operasi Perhotelan	15	13.2
	Sijil Teknologi Elektrik	43	37.72
	Sijil Seni Visual Kreatif	8	7.01

Selain itu, statistik deskriptif turut digunakan untuk menguji soalan kajian pertama iaitu tahap kemahiran praktikal yang diperoleh oleh pelajar. Hasil analisis deskriptif dalam Jadual 3 menunjukkan persepsi pelajar tentang kemahiran praktikal yang diperoleh ketika menjalani LI berada pada tahap yang tinggi (M = 4.20). Keputusan ini menunjukkan bahawa pelajar diberi peluang untuk terlibat secara langsung dalam persekitaran kerja sebenar. Ini membolehkan mereka mempraktikkan pengetahuan yang telah dipelajari di dalam kelas, sekaligus meningkatkan kemahiran praktikal mereka. Dalam konteks ini, kepentingan bagi pihak industri untuk

menerapkan pelbagai jenis kemahiran yang sejajar dengan Revolusi Industri 4.0 menjadi penekanan utama. Ini bertujuan untuk memenuhi tuntutan majikan yang semakin tinggi, memerlukan tenaga pakar yang mahir dalam pelbagai aspek kemahiran. Dengan itu, pihak industri dapat memastikan persediaan pelajar memasuki alam pekerjaan seiring dengan evolusi keperluan pasaran kerja masa kini (Eurico et al., 2018).

Jadual 3: Analisis Keseluruhan Skor Min

Elemen	Min	Sisihan Piawai
Kemahiran Praktikal	4.20	Tinggi

Merujuk kepada analisis item kemahiran praktikal (lihat Jadual 4), skor tertinggi adalah bagi item PRAKTIKAL 5, di mana pelajar mempunyai persepsi bahawa mereka dapat mengamalkan ciri-ciri keselamatan di tempat kerja dengan nilai skor min 4.26. Ini mungkin kerana pelajar telah menerima latihan keselamatan yang komprehensif dan berstruktur sebagai sebahagian daripada kurikulum mereka. Latihan ini mungkin merangkumi aspek-aspek penting keselamatan di tempat kerja, seperti penggunaan alat pelindung diri, prosedur kecemasan, dan pengendalian bahan berbahaya.

Jadual 4: Analisis Item Kemahiran Praktikal

Item	Persepsi / Pengalaman	Min	Sisihan Piawai
PRAKT 1	Sepanjang menjalani Latihan Industri (LI), saya mendapat pendedahan kemahiran yang bersesuaian berdasarkan keperluan kerja	4.14	Tinggi
PRAKT 2	Sepanjang menjalani Latihan Industri (LI), saya mempraktikkan kemahiran yang telah dipelajari di institusi	4.25	Tinggi
PRAKT 3	Sepanjang menjalani Latihan Industri (LI), saya sentiasa mematuhi prosedur kerja yang ditetapkan	4.23	Tinggi
PRAKT 4	Sepanjang menjalani Latihan Industri (LI), saya mencapai sasaran kerja yang ditetapkan	4.14	Tinggi
PRAKT 5	Sepanjang menjalani Latihan Industri (LI), saya mengamalkan ciri-ciri keselamatan di tempat kerja	4.26	Tinggi

Soalan kajian kedua ini menggunakan analisis regresi untuk memahami dengan lebih terperinci hubungan antara pembolehubah dan untuk menguji hipotesis yang telah dibangunkan. Nilai R^2 untuk konstruk kesediaan bekerja adalah 0.429, yang bermaksud 43% variasi kesediaan bekerja dapat dijelaskan oleh pembolehubah yang dikaji, iaitu kemahiran praktikal. Hasil analisis dalam Jadual 5 menunjukkan bahawa Kemahiran Praktikal (H1), memberikan kesan positif terhadap kesediaan pelajar untuk bekerja, dengan nilai (β = 0.429, t = 5.142, p < 0.005). Ini menunjukkan bahawa pelajar yang mempunyai kemahiran praktikal yang baik lebih bersedia untuk melaksanakan tugas-tugas yang diperlukan dalam pekerjaan sebenar, yang meningkatkan

kesediaan mereka untuk memasuki dunia kerja. Pengalaman positif semasa Latihan Industri (LI) membantu meramal kecenderungan kerjaya graduan, dan banyak kajian telah menyokong bahawa kepuasan semasa latihan industri berkait rapat dengan persiapan pelajar untuk memasuki dunia pekerjaan sebenar (Gili & Ambotang, 2019). Mengenal pasti dan memenuhi kehendak pelajar akan meningkatkan kesediaan mereka untuk bidang kerjaya (Ahmid et al., 2023). Justeru itu, pengalaman pelajar semasa LI perlu diambil berat kerana ia mempengaruhi keputusan mereka untuk kekal dalam industri pada masa akan datang (Sukmawati, 2022). Keputusan analisis regresi berganda ini dijelaskan secara terperinci dalam Jadual 5.

Jadual 5: Analisis Item Regresi

Model	***Beta***	***t***	***Sig.***
Constant			.000
Kem. Praktikal	.429	5.142	.000
Pembolehubah Bersandar: Kesediaan Bekerja			

Untuk persoalan kajian yang ketiga, pengkaji menggunakan analisis ujian *t* sampel tidak bersandar bagi menentukan adakah terdapat perbezaan yang signifikan tentang kesediaan bekerja diantara pelajar lelaki dan perempuan. Hasil dapatan menunjukkan terdapat perbezaan yang signifikan secara statistik antara lelaki dan perempuan berhubung dengan kesediaan bekerja (t = 1.230; df = 116.001; p = 0.018) (lihat Jadual 6). Perbezaan ini mungkin disebabkan oleh pengalaman LI yang berbeza, yang boleh mempengaruhi persepsi mereka terhadap kesediaan untuk memasuki pasaran kerja (Ahmid et al., 2023). Selain itu, terdapat kemungkinan perbezaan dalam jenis tugas yang dilakukan atau persekitaran tempat kerja yang dihadapi, yang memberikan pengalaman berbeza (Ahmid et al., 2023). Lelaki dan perempuan juga mungkin mempunyai aspirasi kerjaya yang berbeza, yang mempengaruhi kesediaan mereka untuk bekerja selepas menamatkan LI (Ismail et al., 2020). Perbezaan ini boleh melibatkan faktor-faktor seperti keutamaan kerjaya, keinginan untuk mencari pekerjaan, atau persepsi terhadap peluang kerjaya dalam bidang tertentu.

Jadual 6: Analisis Ujian *t* Sampel Tidak Bersandar

	Levene's Test		***t-test of Equality of Means***		
	F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**
SEDIA					
Equal variances assumed	3.856	.030	1.231	117	.221

Equal variances not assumed	1.230	116.001	.018

RUMUSAN

Dapatan kajian ini menunjukkan kekuatan dan kelemahan bagi program ini. Kajian ini berpotensi memberi sumbangan kepada pengetahuan sedia ada tentang sejauh mana LI berkesan dalam mempersiapkan kesediaan bekerja di kalangan pelajar. Kajian ini juga boleh menjadi rujukan untuk penyelidikan-penyelidikan akan datang yang berkaitan dengan LI secara menyeluruh. Dari segi sumbangan praktikal, kajian ini dapat memberikan panduan kepada pihak pengurusan untuk merancang atau meningkatkan mutu LI agar dapat mencapai semua objektif program ini dengan lebih berkesan. Untuk memastikan pelajar bersedia untuk alam pekerjaan selepas tamat latihan industri, pihak pengurusan kolej dan industri perlu mengambil beberapa langkah penting. Pertama, menyediakan program latihan industri yang relevan dengan keperluan industri. Kedua, pihak industri perlu memberikan peluang kepada pelajar untuk terlibat dalam projek praktikal yang mencerminkan cabaran sebenar dalam industri tersebut. Ketiga, pengurusan dan industri perlu memberikan penilaian prestasi berkala untuk mengukur kemajuan pelajar. Keempat, menerapkan program pembangunan kemahiran yang menyeluruh untuk membantu pelajar mengembangkan kemahiran yang diperlukan untuk bekerja dalam persekitaran yang berubah-ubah. Ini termasuk kemahiran komunikasi, pengurusan masa, kepimpinan, dan adaptabiliti. Terakhir, kolaborasi yang erat antara institusi pengajian dan industri akan membantu menyelaraskan kurikulum pendidikan dengan keperluan sebenar industri, memastikan pelajar dilengkapi dengan kemahiran yang relevan untuk alam pekerjaan. Dengan langkah-langkah ini, pelajar akan lebih bersedia dan mampu menyambut cabaran dunia pekerjaan dengan keyakinan dan kecekapan.

Kesimpulannya, keberkesanan LI dalam mengembangkan kemahiran praktikal adalah faktor utama yang membantu pelajar bersedia untuk memasuki dunia pekerjaan. Pelajar memperoleh pengetahuan asas dan teori melalui kurikulum yang diajar di dalam kelas. Ini memberikan mereka pemahaman teoretikal yang mendalam dalam bidang pengajian mereka. Manakala latihan praktikal memberikan peluang kepada pelajar untuk mengaplikasikan pengetahuan tersebut dalam konteks sebenar. Kesediaan pelajar untuk bekerja kemudian menjadi hasil daripada holistiknya pendekatan kurikulum yang disediakan untuk pelajar mencapai kejayaan dalam alam pekerjaan dan menghadapi cabaran dunia pekerjaan selepas tamat pengajian.

PENGHARGAAN

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STUDENTS' EXPERIENCE OF GAMIFICATION TOOLS IN LEARNING PROGRAMMING

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ABSTRACT

Gamification has been an integral part of polytechnics' teaching and learning strategies. Online gamification tools provide a flexible design of innovative learning aids that enable lecturers to evaluate students' learning progress, motivation, and engagement. At Politeknik Balik Pulau, knowledge in programming is essential. Initiatives to identify problems in teaching and learning programming at an early stage are important to prevent student failure and reduce dropout rates. Therefore, this research aims to evaluate students' experiences of learning a basic programming course using gamification tools. The quantitative approach was employed to collect the data via a questionnaire and descriptive statistics were used to obtain the mean scores, standard deviations, and percentages. The results indicated that gamification tools can be used effectively in teaching and learning programming courses. Furthermore, the implementation of gamification tools can contribute towards students' motivation and learning achievement.

Keywords: *students' experience, gamification, motivation, learning*

INTRODUCTION

Recent years have witnessed the widespread application of the latest technology across various fields, including education, marketing, health, wellness, and customer engagement. It subsequently stands as an inspiration for academic researchers to introduce a new pedagogical approach called gamification. Such a concept implicates the process of incorporating gaming elements, such as progress bars, levels, leaderboards, badges, points, and rewards, into non-gaming contexts to increase user motivation and engagement (Deterding et al., 2011).

Considering its vast pedagogical advantages, several experts have advocated on utilising gamification tools for teaching and learning purposes, particularly involving complex syllabus-like programming. According to Azmi et al. (2017), learning computer programming can be

complex and challenging due to the difficulties in adapting the concept as well as gaining and mastering the necessary abilities at the formative stage. Additionally, students in programming courses must be capable of applying relevant concepts, transforming the proposed problems according to predetermined steps, and solving problems using programming languages (Martins et al., 2018).

DFC20113 Programming Fundamentals is a compulsory course at Politeknik Balik Pulau (PBU) and serves as a pre-requisite for other programming courses. This course aims to equip students with a basic understanding of programming concepts for developing a meaningful program using the C++ programming language. However, many students are believed to experience difficulties in understanding basic programming skills, as denoted by the statistics of students' failure in Figure 1.

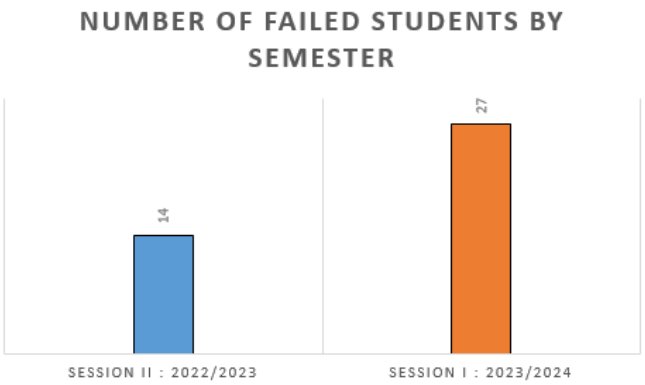

Figure 1: Statistics of failed students in DFC20113 Programming Fundamentals
Source: Examination Department, Politeknik Balik Pulau

The data in Figure 1 shows an increase in the number of failed students from 14 students in Session II: 2022/2023 to 27 students in Session I: 2023/2024. Further observations and discussions with other programming lecturers revealed that such failure could be attributed to the difficulties of assessing the level of understanding of each student due to the large number of students in the classroom. Lecturers also faced challenges in giving immediate feedback and personal assistance that suited student's individual needs. To address these issues, the utilisation of gamification techniques and tools were recommended as part of the teaching and learning strategies to teach the course in the current semester (i.e., Session II: 2023/2024). The strategy was selected following numerous past studies that concentrated on incorporating gamification into the computer programming learning process. This is further supported by Ubaidullah et al. (2019) who stated

that the game-based approach and its effects are particularly important in courses that require a high level of cognitive involvement, such as computer programming.

Therefore, the objective of this research is to evaluate students' experience in learning basic programming by implementing gamification tools as an alternative in the teaching and learning process. This is because user experience is the perception and reaction of real-world users toward real products and services (Hashim et al., 2022; Yusof et al., 2022).

LITERATURE REVIEW

In this modern world, technology has become the driving force behind learning and curriculum development. To achieve better results for students, educators must use advanced digital tools and strategies in their teaching methods. Gamification for learning is an increasingly popular strategy among educators throughout the world. The use of gamified components can enhance student engagement, motivation, and collaboration, ultimately leading to more effective learning outcomes (Deterding et al., 2011).

In Malaysia, the wealth of technologies available in the education field has made traditional teaching and learning methods, such as chalk and talk, become relegated. According to Tan and Hew (2016), students are not truly engaged in constructing knowledge using traditional methods since they are perceived as typical technology users. Therefore, the concept of gamification in education is gaining a foothold as an area of study among researchers (Tamrin et al., 2022). Previous studies have proven that gamification has a great impact on students' learning. Thus, educators are recommended to utilise gamification tools, such as Kahoot! and Quizizz, in their learning settings. Furthermore, gamification not only includes playfulness elements but also assists students in becoming fully immersed in the learning experiences and increasing their enthusiasm (Codish & Ravid, 2014).

The experience of using gamification can attract positive emotions while demonstrating the activities that contribute to a mutual goal. Students who interact with gamification tools will also receive immediate feedback on their performance that leads them toward new goals. In this context, gamification for learning can be beneficial because games instill lifelong skills like problem-solving, critical thinking, social awareness, cooperation, and collaboration. Thus, gamification can be used to stimulate individual learners, increase their interest in specific courses, minimise attrition, improve grades, and develop their cognitive abilities (Buckley & Doyle, 2017).

METHODS

This quantitative research used a questionnaire as the instrument for data collection. The questionnaire method was selected since it is appropriate for gathering data from a large group of respondents (Saefi et al., 2020). It allows the gathering of quantitative data in a standardised manner, ensuring that the information is coherent and internally consistent for analysis (Roopa & Rani, 2012).

Sampling Procedures

The total population of this study was 301 students enrolled in the DFC20113 Programming Fundamentals course as part of the Diploma in Digital Technology (DDT) program. The Krejcie and Morgan's (1970) sampling standards suggest that a minimum of 169 samples for 300 population. Hence, 172 students were selected as the respondents who answered the questionnaire online through Google Forms.

Research Instrument

A detailed review of past literature was conducted to explore various existing questionnaires that measure the implementation of media and technology, such as games and applications, into teaching and learning. The use of questionnaires as a data collection instrument provides researchers with a further objective perspective based on the positivist methodology, which serves as the foundation for this study. The questionnaire used in this research was adopted from Rajendran and Mohd Shah (2020) with minor modifications based on the requirements of this research. It encompassed three sections: Section A elicited the respondents' demographic information; Section B contained 8 items related to their perception of gamification methods; and Section C consisted of 8 items concerning their responses to gamification tools. All respondents were asked to answer the questions using a five-point Likert-type scale (1= Strongly Disagree, 2= Disagree 3=Neither Agree nor Disagree, 4=Agree, 5=Strongly Agree) (Taherdoost, 2019). Descriptive statistics were used to analyse the data using mean scores and percentages.

RESULTS AND DISCUSSION

Table 1 summarises the respondents' demographic information. It can be observed that male respondents slightly outnumbered female respondents with 51.7% and 48.3%, respectively. A majority of them were between 19 to 21 years old (91.3%) while the remaining were between 22 to 24 years old (8.7%).

Table 1: Demographic of respondents

Description		Frequency (f)	Percentage (%)
Gender	Male	89	51.7
	Female	83	48.3
Age	19 – 21	157	91.3
	22 – 24	15	8.7

Figure 2 shows a list of gamification tools that have been applied in the teaching and learning of DFC20113 Programming Fundamentals. Quiziz (84.9%) ranked first among the widely used gamification tools, followed by Kahoot (45.3%), Actionbound (25%), EdPuzzle (4.1%), Nearpod (3.5%), and Mentimeter (2.9%). Other types of gamification tools (e.g., Quizlet and CodinGame) were also used as teaching aids, accounting for 4.1% of the entire list.

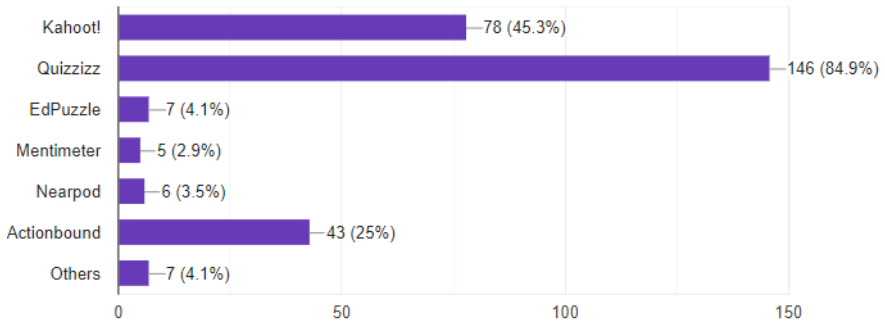

Figure 2: Gamification tools used in programming class

Figure 3 indicates the gamification tools' level of usefulness based on the respondents' experience. Many respondents (82.6%) believed that Quizizz is the best gamification tool for learning programming. Some respondents demonstrated their preference for Kahoot (45.3%) and Actionbound (19.8%). Whereas, the least useful gamification tools according to the respondents' experience were EdPuzzle (5.2%), Nearpod (4.1%), and Mentimeter (2.9%). They also recommended using CodinGame (4.1%) in the teaching and learning of programming.

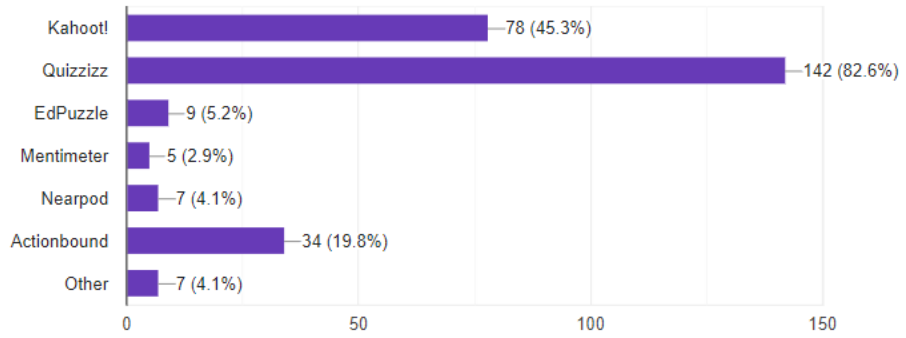

Figure 3: The most helpful gamification tools based on respondents' experience

Table 3 reports the students' perception of gamification methods. The mean score interpretation was based on Issam Khalil Abu-Baker et al. (2019) as shown in Table 2.

Table 2: Interpretation of Mean Score

Mean Value	Estimation Degree
1.00 - 1.80	Very Low
1.81 - 2.60	Low
2.61 - 3.40	Average
3.41 - 4.20	High
4.21 - 5.00	Very High

Source: Issam Khalil Abu-Baker et al. (2019)

The findings in Table 3 showed that the mean scores for all items were interpreted as very high. It indicates that all respondents had positive impressions towards the usage of gamification in learning basic programming concepts. The highest mean score was obtained by the statement "Gamification method is fun" (M=4.52, SD=.67), demonstrating that most students strongly agreed that the gamification approach is enjoyable. Previous research suggests that gamification serves as a useful tool in motivating and encouraging learning while playing a significant role in leveraging technology. Furthermore, gamification makes education more enjoyable by strengthening the learning process, social relationships, the ambition to achieve success in a competitive environment, the ability to specialise, as well as passion for learning (Cuervo-Cely et al., 2022).

Table 3: Students' Perceptions of Gamification Methods

Item	Frequency and Percentage (%)					Mean	Std. Deviation
	SD	D	N	A	SA		
The gamification method increases my interest in the lesson.		3 (1.7)	11 (6.4)	53 (30.8)	105 (61.0)	4.51	0.69
I want to be more successful through the gamification method.	1 (0.6)	3 (1.7)	11 (6.4)	60 (34.9)	97 (56.4)	4.44	0.74
I compete with motivation using the gamification method.	1 (0.6)	2 (1.2)	15 (8.7)	59 (34.3)	95 (55.2)	4.42	0.74
I communicate more through the gamification method.		6 (3.5)	24 (14.0)	60 (34.9)	82 (47.7)	4.26	0.82
I prefer the gamification method in other lessons.		4 (2.3)	22 (12.8)	57 (33.1)	89 (51.7)	4.34	0.79
Gamification method is fun.		3 (1.7)	9 (5.2)	54 (31.4)	106 (61.6)	4.52	0.67
Group work in gamification fosters collaboration.	1 (0.6)	4 (2.3)	20 (11.6)	54 (31.4)	93 (54.1)	4.36	0.82
Gamification improves students' self-confidence.		4 (2.3)	12 (7.0)	62 (36.0)	94 (54.7)	4.43	0.72

The majority of students also agreed that a gamification environment in competitive learning increased students' motivation; however, several elements need to be emphasised. As shown in Table 3, low mean scores were obtained by the characteristics of collaboration activities (M=4.36, SD=.82) and communication with other students during activities (M=4.26, SD=.82). Therefore, lecturers should become more competent and proficient in constructing and designing learning contents and explore more features offered by various tools available online. This will assist them in producing more creative content materials that can foster collaboration activities and improve students' interaction.

Table 4: Students' Responses to the Gamification Tools

Item	Frequency and Percentage (%)					Mean	Std. Deviation
	SD	D	N	A	SA		
Learning programming is excellent through gamification tools.	1 (0.6)	3 (1.7)	16 (9.3)	66 (38.4)	86 (50)	4.35	0.76
I enjoy learning programming using gamification tools.	1 (0.6)	3 (1.7)	12 (7)	63 (36.6)	93 (54.1)	4.41	0.74
I would rather spend more time in my programming class and less on other courses.		10 (5.8)	32 (18.6)	65 (37.8)	65 (37.8)	4.07	0.89
I enjoy this kind of gamification activities than those of my other classes.		3 (1.7)	35 (20.3)	55 (32)	79 (45.9)	4.22	0.82
I think my programming class without games is boring.	3 (1.7)	5 (2.9)	42 (24.4)	47 (27.3)	75 (43.6)	4.08	0.97
I plan to learn as much programming as possible using gamification tools.		4 (2.3)	26 (15.1)	64 (37.2)	78 (45.3)	4.25	0.79
I like being placed in competition with other students in the classroom via gamification so it will increase my motivation.		3 (1.7)	34 (19.8)	55 (32)	80 (46.5)	4.23	0.82
I like my programming class so much and I look forward to studying more about programming in the future.		3 (1.7)	22 (12.8)	54 (31.4)	93 (54.1)	4.37	0.77

Table 4 shows the students' responses towards gamification tools. Overall, the mean scores for all items were interpreted at very high and high levels. The highest mean score was recorded by the statement "I enjoy learning programming using gamification tools" (M=4.41, SD=.74). This indicates the respondents' positive feedback to the gamification tools that have been applied in the teaching and learning of programming. Meanwhile, low mean scores were obtained by the statements "I would rather spend more time in programming class and less on other courses" (M=4.07, SD=.89) and "I think my programming class without games is boring" (M=4.08, SD=.97). This indicates that although the majority of students agreed that gamification tools can boost their motivation, enthusiasm, and understanding in learning programming, there are some who disagreed with such notion. It also revealed that students always embrace any instruction methods presented by their lecturers and not only focus on the use of gamification tools. This is supported by previous studies which stated that user experience is influenced by their internal state, such as individual motivations, expectations, needs, and mood (Yusof et al., 2022).

CONCLUSION AND RECOMMENDATIONS

This study found that students mainly have interesting experiences and positive feedback with online gamification tools. The majority of respondents reported feeling engaged and motivated when their lecturers applied the gamification method in the teaching and learning of programming. Quizizz was the most preferred gamification tool following its user-friendly interfaces and features that are suitable for various education levels. As reported by Narpila et al. (2023), Quizizz can be configured as a live game or homework depending on the assessment objectives and, upon completion, it will display the correct answer and review for each question. This enables the monitoring of students' performance levels throughout the class. Quizizz also allows students to actively participate in learning activities via mobile devices to improve their overall learning experience. According to past research, Quizizz offers numerous engaging and user-friendly features, such as theme, music, avatars, and a colorful display, that can be useful in keeping students interested during learning activities (Zhao, 2019; Zuhriyah & Pratolo, 2020). It also allows students to compete and engage with one another, including during classroom assessments, which increases their motivation to learn (Basuki & Hidayati, 2019).

In 21st-century education, teaching and learning methods must align with the educational needs of the current generation that leads technology towards the Fourth Industrial Revolution (IR 4.0). Students should be introduced to new, technology-integrated instructional methods that can encourage creativity and critical thinking. Thus, the implementation of gamification tools in teaching and learning serves as an effective strategy for enhancing students' experience and achieving desired outcomes. The results also suggest that gamification can improve students' perceptions of learning and provide interactive ways for them to learn and retain information. However, gamification methods or tools should never be regarded as equally beneficial across every lesson or topic.

Based on the researcher's experience of providing lesson content to students, it is easier to gamify theoretical topics that involve cognitive activities compared to practical activities involving psychomotor skills. Nevertheless, the majority of students strongly believed that gamification tools would contribute to their motivation and achievement in programming. This research can be extended to other courses to determine any differences between the results. An empirical study in computer programming learning environments is recommended to gain a better understanding on the effects of gamification across various elements, including academic achievement, motivation, and engagement (Kaila et al., 2018).

In conclusion, the findings of this research can help polytechnics in conducting further exploration of all the features offered by each gamification tool. This will provide valuable insights for lecturers to design and implement high-quality learning content and activities that will ultimately benefit students in all aspects.

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PERSEPSI DAN KESEDARAN PELAJAR TERHADAP KEBERKESANANPROGRAM KESELAMATAN DAN KESIHATAN PEKERJAAN DI KOLEJ KOMUNITI SEBERANG JAYA

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ABSTRAK

Selaras dengan Dasar Keselamatan dan Kesihatan dan Dasar Keselamatan Perlindungan Kementerian Pendidikan Tinggi (KPT), maka Kolej Komuniti Seberang Jaya telah memperkenaklan Program Keselamatan dan Kesihatan iaitu Program Hazard And Safety Awareness Week pada tahun 2023. Program ini bertujuan untuk memastikan pelajar kolej sedar akan kepentingan amalan keselamatan dan kesihatan dan yakin untuk menghadapi sebarang situasi kecemasan. Program ini juga diperkenalkan susulan daripada penemuan dapatan kajian pada tahun 2020 di mana sebanyak 51.3% pelajar berpendapat mereka tidak pernah menjalani latihan keselamatan di kolej. Justeru satu kajian telah dijalankan bagi mengenalpasti tahappersepsi dan kesedaran pelajar terhadap program keselamatan yang telah dianjurkan bermula tahun 2023. Di samping itu kajian ini juga meninjau tahap perbezaan skor min persepsi dan kesedaran pelajar terhadapkeberkesanan program keselamatan di Kolej Komuniti Seberang Jaya bagi tahun 2023 dan 2024. Kajian inimenggunakan pendekatan kuantitatif deskriptif secara kaedah tinjauan yang melibatkan soal selidiksebagai instrumen kajian. Seramai 75 orang pelajar Program Sijil Teknologi Elektrik dan ProgramDiploma In Electronics Instrumentation Technology telah dipilih secara rawak sebagai sampel kajian. Didapati selepas menyertai Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya purata keseluruhan skor min tahap persepsi dan kesedaran pelajar terhadap keberkesanan program tersebut ialah 4.68 dan berada pada tahap tinggi. Berdasarkan dapatan kajian juga, perbandinganskor min yang dicatatkan bagi tahun 2023 dan 2024 ialah 4.73 dan 4.64 dan berada pada tahap tinggi. Walaupun pada tahun 2024 ia menunjukkan penurunan skor min sebanyak 0.34 berbanding tahun 2023 namun tahap persepsi masih berada pada tahap tinggi dan nilai penurunan hanya sebanyak 7.19%. Dapatankajian ini akan disalurkan kepada penyelaras program bagi membuat sebarang penambahbaikan pada program yang datang agar lebih memanfaatkan semua warga kolej. Dalam usaha pihak pengurusan kolej memberi pendedahan dan mengetengahkan Dasar Keselamatan dan Kesihatan KPT, 2023, maka Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya telah menjadi nilai tambah dalam diri pelajar.

Keywords: *Program Keselamatan dan Kesihatan, Keberkesanan, Nilai Tambah*

PENGENALAN

Keselamatan dan kesihatan pekerjaan merupakan satu bidang yang bertujuan melindungi kesihatan, keselamatan dan kebajikan pekerja. Keselamatan tempat kerja merupakan satu aspek penting di dalam sesebuah organisasi. Bagi menjamin keselamatan dan kesihatan pekerjaan maka satu perundangan Akta Keselamatan dan Kesihatan Pekerjaan telah digubal dan diwartakan pada 25 Februari 1994 oleh Parlimen Malaysia. Akta ini bertujuan untuk menjamin keselamatan, kesihatan dan kebajikan tenaga kerja Malaysia dan untuk melindungi orang lain daripada risiko kepada keselamatan atau kesihatan. Selaras dengan akta tersebut, maka Kementerian Pendidikan Tinggi telah menggariskan Dasar Keselamatan dan Kesihatan dan Dasar Keselamatan Perlindungan dengan pindaan pada 6 Julai 2023 yang lalu. Dasar Keselamatan dan Kesihatan mewartakan tentang penyediaan dan penyenggaraan suatu tempat kerja yang selamat dan sihat dengan menepati kehendak-kehendak perundangan Akta Keselamatan dan Kesihatan Pekerjaan 1994, peraturan-peraturan serta tata amalan yang diluluskan. Manakala aspek yang ditekankan dalam Dasar Keselamatan Perlindungan ialah memastikan keselamatan fizikal dipatuhi berasaskan kepada prinsip-prinsip keselamatan perlindungan bagi mencegah, mengesan, melengahkan dan mengambil tindakan bagi mewujudkan persekitaran tempat kerja yang selamat semasa proses Pengajaran dan Pembelajaran (PdP) di Institusi Pendidikan Tinggi (IPT). Secara umumnya kedua-dua dasar ini menjamin persekitaran kerja yang selamat dan kondusif yang perlu diperaktikkan di IPT untuk memelihara keadaan dan suasana Pengajaran dan Pembelajaran yang sihat dan bebas daripada ancaman bahaya.

LATAR BELAKANG KAJIAN

Menyedari kepentingan pendedahan Dasar Keselamatan dan Kesihatan dan Dasar Keselamatan Perlindungan di Institusi Pendidikan Tinggi (IPT) maka Jabatan Pendidikan Politeknik dan Kolej Komuniti (JPPKK) turut telah mengorak langkah proaktif dengan memperkenalkan kursus berkaitan bidang keselamatan dan kesihatan pekerjaan dalam silibus program sijil dan diploma di politeknik dan kolej komuniti**.** Di Kolej Komuniti, kursus Keselamatan dan Kesihatan Pekerjaan (SEE 20052) telah diperkenalkan kepada para pelajar Program Sijil Teknologi Elektrik (SKE) semester 2 dan Occupational Safety & Health (DEV 10022) kepada pelajar Program Diploma In Electronics Intrumentation Technology (DEI) semester 1. Kursus-kursus ini menerangkan konsep keselamatan dan kesihatan, kemalangan dan pencegahan serta aspek perundangan yang berkaitan. Di samping itu, melalui kursus-kursus ini para pelajar turut boleh mengenalpasti risiko, punca dan kesan kemalangan di tempat kerja serta memberi pendedahan kepada para pelajar tentang latihan

kebakaran dan pertolongan cemas dengan mengamalkan teknik-teknik yang betul dan selamat.

Penerapan ilmu asas keselamatan dan kesihatan pekerjaan dalam kalangan pelajar di KolejKomuniti Seberang Jaya (KKSJ), bukan sahaja berlaku di dalam kelas malah diperaktikkan melalui Program Keselamatan dan Kesihatan Pekerjaan iaitu Program *Hazard And Safety Awareness Week* yang telah dianjurkan sebagai aktiviti tahunan. Program Hazard and Safety Awareness Week telah dianjurkan setiap semester bermula tahun 2023. Program in telah dijalankan dengan kerjasama Unit Akademik dan Unit Keselamatan dan Kesihatan Pekerjaan Kolej Komuniti Seberang Jaya (KKSJ).

Program ini bertujuan untuk memberi pendedahan kursus-kursus ringkas dan latihan berkaitan keselamatan dan kesihatan pekerjaan bagi memastikan wargaKKSJ mempunyai kesedaran dan ilmu yang luas tentang keselamatan dan kesihatan supaya sentiasa bersedia menghadapi sebarang situasi kecemasan. Antara latihan yang telah dilaksanakansetiap semester bagi pelajar dan staf ialah latihan pencegahan kebakaran dan pengungsian bangunan. Selain itu, pelajar semester 2 Program Sijil Teknologi Elektrik (SKE) dan pelajar semester 1 Program Diploma In Electronics Instrumentation Technology (DEI) juga telah diberi kursus-kursus berkaitan akta-akta perundangan keselamatan dan kesihatan oleh pencermah jemputan dari Jabatan Keselamatan dan Kesihatan Pekerjaan Pulau Pinang (DOSH).

Taklimat pertolongan cemas dan latihan kebakaran juga disampaikan kepada para pelajar oleh pegawai- pegawai dari agensi Bomba. Pihak pengurusan bertanggungjawab untuk memastikan tempat kerjayang selamat dan perlu mengambil inisiatif memberi maklumat lengkap mengenai keselamatan dan kesihatan pekerjaan kepada semua pekerja, dan meningkatkan kemahiran bekerja mengikut sistem bekerja yang betul dan selamat melalui program-program latihan (Dasar Keselamatan dan Kesihatan KPT., 2023).

Isu keselamatan dan kesihatan pekerjaan sentiasa menjadi tumpuan utama pihak pengurusan Kolej Komuniti Seberang Jaya. Berdasarkan dapatan kajian yang telah dijalankan oleh pensyarah pada tahun 2020 di Kolej Komuniti Seberang Jaya didapati sebanyak 65.7% pelajar memberi maklum balas positif bahawa pengetahuan, kemahiran dan mematuhi peraturan adalah aspek penting dalam melaksanakan sesuatu aktiviti bengkel agar keselamatan sentiasa terjamin. Ini membuktikan pelajar kolej mempunyai pengetahuan dan kesedaran untuk mengamalkan amalan keselamatan semasa bekerja di dalam bengkel. Tetapi aspek pendedahan latihan kemahiran menghadapi kemalangan di dalam bengkel berada pada tahap yang lemah di mana sebanyak 51.3% pelajar

menyatakan bahawa mereka tidak pernah menjalani latihan bagaimana menghadapi kecemasan di koleh mahupun dalam dalam bengkel. Ini menunjukkan pelajar kolej tidak mempunyai pendedahan sepenuhnya cara menghadapi situasi kecemasan dan kemalangan (Zahir et al., 2020).

Justeru itu, pelajar kolej harus lebih didedahkan dengan program-program dan latihan keselamatan dan kesihatan supaya mereka sentiasa peka terhadap ancaman bahaya di sekitar mereka serta bersedia menghadapi kecemasan pada bila-bila masa. Program Hazard and Safety Awareness Week telah diperkenalkan pada tahun 2023 dan merupakan program berkala yang telah berlangsung selama dua tahun berturut bagi meningkatkan latihan kemahiran menghadapi kecemasan dan kemalangan di tempat kerja. Program ini juga bertepatan dengan Dasar Keselamatan dan Kesihatan Kementerian Pendidikan Tinggi iaitu memastikan semua warga institusi diberi maklumat, arahan, latihan dan penyeliaan berkaitan cara menjalani tugas dengan selamat tanpa terdedah risiko bahaya. Lantaran itu, satu kajian telah dijalankan untuk meninjau persepsi dan kesedaran pelajar terhadap keberkesanan program tersebut supaya dapat mengoptimumkan lagi tahap penguasaan, pengetahuan dan latihan kemahiran keselamatan dan kesihatan pekerjaan terhadap warga Kolej Komuniti Seberang Jaya pada masa akan datang.

OBJEKTIF KAJIAN

Secara khususnya, kajian ini telah dijalankan untuk:

i. Mengenalpasti tahap persepsi dan kesedaran pelajar terhadap keberkesanan Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya.
ii. Meninjau tahap perbezaan skor min persepsi dan kesedaran pelajar terhadap keberkesanan Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya bagi tahun 2023 dan 2024.

PERSOALAN KAJIAN

Secara khususnya, persoalan kajian adalah seperti berikut:

i. Apakah tahap persepsi dan kesedaran pelajar terhadap keberkesanan Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya?

ii. Apakah tahap perbezaan skor min persepsi dan kesedaran pelajar terhadap keberkesanan Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya bagi tahun 2023 dan 2024?

KEPENTINGAN KAJIAN

Kajian ini mendukong Dasar Keselamatan dan Kesihatan dan Dasar Keselamatan Perlindungan Kementerian Pendidikan Tinggi yang menyatakan sesuatu dasar yang telah dilaksana perlu dikaji semula dari semasa ke semasa. Dalam konteks tersebut, Kolej Komuniti Seberang Jaya memberi pendedahan tentang keselamatan dan kesihatan melalui Program Hazard and Safety Awareness Week kepada semua warga kolej. Maka kebereksanan program tersebut perlu dikaji dari semasa ke semasa supaya dapat membuat penambahbaikan secara konsisten agar objektif program yang dilaksanakan tercapai dan tidak tersasar dari dasar yang diperkenalkan oleh KPT. Dapatan kajian akan disalurkan kepada penyelaras program bagi membuat sebarang penambahbaikan pada program yang datang agar lebih memanfaatkan semua warga kolej.

BATASAN KAJIAN

Kajian ini hanya hanya menumpukan kepada persepsi dan kesedaran pelajar terhadap keberkesanan Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya. Para pelajar yang dikaji terdiri dari Program Sijil Teknologi Elektrik (SKE) dan Program Diploma In Electronics Intrumentation Technology (DEI) yang telah menyertai sepenuhnya program keselamatan dan kesihatan tersebut sebagai syarat penilaian kursus pada Sesi I 2023/2024 dan Sesi II 2023/2024.

SOROTAN LITERATUR

Sorotan literatur bagi kajian ini akan membincangkan mengenai Dasar Keselamatan dan Kesihatan Kementerian Pendidikan Tinggi, Dasar Keselamatan Perlindungan Kementerian Pendidikan Tinggi, kajian - kajian terdahulu berkaitan keselamatan dan kesihatan pekerjaan serta impak program dan latihan keselamatan dan kesihatan pekerjaan.

Dasar Keselamatan dan Kesihatan Kementerian Pendidikan Tinggi

Kementerian Pendidikan Tinggi (KPT) telah mewartakan Dasar Keselamatan dan Kesihatan pada 6 Julai 2023 yang lalu. Mengikut dasar tersebut, KPT berkomited untuk menyedia dan menyenggarakan suatu tempat kerja yang selamat dan sihat dengan menepati perundangan yang terkandung dalam Akta Keselamatan dan Kesihatan Pekerjaaan 1994. Selain itu dalam dasar tersebut juga dinyatakan semua pekerja perlu diberi maklumat, latihan dan penyeliaan berkaitan cara menjalankan tugas dengan selamat tanpa risiko ancaman bahaya. Di samping itu, dasar tersebut turut menegaskan untuk menyiasat semua kemalangan, penyakit pekerjaan dan kejadian berbahaya yang berlaku serta mengambil langkah-langkah yang sewajarnya untuk memastikan ia tidak berulang lagi. Akhir sekali dasar tersebut diiktihar untuk mempromosi budaya kerja yang selamat dan sihat di Institusi Pendidikan Tinggi (IPT).

Dasar Keselamatan Perlindungan Kementerian Pendidikan Tinggi

Dasar ini dirangka oleh Kementerian Pendidikan Tinggi (KPT) untuk memastikan aspek keselamatan fizikal dipatuhi berasaskan kepada amalan keselamatan perlindungan bagi mengesan dan mencegah ancaman bahaya, dan mewujudkan budaya kerja yang sihat serta persekitaran tempat kerja yang selamat.

Kajian-Kajian Terdahulu Berkaitan Keselamatan dan Kesihatan Pekerjaan, KeberkesananProgram Dan Latihan Keselamatan Dan Kesihatan Pekerjaan

Berdasarkan kajian Zahir et al. (2020), menyatakan bahawa keselamatan di makmal merangkumi aspek kesihatan fizikal, mental, persekitaran, harta benda serta tempat bekerja yang selamat dan bebas dari ancaman bahaya. Dalam kajian tersebut didapati aspek pendedahan latihan kemahiran menghadapi kemalangan di dalam bengkel berada pada tahap yang lemah di mana hanya sebanyak 48.7% pelajar menyatakan bahawa mereka pernah menjalani latihan bagaimana menghadapi kecemasan di dalam bengkel. Ini menunjukkan pelajar kolej tidak mempunyai pendedahan sepenuhnya cara menghadapi situasi kecemasan dan kemalangan. Manakala kajian Holt dan Allen, (2015) menyatakan bahawa kemalangan di tempat kerja berlaku berpunca daripada aktiviti bahaya dan persekitaran kerja yang tidak selamat yang mana perkara ini boleh dikawal oleh pihak pengurusan. Menurut Holt dan Allen (2015) juga, tahap kesedaran pekerja terhadap keselamatan dan kesihatan pekerjaan perlu dipertingkatkan bagi mengelak berlakunya kemalangan di tempat kerja.

Berdasarkan sumber New Straits Times, (2016) didapati Institut Keselamatan dan Kesihatan Pekerjaan Negara (IKKPN), telah memperkenalkan Program Keselamatan dan Kesihatan Pekerjaan pada tahun 2016 di sekolah-sekolah untuk membantu Kementerian Pendidikan Malaysia bagi meningkatkan kesedaran dan latihan kepada pelajar terhadap aspek keselamatan dan kesihatan di sekolah agar dapat melindungi pelajar daripada risiko keselamatan dan kesihatan dan mewujudkan persekitaran kerja yang kondusif. Mengikut kajian Noormala Abdullah dan Azar Shabudin (2022), keselamatan dan kesihatan merupakan isu yang penting sama ada dalam dan luar masa bekerja di kampus dan taklimat keselamatan dan kesihatan serta latihan pengungsian bangunan perlu diberi secara berkala kepada semua warga institusi pendidikan agar keselamatan dan kesihatan sentiasa terjamin dan dipelihara.

Mustazar Mansur dan Ho Shu Peng (2009) juga berpendapat latihan keselamatan dan kesihatan pekerjaan semakin penting bagi mengekalkan budaya kerja selamat dan meningkatkan kesedaran tentang keselamatan dan kesihatan pekerjaan dalam kalangan pekerja. Kajian Nie et al., (2018) menyatakan bahawa program latihan dan pendidikan keselamatan dan kesihatan pekerjaan perlu diurus oleh pihak pengurusan pentadbiran secara berkala dan konsisten kepada pekerja supaya proses pendidikan dapat diadaptasi dalam kehidupan seharian bagi mencegah sebarang kemalangan serta kecederaan.

METODOLOGI KAJIAN

Kajian ini menggunakan pendekatan kuantitatif deskriptif secara kaedah tinjauan yang melibatkan soal selidik sebagai instrumen. Borang soal selidik telah diedarkan melalui google form dan pelajar dikehendaki memilih jawapan berdasarkan skala likert yang diberi. Aras skala likert tersebut adalah seperti di Jadual 1:

Jadual 1: Skala Likert Yang Digunakan Dalam Borang Soal Selidik

Aras	Tahap
1	Sangat Tidak Setuju (STS)
2	Tidak Setuju (TS)
3	Kurang Setuju (KS)
4	Setuju (S)
5	Sangat Setuju (SS)

Soalan soal selidik dibahagikan kepada dua bahagian seperti berikut:

Bahagian A: Demografi Responden - 2 Soalan

Bahagian B: Tahap Persepsi dan Kesedaran Pelajar Terhadap Keberkesanan Program

Keselamatandan Kesihatan Pekerjaan Di Kolej Komuniti Seberang Jaya - 30 Soalan.

Populasi kajian adalah seramai 94 orang pelajar Program Sijil Teknologi Elektrik (SKE) dan Program Diploma In Electronics Intrumentation Technology (DEI) Kolej Komuniti Seberang Jaya. Teknik persampelan rawak mudah telah digunakan berdasarkan pengiraan sampel Krejcie dan Morgan (1970) bagi menentukan sampel kajian iaitu seramai 75 orang responden. Data yang telah dikumpul dianalisis menggunakan IBM Statistical Package for Social Science (SPSS) versi 26.0. Item dalam borang soal selidik telah diadaptasi daripada kajian Mohd Fa'iz Bin Ahmad Hassan (2009). Kajian rintis telah dijalankan terhadap 15 orang pelajar. Menurut Hill, R., (1998) saiz sampel seramai 10-30 orang memadai untuk memenuhi tujuan perbincangan awal yang berkesan tentang ujian. Nilai kebolehpercayaan (Cronbach's Alpha) yang diperoleh ialah 0.980 dan menunjukkan soal selidik yang dibina adalah pada aras kesahan yang tinggi.

ANALISIS DAPATAN KAJIAN DAN PERBINCANGAN

Skor min telah dianalisis berdasarkan Sumber Rathaneswaary Derbala, dan Ruhizan M. Yasin (2022) untuk menginterpretasi tahap bagi setiap objektif yang dikaji. Skor min yang telah dianalisis daripada soal selidik responden dibandingkan dengan nilai interpretasi seperti di Jadual 2.

Jadual 2: Jadual Interpretasi Skor Min

Min Skor	Tahap
1.00-2.33	Rendah
2.34-3.66	Sederhana
3.67-5.00	Tinggi

Analisis Objektif 1: Mengenalpasti tahap persepsi dan kesedaran pelajar terhadap keberkesanan Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya.

Jadual 3 menunjukkan analisis skor min bagi setiap pernyataan tahap persepsi dan kesedaran pelajar selepas menyertai Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya. Tahap persepsi dan kesedaran telah diklasifikasi mengikut **Jadual 2**.

Jadual 3: Analisis Objektif Pertama (Tahun 2023 & Tahun 2024)

Bil	Item	Skor Min	Tahap
1	Saya memahami kepentingan mematuhi peraturan bengkel agar keselamatan sentiasa terjamin ketika menjalankan amali.	4.75	Tinggi
2	Saya sedar bahawa keadaan pengudaraan di dalam bengkel yang bebas daripada habuk, asap atau wap beracun adalah pentinguntuk keselamatan bersama.	4.61	Tinggi

3	Saya dapat mengetahui bahawa pada kawasan atau tempat bahayadi dalam bengkel perlu dicat dengan warna cerah, contohnya merah.	4.65	Tinggi
4	Saya dapat meningkatkan pengetahuan bagaimana menggunakanalat pemadam api dan peti pertolongan cemas.	4.71	Tinggi
5	Saya dapat menjalani latihan bagaimana menghadapi kecemasan semasa menjalani kerja amali di dalam bengkel	4.78	Tinggi
6	Saya faham dengan jelas tentang Polisi Keselamatan di tempat kerja khususnya di bengkel dan makmal.	4.72	Tinggi
7	Saya sedar kegagalan saya mematuhi peraturan keselamatan boleh mengakibatkan kecederaan kepada saya.	4.75	Tinggi
8	Saya dapat mengetahui bahawa mesin-mesin di bengkel perludiperiksa atau diselenggara oleh orang yang bertanggungjawab bagi mengelakkan sebarang kemalangan ketika menjalani amali.	4.68	Tinggi
9	Saya suka menggunakan alat perlindungan diri semasa menjalani amali.	4.59	Tinggi
10	Saya akan memeriksa peralatan keselamatan sebelum menggunakannya.	4.71	Tinggi
11	Saya tidak merokok di tempat keselamatan "Dilarang Merokok".	4.76	Tinggi
12	Saya sentiasa memastikan lantai bersih dari minyak, habuk, air dan bahan-bahan tidak selamat di bengkel dan makmal.	4.64	Tinggi
13	Saya dapat mengenalpasti terdapat banyak laluan keluar (exit)disediakan di bengkel/makmal.	4.69	Tinggi
14	Saya sering memastikan alatan sentiasa dalam keadaan bersih dan kemas selepas digunakan.	4.61	Tinggi
15	Saya akan memastikan peralatan untuk amali dalam bengkel lengkap dan tidak menimbulkan masalah semasa melakukan kerja amali.	4.68	Tinggi
16	Saya dapat meningkatkan pengetahuan tentang langkah-langkahuntuk memadamkan kebakaran ketika berlaku kecemasan.	4.63	Tinggi
17	Saya dapat meningkatkan pengetahuan tentang teknikpertolongan cemas dan rawatan untuk merawat kecederaan.	4.69	Tinggi
18	Saya dapat mengenalpasti jenis rawatan untuk kecederaan ringan dan berat.	4.64	Tinggi
19	Saya yakin untuk menghadapi situasi yang memerlukan rawatan pertolongan cemas.	4.63	Tinggi
20	Saya tahu cara pengungsian bangunan mengikut laluan yang betul.	4.67	Tinggi
21	Saya tahu teknik-teknik balutan untuk kecederaan.	4.60	Tinggi
22	Saya boleh mengenalpasti jenis-jenis alat pemadam api serta kegunaannya.	4.67	Tinggi
23	Saya berani menggunakan alat pemadam api jika berlaku kebakaran.	4.71	Tinggi

24	Saya akan memberitahu dan sentiasa mengingatkan kepentingan aspek keselamatan kepada rakan yang lain.	4.68	Tinggi
25	Saya tahu lokasi terletaknya alat pemadam api di bengkel dan makmal.	4.67	Tinggi
26	Saya dapat memahami peraturan-peraturan keselamatan di bengkel dan makmal dengan mudah.	4.75	Tinggi
27	Saya tahu lokasi letaknya peti pertolongan cemas di bengkel dan makmal.	4.64	Tinggi
28	Saya sedar akan kepentingan program latihan keselamatan di kolej.	4.72	Tinggi
29	Saya sedar bahawa latihan pertolongan cemas adalah penting.	4.76	Tinggi
30	Saya sedar bahawa setiap orang perlu mengikuti program latihan keselamatan dan kesihatan pekerjaan secara berterusan mahupundi kolej atau di tempat kerja kelak.	4.75	Tinggi
Purata Skor Min		**4.68**	**Tinggi**

Mengikut analisis di **Jadual 3**, didapati selepas menyertai Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya purata keseluruhan skor min tahap persepsi dan kesedaran pelajar terhadap keberkesanan program tersebut ialah 4.68 dan berada pada tahap tinggi. Daripada analisis dapatan dirumuskan bahawa Program Hazard and Safety Awareness Week yang diperkenalkan di Kolej Komuniti Seberang Jaya pada tahun 2023 telah memberi impak yangpositif terhadap pelajar dimana pelajar tahu cara untuk menghadapi sebarang kecemasan semasa menjalani kerja amali di dalam bengkel dan makmal. Ini dapat disokong dengan pernyataan no.5 iaitu "Saya dapat menjalani latihan bagaimana menghadapi kecemasan semasa menjalani kerja amali di dalam bengkel" yang telah mencatat skor min yang paling tinggi daripada 30 item pernyataan yang diajukan kepada pelajar. Selain itu, melalui pelaksanaan program keselamatan dan kesihatan ini seramai 96% pelajar sedar akan kepentingan mematuhi peraturan keselamatan walau berada di mana-mana kerana kegagalan mematuhi peraturan boleh mengakibatkan kemalangan kepada diri sendiri. Ini merujuk kepada pernyataan no 7 yang menunjukkan skor minyang tinggi iaitu 4.75. Manakala 97.3% pelajar juga dapat memahami peraturan-peraturan keselamatan di bengkel dan makmal dengan mudah.

Di samping itu, sebanyak 98.6% pelajar jugasedar bahawa latihan pertolongan cemas dan latihan keselamatan adalah penting dan 97.3% pelajarberpendapat bahawa setiap orang perlu mengikuti program latihan keselamatan dan kesihatan pekerjaan secara berterusan mahupun di kolej atau di tempat kerja kelak. Mereka juga memahami kepentingan mematuhi peraturan bengkel agar keselamatan sentiasa terjamin.

Bedasarkan dapatankajian juga didapati bahawa dengan adanya program seperti ini sebanyak 98.6% pelajar faham dengan jelas tentang Polisi Keselamatan di tempat kerja khususnya di bengkel dan makmal. Sebanyak 96% pelajar berpendapat melalui taklimat-taklimat keselamatan yang telah dijalankan sepanjang Program Hazard and Safety Awareness Week ini mereka dapat mengetahui bahawa mesin-mesin di bengkel perlu diperiksa atau diselenggara oleh orang yang bertanggungjawab bagimengelakkan sebarang kemalangan ketika menjalani amali. 98.7% pelajar menyatakan bahawa mereka akan memeriksa peralatan keselamatan sebelum menggunakannya dan sebanyak 92.7% pelajar bersetuju untuk memastikan lantai bersih dari minyak, habuk, air dan bahan-bahan tidak selamat di bengkel dan makmal.

Di samping itu, sebanyak 94.7% pelajar juga menyatakan merekaakan memastikan alatan sentiasa dalam keadaan bersih dan kemas selepas digunakan. Selepas menyertai program ini, seramai 97.3% pelajar juga berpendapat bahawa mereka dapat mengenalpasti terdapat banyak laluan keluar (exit) disediakan di bengkel/makmal. Program keselamatan ini juga telah membolehkan pelajar yakin menghadapi situasi yang memerlukan rawatan pertolongan cemas. Sebanyak 93.4% pelajar menyatakan bahawa mereka berani menggunakan alat pemadam api jika berlaku kebakaran dan 90.7% pelajar setuju bukan sahaja mereka tahu teknik-teknik balutan untuk kecederaan malah sebanyak 93.3% pelajar dapat mengenalpasti jenis rawatan untuk kecederaan ringan dan berat. Manakala 96% pelajar menyatakan bahawa mereka tahu cara pengungsian bangunan mengikut laluan yang betul. Ini menunjukkan peningkatan peratus yang sangat ketara berbanding dengan tahun 2020 di mana hanya sebanyak 48.7% pelajar yang akur bahawa mereka pernah menjalani latihan keselamatan diKolej Komuniti Seberang Jaya (Zahir, Zaim & Saiful, 2020).

Program latihan dan pendidikan keselamatan dan kesihatan pekerjaan perlu dilaksanakan oleh pihak pengurusan pentadbiran secarakonsisten kepada pekerja di industri mahupun pelajar di IPT supaya proses pendidikan dapat diadaptasi dalam kehidupan seharian bagi mencegah sebarang kemalangan serta kecederaan (Nie,et al, 2018).

Analisis Objektif 2: Meninjau tahap perbezaan skor min persepsi dan kesedaran pelajar terhadap keberkesanan Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya bagi tahun 2023 dan 2024

Jadual 4 menunjukkan perbezaan skor min tahap persepsi dan kesedaran pelajar terhadap keberkesanan Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya bagi tahun 2023 dan 2024. Tahap persepsi dan kesedaran telah diklasifikasi mengikut Jadual 2.

Jadual 4: Perbezaan Skor Min Tahap Persepsi Dan Kesedaran Pelajar Terhadap Keberkesanan Program Hazard And Safety Awareness Week

Tahun	Purata Skor Min	Tahap
2023	4.73	Tinggi
2024	4.64	Tinggi

Mengikut analisis di Jadual 4, didapati bagi kedua-dua tahun iaitu 2023 dan 2024 skor min yang dicatatkan ialah 4.73 dan 4.64 serta ia berada pada tahap tinggi. Walaupun pada tahun 2024 ia menunjukkan penurunan skor min sebanyak 0.09 berbanding tahun 2023 namun tahap persepsi masih berada pada tahap tinggi dan nilai penurunan hanya sebanyak 7.19%. Justeru itu, dapat dirumuskan bahawa terdapat sedikit penurunan iaitu sebanyak 7.19% tahap persepsi dan kesedaran pelajar terhadap keberkesanan Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya bagi tahun 2024 berbanding 2023 dan pihak pengurusan kolej perlu mengambil inisiatif yang konsisten untuk mengekalkan peratusan yang lebih tinggi pada masa yang akan datang. Keselamatan dan kesihatan merupakan isu yang penting sama ada dalam dan luar masa bekerja di kampus dan lantaran itu, taklimat keselamatan dan kesihatan serta latihan pengungsian bangunan perlu diberi secara berkala kepada semua warga institusi pendidikan agar keselamatan dan kesihatan sentiasa terjamin dan dipelihara (Noormala Abdullah dan Azar Shabudin, 2022). Tambahan itu, sesuatu dasar yang telah dilaksana perlu dikaji dari semasa ke semasa supaya dapat membuat penambahbaikan dan melihat impak yang positif serta tidak tersasar dari objektif asal (Dasar Keselamatan dan Kesihatan KPT, 2023).

KESIMPULAN

Secara keseluruhannya dapat dilihat dan dikenalpasti, skor min tahap persepsi dan kesedaran pelajar terhadap keberkesanan Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya ialah 4.68 dan berada pada tahap tinggi. Namun begitu terdapat sedikit penurunan tahap persepsi dan kesedaran pelajar terhadap keberkesanan program tersebut bagi tahun 2024 iaitu sebanyak 7.19%. Bagi mempromosi budaya kerja yang selamat dan sihat di Institusi Pendidikan Tinggi (IPT), pihak pengurusan perlu mengambil inisiatif yang positif secara berterusan dengan menganjurkan program keselamatan dan kesihatan supaya warga institusi dapat menghadapi kecemasan dengan yakin dan berani. Ini dapat ditinjau daripada dapatan kajian dimana 97.3% pelajar berpendapat bahawa setiap orang perlu mengikuti program latihan keselamatan dan kesihatan pekerjaan secara berterusan mahupun di kolej atau di tempat kerja kelak.

Mengikut dapatan kajian juga, dapat dinyatakan dengan adanya latihan dan program seperti ini maka pelajar bukan sahaja dapat meningkatkan pengetahuan bagaimana menggunakan alat pemadam api dan peti pertolongan cemas malah lebih yakin dan berani bertindak ketika berlaku kecemasan. Selain itu, program keselamatan dan kesihatan ini telah memberi kesan positif dalam diri pelajar di mana pelajar menzahirkan rasa suka memakai alat perlindungan diri semasa menjalani amali di bengkel. Ini dapat dilihat melalui pernyataan "Saya suka menggunakan alat perlindungan diri semasa menjalani amali" yang mencatat skor min pada tahap tinggi iaitu 4.59.

Kajian ini turut membuktikan dengan adanya program keselamatan dan kesihatan maka Polisi Keselamatan di tempat kerja khususnya di bengkel mudah untuk diperjelaskan dan difahamkan kepada pelajar. Dalam usaha pihak pengurusan kolej memberi pendedahan dan mengetengahkan Dasar Keselamatan dan Kesihatan Kementerian Pendidikan Tinggi, 2023, maka Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya telah menjadi nilai tambah dalam diri pelajar.

CADANGAN KAJIAN LANJUTAN

Kajian ini boleh ditambahbaik dengan menggunakan reka bentuk kajian jenis kualitatif dengan menemuramah pelajar dan staf yang menyertai program keselamatan dan kesihatan sebagai sampel kajian. Selain itu, kajian lanjutan juga akan dijalankan untuk mengenal pasti tahap persepsi pelajar dan staf terhadap keberkesanan Program Hazard and Safety Awareness Week di Kolej Komuniti Seberang Jaya. Di samping itu, kajian keberkesanan program keselamatan juga akan dikaji terhadap persepsi pelajar kolej komuniti zon utara.

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IMPAK KEBERKESANAN INOVASI KAD PERMAINAN TERHADAP KURSUS DVG10022 PROLOGUE TO GRAPHIC DESIGN

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ABSTRAK

Kajian ini dijalankan bagi melihat impak keberkesanan alat bahan bantu mengajar (ABBM) Inovasi Graphic Design Prominent Figure Card Game dalam proses pengajaran dan pembelajaran bagi kursus DVG10022 Prologue to Graphic Design JRKV, PMS. Pembangunan ABBM disebabkan masalah yang dihadapi oleh pelajar iaitu sukar mengenal pasti tokoh-tokoh terkemuka rekabentuk grafik bagi kursus tersebut dan pelajar juga sukar mengingati fakta-fakta penting tentang tokoh-tokoh tersebut dalam melaksanakan tugasan yang berkait dengan topik. Objektif kajian ini dilaksanakan untuk mengenal pasti kekangan yang dihadapi oleh pensyarah dan pelajar dalam proses pengajaran pembelajaran topik 2 tokoh terkemuka dalam rekabentuk grafik, objektif yang kedua mengenal pasti tahap kecenderungan minat pelajar terhadap topik tersebut dengan kaedah PdP yang digunakan oleh pensyarah dan yang ketiga mengenal pasti impak keberkesanan penggunaan kad permainan Graphic Design Prominent Figure dalam melaksanakan tugasan berkaitan tersebut. Kaedah kajian ini dilaksanakan terhadap pelajar semester 1 Diploma Rekabentuk Grafik (DRG) dan semester 2 Diploma Teknologi Media Cetak (DMC) secara Kuantitatif iaitu borang soal selidik yang diberi terhadap responden tersebut. Hasil kajian ini dapat memudahkan pensyarah menyampaikan topik ini dengan lebih ringkas, jelas serta mudah untuk difahami oleh para pelajar. Oleh itu, diharapkan kajian ini dapat dijadikan dorongan untuk pensyarah dan pelajar dalam menggunakan kaedah pembelajaran secara interaktif semasa sesi PdP berlangsung. Hal ini secara tidak langsung menyokong sistem Pendidikan negara yang menerapkan pembelajaran abad ke-21.

***Kata kunci**: Figure Card Game, Alat Bahan Bantu Mengajar, Prominent Figure*

PENGENALAN

Dalam meniti arus kemodenan ini, dunia sedang maju dalam pelbagai bidang seperti ekonomi, sosial dan politik mengikut perubahan masa. Dalam mengekalkan keistimewaan sesuatu negara di persada dunia, kekukuhan sistem pendidikan negara menjadi asas kepada kemajuan negara tersebut. Menurut Saleh dan Rosli (2019), negara perlu optimis dalam mengambil langkah perubahan dasar pendidikan supaya dapat melahirkan masyarakat berpendidikan yang dapat mengharungi cabaran masa kini. Oleh itu, Pelan Pembangunan Pendidikan Malaysia (PPPM) gelombang ke-2 (2016-2020) yang menumpu untuk memacu peningkatan sistem pendidikan merupakan transformasi sistem pendidikan yang amat diperlukan bagi merealisasikan hasrat dan aspirasi negara. PPPM menyarankan kurikulum perlu memberi penekanan kepada penguasaan kemahiran abad-21 seperti kreatif, inovatif, penyelesaian masalah, pemikiran kritis dan komunikasi untuk pelajar bersaing di peringkat global. Disamping itu, menurut Wan Ali Akbar Wan Abdullah et al. (2022) asas Pembelajaran Abad Ke-21 (PAK21) iaitu kolaboratif dan komunikasi dalam pengajaran dan pembelajaran merupakan perkara utama yang ditekankan dalam sistem Pendidikan.

Pendidikan abad ini telah menggunakan kaedah gamifikasi bagi menyokong pembelajaran abad ke-21 yang menggabungkan teknologi dan kaedah tradisional. Pembelajaran yang menggunakan kaedah berpusatkan pengajar sudah tidak relevan terhadap pelajar selepas era Covid-19. Abdullah et al. (2024). sesi pembelajaran berpusatkan pelajar memerlukan Teknik dan strategi Baharu semasa PdP berlangsung tidak kira terhadap pelajar sekolah mahupun di peringkat pengajian tinggi. Permainan dalam menyampaikan pemahaman teori boleh dijadikan satu kaedah bagi mencapai objektif dalam pengajaran dan pembelajaran secara tidak langsung pelajar akan berinteraksi bersama pensyarah dan rakan sekelas dan dapat mewujudkan suasana pembelajaran yang lebih menarik.

Oleh hal yang demikian, sesuai dengan hasrat Kementerian Pendidikan Malaysia bagi menyokong pembelajaran abad-21 pensyarah kursus DVG10022 Prologue to Graphic Design telah mengenal pasti permasalahan dalam sesi pengajaran dan pembelajaran ketika di dalam kelas antaranya ialah pensyarah mendapati bahawa alat bahan bantu mengajar (ABBM) yang digunakan ketika sesi PdP berlangsung agak kurang efektif digunakan pada masa kini. Hal ini kerana kursus ini merupakan pembelajaran teori yang memerlukan pelajar untuk memahami dan mengingati fakta-fakta penting yang terdapat dalam kursus tersebut. Maka ini mengakibatkan pelajar kurang memberi tumpuan apabila pensyarah menggunakan kaedah pembelajaran sehala dan kurang menarik. Justeru itu,

pensyarah perlu menerapkan kaedah pembelajaran yang interaktif bagi menarik minat pelajar terhadap pembelajaran teori dan dapat meningkatkan penglibatan pelajar ketika di dalam kelas supaya pelajar dapat memahami topik yang dipelajari dengan lebih jelas dan mudah. Kesimpulannya, pensyarah harus mahir mengenal pasti dan membuat keputusan untuk memilih ABBM yang bersesuaian agar pengajaran dijalankan dengan berkesan dan menghasilkan pembelajaran yang lebih menarik minat pelajar serta menyeronokkan dan secara tidak langsung dapat mencapai hasil pembelajaran kursus yang telah dirancang.

KAJIAN LITERATUR

Kaedah pembelajaran dan pengajaran tradisional

Kemahiran mendidik adalah perkara penting bagi tugas sebagai seorang pendidik. Pencapaian pelajar dalam sesuatu subjek kebiasaanya berhubung kait dengan kemahiran mengajar yang dimiliki oleh seseorang pendidik bagi proses PdP dan bukan sekadar kebolhan guru Sahaja. Kemahiran mengajar pendidik akan menjadikan sesi PdP lebih menarik, menyeronokkan dan bermakna kepada pelajar. Oleh itu, sangat penting untuk seorang pendidik memiliki kemahiran mengajar, agar berupaya mempelbagaikan kaedah PdP semasa kelas berlangsung. Pendidik perlu mahir dan menggunakan kaedah serta Teknik mengajar terkini, selaras dengan keperlua abad ke-21. Pengajaran dan pembelajaran terbahagi kepada dua iaitu kaedah tradisional dan moden. Menurut Zahri dan Othman (2023) kaedah pembelajaran tradisional melibatkan proses pengajaran berpusatkan pensyarah yang hanya menggunakan buku dan papan putih. Namun, kaedah moden adalah proses pembelajaran berpusatkan pelajar Dimana pelajar berinteraksi dan aktif ketika sesi PdP berlangsung.

Kaedah pembelajaran yang digunakan oleh pensyarah amat penting bagi memastikan prestasi pencapaian pelajar baik. Pemilihan kaedah pembelajaran yang bersesuaian juga dapat meningkatkan komitmen dan minat pelajar terhadap subjek yang dipelajari. Menurut Elman et al. (2023) pemilihan bahan mengajar yang sesuai amat penting kerana ia memberi kesan kepada keberkesanan PdP kerana penggunaan ABBM mampu mempelbagaikan bentuk pengajaran, menyokong gaya pengajaran yang berbeza dan meningkatkan sikap profesional pensyarah di samping menarik minat pelajar, meningkatkan penggunaan deria mereka sekali gus memudahkan pemahaman mereka berkenaan topik yang diajarkan

Figure Card Game Alat Bahan Bantu Mengajar

Pendidikan berasaskan permainan atau Game-Based Learning (GBL) merupakan pendekatan pembelajaran yang menempatkan pelajar sebagai pusatnya, membolehkan mereka untuk mengetahui, mengembangkan kemahiran dan membentuk sikap positif melalui pengalaman bermain yang dirancang khusus untuk tujuan Pendidikan. Menurut Abdullah et al. (2024) gamifikasi dalam bidang pendidikan di semua peringkat akademik, sangat digalakkan kerana kebolehannya untuk mempengaruhi perilaku dalam proses pengajaran dan pembelajaran, serta menjadi strategi pendidikan yang menarik. Menurut Abdullah et al. (2024) kaedah gamifikasi dalam pembelajaran memberi tumpuan kepada teori konstruktivisme yang menekankan pembelajaran berpusatkan pelajar.

Pembelajaran teori mendorong pelajar untuk melibatkan diri secara aktif dalam memahami pembelajaran secara praktikal. Melalui penglibatan aktif dalam proses pembelajaran, secara tidak langsung dapat meningkatkan daya ingatan dan pemahaman pelajar untuk jangka masa Panjang. Menurut Herliana Cendana, dan Dadan Suryana (2022), bermain membolehkan seseorang itu meningkatkan perkembangan bahasa dan sosial anak. Permainan tradisional dapat meningkatkan dimensi psikomotor, kognitif, emosi, bahasa, sosial serta membentuk nilai-nilai sosial peringkat awal perkembangan anak. Menurut Abdullah et al. (2024) penggunaan permainan dalam pendidikan adalah kaedah yang efektif bagi meningkatkan motivasi dan penglibatan pelajar dalam proses pembelajaran. Kajian Ramli et al. (2023) pembelajaran berasaskan permainan merupakan kaedah pengajaran yang melibatkan pelajar sebagai medium pembelajaran.

Dalam kajian ini menurut Abdullah et al. (2024) gamifikasi dapat meningkatkan pemahaman, daya ingat, prestasi akademik, serta meningkatkan pelbagai rasa dan amalan positif dalam kalangan pelajar dalam tempoh masa yang Panjang. Dengan mempelbagaikan kaedah pengajaran antaranya melalui gamifikasi, menjadikan pelajar lebih focus, dan aktif semasa sesi pembelajaran berlangsung. Kajian Abdullah et al. (2024) gamifikasi mampu memberi perkembangan kemahiran secara berperingkat atau bertahap, disamping mencipta elemen persaingan dan cabaran. Kaedah pembelajaran berasaskan gamifikasi secara tidak langsung dapat membolehkan perkembangan kemahiran kognitif dan psikomotor dan seterusnya meningkatkan kemahiran pelajar. Menurut Abdullah et al. (2024) pendidikan menggunakan kaedah seperti ini dapat memberikan pandangan baru terhadap pembelajaran serta membantu pelajar menghayati potensi diri dan menyedari kebolehan diri. Kajian Salleh et al. (2023) kaedah penggunaan teknologi masa kini sebagai bahan pengajaran bukan hanya penggunaan buku teks dan alat tulis serta pedagogi tradisional semata-

mata, malah merangkumi penggunaan bahan bantu mengajar berasaskan teknologi seperti komputer, smart phone dan digital kamera. Gamifikasi juga meningkatkan persaingan membina kemahiran melalui tahap permainan. Secara keseluruhannya pendekatan gamifikasi card game dapat mewujudkan suasana yang lebih menarik. Kajian ini seterusnya dilakukan untuk mengenalpasti tahap boleh pelajar dalam mengenalpasti serta mengingati tokoh-tokoh terkemuka rekabentuk grafik.

METODOLOGI KAJIAN

Kajian ini menggunakan kaedah kuantitatif yang berbentuk deskriptif bagi menganalisa impak keberkesanan alat bahan bantu mengajar (ABBM) yang digunakan oleh pensyarah terhadap pelajar Jabatan Rekabentuk dan Komunikasi Visual, Politeknik Muadzam Shah, Pahang. Data diperolehi daripada borang soal selidik yang dibangunkan di google form. Maklumbalas dari pelajar sebelum dan selepas terhasilnya ABBM diperlukan bagi mengukur keberkesanan penggunaan ABBM tersebut. Soal Selidik sebelum penggunaan ABBM mempunyai dua bahagian iaitu bahagian A maklumat demografi dan bahagian B pengenalan tahap kefahaman pelajar terhadap topik 2 tokoh-tokoh terkemuka dalam bidang rekabentuk grafik, manakala soalan selepas ABBM dibangunkan terdapat tiga bahagian iaitu bahagian A maklumat demografi, bahagian B pengenalan tahap kefahaman pelajar terhadap topik 2 tokoh-tokoh terkemuka dalam bidang rekabentuk grafik dan bahagian C berkaitan ABBM yang telah digunakan oleh pelajar. Soal selidik diberikan secara bersemuka ketika kelas berlangsung.

Pensampelan

Kajian ini melibatkan 4 buah kelas yang merupakan pelajar semester 1 Diploma Rekabentuk Grafik dan pelajar semester 2 Diploma Teknologi Media Cetak. Kaedah pensampelan digunakan adalah bertujuan untuk pemilihan populasi bagi memenuhi ciri dan kriteria iaitu pelajar yang mengikut kursus DVG10022 Prologue to Graphic Design dan pelajar yang telah menggunakan kad permainan Graphic Design Prominent Figure. Bilangan populasi dalam kajian ini ditunjukkan dalam jadual 1. Kaedah pensampelan dalam kajian ini bertujuan untuk mempertimbangkan kaedah pensampelan ini biasa digunakan untuk memilih sample yang mempunyai ciri yang diperlukan dan relevan dengan objektif kajian ini dijalankan Tangkui et al. (2024). Merujuk kepada data yang diperolehi dari pelajar semester 1 Diploma Rekabentuk Grafik dan pelajar semester 2 Diploma Teknologi Media Cetak pada Jadual 1.

Jadual 1: Jadual responden yang mengikuti kursus DVG10022 Prologue to Graphic Design

KELAS	BILANGAN PELAJAR	JUMLAH KESELURUHAN PELAJAR
DMC2A	17	112
DMC2B	16	
DRG1A	40	
DRG1B	39	

Dalam memastikan kajian ini lebih kukuh, kajian ini telah merujuk Jadual Penentuan Saiz Sampel Krejcie dan Morgan (1970) untuk menentukan saiz responden yang lebih sesuai agar dapat memastikan kesahihan mengenai responden yang dipilih adalah tercapai. Berdasarkan Jadual 2, bilangan responden yang sesuai dan berpadanan dengan populasi pelajar yang mengikuti kursus DVG10022 Prologue to Graphic Design adalah sebanyak 110 adalah 86. Oleh itu, kajian ini hanya memilih 85 maklumbalas soal selidik yang dijawab oleh responden dan ianya dilaksanakan secara rawak

Jadual 2: Jadual penentuan saiz sampel Krejcie dan Morgan (1970)

N	S	N	S	N	S	N	S	N	S	N	S
10	10	85	70	220	140	440	205	1200	291	4000	351
15	14	90	73	230	144	460	210	1300	297	4500	354
20	19	95	76	240	148	480	214	1400	302	5000	357
25	24	100	80	250	152	500	217	1500	306	6000	361
30	28	110	86	260	155	550	226	1600	310	7000	364
35	32	120	92	270	159	600	234	1700	313	8000	367
40	36	130	97	280	162	650	242	1800	317	9000	368
45	40	140	103	290	165	700	248	1900	320	10000	370
50	44	150	108	300	169	750	254	2000	322	15000	375
55	48	160	113	320	175	800	260	2200	327	20000	377
60	52	170	118	340	181	850	265	2400	331	30000	379
65	56	180	123	360	186	900	269	2600	335	40000	380
70	59	190	127	380	192	950	274	2800	338	50000	381
75	63	200	132	400	296	1000	278	3000	341	75000	382
80	66	210	136	420	201	1100	285	3500	346	1E+06	384

Instrumen Kajian

Kajian ini dijalankan menggunakan borang soal selidik yang telah diadaptasi dari kajian Ahmat et al. (2023) dan telah diubah suai mengenal pasti kekangan yang dihadapi oleh pensyarah dan pelajar dalam proses pengajaran pembelajaran topik 2 tokoh terkemuka dalam rekabentuk grafik, mengenal pasti tahap kecenderungan minat pelajar terhadap topik tersebut dengan kaedah PdP

yang digunakan oleh pensyarah dan mengenal pasti impak keberkesanan penggunaan kad permainan Graphic Design Prominent Figure dalam melaksanakan tugasan berkaitan tersebut. Soal selidik yang diadaptasi dan diubah suai ini mengandungi 2 soalan iaitu *pre test* dan *post test* yang mempunyai 3 bahagian iaitu Bahagian A (Demografi responden), Bahagian B (Tahap kefahaman pelajar terhadap topik 2 tokoh-tokoh terkemuka dalam bidang rekabentuk grafik) dan Bahagian C (Penerimaan penggunaan ABBM Kad Permainan Graphic Design Prominent Figure dalam proses PdP) dengan menggunakan Skala Likert 5 mata. Pada bahagian B melibatkan objektif kajian iaitu kefahaman pelajar terhadap tokoh-tokoh terkemuka bidang rekabentuk grafik dan pada bahagian C berkaitan impak penerimaan penggunaan ABBM Kad Permainan Graphic Design Prominent Figure dalam proses PdP. Jadual 3 menunjukkan aspek kajian dan bilangan bahagian soalan yang terdapat dalam boring soal selidik. Pengetahuan dan kefahaman terhadap perlaksanaan kajian dapat dikelaskan mengikut interpretasi skala likert seperti di Jadual 3.

Jadual 3: Bilangan item pada soal selidik

BAHAGIAN	ASPEK KAJIAN	BILANGAN ITEM
A	Demografi Responden	2
B	Pengenalan tahap kefahaman pelajar terhadap topik	6
C	Penerimaan penggunaan ABBM kad permainan Graphic Design Prominent Figure dalam proses PdP	8

Jadual 4: Interprestasi Skala Likert

SKALA PENILAIAN				
1	2	3	4	5
Sangat Tidak Setuju	Tidak Setuju	Kurang Setuju	Setuju	Sangat Setuju

DAPATAN KAJIAN

Borang soal selidik telah diedarkan kepada pelajar semester 1 Diploma Rekabentuk Grafik (DRG) dan semester 2 Diploma Teknologi Media Cetak (DMC), dan seramai 85 orang pelajar DRG dan DMC telah memberi respon kepada soal selidik ini. Berikut merupakan jadual bagi dapatan bahagian A maklumat demografi bagi soal selidik ini.

Jadual 5: Demografi Responden Mengikut Program Dan Jantina

JANTINA	LELAKI	PEREMPUAN	JUMLAH MENGIKUT PROGRAM	KADAR PERATUSAN
DMC	9	7	16	18.8%
DRG	37	32	69	81.2%
			85	

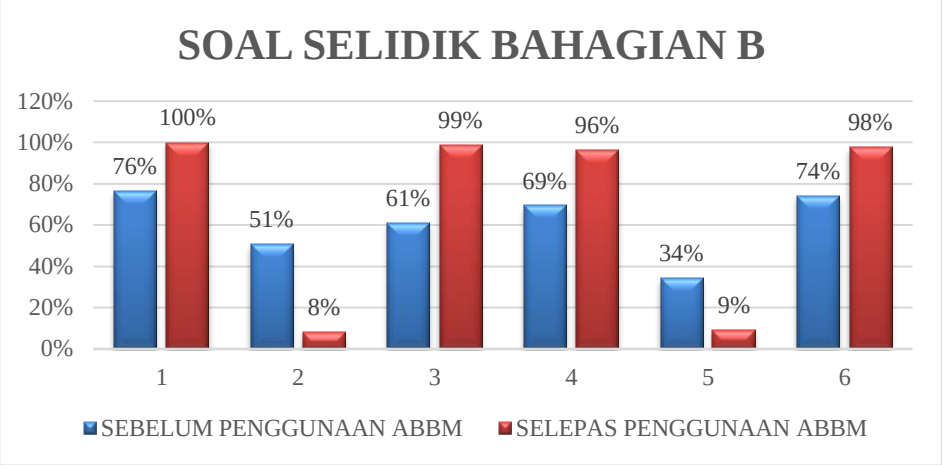
Berdasarkan jadual 5 terdapat 16 orang pelajar DMC (18.8%) iaitu seramai 9 orang pelajar lelaki dan 7 orang pelajar perempuan yang memberi respon kepada soal selidik ini. Manakala bagi program DRG pula adalah seramai 69 orang pelajar (81.2%) yang terdiri dari 37 orang pelajar lelaki dan 32 orang pelajar perempuan.

Berdasarkan borang soal selidik sebelum dan selepas penggunaan ABBM *Graphic Design Prominent Figure Game Card*, terdapat 6 item yang dikemukakan pada bahagian B. Jadual 6 menunjukkan item yang dikemukakan pada Bahagian B berkenaan pengenalan tahap kefahaman pelajar terhadap topik 2 dalam kursus DVG10022 Prologue to Graphic Design iaitu tokoh-tokoh terkemuka dalam bidang rekabentuk grafik.

Jadual 6: Borang Soal Selidik Bahagian B

BIL	ITEM
1	Adakah anda memahami topik 2 tokoh-tokoh terkemuka dalam bidang rekabentuk grafik?
2	Adakah anda mengalami kekangan dalam mengenal pasti tokoh-tokoh terkemuka dalam bidang rekabentuk grafik?
3	Adakah anda meminati pembelajaran teori topik 2 tokoh-tokoh terkemuka dalam bidang rekabentuk grafik?
4	Adakah alat bahan bantu mengajar (ABBM) yang digunakan oleh pensyarah membantu anda memahami pembelajaran topik 2?
5	Adakah anda berasa bosan semasa proses pengajaran dan pembelajaran (PdP) berlangsung?
6	Adakah anda berasa ABBM yang digunakan oleh pensyarah ketika proses PdP membantu anda dalam melaksanakan tugasan?

Merujuk kepada Jadual 6 terdapat dua perkara yang dapat dikenalpasti daripada borang soal selidik berdasarkan 6 item yang dikemukakan. Perkara pertama adalah tahap kefahaman pelajar terhadap tokoh-tokoh terkemuka dalam bidang rekabentuk grafik dan perkara yang kedua, dapat mengenalpasti alat bahan bantu mengajar yang digunakan pensyarah semasa proses PdP mempengaruhi kefahaman pelajar dan membantu pelajar dalam melaksanakan tugasan.



Rajah 1: Perbandingan Soal Selidik Sebelum Dan Selepas Penggunaan Alat Bahan Bantu Mengajar *Prominent Figure Game Card*

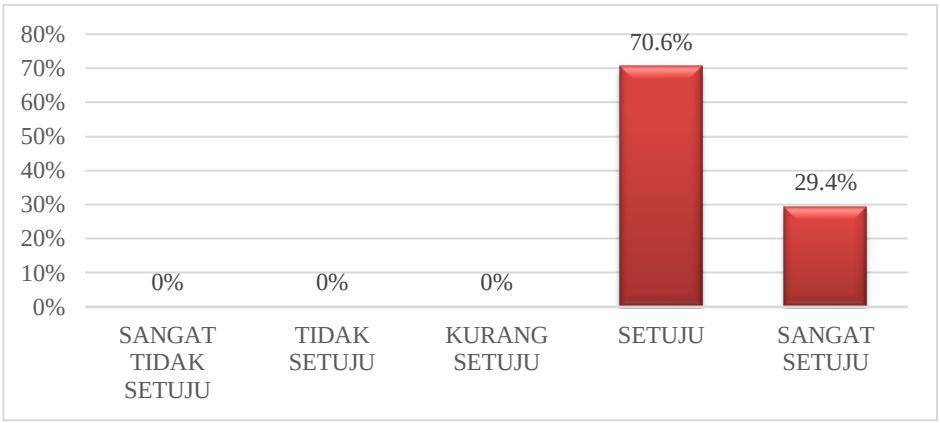
Merujuk pada Rajah 1, daripada soalan 1 bagi soal selidik sebelum penggunaan ABBM *Graphic Design Prominent Figure Game Card* sebanyak 76% pelajar memahami topik tokoh-tokoh terkemuka dalam bidang rekabentuk grafik manakala peratusan soal selidik selepas penggunaan ABBM *Graphic Design Prominent Figure Game Card* meningkat kepada 100%. Daripada soalan 2 bagi soal selidik sebelum penggunaan ABBM *Graphic Design Prominent Figure Game Card* sebanyak 51% pelajar mengalami kekangan dalam mengenalpasti tokoh-tokoh terkemuka dalam bidang rekabentuk grafik akan tetapi selepas penggunaan ABBM *Graphic Design Prominent Figure Game Card* hanya 8% pelajar sahaja yang mengalami kekangan. Berdasarkan Rajah 1 juga dapat dilihat minat pelajar meningkat daripada 61% kepada 99% selepas penggunaan ABBM *Graphic Design Prominent Figure Game Card* semasa proses PdP daripada soalan 3. Sebanyak 69% pelajar merasakan sebelum penggunaan ABBM *Graphic Design Prominent Figure Game Card* membantu mereka dalam pembelajaran topik 2 dan selepas penggunaan ABBM *Graphic Design Prominent Figure Game Card* peratus meningkat kepada 96% dilihat pada soalan 4. Daripada soalan 5, sebelum penggunaan ABBM *Graphic Design Prominent Figure Game Card* sebanyak 34% pelajar berasa bosan semasa proses PdP berlangsung akan tetapi apabila selepas penggunaan peratusan pelajar berasa bosan turun kepada 9% sahaja. Dapatan soal selidik bagi soalan 6 sebelum penggunaan ABBM *Graphic Design Prominent Figure Game* sebanyak 74% pelajar berasa ABBM yang digunakan oleh pensyarah ketika proses PdP membantu dalam melaksanakan tugasan akan tetapo selepas penggunaan ABBM *Graphic Design Prominent Figure Game* peratusan meningkat kepada 98%. Dapatan daripada bahagian B secara keseluruhan menunjukkan maklumbalas yang baik daripada pelajar selepas penggunaan ABBM *Graphic Design Prominent Figure Game Card* dalam proses PdP.

Soal selidik Bahagian C, hanya terdapat di borang soal selidik selepas penggunaan ABBM *Graphic Design Prominent Figure Game Card*, terdapat 8 item yang dikemukakan pada bahagian tersebut. Jadual 3 menunjukkan item yang dikemukakan pada Bahagian C berkenaan penerimaan penggunaan ABBM *Graphic Design Prominent Figure Game Card* dalam proses PdP.

Jadual 7: Borang soal selidik Bahagian C

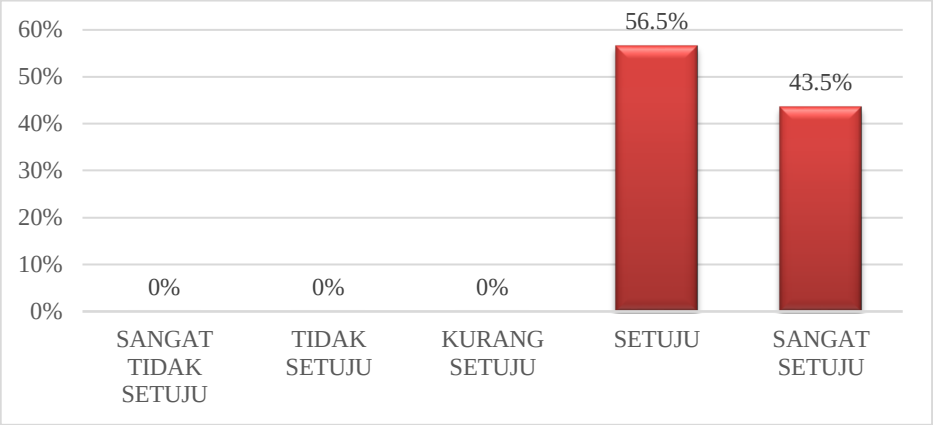
BIL	ITEM
1	Adakah anda bersetuju, Prominent Figure Card Game membantu anda menumpukan perhatian ketika didalam kelas?
2	Adakah anda bersetuju, Prominent Figure Card Game membantu meningkatkan kefahaman topik 2 yang diajar oleh pensyarah?
3	Adakah anda bersetuju, Prominent Figure Card Game membantu anda dalam melaksanakan tugasan yang diberi?
4	Adakah anda bersetuju, Prominent Figure Card Game membantu meningkatkan minat anda terhadap pengajaran oleh pensyarah berbanding pengajaran biasa?
5	Adakah anda bersetuju, inovasi ini membantu anda mengenal pasti tokoh-tokoh terkemua rekabentuk grafik?
6	Adakah anda bersetuju, inovasi ini membantu anda mengingati tokoh-tokoh terkemuka rekabentuk grafik?
7	Adakah anda bersetuju, Prominent Figure Card Game membuatkan anda bertambah minat mempelajari kursus ini?
8	Adakah anda bersetuju, Prominent Figure Card Game lebih menyeronokkan berbanding pengajaran biasa?

Berdasarkan Jadual 7, perkara yang dapat dikenalpasti daripada soal selidik ialah kadar keberkesanan dan impak alat bahan bantu mengajar (ABBM) Inovasi *Graphic Design Prominent Figure Card Game* dalam proses pengajaran dan pembelajaran. Namun, memadai perbincangan hanya memfokuskan kepada soalan 2 dan 8 sahaja.



Rajah 2: Maklumbalas Soalan 2 Bahagian C

Daripada soalan 2 sebanyak 29.4% pelajar sangat setuju *Graphic Design Prominent Figure Card Game* membantu meningkatkan kefahaman topik 2 kursus DVG10022 Prologue to Graphic Design yang diajar oleh pensyarah. Sebanyak 70.6% pelajar turut bersetuju akan perkara yang sama seperti yang ditunjukkan dalam Rajah 2. Ini menunjukkan keberkesanan *Graphic Design Prominent Figure Card Game* dalam membantu meningkatkan kefahaman pelajar secara tidak langsung turut membantu pensyarah menjalankan proses PdP dengan lebih mudah dan berkesan.



Rajah 3: Maklumbalas Soalan 8 Bahagian C

Merujuk dari soalan 8 sebanyak 43.5% pelajar sangat setuju pengajaran dan pembelajaran menggunakan *Graphic Design Prominent Figure Card Game* lebih menyeronokkan berbanding dengan pengajaran dan pembelajaran tradisional. Sebanyak 56.5% turut bersetuju dengan hal yang sama. Penglibatan pelajar dalam proses PdP akan membolehkan mereka untuk mengetahui, mengembangkan kemahiran dan membentuk sikap positif melalui komunikasi sesama pensyarah ataupun rakan. Jelaslah bahawa, penggunaan alat bahan bantu mengajar (ABBM) *Graphic Design Prominent Figure Card Game* mampu meningkatkan kefahaman pelajar serta menarik minat pelajar dan mengelakkan pelajar berasa bosan dalam proses PdP di dalam kelas. Selain itu, kaedah ini juga dapat membantu pelajar menyelesaikan tugasan yang berkaitan dengan topik dengan lebih mudah.

CADANGAN DAN KESIMPULAN

Untuk memastikan sesi PdP berjalan dengan lebih kreatif, menarik minat pelajar, serta membantu pelajar memahami topik yang dipelajari dengan lebih mudah dan ringkas. Kaedah inovasi yang dicadangkan akan memberi banyak manfaat dan kelebihan seperti menambahbaik Prominent

Figure Card Game dalam bentuk digital seperti AR dan membangunkan Prominent Figure Card Game yang lebih menarik iaitu mempunyai audio & visual yang bergerak.

Secara keseluruhannya, inovasi Graphic Design Prominent Card Game bukan sahaja menarik minat pelajar, malah mampu meningkatkan kefahaman dan keupayaan mengingat fakta tokoh-tokoh terkemuka reka bentuk grafik dengan ringkas dan mudah. Hasil kajian ini dapat membuktikan bahawa dengan pembangunan inovasi ini, minat pelajar terhadap pembelajaran kursus Prologue to Graphic Design mengalami peningkatan. Oleh itu, pensyarah juga dapat mempelbagaikan teknik dan pelaksanaan aktiviti di samping menjimatkan masa, kos dan tenaga. Selain itu, inovasi ini juga dapat membantu memberi kemudahan terhadap pelajar untuk memahami teori tokoh-tokoh terkemuka ini secara interaktif dan fleksibel. Justeru, Graphic Design Prominent Figure Card Game sememangnya satu inisiatif yang memudahkan pensyarah dan pelajar memahami dan mempelajari topik 2 dengan ringkas dan menyeronokkan. Hasil kajian ini diharapkan dapat dijadikan pemangkin semangat untuk pensyarah dan pelajar dalam mengaplikasikan pembelajaran interaktif dalam proses PdP.

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WEBDAPP GAME BOARD AS EDUCATIONAL GAMES FOR TEACHING AND LEARNING

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ABSTRACT

Educational games have been widely used in educational teaching and learning. The development of educational games is based on the use of interactive learning. This study is aimed at developing a new educational game board, namely, WebDApp. The study was conducted via questionnaires that encompassed a sample size of 30 students. The students involved in this survey are those who registered for the Web Design Technologies course during the second session of 2021/2022. The results of a survey conducted on students who have used this application, as much as 50% strongly agree that this application can help in learning Web Design technologies. The achievement of Practical Test scores (covering HMTL and CSS topics) of students before and after using this application will be explained. The future of educational games is expected to be marked by innovation, inclusivity, and a concentration on utilizing technology to generate captivating, tailored, and influential learning experiences. Educational games can revolutionize teaching methods, empower learners, and tackle the various difficulties and opportunities in education by adopting new trends and pedagogical techniques.

Keywords: *Educational games; gamification; game board; active learning; interactive learning.*

INTRODUCTION

Interactive teaching and learning encompass pedagogical strategies that foster dynamic involvement, active participation, and collaborative interactions among educators and learners, as well as among students independently. This methodology departs from the conventional unidirectional dissemination of knowledge when the instructor assumes the central role as the major provider of information and instead embraces a more dynamic and participatory educational setting. There are several aspects of interactive teaching and learning such as two-way communication, active participation, and a variety of learning activities. Interactive learning is essential for several reasons such as engagement (Smiderle et al., 2008; Muir et al., 2022), critical

thinking (Djamas et al., 2018), and skill development (Malikovna et al., 2022). Interactive learning is an educational approach that actively engages students in the learning process, hence enhancing their level of engagement and motivation (Yu et al., 2021). Active engagement in conversations, problem-solving exercises, and practical assignments enhances students' concentration and engagement with the subject matter. Interactive learning fosters the development of critical and analytical thinking skills among students. Through active participation in conversations, debates, and problem-solving exercises, students are compelled to assess material, scrutinize various viewpoints, and formulate their own deductions. Interactive learning enables the development of a wide range of skills and abilities among students (Zhang et al., 2020), enables effective communication (Al Rawashdeh et al., 2021), adept problem-solving (Lee et al., 2023), collaborative teamwork (Espino-Díaz et al., 2020), and proficient digital literacy (Churchill, 2020). The acquisition of these abilities is crucial for achieving success in academic, professional, and personal domains.

Educational games are specifically intended to enhance learning and achieve educational goals. These educational games are meticulously designed to impart or strengthen particular knowledge, skills, or concepts in a captivating and interactive fashion. By incorporating educational information, objectives, and instructional tactics into their gaming mechanics, storylines, and obstacles, educational games distinguish themselves from standard recreational games.

The efficacy of education delivery and student outcomes might be impeded by many obstacles encountered in traditional teaching and learning approaches. The following are few significant challenges: 1) passive learning, 2) lack of engagement and motivation, and 3) limited integration of technology. Traditional instructional approaches frequently depend on lectures and rote memorization, fostering a passive learning environment in which students are anticipated to passively assimilate material without actively participating in its acquisition. This phenomenon has the potential to result in disengagement, boredom, and restricted retention of information (Vahedi et al., 2021). The efficacy of conventional instructional approaches in fostering student engagement and promoting active participation in educational endeavours may be limited. Insufficient integration of students' interests, experiences, or real-world situations in education can result in a lack of relevance and an inability to engage students' attention or foster excitement for learning.

The utilization of digital tools and resources in traditional classrooms may be limited, despite the potential of technology to enhance learning experiences and extend educational opportunities. The

restricted incorporation of technology could potentially hinder students' acquisition of digital literacy competencies and their capacity to traverse an ever-expanding digital landscape.

This study is conducted to create a new method in teaching and learning as to demonstrate the active learning during the class. The following are our research questions:

i) How does this application enhance students learning ability?

ii) What are the consequences of using the educational games during teaching and learning?

The second section of this study provides an overview of the existing literature. In this study, the methods employed are outlined in Section 3. The findings and analysis are presented in Section 4. Finally, the result of this research is presented in Section 5.

LITERATURE REVIEW

Key components of gamification include game mechanics, social interaction, narrative and theme. The following are the regulations, frameworks, and components that govern gaming and facilitate interaction. Illustrations encompass several elements such as points, badges, levels, progress bars, challenges, awards, leaderboards, and feedback mechanisms. Gamification frequently integrates social components to promote cooperation, rivalry, and involvement within a community. Participants can engage with peers, compare progress, and provide mutual support through features such as leaderboards, challenges, multiplayer modes, and social sharing opportunities. The incorporation of a captivating narrative or subject has the potential to augment engagement and immersion within gamified experiences. Gamification offers users a sense of purpose, growth, and emotional connection by placing activities within a plot or theme framework. Gamification in education has positive impacts on students' learning activities (Khaleel et al., 2020). The students becoming more motivated (Ardiana et al., 2020) and able to produce skills effectively (Krisbiantoro, 2020).

Educational games are specifically intended to enhance learning and achieve educational goals. These educational games are meticulously designed to impart or strengthen knowledge, skills, or concepts in a captivating and interactive fashion. By incorporating educational information, objectives, and instructional tactics into their gaming mechanics, storylines, and obstacles, educational games distinguish themselves from standard recreational games. The existing studies shows that educational games have been developed for many purposes such as to prevent

cyberbullying (Calvo-Morata et al., 2020) and to improve English language learning (Xu et al., 2020). Educational games not only focus on primary or high school learning but also in college such as in health education (Krishnamurthy et al., 2022). Education games able to increase quality of learning experience by introducing the technology such as augmented reality (Videnovik et al., 2020) and virtual reality (Asad et al., 2021). Educational games are fun to explore and promotes enjoyable learning experiences to students. They also promote students' skill in learning new knowledge (Hooshyar et al., 2021).

MATERIALS AND METHOD

This section presents the system development model including the use cases and flowchart**.** We designed and developed this WebDApp application using ADDIE model. A commonly employed instructional design framework, the ADDIE model offers a methodical approach to the creation of impactful learning experiences. The acronym ADDIE represents the sequential stages of Analysis, Design, Development, Implementation, and Evaluation. Every phase within the instructional design process serves as a crucial stage, providing guidance to designers and educators as they navigate the creation of educational resources and programs.

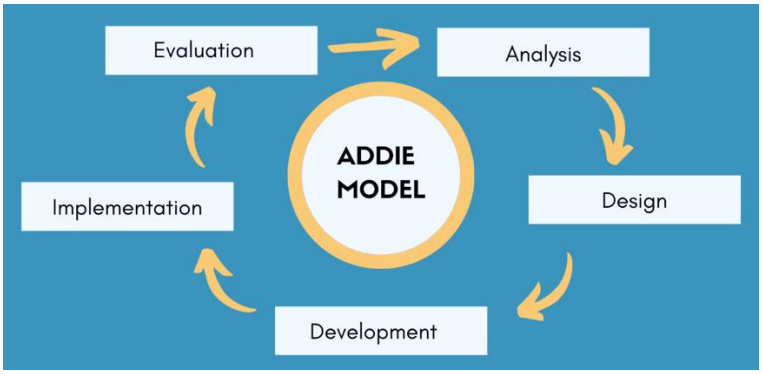

Figure 1: ADDIE Model

1) *Analysis*: During the analysis phase, an examination was held to assess the performance of students and identify the significant issues that led to their failure in the practical examination.
2) *Design*: During the design phase, the primary objective is to develop the essential functionalities of the application that have the potential to enhance students' learning capabilities. The use case diagram for the player is shown in Figure 2. The player can choose the GameSpace in this application. The player then drags and drop the answer in the answer box. Lastly, the player able to view score after the game finished. Figure 3

shows the use case diagram for the instructor. The instructor can evaluate the answer and score the player.

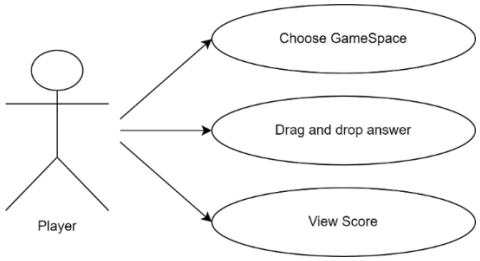

Figure 2: Use Case Diagram of a Player

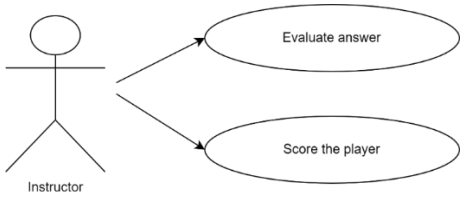

Figure 3: Use Case Diagram of an Instructor

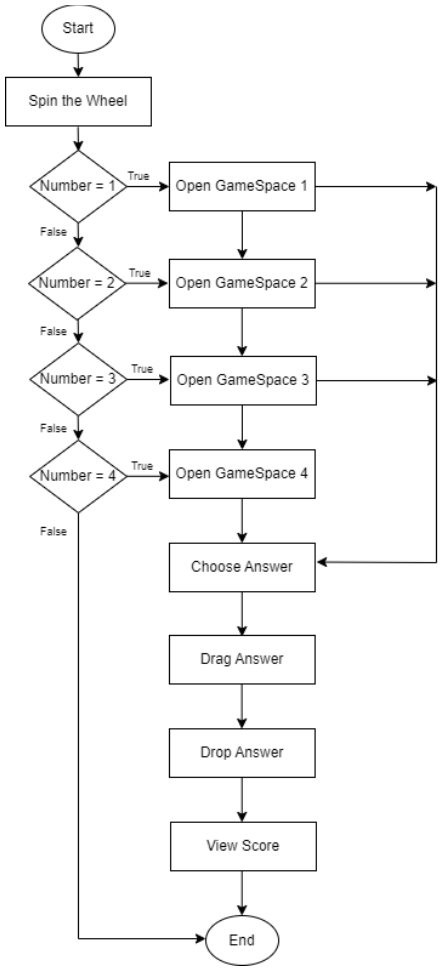

Figure 4: WebDApp Game Board Flowchart for Player

As shown in Figure 4, we present the flowchart for our WebDApp game board. There are six processes involved during the game simulation: 1) spin the wheel, 2) open GameSpace, 3) choose answer, 4) drag answer, 5) drop answer, and 6) view score.

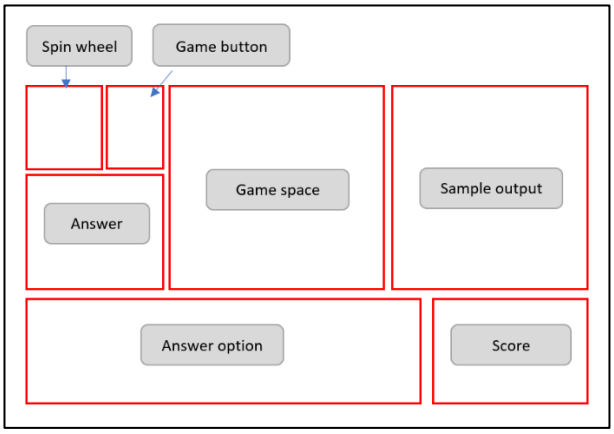

Figure 5: WebDApp Game Board Interface Design

Figure 5 presents the interface design of the WebDApp. There are seven elements in this game board: 1) spin wheel, 2) game button, 3) answer box, 4) game space, 5) answers option, 6) sample output, and 7) score box.

3) *Development*: During the development phase, the application is initiated by employing the Java Netbeans framework. Our primary functionality, drag & drop, was implemented. Figure 6 shows the WebDApp player registration interface, and Figure 7 shows the main interface of the game board that has been developed using NetBeans software.

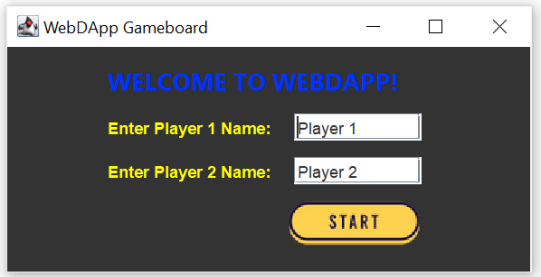

Figure 6: WebDApp Player Registration Interface

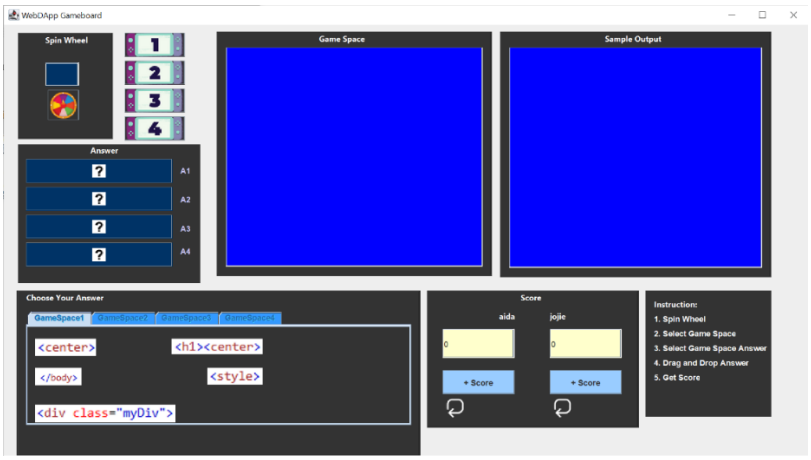

Figure 7: WebDApp Game Board Main Interface

Figure 8: Registration of Player's Name

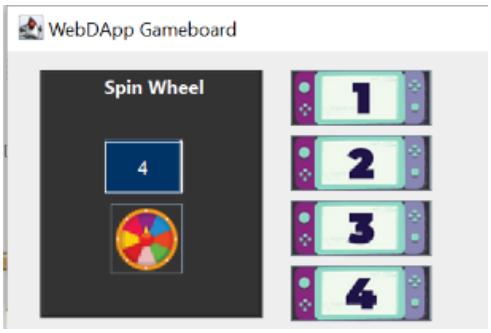

Figure 9: Selecting the Game Space

Figure 10: Questions and Sample Output

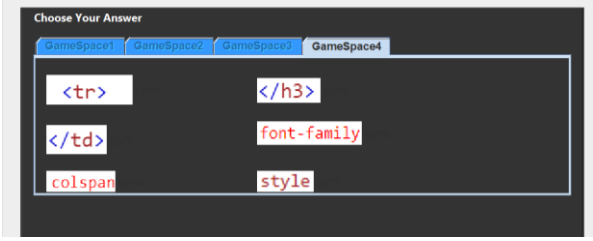

Figure 11: Player selects the Corresponding Sets of Game Space's Answers

Figure 12: Player Drag and Drop the Answer in The Answer Box

4) *Implementation*: In the phase of implementation, an experimental study was done on students who were enrolled in the Web Design Technologies course.
5) *Evaluation*: The final stage involves the process of evaluation. The study was conducted via questionnaires that encompassed a sample size of 30 students. Additionally, feedback was obtained from other professors.

RESULT AND DISCUSSION

The adoption of the ADDIE model is justified by the provision of a methodical and organized framework for instructional design, thereby guaranteeing the efficacy, efficiency, and alignment of learning experiences with predetermined learning objectives.

The researchers surveyed to study the effectiveness of the WebDApp application. The students involved in this survey are those who registered for the Web Design Technologies course during the second session of 2021/2022. The result of the survey is summarized in the following Table 1.

Table 1: Result of survey

Item	Questions	Criteria	Percentage	Qualitative Interpretation
1	WebDApp game board helps in learning Web Design Technologies	Functionality	50%	Strongly agree
2	WebDApp game board increased my passion in learning Web Design Technologies	Reliability	60%	Strongly agree
3	WebDApp game board can increase my understanding in Web Design Technologies	Usability	63.3%	Strongly agree
4	WebDApp game board can save my time to study Web Design Technologies	Efficiency	70%	Strongly agree
5	WebDApp game board is easy to use	Usability	73.3%	Strongly agree

The results of a survey conducted on students who have used WebDApp game board, as much as 50% strongly agree that this application can help in learning Web Design Technologies. As many as 60% of students strongly agree with the statement that WebDApp game board can raise the spirit to learn. 63.3% of students strongly agree that WebDApp can increase understanding of Web Design Technologies. As many as 70% strongly agree that WebDApp game board can save time. WebDApp Gameboard is also easy to use and agreed by 73.3% of students.

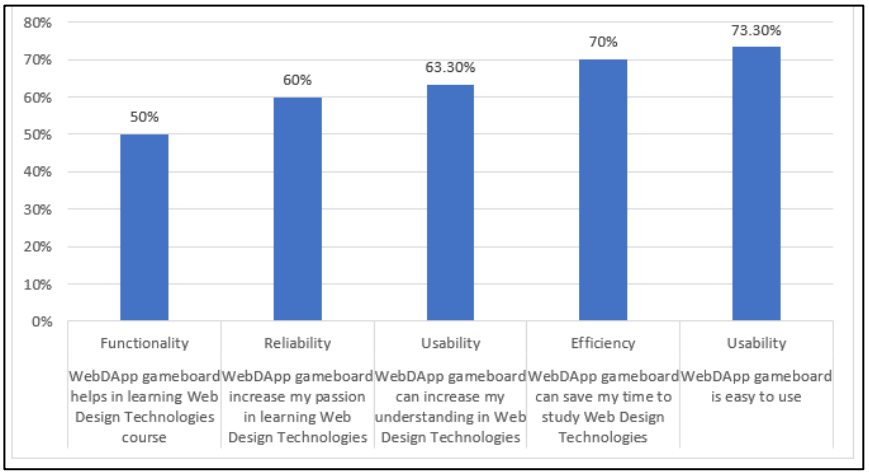

Figure 13: Analysis of Student Acceptance and Perception of WebDApp Game Board

The effectiveness analysis continues by looking at the percentage of student achievement in the Practical Test evaluation. Table 2 shows student achievement before and after using WebDApp Gameboard.

Table 2: Students' Achievement

Session	Number of Students	Passed	Passed Percentage	Failed	Failed Percentage
Session 1 2021/2022	13	3	23	10	77
Session 2 2021/2022	14	10	72	4	29

Figure 8.0 shows the analysis of student achievement before and after using WebDApp Game board.

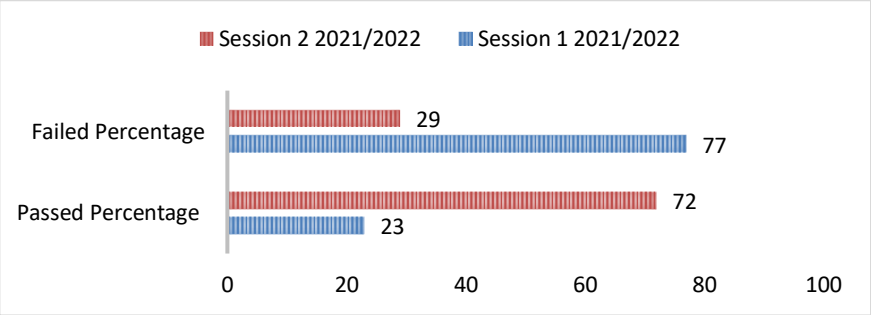

Figure 14: Analysis of Student Achievement Before and After using WebDApp Game Board

Next, the results of the analysis of the achievement of Practical Test scores (covering HMTL and CSS topics) of students before and after using WebDApp will be explained. The percentage of students who failed in answering the Practical Test questions in Session I 2021/2022 was as much as 77%. This number includes 10 students out of a total of 13 students. However, after using the WebDApp game board in Session II 2021/22, the percentage of failing the Practical Test dropped to 29%, which is only 4 people out of a total of 14 students. The use of WebDApp game board is seen to improve student understanding. This can be proven by the sudden failure rate of 48%.

CONCLUSION AND FUTURE WORKS

Emerging technologies, shifting pedagogical techniques, and changing educational demands are expected to influence the future trajectory of educational games. To summarize, the future of educational games is expected to be marked by innovation, inclusivity, and a concentration on utilizing technology to generate captivating, tailored, and influential learning experiences. Educational games can revolutionize teaching and learning methods, empower learners, and tackle the various difficulties and opportunities in education by adopting new trends and pedagogical techniques.

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THE EFFECTIVENESS OF GAMIFICATION IN PROGRAMMING COURSE AT POLITEKNIK BALIK PULAU

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ABSTRACT

Students frequently struggle with learning programming courses due to their complicated and abstract structure. Experts believe that new teaching strategies are needed to motivate and interest students in programming courses, along with the development of Industrial Revolution 4.0. Most educators are now aware of the advantages of gamification in the classroom. Nevertheless, there has not been any intensive research done to find out how gamification affects students' performance and motivation in learning Python programming. This study's primary goal is to investigate how gamification affects students' performance and motivation. The design of this research is quantitative and uses quasi-experimental techniques. Two strategies were applied to two student groups: the gamification group (G group) used the ActionBound application, while the non-gamification group (NG group) used the multimedia application. In this study, 60 students from Politeknik Balik Pulau served as the sample size. The students were split into two groups: thirty (30) in the G group and thirty (30) more in the NG group. Numerous tools were used to gather data, including questionnaires, pre-test, and post-tests. The Covariate (ANCOVA) results showed a significant difference in students' performance using ActionBound for gamification compared to multimedia applications without gamification. Additionally, a significant difference in the motivation level of the students between the G group and the NG group was found in the ANOVA analysis. Moreover, the findings have demonstrated that gamification improves students' performance and motivation. This study contributes to the academic department and motivates educators to apply gamification in the classroom to improve the quality of the teaching and learning process. Future studies can be conducted by examining gamification tools that can influence students' cognitive thinking and emotions while learning programming courses at the polytechnic.

Keywords: *Gamification, students' performance, motivation, programming course*

INTRODUCTION

The Python programming course (DFP40203) is an elective course in the software and application development track. Students frequently struggle with learning programming courses due to their complicated and abstract structure. Experts believe that new teaching strategies are needed to motivate and interest students in programming courses, along with the development of Industrial Revolution 4.0 and in line with the demands of 21st Century Learning. The Malaysian Ministry of Education has drafted the current "Education Blueprint" (2013-2025), incorporating technology-based teaching strategies, such as information, communication, and technology (ICT), into the daily teaching and learning process. Therefore, educators need to prepare themselves with more creative and innovative teaching techniques (Naz et al., 2017). However, educators need to be wise in choosing a method that is suitable for learning to keep students motivated in their lessons. Thus, gamification is stated to have the potential to overcome this issue by increasing students' performance (Boudadi & Gutiérrez-Colón, 2020) and motivation in learning (Behnke, 2015). This is very distinct from previous teaching and learning approaches, which prioritised knowledge over educational experience. Students are no longer inactive learners. They participate fully in the educational process, also known as student-centered learning, and they gather knowledge on their own. Through digital games in education, students will be more motivated to beat their current grades and performance. It encourages healthy competition in learning (Ali et al., 2021). Many gamification tools have been developed to provide students with engaging learning experiences, including Kahoot, Socrative, Quizizz, Quizlet, Actionbound, Edmodo, Mentimeter, Gimkit, and others (Panmei, 2022). This research only focuses on Actionbound out of all gamification technologies. It is considered a powerful tool for motivating students, fostering student-centered learning, and raising students' performance.

PROBLEM STATEMENT

Students at Politeknik Balik Pulau find it difficult to comprehend the Python programming course, according to observations and conversations with the polytechnic programming lecturer. They are not able to apply their knowledge to complete practical assessments like problem-based assignments and mini-projects. The analysis of the Course Outcome Review Report (CORR) for the final examination results of the Python programming course for Session II: 2022/2023 and Session I: 2023/2024 reveals decreased scores, as indicated in Figure 1. The graph shows that Course Learning Outcome (CLO), for CLO1P, decreased to 91.3%, while CLO2A and CLO3P decreased to 87%, respectively. CLO1P, CLO2A, and CLO3P is stand for Course

Learning Outcomes for Level 1 Psychomotor (CLO1P), Course Learning Outcomes for Level 2 Affective (CLO2A), and Course Learning Outcomes for Level 3 Psychomotor (CLO3P). By the end of this course, the student should be able to construct a Python application based on a given scenario (CLO1P), demonstrate effective communication and writing among team members in the process of developing a Python application (CLO2A), and display the ability to visualise the development process of an application (CLO3P). However, the review showed a decrease in Course Learning Outcomes for Python programming courses, thus motivating researchers to investigate this issue.

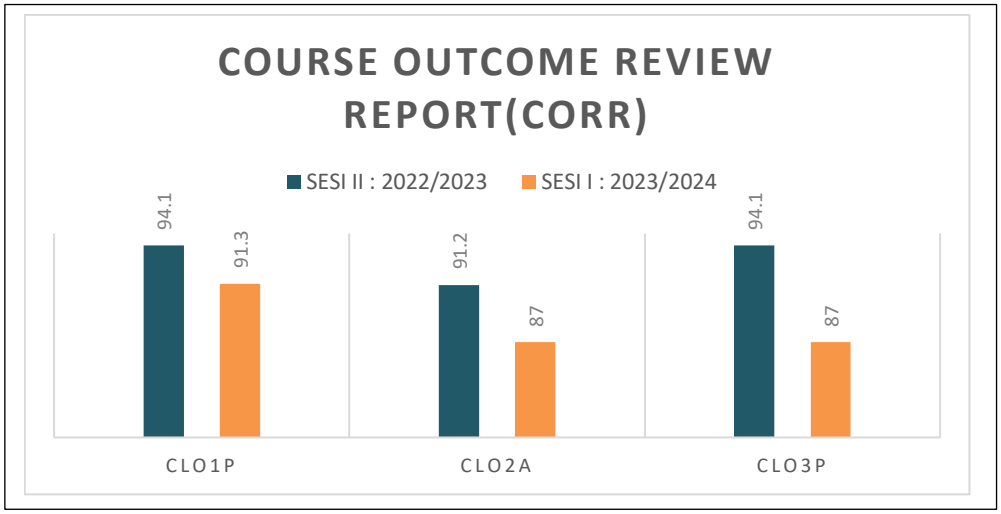

Figure 1: Course Outcome Review Report of Python Programming Course
Source: Examination Unit, Politeknik Balik Pulau.

RESEARCH OBJECTIVES

The objectives of this study are:

i. To examine the effectiveness of gamification on students' performance.
ii. To examine the effectiveness of gamification on students' motivation.

LITERATURE REVIEW

The following literature review demonstrates how gamification has been thoroughly studied in education (Caponetto et al., 2014; Dicheva et al., 2015; de Sousa Borges et al., 2014). Reviews of the literature indicate that gamification is becoming more and more significant in education, especially in higher education. The study by Wang and Zheng (2021) and Zhan et al. (2022) stated that gamification is a process of learning where students solve problems and overcome obstacles in game-based environments to obtain the desired learning outcomes, which can be represented in either the straightforward form of leaderboards, points, and badges (Bodnar et al., 2015).

Gamification has been demonstrated in the past to have a good impact on increasing general competence, learning performance, and motivation for learning. According to Mathrani et al. (2016), there is no consensus on how to evaluate instructional games. Apart from assessing the benefits of learning, many analytical elements were taken into consideration, such as motivation, usability, user experience, and so on. Based on this discussion, among the dimensions or components that can be used for measurements are usability, user experience (Yusof et al., 2022), and motivation. Therefore, this study measured students' motivation.

A few researchers have investigated the effects of Python programming that has been gamified. As programming is so complex and requires students to comprehend the fundamental abstractions, logical reasoning, and problem-solving techniques involved in the process, it has long been regarded as a challenging topic to teach and learn (Khenissi et al., 2013). It is difficult to motivate and assist students in understanding algorithms and abstract programming ideas (Hatzilygeroudis et al., 2012). Thus, gamification could be an effective way to boost students' enthusiasm and make learning programming easier for them (Lipovetzky & Sardina, 2018). This previous literature has suggested that more research should be done on the impact of gamification in programming. Therefore, this study is very significant in identifying how gamification affects the performance and motivation of students in Python programming courses.

CONCEPTUAL FRAMEWORK

This conceptual framework is adapted from the theoretical framework presented by Garris et al. (2002).

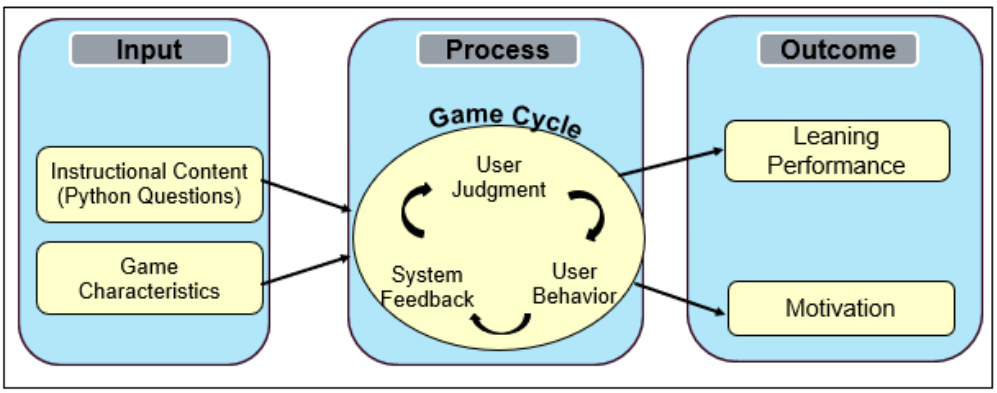

Figure 2: Conceptual Framework
(Adapted from Input-Process-Outcome Game Model (Garris et al., 2002))

RESEARCH METHODOLOGY

Research Design

The design of this research is quantitative and uses quasi-experimental methods to answer the research questions. Quasi-experimental methods are used when respondents cannot be randomly distributed and the sample has been pre-arranged; for example, the number of students in a class has been determined. This quasi-experiment was chosen to identify the difference between the two groups, namely the treatment group (G) and the control group (NG), through pre-test and post-test methods. In this study, a total of sixty (60) students were selected to conduct a study on the effectiveness of gamification.

Table 1: Research Design

Research Method	Purpose	Data Collection	To assess
Quantitative	To assess students' performance and motivation in the G group and NG group	Pre-test and post-test	Performance
		Questionnaire	Motivation

Table 2: Data Collection

Group	Learning Mode	Learning Material
G	Actionbound	Online game: https://en.actionbound.com/
NG	Multimedia applications	Interactive quiz created using Microsoft PowerPoint

Research Variables

Table 3 below indicates that there are two independent variables and two dependent variables in this study.

Table 3: Research variables

Independent Variables	Dependent Variable
Learning mode: 1. Gamification (Actionbound) 2. Non-Gamification (Multimedia application)	Performance Motivation

The two modes are gamification mode (G group) and non-gamification mode (NG group).

Gamification mode

Actionbound serves as a gamification tool in this study, allowing researchers to investigate the impact on student performance and motivation. Students were given the task of answering a series of questions on the Actionbound platform, which awarded points for accurate responses.

Non-gamification mode

A multimedia application uses many media sources, including text, graphics, photos, sound or audio, animation, and video. As a non-gamified (NG) tool, this study used multimedia applications that included quizzes. Microsoft PowerPoint 365 was used to construct this application, which includes multimedia elements.

Population and Sampling

The students were selected through the purposive sampling technique. Purposive sampling is used to obtain information about the respondents who have the needed characteristics in the sample (Yusof et al., 2022). The population of the study is students at Politeknik Balik Pulau, Penang, who are learning Python programming. They are the target group for this study. Therefore, the total number of students in the Gamification (G) and Non-Gamification (NG) groups is sixty (60).

Instruments

Three instruments are used to measure two variables. Pre-test and post-test results were employed for assessing students' performance, while a questionnaire was used to assess their motivation. The questionnaire is divided into two (2) sections: Section A for the demographics of the respondents, and Section B for student motivation measurement. A five-point scale was employed for the questionnaire's items, with 1 indicating 'Strongly disagree' and 5 indicating 'Strongly agree' (Taherdoost, 2019). A series of quiz questions served as the intervention's treatment. Table 4 below illustrates the instrument details.

Table 4: Instruments

No	Instruments	Construct	Sub-construct	Original source	No. of items	Total items
1	Questionnaire (Motivation)	Motivation	Attention	John Keller (1990)	6	24
			Relevance		6	
			Confidence		6	
			Satisfaction		6	
2	Performance	Pre-test			20	20
		Post-test			20	20
3	Quiz questions. (Intervention)				20	20

DATA ANALYSIS

Pilot Study

The questionnaire needs to be constructed accurately and appropriately; therefore, the pilot study procedure needs to be implemented first by selecting 30 respondents who are not part of the population. The pilot data test shows that all the questions constructed are appropriate and reach a level of reliability. The minimum reliability level of Cronbach's alpha is 0.60 (Dalyanto et al., 2021; Haynes et al., 1995). The value of Cronbach's alpha reliability level is shown in Table 5. Based on the collected data and samples obtained, the reliability test is analysed. The tests of the Cronbach's alpha values are shown in Table 6 below. The data indicated that these Instructional Materials Motivation Survey (IMMS) instruments were very reliable.

Table 5: Cronbach's alpha reliability level

Cronbach's Alpha Value	Reliability Level
0.0 - 0.20	Less Reliable
>0.20 – 0.40	Somewhat Reliable
>0.40 – 0.60	Reliable enough
>0.60 – 0.80	Reliable
>0.80 – 1.00	Very Reliable

Table 6: Reliability of Questionnaire

Construct	Cronbach's Alpha Coefficient	No. of Item	Analysis
IMMS Attention	0.841	6	Very Reliable
IMMS Relevance	0.816	6	Very Reliable
IMMS Confidence	0.804	6	Very Reliable
IMMS Satisfaction	0.824	6	Very Reliable
Overall	0.901	24	Very Reliable

Descriptive Statistic

There are two sections in the questionnaire. Section A is for the demographics of the respondents, and Section B is for student motivation measurement, as mentioned earlier. The data analysis findings are shown below.

Demographic Information

Table 7 shows the group, gender, and race of the respondents to this study.

Table 7: Respondents Demographic Information

Item	Value	Frequency	Percent
Group	Gamification (G)	30	50.0
	Non-Gamification (NG)	30	50.0
Gender	Male	37	61.7
	Female	23	38.3
Race	Malay	40	66.7
	Chinese	5	8.3
	Indian	15	25.0

Descriptive Statistics of Student's Motivation

Table 8 shows the descriptive statistics results of the IMMS survey for students' motivation levels among the G and NG groups.

Table 8: Descriptive statistics for motivation of G and NG groups

Group	G			NG		
	N	Mean	Std. Deviation	N	Mean	Std. Deviation
Motivation	30	4.53	0.51	30	3.32	0.68

Descriptive Statistics of Students' Performance (Pre-test and Post-test)

The results of the student's performance are highlighted in this section. The pre-test and post-test instruments were used in this study to evaluate their performance (Piaw, 2014). The mean values obtained by the G and NG groups are shown in Table 9.

Table 9: Mean and Std. deviation of Pre-test and Post-test scores of treatment (G) and control groups (NG)

Group	G		NG	
N	30		30	
Score	Pre-test	Post-test	Pre-test	Post-test
Mean	4.77	14.03	4.87	11.87
Std. Deviation	1.85	2.88	2.16	3.01

The descriptive statistics for the two groups of pre-test and post-test scores for students' performance are shown in Table 9. It draws attention to the mean and standard deviations. The group with gamification (G) had lower mean scores (mean: 4.77, SD: 1.85) than the non-gamification group (NG) (mean: 4.87, SD: 2.16), according to an analysis of the pre-test results. It is interesting to note that, when comparing the mean scores from the post-test, the G group (mean: 14.03, SD: 2.88) outperformed the NG group (mean: 11.87, SD: 3.01).

Inferential Statistic

Preliminary tests to determine ANCOVA analysis requirements.

Based on the pre-test score, an ANOVA analysis was conducted to determine if there were any significant performance differences between the G and NG groups. There is no significant difference between these two groups' pre-test results, as demonstrated in Table 10. ANCOVA analysis, on the other hand, was used to examine the study's hypotheses and to ensure that the pre-test results were reliable and normalized. Selecting the pre-test as a covariate in an ANCOVA analysis would allow for the adjustment of differences in pre-test scores.

Table 10: ANOVA pretest score analysis for G and NG group.

Group	N	Mean	Std. Deviation	Sig.	Result
G	30	4.77	1.85	0.848	Not significant
NG	30	4.87	2.12		

Findings According to Research Questions

Research Question 1:

Is there any significant difference in performance between the Gamification (using Actionbound) and the Non-Gamification group (using multimedia application)?

Table 11 shows that the G group outperformed the NG group in terms of mean post-test scores (mean post-test G: 14.03; mean post-test NG: 11.87). The learning performance of the G group and the NG group differed significantly, according to the ANCOVA analysis results (Table 12)

(F: 15.548; p: 0.00). More specifically, the post-test score showed a significant difference between the G and NG groups. This result indicates that the first hypothesis is validated. This result aligns with findings from previous studies, which stated that the gamification approach could help improve students' understanding and achievement scores as compared to traditional methods (Ali et al., 2021).

Table 11: Pre-test and post-test mean scores of G and NG groups.

	Group	**G**	**NG**
	N	**30**	**30**
Pre-test	Mean	4.77	4.87
	Std. Deviation	1.85	2.16
Post-test	Mean	14.03	11.87
	Std. Deviation	2.88	3.01

Table 12 shows the one-way ANCOVA analysis of the mean post-test score with G (Actionbound) and NG (multimedia application) and the mean pre-test score as covariates.

Table 12: One-way ANCOVA analysis

Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	
Corrected Model	293.144[a]	2	146.572	29.657	.000	
Intercept	590.789	1	590.789	119.539	.000	
Pretest	222.727	1	222.727	45.066	.000	
Group	**76.840**	**1**	**76.840**	**15.548**	**.000**	**Significant**
Error	281.706	57	4.942			
Total	10637.000	60				
Corrected Total	574.850	59				

a. R Squared = .510 (Adjusted R Squared = .493)

Research Question 2:

Is there any significant difference in motivation between the Gamification (using Actionbound) and the Non-Gamification group (using multimedia application)?

Based on Table 13, the G group scored higher on average than the NG group (mean score for G group: 4.53; mean score for NG group: 3.32) in terms of motivation. An ANOVA was performed to find out if the difference was significant at p:.005. The findings of the ANOVA analysis, as illustrated in Table 14, show that there was a significant difference (F = 60.646; p = 0.00) in the motivation scores of the G and NG groups. Regarding the motivation of respondents, the G group has higher scores than the NG group. These results show that hypothesis 2 is accepted. This

outcome is in line with the previous research, which stated that as for gamification applications, games as a competitive mechanism have the greatest impact on students' thinking skills and motivation (Zhan et al., 2022).

Table 13: Motivation mean score of G and NG group.

	Group	**G**	**NG**
	N	**30**	**30**
Motivation	Mean	4.53	3.32
	Std. Deviation	0.51	0.68

Table 14: ANOVA analysis of mean motivation with G and NG groups.

Dependent Variable: Motivation

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	
Corrected Model	22.052[a]	1	22.052	60.646	.000	
Intercept	922.703	1	922.703	2537.502	.000	
Group	**22.052**	**1**	**22.052**	**60.646**	**.000**	**Significant**
Error	21.090	58	.364			
Total	965.845	60				
Corrected Total	43.143	59				

a. R Squared = .511 (Adjusted R Squared = .503)

Additionally, the measurements were analysed to find out how each motivational factor differed between the G and NG groups. The descriptive and inferential statistics are highlighted in Table 15.

Table 15: Descriptive and Inferential Statistic of Four (4) Components in Motivation

	Group	**N**	**Mean**	**SD**	**p**	**Result**
Attention	G	30	4.44	0.62	0.00	Significant
	NG	30	3.39	0.75		
Relevance	G	30	4.48	0.55	0.00	Significant
	NG	30	3.41	0.68		
Confidence	G	30	4.58	0.50	0.00	Significant
	NG	30	3.24	0.71		
Satisfaction	G	30	4.46	0.50	0.00	Significant
	NG	30	3.21	0.76		

Four components of motivation measured by the IMMS instrument are 'Satisfaction', 'Attention', 'Relevance', and 'Confidence'. In this section, the researchers identify the key differences between the G and NG groups and discuss in further detail each component. The ANOVA analysis results, as illustrated in Table 15, show that the two groups significantly differed in each of the four motivation components, with the G group outperforming the NG group in every component.

Specifically, the mean scores of the G group are higher than the NG group in terms of the 'Attention' component ($p < .05$, mean G: 4.44, NG: 3.39). There is a significant difference in the 'Confidence' component ($p < .05$; G: 4.58, mean NG: 3.24), where the G group performed significantly better than the NG group in terms of the 'Relevance' component ($p < .05$, mean G: 4.48, NG: 3.41). Lastly, the G group outperformed the NG group in terms of the 'Satisfaction' component ($p < .05$; mean G: 4.46, NG: 3.21).

CONCLUSION

This study was conducted to identify the effectiveness of Actionbound as one of the learning methods in the teaching and learning process for the Python Programming course at Politeknik Balik Pulau. The study's findings demonstrate that gamification has a beneficial effect on students' performance and motivation. The performance of students who used the Actionbound platform was higher compared to students who did not use Actionbound. Furthermore, the treatment group that used the Actionbound application had a higher mean score than the control group in terms of motivation. Therefore, the objectives of the study were achieved. This study contributes to helping educators improve the quality of education. In addition, this study can also be used by researchers for future studies related to the use of Actionbound in the classroom. Future researchers could examine gamification tools that can influence students' cognitive thinking and emotions during learning programming courses at the polytechnic.

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KATEGORI 06

MANAGEMENT AND LEADERSHIP

MINAT DAN PENGLIBATAN PELAJAR POLITEKNIK TERHADAP AMALAN TANGGUNGJAWAB SOSIAL

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ABSTRAK

Matlamat Politeknik Malaysia adalah untuk melahirkan graduan TVET yang holistik dan kompeten dalam membentuk pelajar mendepani arus dan cabaran mendatang. Amalan tanggungjawab sosial merupakan satu kemahiran yang perlu dipupuk secara berterusan ke arah memperkembangkan potensi individu secara menyeluruh dan bersepadu bagi melahirkan insan yang seimbang dan harmoni. Kajian ini bertujuan untuk mengenalpasti minat dan penglibatan pelajar politeknik terhadap amalan tanggungjawab sosial. Kajian ini menggunakan reka bentuk kaedah campuran yang merangkumi penyelidikan kuantitatif dan penyelidikan kualitatif. Kajian kuantitatif menggunakan soalan soal selidik kepada 144 orang pelajar daripada semester tiga dan semester empat Politeknik Balik Pulau. Data kajian dianalisis secara deskriptif menggunakan SPSS Versi 26.0 untuk mendapatkan min dan sisihan piawai. Hasil kajian mendapati tahap minat dan faktor penglibatan pelajar terhadap amalan tanggungjawab sosial kedua-duanya adalah tinggi yang mana masing-masing mencatatkan jumlah skor 4.07 dan 4.14. Manakala kajian kualitatif menggunakan pendekatan temubual separa berstruktur. Enam responden dipilih untuk ditemubual tentang cabaran pelaksanaan amalan tanggungjawab sosial. Dapatan temubual menunjukkan terdapat empat tema telah dikenalpasti iaitu kekurangan sumber kewangan, kekangan masa, kekurangan maklumat dan sokongan daripada pihak pengurusan.

Kata Kunci: *Tanggungjawab sosial, pelajar politeknik*

PENGENALAN

Graduan holistik dan seimbang merangkumi mahasiswa yang beretika, mempunyai kerohanian mantap, penyayang dan prihatin. Ianya selaras dengan Lonjakan 1 Pelan Pembangunan Pendidikan Malaysia (PPPM) 2015-2025 (Pengajian Tinggi) yang memfokuskan graduan holistik berciri keusahawanan dan seimbang. Pembentukan nilai kesukarelawan dalam kalangan pelajar institusi

pengajian tinggi telah membuktikan pembangunan modal insan melalui aktiviti kesukarelawan dan kerja sosial yang dijalankan terhadap komuniti dan masyarakat. Justeru, aktiviti tanggungjawab sosial yang dilaksanakan oleh Institusi Pengajian Tinggi adalah selaras dengan aspirasi Dasar PPPM yang berpaksikan Revolusi Industri 4.0.

Politeknik Malaysia di bawah Jabatan Pendidikan Politeknik dan Kolej Komuniti (JPPKK) turut melestarikan amalan tangungjawab sosial. Antara dokongan yang ditunjukkan oleh pihak JPPKK adalah melalui pelaksanaan kurikulum Matapelajaran Pengajian Umum (MPU), penubuhan Yayasan Sukarelawan Siswa Politeknik Malaysia (YES!Politeknik Malaysia) serta program-program yang menjurus ke arah tanggungjawab sosial yang lain. MPU merupakan salah satu strategi dan inisiatif yang direncanakan untuk mencapai matlamat Lonjakan 1 iaitu Graduan Holistik, Berciri Keusahawanan dan Seimbang (Garis panduan Matapelajaran Pengajian Umum Edisi Kedua, 2016). YES! Politeknik pula merupakan satu platform bagi pelajar Politeknik untuk memberikan sumbangan khidmat bakti kepada masyarakat dalam bentuk kemahiran TVET. Pelbagai aktiviti telah dirancang di peringkat pusat dan di peringkat institusi politeknik itu sendiri untuk membentuk pelajar yang bercirikan holistik. Pendedahan tanggungjawab sosial ini adalah untuk menarik minat pelajar agar cenderung kepada amalan tanggungjawab sosial.

Justeru, kajian ini adalah untuk meneliti penglibatan pelajar dalam aktiviti tanggungjawab sosial sebagai satu platfrom untuk meningkatkan modal insan serta melahirkan pelajar berkemahiran dan seimbang dari aspek jasmani, emosi, rohani, intelek dan sosial.

Latar Belakang Kajian

Mahasiswa kompeten adalah mahasiswa yang memiliki tahap keyakinan dan tahap kemahiran insaniah yang tinggi (Saqinah, 2020). Kesukarelawanan terus menjadi agenda penting dalam misi pembangunan negara. Penyertaan masyarakat khususnya generasi muda dalam aktiviti kesukarelawanan amat penting dalam melahirkan sebuah komuniti berempati. Kesukarelawanan sering kali dikaitkan aktiviti amal dan kebajikan yang dijalankan terhadap golongan memerlukan (United Nations Volunteers (UNV), 2011). Pendekatan bantuan dan khidmat sosial amatlah luas, termasuklah konteks pembangunan komuniti, pendidikan, kesihatan, sosioekonomi, pertanian, alam sekitar, bencana, kebajikan, perpaduan dan lain-lain lagi. Ia memerlukan penyertaan aktif belia dan masyarakat tanpa mengira latar belakang, agama dan bangsa.

Menurut kajian Charities Aids Foundation (CAF) World Giving Index (WGI) pada 2019 menunjukkan Malaysia pada tangga ke-30 daripada 146 negara (World Giving Index, 2019). Kedudukan ini agak memberangsangkan dan menunjukkan rakyat Malaysia sebenarnya banyak meluangkan masa melakukan aktiviti kesukarelawanan. Situasi ini berpadanan dengan dapatan kajian mengenai kesedaran masyarakat terhadap aktiviti kesukarelawanan yang dijalankan Institut Penyelidikan Pembangunan Belia Malaysia (IYRES) yang menunjukkan 81.6 peratus responden kajian pernah terbabit aktiviti kemasyarakatan (Wan Zumaiza, IYRES, 2020). Daripada data ini, jelas menunjukkan aktiviti kesukarelawanan di Malaysia berjalan dengan rancaknya.

Kursus Matapelajaran Pengajian Umum merupakan kursus Mata pelajaran Wajib (MPW) yang perlu diikuti oleh semua pelajar politeknik. Ianya juga merupakan pelengkap kepada kursus-kursus yang ditawarkan dalam program pengkhususan pelajar. Kursus MPU ini terbahagi kepada empat kelompok iaitu U1, U2, U3 dan U4. Kelompok U4 mengkhususkan kemahiran pengurusan masyarakat bersifat praktikal seperti khidmat masyarakat dan ko-kurikulum. (Garis panduan Matapelajaran Pengajian Umum Edisi Kedua, 2016).

Yayasan Sukarelawan Siswa Politeknik Malaysia atau YES!Politeknik Malaysia telah ditubuhkan pada 15 Julai 2011. YES!Politeknik merupakan satu platform kepada siswa Politeknik menyumbang khidmat bakti dalam bentuk kemahiran TVET kepada masyarakat. Moto YES!Politeknik Malaysia adalah "We Care For The Community, We Love Malaysia". Proses perlaksanaan aktiviti sukarela YES!Politeknik ialah penerapan nilai, kualiti, autonomi dan akauntabiliti kepada pelajar. Dalam masa yang sama, YES!Politeknik melaksanakan jaringan kolaborasi serta perkongsiam kepakaran melalui agensi swasta dan badan-badan NGO.

Oleh yang demikian, kesalinghubungan pelbagai aktiviti normal pengajaran dan pembelajaran dengan program sokongan berbentuk kesukarelawanan ini mampu meningkatkan nilai dan kemahiran interpersonal pelajar (Hamzah et al., 2022). Nilai tanggungjawab sosial melalui pendidikan seperti ini perlu diperkasakan bagi melahirkan insan menghayati nilai, holistik dan seimbang.

Pernyataan Masalah

Aktiviti kemasyarakatan seringkali diremehkan lantaran kesibukan tugas seharian dan timbul sikap tidak mengambil berat terhadap program-program sedemikian. Konsep tanggungjawab atas kebaikan bersama juga sering diabaikan sedangkan tanggungjawab ini wajib dipikul bersama oleh

setiap anggota masyarakat tanpa mengira pangkat, kedudukan mahupun perbezaan bangsa dan agama (Mashitah, 2009).

Sistem pendidikan yang masih berorientasikan peperiksaan di negara kita turut menghalang usaha penerapan tanggungjawab sosial secara lebih efektif. Kebanyakan pelajar hanya cemerlang dalam bidang akademik berdasarkan pengetahuan teori semata-mata dan tidak menitikberatkan elemen-elemen afektif lain. Sedangkan amalan tanggungjawab sosial ini boleh dipraktikkan oleh pelajar semasa proses pengajaran dan pembelajaran dengan pelaksanaan tugasan (Mohd Hasril, 2016).

Politeknik Malaysia menawarkan Kursus Penghayatan Etika Dan Peradaban (MPU21032) kepada semua pelajar yang mana kandungan kursus ini telah memperincikan tentang amalan tanggungjawab sosial. Selain itu, kandungan Kelab Ko-kurikulum di politeknik juga turut mengetengahkan kerja berpasukan berdasarkan penguasaan kemahiran dan amalan positif. Dalam masa yang sama, pelajar politeknik terlibat dengan program sukarelawan YES!Politeknik Malaysia yang telah dirancang di peringkat pusat dan peringkat politeknik itu sendiri. Namun, persoalannya adakah pelajar politeknik dapat membudayakan amalan tangungjawab sosial ini?

Kemahiran-kemahiran yang diterapkan dalam amalan tanggungjawab sosial amat penting dalam dunia pekerjaan. Pelajar yang menguasai kemahiran kebolehkerjaan mampu melaksanakan tugas dalam pelbagai situasi di kehidupan sehari-hari, dalam pembelajaran dan di tempat kerja (Abd Rahim & Ivan, 2007). Menurut Kwok et al. (2014), kemahiran generik dan kemahiran bukan generik memainkan peranan penting dalam menentukan kebolehpasaran graduan. Elemen-elemen kebolehkerjaan biasanya dikaitkan dengan gambaran peribadi, sikap, tabiat, tingkah laku, gaya komunikasi, penyelesaian masalah, kemahiran membuat keputusan dan kebolehan mengorganisasi.

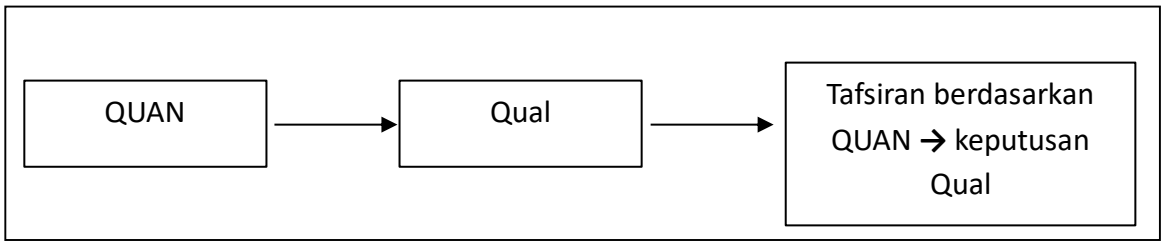
Justeru, kajian yang dijalankan ini adalah bertujuan untuk mengenal pasti sejauhmana amalan tanggungjawab sosial dipraktikkan dalam individu pelajar dan apakah faktor serta cabaran dalam mengorientasikan amalan tanggungjawab sosial tersebut.

Objektif Kajian

1. Mengenalpasti minat pelajar politeknik terhadap amalan tanggungjawab sosial.
2. Mengenalpasti faktor penglibatan pelajar politeknik terhadap amalan tanggungjawab sosial.
3. Mengenalpasti cabaran pelaksanaan tanggungjawab sosial dalam kalangan pelajar politeknik.

METODOLOGI

Kajian ini menggunakan kaedah campuran iaitu kuantitatif dan kualitatif.



Rajah 1: Kaedah Campuran (QUANqual)

Kajian ini memaparkan tinjauan kuantitatif yang menggunakan statistik untuk mengurus sampel soal selidik. Pengumpulan data yang dibuat menggunakan pendekatan kuantitatif adalah untuk mengumpul data primer melalui instrumen soal selidik. Berdasarkan kaedah ini, pengkaji menggunakan set ujian soal selidik menggunakan skala likert yang diedarkan kepada responden. Pengkaji mengumpulkan data kuantitatif melalui tinjauan untuk mengetahui profil responden, manakala bagi data kualitatif, pengkaji menggunakan kaedah temu bual semi struktur terhadap kumpulan fokus.

Sampel

Kajian ini tertumpu kepada pelajar Semester Tiga dan Semester 4, Sesi 2 2023/2024, Jabatan Teknologi Maklumat Dan Komunikasi (JTMK), Politeknik Balik Pulau iaitu seramai 144 orang pelajar.

DAPATAN KAJIAN

Maklumat demografi responden dianalisis berdasarkan data yang diperolehi dari Bahagian A borang soal selidik yang merangkumi jantina, umur, kelas, dan bangsa. Analisis demografi dilakukan dengan menggunakan statistik deskriptif untuk mengkaji kekerapan dan peratusan.

Demografi Responden Kajian Kuantitatif

Jadual 2: Maklumat Demografi Responden Kajian Kuantitatif

Pembolehubah	Kategori	Kekerapan (N=144)	Peratusan
Jantina	Lelaki	61	42.4
	Perempuan	83	57.6
Umur	18 - 20 tahun	128	88.9
	21 tahun ke atas	16	11.1
Kelas	DDT3A	10	6.9
	DDT3B	10	6.9

	DDT4A	16	11.1
	DDT4B	16	11.1
	DDT4C	15	10.4
	DDT4D	16	11.1
	DDT4E	15	10.4
	DDT4F	16	11.1
	DDT4G	15	10.4
	DDT4H	15	10.4
Bangsa	Melayu	93	64.6
	Cina	6	4.2
	India	45	31.3
	Lain-lain	0	.0

Manakala demografi responden kualitatif pula terdiri daripada tiga responden lelaki dan tiga responden perempuan masing-masing adalah 50 peratus. Maklumat demografi dipaparkan dalam Jadual 3.

Jadual 3: Maklumat Demografi Responden Kajian Kualitatif

Pembolehubah	Kategori	Kekerapan (N=6)	Peratusan
Jantina	Lelaki	3	50
	Perempuan	3	50

Dapatan Kajian Data Deskriptif

1. Minat Pelajar Terhadap Amalan Tanggungjawab Sosial

Berdasarkan analisis, nilai skor min bagi minat pelajar terhadap tanggungjawab sosial berada pada tahap yang tinggi iaitu (M=4.07, SD=.34) seperti yang dinyatakan dalam Jadual 4.

Jadual 4: Nilai Total Skor Min Bagi Minat Terhadap Penglibatan Pelajar dalam Amalan Tanggungjawab Sosial

N	Minimum	Maksimum	Min	Sisihan Piawai
144	3.05	5.00	4.07	.34

2. Penglibatan Pelajar Terhadap Amalan Tanggungjawab Sosial

Berdasarkan analisis, nilai skor min tertinggi bagi faktor penglibatan pelajar terhadap amalan tanggungjawab sosial adalah faktor dorongan pengajian dan institusi iaitu (M=4.21, SD=.55). Manakala faktor dorongan rakan merupakan skor min responden paling rendah iaitu (M=4.03, SD=.41) seperti yang dinyatakan dalam Jadual 5.

Jadual 5: Nilai Total Skor Min Bagi Penglibatan Pelajar Terhadap Amalan Tanggungjawab Sosial

Penglibatan	N	Minimum	Maksimum	Min	Sisihan Piawai	Tahap
Dorongan pengajian dan institusi	144	2.80	5.00	4.21	.55	Tinggi
Dorongan pensyarah	144	3.20	5.00	4.20	.40	Tinggi
Dorongan rakan	144	3.20	5.00	4.03	.41	Tinggi
Sumber maklumat program	144	3.00	11.60	4.13	.64	Tinggi

3. Cabaran Pelaksanaan Amalan Tanggungjawab Sosial

Bahagian ini menghuraikan cabaran pelaksanaan amalan tanggungjawab sosial. Selepas temubual dijalankan, penyelidik mendapati terdapat empat tema yang menjadi cabaran kepada responden kajian. Tema pertama ialah kekurangan sumber kewangan yang mana dua responden mengatakan kekurangan sumber kewangan merupakan cabaran utama pelaksanaan tanggungjawab sosial. Kekurangan sumber kewangan mungkin menghadkan keupayaan organisasi untuk melaksanakan program tanggungjawab sosial yang luas.

Tema kedua ialah kekangan masa. Kesemua responden menyatakan jadual yang padat menyebabkan mereka sukar untuk memberi komitmen sepenuhnya dalam kesemua aktiviti yang dianjurkan. Tema ketiga adalah kekurangan maklumat merupakan cabaran pelaksanaan aktiviti sosial. Publisiti berkaitan program yang bermotifkan kesukarelawanan perlu disebarluaskan melalui sumber yang pelbagai agar pelajar dapat menonjolkan diri dalam aktiviti kemahiran sosial secara terbuka dan konsisten.

Seterusnya tema terakhir yang menjadi cabaran pelaksanaan amalan tanggungjawab sosial ialah sokongan daripada pihak pengurusan. Tiga responden mengatakan sokongan daripada pihak pengurusan wajar diperkasa dalam melestarikan aktiviti tanggungjawab sosial. Dedikasi pihak pengurusan dalam menyokong penglibatan aktiviti sukarelawan pelajar amat diharapkan agar graduan politeknik kekal kompeten dan berdaya saing.

KESIMPULAN

Secara keseluruhan, minat pelajar politeknik terhadap amalan tanggungjawab sosial adalah berada pada tahap tinggi. Dapatan ini selari dengan dapatan kajian Wan Zuhari et al. (2018) yang memperlihatkan penglibatan pelajar secara langsung dalam kesukarelawanan dapat memberi berpeluang untuk mempraktikkan kemahiran kesukarelawanan dan dapat menghubungkan pelbagai pihak untuk sama-sama berkongsi idea dalam menjayakan kesedaran dalam kempen

kerja-kerja kemanusiaan dan kemasyarakatan. Jika pelajar diberi peluang untuk terlibat dalam projek sosial, kempen sukarelawan atau program tanggungjawab sosial, mereka boleh mengembangkan minat yang lebih besar dan melihat nilai dalam sumbangan mereka.

Semua pihak perlu menggalas tanggungjawab menyokong dasar kerajaan dalam melestarikan amalan tanggungjawab sosial. Langkah-langkah positif dalam mengatasi cabaran mempergiat tanggungjawab sosial juga perlu digalas oleh semua individu masyarakat. Semakin tinggi kesedaran dan pemahaman tentang kepentingan tanggungjawab sosial, semakin besar kemungkinan masyarakat terlibat dan mengambil bahagian dalam aktiviti seumpama ini.

Justeru itu, pengkaji telah menyedari keperluan untuk membangunkan langkah-langkah yang boleh membantu meningkatkan kesedaran dalam kalangan pelajar dan institusi pengajian. Usaha untuk menerapkan dan membina nilai-nilai murni dan sikap mengambil tahu ini perlu dipupuk dan dilatih agar budaya ini dapat diimplentasikan secara konsisten dalam setiap kelompok masyarakat sama ada di jabatan akademik mahupun bukan akademik. Semua pihak juga perlu membentuk strategi yang berkesan untuk mengekalkan dan meningkatkan amalan sukarelawan dalam jangka masa panjang.

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