

EMBRACE e-LEARNING DIVERSITY FOR FUTURE INNOVATION TRENDS

Volume 6, 2023

e-ISBN : 978-629-98755-0-5



**SIG CS@e-Learning
Unit Penerbitan**

**Jabatan Sains Komputer & Matematik
Kolej Pengajian Pengkomputeran, Informatik & Media
Universiti Teknologi MARA Cawangan Pulau Pinang**

EMBRACE e-LEARNING DIVERSITY FOR FUTURE INNOVATION TRENDS

EMBRACE e-LEARNING DIVERSITY FOR FUTURE INNOVATION TRENDS

Advisor

Ts. Dr. Rozita Kadar, Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

Chief Editor

Ts. Jamal Othman, Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

Editors

Ts. Dr. Rozita Kadar, Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

Wan Anisha Wan Mohammad, Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

Azlina Mohd Mydin, Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

Copyright@2023 by Unit Penerbitan JSKM

Universiti Teknologi MARA

Cawangan Pulau Pinang

13500 Permatang Pauh

Pulau Pinang

Malaysia

All rights reserved. No parts of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying or otherwise, without the prior written permission of the publishers.

e-ISBN: 978-629-98755-0-5

PREFACE

The SIG CS@e-Learning committee extends their heartfelt gratitude to the Divine for the valuable contribution of the educators from Kolej Pengajian Pengkomputeran, Informatik dan Media (KPPIM), UiTM Penang Branch, in creating the sixth issue. A total of 12 scholarly articles were received by the committee, all of which were accepted. The submitted articles demonstrate sufficient content and research frameworks. The authors are encouraged to enrich their papers by incorporating additional findings and discussions for potential publication in journals indexed by SCOPUS, WOS, or ERA.

The central theme of the sixth volume revolves around the Enhancement of Innovations in e-Learning for Future Readiness. Over the past decades, e-learning has emerged as a pivotal mode of learning and instruction, proven to be both efficient and effective. The exponential rise in global Internet users equipped with smartphones and tablets has greatly facilitated the dissemination of e-learning, spanning not only higher education and vocational training but also primary and secondary education. Emerging trends in e-learning encompass diverse areas such as artificial intelligence (AI), micro credentials, big data, virtual and augmented reality, blended learning, cloud-based e-learning, gamification, mobile learning, the Internet of Things(IoT), and online video.

The SIG CS@e-Learning is committed to a continuous and active engagement in publishing academic articles of significant impact. It is our aspiration that KPPIM attains remarkable levels of publication in high-impact journals, with the blessings of the Almighty.

Ts. Jamal Othman

Chief Editor

SIG CS@e-LEARNING

EMBRACE e-LEARNING DIVERSITY FOR FUTURE INNOVATION TRENDS

Vol. 6, 16 Oct 2023

TABLE OF CONTENTS

	Page
Preface	
Table of contents	
LOGIC PROGRAMMING WITH PROLOG	1-6
<i>*Jamal Othman , Mahfudzah Othman , Nora Yanti Che Jan, Syarifah Adilah Mohamed Yusoff</i>	
ANALYZING LECTURER'S PROFESSIONALISM BASED ON ENGINEERING STUDENTS' PERSPECTIVES THROUGH ONLINE FEEDBACK	7-12
<i>*Norshuhada Samsudin, Wan Nur Shaziayani Wan Mohd Rosly, Fuziatul Norsyiha Ahmad Shukri, Nur Azimah Idris, Sharifah Sarimah Syed Abdullah, Noor Azizah Mazeni</i>	
BOOST UP YOUR MATHEMATICAL SKILLS WORKSHOP: AN INTERVENTION PROGRAMME FOR ENGINEERING STUDENTS	13-18
<i>*Rafizah Kechil, Sharifah Sarimah Syed Abdullah, Nur Azimah Idris, Noor Azizah Mazeni, Mahanim Omar, Chew Yee Ming and Mohd Syafiq Abdul Rahman</i>	
UNDERSTANDING POPULATION AND SAMPLE IN RESEARCH: KEY CONCEPTS FOR VALID CONCLUSIONS	19-24
<i>*Nurhafizah Ahmad, Fadzilawani Astifar Alias, Noor 'Aina Abdul Razak</i>	
ANALISA KESILAPAN PELAJAR DALAM TOPIK SELANG KEYAKINAN DAN UJIAN HIPOTESIS	25-30
<i>*Siti Balqis Mahlan, Maisurah Shamsuddin dan Muniroh Hamat</i>	
STUDENTS' MOST COMMON MISTAKES WHEN TAKING NOTES	31-34
<i>*Muniroh Binti Hamat, Siti Balqis Mahlan, Maisurah Shamsuddin, Siti Asmah Mohamed</i>	
DEVELOPMENT OF MICRO CREDENTIAL VARIABLE IN C++ FOR NOVICE PROGRAMMERS	35-39
<i>*Azlina binti Mohd Mydin, Wan Anisha binti Wan Mohammad, Elly Johana binti Johan, Syarifah Adilah binti Mohamed Yusoff, Rafizah binti Kechil</i>	
A STUDY OF MENTAL HEALTH AMONG STUDENTS DURING MOVEMENT CONTROL ORDER (MCO)	40-47
<i>*Syarul Heiry Yahaya, Norazah Umar, Rozita Kadar and Nursakirah Ab Rahman Muton</i>	
SENTIMENT ANALYSIS USING MACHINE LEARNING ALGORITHM	48-56
<i>*Syarifah Adilah Mohamed Yusoff, Nurul Izzah Mohd Rahiman, Wan Anisha Wan Mohammad, Azlina Mydin and Rozita Kadar</i>	

KAJIAN FAKTOR-FAKTOR PERMASALAHAN PEMBELAJARAN MATEMATIK DI KALANGAN PELAJAR KEJURUTERAAN DI UiTM CAWANGAN PULAU PINANG	57-64
<i>*Rozita Kadar, Wan Nur Shaziayani Wan Mohd Rosly, Sharifah Sarimah Syed Abdullah, Syarifah Adilah Mohamed Yusoff and Mohd Saifulnizam Abu Bakar</i>	
ArabKafa3: PERSUASIVE ARABIC LANGUAGE E-LEARNING PORTAL	65-70
<i>Siti Saudah Binti Mohd Ghani, *Elly Johana Binti Johan, Wan Anisha Wan Mohammad, Azlina Mohd Mydin and Syarifah Adilah Mohamed Yusuf</i>	
KAJIAN KES : KESALAHAN PELAJAR DALAM TOPIK PERSAMAAN PEMBEZAAN	71-76
<i>*Maisurah Shamsuddin, Siti Balqis Mahlan, Muniroh Hamat Fadzilawani Astifar Alias</i>	

LOGIC PROGRAMMING WITH PROLOG

*Jamal Othman¹, Mahfudzah Othman², Nora Yanti Che Jan³, Syarifah Adilah Mohamed Yusoff⁴
*jamalothman@uitm.edu.my¹, fudzah@uitm.edu.my², noray084@uitm.edu.my³,
syarifah.adilah@uitm.edu.my⁴

^{1,4}Jabatan Sains Komputer & Matematik,
Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

^{2,3}Kolej Pengajian Pengkomputeran, Informatik & Media
Universiti Teknologi MARA Cawangan Perlis, Malaysia

*Corresponding author

ABSTRACT

Programming paradigms can be classified such as the imperative, object-oriented, functional, logic and scripting paradigms. The curriculum structures of computer programming subject at any higher level of education institutions focus on the imperative and object-oriented programming languages. The logic programming paradigms will be offered as elective subject if the students interested to learn on the Artificial Intelligence (AI) or Data Mining. Those students who are specialized in information system engineering, the logic programming becomes the core subject. Logic programming is based on the formal logic or called as declarative statements or predicate. This article will discuss and scrutinize the characteristics of logic programming by using the PROLOG programming language. The important concepts of constructing the knowledge based, facts, rules and resolution will be elaborated more by showing the example of real problem statements to solve the problem by using PROLOG. Samples of real application such the ChatGPT open AI, currently become popular apps which help users to find answers, generate details step of solution or recommend possible options for the resolution will be elucidated at the last part of this article.

Keywords: *logic programming, PROLOG, facts, rules, resolution*

Introduction

Logic Programming has been introduced for a very long time ago. Aristotle is the first important figure who placed the logic on sound systematic foundations (Kneale 1962). Frege published the first version of modern symbolic logic is known as predicate calculus (Heijenoort, 1967). The main principle of predicate calculus is to offer precise characterization for proofing methods. Basically, the logic programming is a method of programming which the program represents set of sentences in the language of symbolic logic. The program which is written in logic programming is often to be said as declarative or descriptive (Genesereth & Chaudry, 2020). Logic programming describes details application area and the goals that should be achieved. It focuses on what is true rather than how to achieve the desired goals. Conclusively the logic programming focus more on the specification rather than an implementation.

Logic programming is typically easier to understand, and the programmers are not requiring of having the extensive knowledge or skills. You don't have to choose a specific method of achieving the application goals. Logic programming is composable. The programmers don't have to make arbitrary choices and it can be combined with each other more easily. Furthermore, the logic programming is

Agile as compared to other programming paradigms such as functional and imperative. An application which developed with logic programming, can readily adapt to unexpected changes or modification to its assumptions and goals. Logic programming is also considered versatile because it can be used for multiple purposes or not specific for natural language processing only, but it also can be applied to process complicated calculation, to do the forecasting, Artificial Intelligence (AI), robotics, expert systems, software engineering and database systems.

The structure of this article will discuss example of cases solved with PROLOG in logic programming and example of application related to logic programming such ChatGPT.

Solution with Logic Programming

a) Proving of Statements

With logic programming we can proof the statements by using the PROLOG programming language. Given the following statements and we need to construct the facts and appropriate rules.

“All engineering students like to play game, eat burger and sleep in the class and that is why there are excellent in academic”

Based on the above statement we need to provide the appropriate facts and rules to support the statements. The facts and rules are as follows.

```
play(engineering, game).
eat(engineering, burger).
sleep(engineering, class).
excellent(X,A,B,C):-play(X,A),eat(X,B),sleep(X,C),
                    X=engineering, A=game, B=burger, C=class.
```

If we submit a query to determine either the engineering students are excellent if they are like to play game, eat burger and sleep in the class, the query will be as follows.

```
? - excellent (engineering, game, burger, class).
true
```

Similar query can be used if we try to ask whether the engineering students are excellent if they are like to play game, eat pizza and sleep in the class, the result of query will be false because the facts do not have any information about `eat (engineering, pizza)`.

```
? - excellent (engineering, game, pizza, class).
false
```

Through the same rule, you may proof the statement for arts students, are they excellent if they like to play game, eat burger and sleep in the class. The query resulted false as shown below.

```
? - excellent (arts, game, burger, class).
false
```


b) Proving through the Database

Given the following table shows the details result of students' assessments.

Table 1: List of students' results for three assessments

StudID	Program	Assessment1	Assessment 2	Assessment 3
2020123456	CS110	75	62	73
2020123457	CS110	81	62	94
2020123458	CS110	68	85	57
2020123459	CS110	49	43	40
2020123451	CS110	68	75	76
2020123452	CS110	66	64	68
2020123453	CS110	80	71	80
2020123454	CS110	72	64	74
2020123455	CS110	74	77	65
2020123460	CS110	59	62	51

Assume the above table consists of hundreds of students' assessments result and these records are stored in a database. In PROLOG we must represents these records as list of facts as shown below.

```
student(2020123456, 'CS110', 75, 62, 73).
student(2020123457, 'CS110', 81, 62, 94).
student(2020123458, 'CS110', 68, 85, 57).
student(2020123459, 'CS110', 49, 43, 40).
student(2020123451, 'CS110', 68, 75, 76).
student(2020123452, 'CS110', 66, 64, 68).
student(2020123453, 'CS110', 80, 71, 80).
student(2020123454, 'CS110', 72, 64, 74).
student(2020123455, 'CS110', 74, 77, 65).
student(2020123460, 'CS110', 59, 62, 51).
```

Based on the facts, we may create varieties of rules such to calculate the coursework marks and to determine the highest or lowest marks. The following is the rule to calculate the coursework mark if the weightage for assessment 1, 2 and 3 are 20%, 25, and 15% respectively.

```
coursework(StudentNumber, CW) :- student(StudentNumber, _, A, B, C),
    CW is A*0.2 + B*0.25 + C*0.15.
```

If you apply the query related to the above rule for a specific student for example the student ID '2020123456' the result will be as follows.

```
?- coursework(2020123456, Marks).
Mark = 41.45.
```

Through the same rule, you can expand to determine list of students who scored less than 30 marks. The rule is as follows.

```
cwless30(StudentNumber):-coursework(StudentNumber,CW),CW=< 30.
```

The result of the above rule is as follows. Only one student detected which the coursework mark is less than 30.

```
?- cwless30(StudentNumber).  
StudentNumber = 2020123459
```

Besides that, you may apply the existing rule to determine the highest or lowest mark of the coursework. The rules are as shown below.

```
highestMark(StudentNumber, CW):-  
coursework(StudentNumber,CW),\+ (coursework(_,CW1),CW1 > CW).  
  
lowestMark(StudentNumber, CW):-  
coursework(StudentNumber,CW),\+ (coursework(_,CW1),CW1 < CW).
```

The result of the query for the two rules as shown below.

```
?- highestMark(StudentNumber,CW).  
StudentNumber = 2020123457,  
CW = 45.8 ;  
  
?- lowestMark(StudentNumber,CW).  
StudentNumber = 2020123459,  
CW = 26.55 ;
```

Based on the facts, we may create several rules which related to the data as provided in the database. If the facts are not adequate, then the results of queries will be not very outstanding, or the result is not significant.

The facts as created from the database we can enhance it by providing the components of condition. For example, we want to know the grade obtained by the student based the calculation of the coursework marks. Through the specified range of marks and it's grade we need to create multiple selection in PROLOG programming language.

Given the following table shows the grade based on the range of coursework mark.

Table 2: Table of range of marks and grade

Range of Marks	Grade
0 – 15	D
16 – 30	C
31 – 45	B
46 – 60	A

The followings are the set of related rules to determine the grade.

```
gradeObtained(StudentNumber,Grade):-coursework(StudentNumber, CW),
    CW >= 0, CW =< 15, Grade = 'D'.
```

```
gradeObtained(StudentNumber,Grade):-coursework(StudentNumber, CW),
    CW >= 16, CW =< 30, Grade = 'C'.
```

```
gradeObtained(StudentNumber,Grade):-coursework(StudentNumber, CW),
    CW >= 31, CW =< 45, Grade = 'B'.
```

```
gradeObtained(StudentNumber,Grade):-coursework(StudentNumber, CW),
    CW >= 46, CW =< 60, Grade = 'A'.
```

The result of the queries are as follows.

```
?- coursework(2020123456,CW).
```

```
CW = 41.45.
```

```
?- gradeObtained(2020123456,Grade).
```

```
Grade = 'B'
```

Logic programming does not only concentrate on the calculation, but it helps human to make decision. Provided the rules as embedded in the application are comprehensive for any kinds of situation and condition to achieve the desired goals. This statement is aligned with Martin (1996) which logic programming is study of proof search.

ChatGPT – Open AI Application

ChatGPT is a complex Artificial Intelligence (AI) model developed by OpenAI. The GPT-3.5 architecture is used to develop this application. GPT stands for "Generative Pre-trained Transformer 3.5." The model has been tested and trained with massive amount of data through various sources from the internet. These allow the users to ask wide range of queries.

ChatGPT can respond the conversational interactions and simulate the conversation with a knowledgeable assistant. Generally, it can answer the questions, provides explanations, offering ideas, and suggest several options for a problem.

Nevertheless, the ChatGPT has some limitations. It may generate inaccurate or sensational answers. Since the ChatGPT struggles to give precise and up to date answers, as academicians are always needed to verify the information generated are based on the valid sources (ChatGPT, 2023).

Conclusion

Logic Programming is a powerful programming paradigm which provides a systematic and declarative approach to problem-solving. By representing the knowledge-based and mathematical computation in logical formulas, it enables the development of useful and flexible programs. Logic Programming languages, such as PROLOG, allow programmers to specify the relationships and constraints within a problem domain and let the system handle the search for best solutions. Overall, Logic Programming offers a unique and valuable approach to programming, particularly in domains that involve complex reasoning and knowledge representation. By leveraging the power of logical inference and constraint solving, logic programming provides a versatile tool for solving a wide range of problems.

References:

- ChatGPT, *Introduction of ChatGPT*, Chat conversation, Open AI, 19 May 2023, <https://openai.com>, accessed on 19 May 2023.
- Genesereth, M., & Chaudhri, V. K. *Introduction to Logic Programming*. Morgan & Claypool, 2020.
- Heijenoort, V., J. Ed. From Frege to Godel; *A Source Book in Mathematical Logic*, 1879-1931. Harvard University Press, 1967.
- Kneale, W.C. and Kneale, M. *The Development of Logic*. Oxford, 1962.
- Martin, P.L., *On the meanings of the logical constants and the justifications of the logical laws*. Nordic Journal of Philosophical Logic, 1(1):11–60, 1996.

ANALYZING LECTURER'S PROFESSIONALISM BASED ON ENGINEERING STUDENTS' PERSPECTIVES THROUGH ONLINE FEEDBACK

*Norshuhada Samsudin¹, Wan Nur Shaziayani Wan Mohd Rosly², Fuziatul Norsyiha Ahmad Shukri³,
Nur Azimah Idris⁴, Sharifah Sarimah Syed Abdullah⁵ and Noor Azizah Mazeni⁶
*norsh111@uitm.edu.my¹, shaziayani@uitm.edu.my², fuziatul@uitm.edu.my³,
nurazimah7083@uitm.edu.my⁴, sh.sarimah@uitm.edu.my⁵, noorazidah1103@uitm.edu.my⁶

^{1,2,3,4,5,6}Jabatan Sains Komputer dan Matematik (JSKM),
Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

**Corresponding Author*

ABSTRACT

In the field of academia, the role of a lecturer is crucial in guiding students' educational experience and preparing them for future careers. The professionalism and teaching effectiveness of the lecturers play a vital role in engineering courses where technical expertise and practical skills are important. To assess and improve the quality of education, educational institutions continuously use online feedback system to gather students' perspectives on their lecturers' professionalism. In Universiti Teknologi Mara (UiTM), students' responses to instruction and learning are tracked using a standardised instrument. The online feedback serves as a significant tool in evaluating a lecturer's effectiveness and identifying areas of improvement which ultimately contribute to the enhancement of the students' learning experience. By considering the viewpoints and experiences of the students, this article aims to explore the significance of engineering students' online feedback in evaluating lecturers' professionalism and the impact on their overall learning experience.

Keywords: *Lecturer's professionalism, feedback, online*

Introduction

Student academic excellence is the main priority for any educational institutions or colleges. To ensure that academic excellence can be achieved, it requires action and cooperation from everyone in the institution. Despite concerns about the validity, student evaluations on lecturers' teaching abilities remained the most common assessment employed in higher education for evaluating the way courses are delivered. At Universiti Teknologi Mara (UiTM), the teaching evaluation process is known as Students' Feedback Online (SuFO) which is carried out every semester for all courses.

SuFO is available online via <https://ufuture.uitm.edu.my/>. It was divided into four main sections which are Overall impression about the course (Section A), Lecturer Professionalism (Section B), Teaching and Learning activities (Section C) and Infrastructure (Section D). The primary objective of the evaluation is to provide academic staffs with information and feedback related to their teaching abilities. This will allow them to engage in self-reflection and ultimately undertake the required measures to improve their teaching performance in the future. In order to be an excellent lecturer, one

should master the delivery techniques and establish good relations with the students (Samian & Noor, 2012).

Professionalism encompasses various aspects including subject knowledge, teaching skills, communication abilities, responsiveness, and overall demeanor. In the context of engineering education, lecturers must possess a strong foundation in their respective fields and stay updated with emerging trends and advancements. Additionally, they need to effectively communicate complex concepts, provide real-world examples, and foster an engaging learning environment. High performance from lecturers is anticipated in order to satisfy all stakeholders, particularly students, parents, and the larger society (Hidayati and Siswati, 2018). Students' feedbacks provide valuable insights into whether the lecturers fulfill their expectations and contribute positively to their academic journey.

Educational institutions have embraced online feedback system as an efficient instrument to collect students' opinions on various aspects of their educational experience. This system allows students to provide anonymous and honest feedback while also ensuring that their opinions are unbiased. By utilizing such system, institutions can identify areas where the lecturers excel, need improvement, and subsequently take necessary measures to enhance the quality of teaching. Besides that, the students' feedbacks will help to improve on the lecture formats and materials, course requirements, assessment methods, classroom management and interactions (Eng et al., 2015)

Regularly assessing lecturers' professionalism based on students' feedback allows for continuous improvement in teaching practices. Constructive criticism and positive feedback help lecturers to identify their strengths, weaknesses, and enable them to adjust their teaching methodologies accordingly. Furthermore, feedback collected can aid faculty's programme development and organize targeted training workshops to enhance lecturers' skills and expertise.

The main objective of this article is to explore the significance of mechanical engineering, civil engineering and electrical engineering students' online feedback in evaluating lecturers' professionalism on Section B of SuFO for Semester Oct 2022 - Feb 2023 and its impact on their overall learning experience.

Methodology

Samples were taken from the mathematics course MAT 183 (Calculus 1) by 98 undergraduate engineering majors at the UiTM campus in Permatang Pauh, Pulau Pinang. This study used descriptive statistics (mean, standard deviation, and confidence intervals) in the analysis. Descriptive methodology refers to the process of describing and summarising the data collected in a study. It focuses on presenting the main features, patterns, and characteristics of the data without making inferences or generalisations beyond the sample being studied.

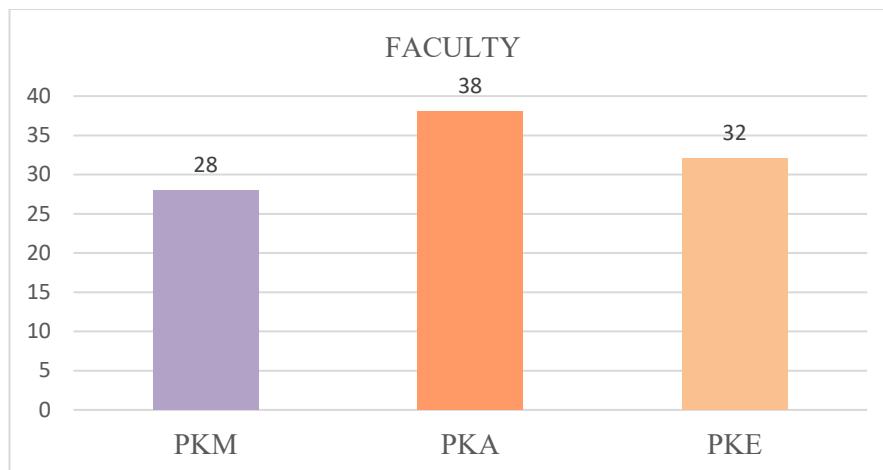


Figure 1: Student Enrollment by Faculty

The number of students enrolled in MAT183 (Calculus 1) in the College of Engineering specifically School of Mechanical Engineering (PKM), School of Civil Engineering (PKA), and School of Electrical Engineering (PKE) is depicted in Figure 1. Particularly, there are 32 students registered in MAT183 at PKM, 38 at PKA, and 28 at PKE.

Data Analysis

The survey in this study consists of 7 questions which focusses on lecturers professionalism (Section A). It consists of several statements or criteria that assess different aspects of the lecturer's performance, including planning and preparation by the lecturer, delivery techniques and lecturer-student relationship. A 4-point Likert scale (1 = strongly disagree, 4 = strongly agree) was used to record item responses. This study uses descriptive research to determine students' perspectives toward lecturer professionalism.

Result and Discussion

Table 1: Analysis of lecturer professionalism in planning and preparation

Category A								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
PKM	28	3.71	.535	.101	3.51	3.92	2	4
PKA	38	3.74	.446	.072	3.59	3.88	3	4
PKE	32	3.78	.420	.074	3.63	3.93	3	4
Total	98	3.74	.461	.047	3.65	3.84	2	4

Category A which focuses on planning and preparation by the lecturer assesses various aspects of the lecturer's performance in terms of their planning and preparation for instructional activities. Table 1 shows that the average score given by PKM students was 3.71; for PKA, it was 3.74; and for PKE, it was 3.78. The mean score provides an indication on the students' perception of the lecturer's effectiveness in planning and preparing for instructional activities. Higher mean scores suggest a higher level of perceived professionalism in this category. The standard deviation were 0.535 (PKM), 0.446 (PKA), and 0.420 (PKE). A lower standard deviation suggests that the scores are relatively close to the mean, indicating a higher level of agreement among students regarding the lecturer's planning and preparation. The minimum score was 2 for all three faculties, and the maximum score was 4. Overall, the findings suggest that students from PKM, PKA, and PKE perceive that the lecturers who were teaching MAT183, demonstrated a good level of professionalism in terms of planning and preparation. The relatively high mean scores and low variability indicate a general agreement among students within each schools regarding this aspect of the lecturers' performance.

Table 2: Analysis of lecturer professionalism in delivery techniques

Category B								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
PKM	28	3.75	.518	.098	3.55	3.95	2	4
PKA	38	3.71	.460	.075	3.56	3.86	3	4
PKE	32	3.69	.535	.095	3.49	3.88	2	4
Total	98	3.71	.497	.050	3.61	3.81	2	4

The results for Category B which focuses on delivery techniques by the lecturer is summarized in Table 2. The average scores for delivery techniques were 3.75 for PKM, 3.71 for PKA, and 3.69 for PKE, indicating a relatively positive perception of the lecturer's effectiveness in delivering instructional content across all three schools. The standard deviations were 0.518 for PKM, 0.460 for PKA, and 0.535 for PKE. These relatively low standard deviation values suggest that there was a consensus among students in each schools regarding the lecturer's delivery techniques. The minimum score of 2 and maximum score of 4 were observed across all three schools, representing the lowest and highest ratings given by students for Delivery Techniques. Overall, the results indicate that PKM, PKA, and PKE students think their lecturers provide instructional content with a high level of efficiency. The low variability and relatively high mean ratings show that students in each schools generally agree on this aspect of the lecturers' performance.

Table 3: Analysis of lecturer-student relation

Category C								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
PKM	28	3.75	.518	.098	3.55	3.95	2	4
PKA	38	3.68	.471	.076	3.53	3.84	3	4
PKE	32	3.72	.457	.081	3.55	3.88	3	4
Total	98	3.71	.476	.048	3.62	3.81	2	4

Table 3 shows a summary of the results for Category C. It evaluates various aspects of the lecturer-student relationship such as communication, approachability, availability for discussions, and overall satisfaction with the lecturer-student interaction. The average scores for the Lecturer-student relationship were 3.75 for PKM, 3.68 for PKA, and 3.72 for PKE, indicating a positive perception of the lecturer-student relationship across all three schools. The standard deviations were 0.518 for PKM, 0.471 for PKA, and 0.457 for PKE. These relatively low standard deviation values suggest that there was a general consensus among students within each school regarding the lecturer-student relationship. The 95% confidence intervals for the mean scores in the Lecturer-student relationship ranged from 3.55 to 3.95 for PKM, indicating a high level of confidence in the estimated mean score within this range. The minimum score of 3 and maximum score of 4 were observed across all three schools, representing the lowest and highest ratings given by students for the Lecturer-student relationship. In summary, the results suggest that students from PKM, PKA, and PKE schools generally had positive perceptions on the lecturer-student relationship, with a relatively high level of consensus among the schools. These findings indicate that the lecturers were viewed favourably in terms of their communication, approachability, availability for discussions, and overall satisfaction with the lecturer-student interaction.

Conclusion

The evaluation of the information collected shows that the lecturer's have exceptionally high level of professionalism. With consistently excellent evaluations in all areas, it is clear that the lecturers are deeply committed to their duties. Their ability to finish lessons during the allotted time, readiness to offer academic advice, and friendliness demonstrate their commitment to foster students' academic development.

The study on MAT183 lecturers shows that students have a highly favorable view of the lecturers in terms of professionalism, instructional delivery, and the lecturer-student relationship.

Students across all faculties generally perceive the lecturers positively, indicating that the efforts put into planning, preparation, communication, and approachability have been well-received.

In conclusion, the result demonstrates the lecturer's exceptional professionalism that underlines their commitment to deliver high-quality instruction and maintaining a supportive learning environment. They are a priceless resource for the educational institution because of their great qualities and behaviours, which help students succeed and have a sense of fulfillment in their studies generally.

References:

- Eng, T. H., Ibrahim, A. F., & Shamsuddin, N. E. (2015). Students' Perception: Student Feedback Online (SuFO) in Higher Education. *Procedia - Social and Behavioral Sciences*, 167, 109–116. <https://doi.org/10.1016/j.sbspro.2014.12.651>
- Hal Ehwal Akademik (HEA) Universiti Teknologi MARA (UiTM) (2010). Student feedback online. UiTM: Shah Alam.
- Hidayati, F.N., Siswati, S., 2018. Correlation between lecturer professionalism and self-efficacy in college students. *Int. Res. Based Educ. J.* 1 (2).
- Samian, Y., & Noor, N. M. (2012). Student's Perception on Good Lecturer based on Lecturer Performance Assessment. *Procedia - Social and Behavioral Sciences*, 56, 783–790. <https://doi.org/10.1016/j.sbspro.2012.09.716>

BOOST UP YOUR MATHEMATICAL SKILLS WORKSHOP: AN INTERVENTION PROGRAMME FOR ENGINEERING STUDENTS

*Rafizah Kechil¹, Sharifah Sarimah Syed Abdullah², Nur Azimah Idris³, Noor Azizah Mazeni⁴, Mahanim Omar⁵, Chew Yee Ming⁶ and Mohd Syafiq Abdul Rahman⁷

*rafizah025@uitm.edu.my¹, sh.sarimah@uitm.edu.my², nurazimah7083@uitm.edu.my³, noorazizahl103@uitm.edu.my⁴, mahanim@uitm.edu.my⁵, chewyeeming@uitm.edu.my⁶, mohdsyafiq5400@uitm.edu.my⁷

^{1,2,3,4,5,6,7}Jabatan Sains Komputer dan Matematik (JSKM),
Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

**Corresponding author*

ABSTRACT

Further Differential Equations (MAT480) is one of the mathematics courses that needs to be taken by undergraduate students of the College of Civil Engineering, UiTM Cawangan Pulau Pinang. In the October 2022 - February 2023 semester, 30% of students failed this course. To ensure that students in the March 2023 - August 2023 semester achieve good results, an intervention programme called Boost Up Your Mathematical Skills Workshop was conducted for the first three weeks of the semester. The programme involved seven lecturers from the Department of Computer Science and Mathematics and 132 students. In the first week, students were given a pre-test to assess their skills on topics they had previously learned. The selection of topics took into account their relevance to the subject. In the second week, students were asked to watch videos related to the subject as part of the intervention programme to improve their skills. They were also given questions to discuss in small groups. At the end of the second week, students presented their solutions to the problems to their peers and the facilitators, consisting of mathematics lecturers. In the third week, students took a post-test to measure their progress throughout the intervention programme. The Boost Up Your Mathematical Skills Workshop is expected to strengthen the mathematical foundation of students and increase their confidence while studying MAT480.

Keywords: *intervention; further calculus; peer; self-monitoring studies; facilitator.*

Introduction

Further Differential Equations (MAT480) is a critical mathematics course that needs to be taken by undergraduate students of the College of Civil Engineering, UiTM Cawangan Pulau Pinang. The course is a prerequisite for graduation, and it is essential that students perform well in it. However, in the October 2022 - February 2023 semester, 30% of students failed this course. In response to this, an intervention programme called Boost Up Your Mathematical Skills Workshop was developed to improve student outcomes. This workshop used a combination of open and distance learning (ODL) and traditional or face-to-face teaching and learning. The workshop involved seven lecturers from the Department of Computer Science and Mathematics, UiTM Cawangan Pulau Pinang and 132 undergraduate students of the College of Civil Engineering, UiTM Cawangan Pulau Pinang of semester six, seven and eight.

Literature Review

In their study, Arif and Mirza (2017) examined the effectiveness of an intervention programme in fostering the academic resilience of non-resilient at-risk students at the secondary school level. The intervention program had a positive impact on students' academic achievement, including their grades, and significantly improved their motivation (Jie et al., 2022). The most effective interventions involved one-on-one or small-group instruction (Ross & Begeny, 2011). Furthermore, intervention programme has been found to significantly improve students' confidence in learning mathematics (Dennis, 2016). Research has shown that students who work who in cooperative groups have higher academic achievement and better peer relationships than those work in competitive or individualistic structures (Qureshi et al., 2021). In addition, the report by Magruder and Kumar (2018) emphasized the critical role of facilitators in e-learning environments by providing support, guidance, and feedback to learners, ultimately leading to better learning outcomes.

According to a recent study published in the Journal of Educational Psychology, self-monitoring studies are an important factor for academic success in college students (Ghanizadeh, 2017). The study found that self-monitoring study, along with reflective thinking and critical thinking, significantly predicted academic achievement in college students.

Meanwhile, Nadeak and Naibaho (2020), found that video-based learning had a positive impact on students' learning outcomes. Specifically, students who used video-based learning had higher academic achievement and better learning performance than those who did not use this method. The authors concluded that video-based instruction can be an effective instructional method for promoting student learning in higher education settings. This study can be useful for educators and instructional designers who are interested in incorporating video-based instruction into their teaching practises.

Methodology

The programme was designed to help engineering students improve their mathematical skills and excel in MAT480. The workshop was held during the first three weeks of the March-August 2023 semester. The programme was divided into three parts.

During the first week, the students were given an online pre-test via uFuture. uFuture is the portal used by Universiti Teknologi MARA (UiTM) students, faculty and staff to access various services and resources related to their academic and administrative needs. This pre-test was given to evaluate students' understanding of the topics they had learned in previous semesters. The topics were carefully selected based on their relevance to MAT480. The pre-test results served as a baseline measurement for the students' mathematical proficiency. The topics that are covered in this program include differentiation using product rule and quotient rule, techniques of integration using by parts and

algebraic integration, nonpolynomial versus polynomial, Taylor and Maclaurin series and sketching a basic graph.

During the second week, the students were asked to watch videos related to differentiation using product rule and quotient rule, techniques of integration using by parts and algebraic integration, nonpolynomial versus polynomial, Taylor and Maclaurin series and sketching a basic graph to enhance their skills. These videos were given to assist students doing self-monitoring studies and to support e-learning. They were also given questions to discuss in small groups, which helped facilitate self-monitoring studies. The lecturers encouraged active participation by monitoring students' participation and providing guidance to help the students improve their mathematical abilities.

At the end of the second week, students were asked to present their solutions to problems to their peers and the facilitators, who were mathematics lecturers. This interactive session provided an opportunity for the students to learn from each other's mistakes and clarify any doubts they had with the facilitators. This two-way learning approach allowed for the correction of errors and misunderstandings in real-time.

Finally, in the third week, students were asked to answer an online post-test via the uFuture portal to measure their progress throughout the programme. This post-test provided an opportunity for the facilitators to gauge the success of the intervention programme and identify areas that need improvement.

Discussion

The development of the intervention programme shown in Figure 1 incorporates three main elements: self-monitoring studies, peers and facilitators. The integration of these elements is crucial for success in any field and is particularly important in mathematics education.

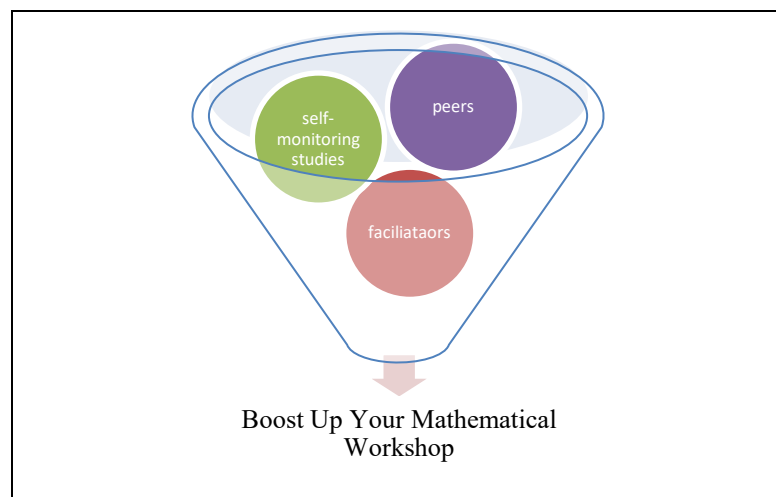


Figure 1: Three main elements in development of intervention program
“Boost Up Your Mathematical Workshop”

Self-monitoring studies allow students to take ownership of their learning and develop self-directed learning skills. Self-monitoring studies can help students develop self-directed learning skills, such as setting their own goals, planning and monitoring their own learning, and taking responsibility for their learning outcomes (Zhu, Bonk & Doo, 2020). Through self-monitoring studies, students can deepen their understanding of course material and explore topics of personal interest. Peers also play a vital role in the learning process, as they can provide support, encouragement, and feedback to one another. Peer learning has been shown to improve student engagement and academic performance in a variety of settings. Peer-assisted learning can be an effective approach to promote active learning and enhance students' learning experiences (Makala, 2017). Facilitators, such as instructors and tutors, serve as guides and mentors for students. They provide expertise, guidance, and feedback on student progress, as well as creating a supportive and inclusive learning environment. By integrating these three elements into the intervention programme, students can develop a strong foundation in calculus and gain the confidence and skills needed to succeed in their academic and professional pursuits.

Result

From Figure 2, we can see that the scores for all the participants have increased from the pre-test to the post-test. The average score for the pre-test is 5.13, while the average score for the post-test is 7.16. The difference between the two scores shows an improvement in the students' performance. The post-test scores are higher than the pre-test scores, indicating that the students have gained knowledge and skills during the period between the pre-test and post-test. The average difference between the pre-test and post-test scores is 2.03, which suggests that the students have made significant progress. This improvement could be due to the students' learning from the intervention programme that was implemented during the period between the two tests. It is also possible that the students were more familiar with the testing process during the post-test, which could have contributed to the increase in their scores.

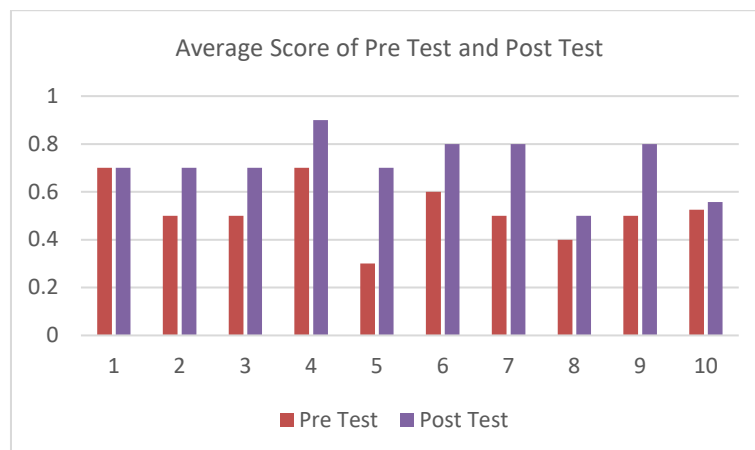


Figure 2: Average score of pre-test and post-test

Conclusion

In conclusion, the Boost Up Your Mathematical Skills Workshop provided a unique and interactive approach to learning. The programme use of peer learning and small-group instruction allowed students to learn from their peers and facilitators, providing them with a more personalized learning experience. Through this approach, the programme has successfully helped students overcome their fear of mathematics and instilled confidence in them. The Boost Up Your Mathematical Skills Workshop can be a model for other programme aimed at helping students overcome their difficulties in mathematics. The programme effectiveness in improving students' mathematics skills and confidence in learning can serve as a model for other similar programmes aimed at helping students overcome their difficulties in mathematics. Overall, the Boost Up Your Mathematical Skills Workshop has demonstrated that a supportive and personalized learning environment can have a positive impact on students' confidence in learning. As such, it is essential for educational institutions to prioritize the development of such programme that provide students with the necessary support to succeed academically and beyond.

References:

- Arif, M. I, & Mirza, M. S. (2017). Effectiveness of an intervention program in fostering academic resilience of students at risk of failure at secondary school level. *Educational Bulletin of Education and Research*, 39(1), 251-264. <https://files.eric.ed.gov/fulltext/EJ1210192.pdf>
- Dennis, M. S., Sharp, E., Chovanes, J., Thomas, A., Burns, R. M., Custer, B., & Park, J. (2016). A meta-analysis of empirical research on teaching students with mathematics learning difficulties. *Learning Disabilities Research & Practice*, 31(3), 156-168.
- Ghanizadeh, A. (2017). The interplay between reflective thinking, critical thinking, self-monitoring, and academic achievement in higher education. *Higher Education*, 74, 101-114.
- Jie, Z., Roslan, S., Muhamad, M.M.,Md Khambari, M.N., & Zaremohzzabieh, Z. (2022). The Efficacy of Positive Education Intervention for Academic Boredom and Intrinsic Motivation among College Students: A Quasi-Experimental Study. *Int. J. Environ. Res. Public Health* 2, 19, 13323. <https://doi.org/10.3390/ijerph192013323>
- Magruder, O., & Kumar, S. (2018). E-learning instruction: Identifying and developing the competencies of online instructors. *Leading and Managing e-Learning: What the e-Learning Leader Needs to Know*, 221-233.
- Makala, Q. (2017). Peer-assisted learning programme: Supporting students in high-risk subjects at the Mechanical Engineering Department at Walter Sisulu University. *Journal of Student Affairs in Africa*, 5(2), 17-31.
- Nadeak, B., & Naibaho, L. (2020). Video-based learning on improving students' learning output. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 17(2), 44-54.

- Qureshi, M. A., Khaskheli, A., Qureshi, J. A., Raza, S. A., & Yousufi, S. Q. (2021). Factors affecting students' learning performance through collaborative learning and engagement. *Interactive Learning Environments*, 1-21.
- Ross, S. G., & Begeny, J. C. (2011). Improving Latino, English language learners' reading fluency: The effects of small-group and one-on-one intervention. *Psychology in the Schools*, 48(6), 604-618.
- Zhu, M., Bonk, C. J., & Doo, M. Y. (2020). Self-directed learning in MOOCs: Exploring the relationships among motivation, self-monitoring, and self-management. *Educational Technology Research and Development*, 68, 2073-2093.

UNDERSTANDING POPULATION AND SAMPLE IN RESEARCH: KEY CONCEPTS FOR VALID CONCLUSIONS

* Nurhafizah Ahmad¹, Fadzilawani Astifar Alias², Noor Aina Abdul Razak³
*nurha9129@uitm.edu.my¹, fadzilawani.astifar@uitm.edu.my², nooraina@uitm.edu.my³

^{1,2,3}Jabatan Sains Komputer & Matematik (JSKM),
Kolej Pengajian Pengkomputeran, Informatik dan Media,
Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

**Corresponding author*

ABSTRACT

This study highlights the fundamental concepts of population and sample in research and their crucial role in drawing valid conclusions. The population refers to the entire group or phenomenon being studied, while the sample is a subset used to represent it practically. The article stresses the importance of representativeness in sampling, where a well-chosen sample accurately reflects the characteristics of the entire population, enhancing the reliability and generalizability of research findings. By using representative samples, researchers can efficiently gather data and make evidence-based decisions applicable to a broader context. It also helps mitigate biases and ensures the study's external validity. Understanding population and sample enables researchers to contribute valuable insights and make informed decisions that enrich human understanding across various fields. Overall, embracing these core concepts in research leads to meaningful and impactful discoveries.

Keywords: *Population, Sample, Representativeness, Research, Validity*

Introduction

In the world of research, population and sample are fundamental concepts that lay the groundwork for drawing valid and meaningful conclusions. Every researcher aims to investigate a specific group or phenomenon, and understanding these concepts is crucial for designing studies that can produce reliable results. Researchers must understand the population and sample to ensure their findings' validity, reliability, and applicability (Garg, 2016). Understanding the population enables researchers to precisely define the interest group and establish the relevance range for their conclusions. The significance of population and sample in research lies in their role in making valid and reliable inferences about a larger group of interest.

By studying the sample, researchers can draw meaningful conclusions that can be generalized to the larger population, making research more feasible, cost-effective, and time-efficient. The accuracy and reliability of the findings depend on the quality of the sample and its ability to mirror the population's characteristics (Shringarpure and Xing, 2014). Statistical methods are then applied to infer results from the sample data, quantifying uncertainty and mitigating risks associated with studying the entire population. By selecting a representative sample, researchers can draw meaningful conclusions about the general population and generalise their findings to a broader context (Meredith, 1998). Knowledge of the sample size is essential for determining the appropriate sample size and ensuring that

the study has adequate statistical power to detect meaningful effects. In addition, understanding the population and sample helps researchers identify and resolve potential biases that may influence research outcomes.

This knowledge enables researchers to make evidence-based decisions, formulate applicable recommendations, and contribute valuable insights to their respective fields (Rashid et al., 2019). This study explores the significance of population and sample, examining the definitions and underscoring the importance of representativeness in sampling. By embracing the essence of population and sample, researchers unlock the doors to evidence-based decision-making, understanding, and progress. Armed with these core concepts, researchers gain the ability to traverse the terrain of knowledge with purpose and precision, offering insights that enrich the fabric of human understanding.

Population in Research

In research, the population refers to the entire group of individuals, objects, or events that share a common characteristic and are the focus of the study. It represents the complete set of elements that the researcher aims to study and draw conclusions about (Jilcha Sileyew, 2020; Garg, 2016). Defining the population is a critical step in research design as it sets the boundaries and scope of the study's findings. In teaching and learning research, the population could be any specific group of interest, such as students, teachers, schools, or educational programmes.

Consider a research study focused on investigating the effectiveness of a new teaching method for improving reading comprehension among elementary school students. In this example, the population would be all elementary school students who are currently enrolled in the school district or educational system targeted by the study. The researcher's goal is to draw conclusions about how the new teaching method impacts the reading comprehension skills of elementary school students. Therefore, the researcher is interested in gathering data from all eligible students in the specified grade levels within the school district.

Suppose the school district has five elementary schools, and each school has three grade levels: 1st grade, 2nd grade, and 3rd grade. The total number of students in each grade level is as follows: 1st grade: 150 students; 2nd grade: 140 students; 3rd grade: 160 students. To determine the population for this research, the researcher would calculate the total number of elementary school students across all three grade levels: Total elementary school students in the population = 150 (1st grade) + 140 (2nd grade) + 160 (3rd grade) = 450 students

Therefore, the population in this teaching and learning research study consists of 450 elementary school students from the specific school district targeted for investigation. The researcher's goal is to evaluate the reading comprehension skills of all elementary school students in the district who are using the new teaching method. However, it might be impractical to assess the entire population due

to resource constraints, time limitations, or other logistical reasons. As a result, the researcher will select a subset of the population, known as the sample, to represent the entire population and draw conclusions from their findings.

Sample in Research

In research, a sample refers to a subset of the population that is selected for study purposes. The sample represents a smaller, manageable group that researchers use to make inferences and draw conclusions about the entire population (Taherdoost, 2018, Bhardwaj, 2019). Since studying the entire population can be impractical, time-consuming, and costly, researchers use samples to gather data and conduct analyses that provide insights into the characteristics and behaviours of the larger group (Ponto, 2015).

Consider the same research study on the effectiveness of a new teaching method for improving reading comprehension among elementary school students. The researcher's population is all elementary school students in a specific school district, which amounts to 450 students across three grade levels. Now, instead of assessing all 450 elementary school students, the researcher selects a smaller representative group as the sample. For instance, the researcher could randomly select 100 students from each grade level (300 students in total) to be part of the sample.

To ensure representativeness, the researcher may use a random sampling method. In this case, the researcher assigns each elementary school student a number and then uses a random number generator or draws names from a hat to select the 100 students from each grade level. This random selection process helps to reduce bias and ensure that every student has an equal chance of being included in the sample. The selected sample of 300 students will then participate in the research study, where their reading comprehension skills will be evaluated using the new teaching method. The researcher will gather data on their reading performance, analyse the results, and draw conclusions about the effectiveness of the teaching method for this specific group of students (Ponto, 2015).

The advantage of using a sample is that it allows researchers to study a smaller group while still making reasonable assumptions about the larger population (Andrade, 2020). If the sample is representative and accurately reflects the diversity and characteristics of the population, the research findings can be applied with a certain level of confidence to all 450 elementary school students within the district. It is important to note that the size of the sample, its representativeness, and the sampling method used all impact the validity and generalizability of the research findings. A larger and more representative sample tends to provide more reliable and applicable results (Andrade, 2020). Additionally, careful consideration must be given to potential sampling bias, which could occur if certain groups of students are overrepresented or underrepresented in the sample, leading to skewed results.

In teaching and learning research, selecting an appropriate sample is crucial for obtaining meaningful insights into educational practises and interventions. By using samples, researchers can efficiently gather data, analyse trends, and draw conclusions that inform decision-making in educational settings (Loeb et al., 2017; Ponto, 2015). However, researchers must be diligent in their sampling methods and interpretations to ensure that the findings accurately represent the broader population of interest and contribute to evidence-based educational practises.

Importance of Representativeness

The importance of representativeness in research lies in its ability to ensure the validity and generalizability of findings. A representative sample accurately mirrors the characteristics and diversity of the entire population being studied, enabling researchers to draw meaningful conclusions that can be applied to a broader context (Andrade, 2020). This enhances the reliability of research outcomes, enables evidence-based decision-making, and allows for the formulation of policies and practises that cater to a diverse range of individuals or groups. Additionally, representativeness minimises sampling bias, optimises resource efficiency, and enhances the external validity of research, making it a fundamental aspect in generating valuable and applicable insights across various fields, including education, social sciences, and public health (Lee & Landers, 2022).

Consider the same research study, the population consisted of all elementary school students in the targeted school district, amounting to 450 students across three grade levels (1st grade, 2nd grade, and 3rd grade). To ensure representativeness, the researchers carefully designed a random sample that included students from different schools, grade levels, and academic backgrounds. They use a stratified random sampling approach, dividing the population into subgroups based on grade levels and schools. From each subgroup, they randomly select a proportionate number of students to be part of the sample. Suppose the researchers select 100 students from each grade level, resulting in a total sample size of 300 students. The selected sample includes students from diverse backgrounds, representing the entire population of elementary school students in the district. The researchers then implement the new teaching method with the selected sample of students and collect data on their reading comprehension outcomes. After analysing the results, they found that the new teaching method significantly improved reading comprehension for the participating students.

Since the researchers used a representative sample, they can confidently generalise their findings to all elementary school students in the district. Policymakers, educators, and school administrators can use this evidence to implement the new teaching method across all grade levels in the district, knowing that it is likely to benefit a diverse group of students. In contrast, if the sample had not been representative and had, for instance, overrepresented students from only one or two schools, the researchers would have limited confidence in applying their findings to the entire population of

elementary school students. The potential lack of representativeness could lead to ineffective or misinformed decisions when implementing the new teaching method district-wide.

Conclusion

Population and sample are fundamental concepts in research that shape the validity and generalizability of study findings. In the realm of research, understanding the concepts of population and sample is paramount to unlocking a treasure trove of knowledge. The population represents the entire group of interest, while the sample, a smaller subset, serves as a representative window into that larger world. The importance of representativeness cannot be understated, as it allows researchers to draw meaningful conclusions that apply beyond the confines of the study.

In summary, representativeness is crucial in the research study on the effectiveness of a new teaching method for improving reading comprehension among elementary school students. By using a representative sample, researchers can produce evidence that is more reliable, applicable, and valuable for informing educational practises and decision-making at the district level. It ensures that the research findings accurately reflect the characteristics and experiences of all elementary school students, making the study's outcomes meaningful and impactful for improving reading outcomes for a broader population of students. By embracing the essence of population and sample, the doors to evidence-based decision-making are opened, ensuring that research efforts lead to a deeper understanding of the world around.

References:

- Andrade, C. (2020). Sample size and its importance in research. *Indian Journal of Psychological Medicine*, 42(1). https://doi.org/10.4103/IJPSYM.IJPSYM_504_19
- Bhardwaj, P. (2019). Types of sampling in research. *Journal of the Practice of Cardiovascular Sciences*, 5(3), 157. https://doi.org/10.4103/jpcs.jpcs_62_19
- Garg, R. (2016). Methodology for research I. *Indian Journal of Anaesthesia*, 60(9), 640. <https://doi.org/10.4103/0019-5049.190619>
- Jilcha Sileyew, K. (2020). Research Design and Methodology. In *Cyberspace*. <https://doi.org/10.5772/intechopen.85731>
- Lee, V., & Landers, R. N. (2022). Sampling Strategies for Quantitative and Qualitative Business Research. In *Oxford Research Encyclopedia of Business and Management*. <https://doi.org/10.1093/acrefore/9780190224851.013.216>
- Loeb, S., Dynarski, S., McFarland, D., Morris, P., Reardon, S., & Reber, S. (2017). Descriptive analysis in education: A guide for researchers. *U.S. Department of Education, Institute of Education Sciences. National Center for Education Evaluation and Regional Assistance, March*.

- Meredith, J. (1998). Building operations management theory through case and field research. *Journal of Operations Management*, 16(4), 441–454. [https://doi.org/10.1016/S0272-6963\(98\)00023-0](https://doi.org/10.1016/S0272-6963(98)00023-0)
- Ponto, J. (2015). Understanding and Evaluating Survey Research. *Journal of the Advanced Practitioner in Oncology*, 6(2).
- Rashid, Y., Rashid, A., Warraich, M. A., Sabir, S. S., & Waseem, A. (2019). Case Study Method: A Step-by-Step Guide for Business Researchers. *International Journal of Qualitative Methods*, 18. https://doi.org/10.1177/1609406919862424/ASSET/IMAGES/LARGE/10.1177_1609406919862424-FIG1.JPEG
- Shringarpure, S., & Xing, E. P. (2014). Effects of sample selection bias on the accuracy of population structure and ancestry inference. *G3: Genes, Genomes, Genetics*, 4(5), 901–911. <https://doi.org/10.1534/g3.113.007633>
- Taherdoost, H. (2018). Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3205035>

ANALISA KESILAPAN PELAJAR DALAM TOPIK SELANG KEYAKINAN DAN UJIAN HIPOTESIS

*Siti Balqis Mahlan¹, Maisurah Shamsuddin² dan Muniroh Hamat³
*sitibalqis026@uitm.edu.my¹, maisurah025@uitm.edu.my², muniroh@uitm.edu.my³

Jabatan Sains Komputer & Matematik (JSKM),
Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

**Corresponding Author*

ABSTRAK

Pemahaman konsep yang lemah dalam matematik merupakan salah satu faktor yang menyebabkan pelajar melakukan kesalahan dalam menyelesaikan masalah matematik. Terdapat juga faktor lain yang mempengaruhi kesilapan matematik contohnya seperti penggunaan formula yang salah, kesilapan dalam operasi matematik dan juga asas matematik yang lemah. Kesilapan ini bukan hanya terbatas dalam topik matematik namun ianya juga berlaku dalam topik statistik. Statistik merupakan suatu cabang dari matematik di mana ianya menggunakan teori asas kebarangkalian dan juga teori matematik bagi membentuk metodologi statistik. Kajian ini dijalankan dengan tujuan mengidentifikasi kesalahan yang sering dilakukan oleh pelajar dalam beberapa topik statistik. Kajian kes ini mengambil kira seramai 23 orang pelajar yang mengambil subjek statistik di peringkat ijazah. Data yang diambil untuk dianalisa merupakan markah penilaian akhir. Peratus yang menjawab soalan dengan betul akan dibandingkan mengikut topik bagi mengenalpasti topik mana satu yang mempunyai kadar kesalahan yang agak tinggi. Berdasarkan analisa markah, didapati topik yang mempunyai kadar kesalahan yang tinggi ialah selang keyakinan sisihan piawai (1 populasi) dan ujian hipotesis min (1 populasi). Diharap dengan dapatan kajian ini, para pensyarah dapat memberi penekanan dengan mengambil pendekatan yang rasional terhadap topik-topik yang dikenalpasti mempunyai banyak kesalahan sebagai persediaan untuk menduduki penilaian akhir bagi semester-semester akan datang.

Kata Kunci: Matematik, statistik, kebarangkalian normal, selang keyakinan, ujian hipotesis

Pengenalan

Statistik adalah cabang sains yang berkaitan dengan pengumpulan, analisis, tafsiran dan persembahan data. Dalam analisis statistik, di antara dua konsep penting ialah selang keyakinan dan ujian hipotesis. Kedua-dua konsep ini membantu kita membuat inferens yang rasional tentang populasi berdasarkan data sampel yang terhad. Kepentingan memahami konsep selang keyakinan bagi sisihan piawai populasi dan menguji hipotesis pada populasi yang sama tidak boleh dipandang mudah. Dalam statistik, selang keyakinan membantu untuk mengukur sejauh mana anggaran parameter statistik seperti sisihan piawai, berkemungkinan berada di sekitar nilai sebenar mereka. Sementara itu, ujian hipotesis membolehkan kita membuat keputusan berdasarkan bukti statistik tentang populasi, seperti sama ada perbezaan atau perhubungan tertentu benar-benar wujud atau adakah ia hanya kebetulan. Kedua-dua konsep ini memainkan peranan penting dalam menyediakan rangka kerja yang teguh untuk membuat inferens dan seterusnya dapat membantu untuk membuat keputusan berdasarkan analisis statistik yang teliti dan boleh dipercayai.

Namun begitu, pelajar seringkali membuat kesilapan semasa menyelesaikan soalan statistik. Ini menyebabkan inferens yang dibuat tidak tepat dan mengurangkan kesahan keputusan analisis. Kesilapan yang dilakukan oleh pelajar dalam menyelesaikan masalah statistik boleh memberi kesan yang besar kepada kesimpulan yang dibuat daripada data. Kesilapan-kesilapan ini bukan sahaja terhad kepada topik selang keyakinan dan ujian hipotesis, ianya juga berlaku dalam topik kebarangkalian normal. Menurut Mahlan et. Al (2022), kajian mendapati bahawa masih terdapat pelajar-pelajar yang membuat kesalahan dalam menggunakan Jadual Z, iaitu Jadual Taburan Normal Piawai. Pelajar-pelajar yang terlibat dalam kesalahan ini cenderung memiliki pemahaman yang terhad tentang konsep kawasan di bawah lengkung taburan untuk mengira nilai kebarangkalian berdasarkan skor Z. Selain itu, pelajar-pelajar ini juga melakukan kesalahan serupa apabila cuba mencari nilai skor Z berdasarkan nilai kebarangkalian yang diberikan dalam soalan.

Ada juga kajian yang sama berkaitan kesalahan dalam topik statistik ini, namun ianya memberi fokus kepada topik ujian hipotesis, berbeza dengan kajian Mahlan et. Al (2022) di mana penyelidik hanya memberi tumpuan kepada topik kebarangkalian normal. Hasil analisis dari Digantoro et. Al (2019), dapat disimpulkan bahawa kesilapan pelajar dalam menyelesaikan masalah statistik termasuklah dari segi salah faham masalah, ralat transformasi, ralat dalam kemahiran proses, dan ralat menulis jawapan. Faktor biasa yang menyebabkan kesilapan ini berlaku ialah ketidaktepatan membaca soalan, kurang penguasaan bahan, tergesa-gesa kerana kesuntukan masa (pengurusan masa yang lemah), tidak terbiasa menulis hipotesis dan kesimpulan, dan kurang mahir menggunakan kalkulator saintifik.

Menurut Sari (2018), berdasarkan hasil kajian dapat disimpulkan bahawa masih terdapat banyak kesilapan dalam menyelesaikan soalan statistik asas mengikut analisis Newman. Kajian ini juga memfokuskan kepada topik ujian hipotesis di mana penyelidik mendapati terdapat kesalahan pada setiap peringkat ralat Newman. Pada peringkat ralat membaca, subjek tidak boleh membaca, mengecam dan mentafsir simbol dan kata kunci dalam soalan yang disediakan. Pada peringkat ralat penyelesaian, subjek tidak dapat menentukan perkara yang diketahui dan ditanya dalam masalah. Pada peringkat ralat transformasi, subjek masih melakukan banyak kesilapan dalam menulis rumus proses penyelesaian masalah. Pada peringkat ralat kemahiran proses, subjek mempunyai ralat konsep dan ralat dalam pengiraan masalah. Dengan ini dapat disimpulkan bahawa terdapatnya kelemahan dalam proses pembelajaran, memberi jawapan yang tidak konsisten, mempunyai sedikit keyakinan diri, hanya fokus kepada jawapan dan bukan kepada proses. Subjek memberi alasan dan jawapan yang tidak wajar. Pelajar melakukan kesilapan dalam proses penyelesaian masalah kerana menganggap perlu menulis secara terperinci. Kesilapan yang berlaku dalam proses penyelesaian masalah berlaku kerana pelajar

tidak cukup berhati-hati, dan subjek berpendapat bahawa masa yang diberikan tidak mencukupi untuk menyelesaikan soalan.

Berdasarkan Shamsuddin et al. (2021), tumpuan kajian juga diberi kepada topik hipotesis berdasarkan kepada markah minimum yang diperolehi oleh pelajar pada topik ini. Setiap lembaran jawapan dari pelajar diperiksa dan dianalisis untuk mengidentifikasi kesalahan-kesalahan yang dilakukan dengan menggunakan kaedah Newman. Dari hasil kajian, didapati bahawa majoriti pelajar mengalami kesulitan dalam memahami soalan yang terkait dengan ujian hipotesis. Keterbatasan pemahaman ini menyebabkan terjadinya pelbagai jenis kesalahan, termasuklah kesalahan dalam transformasi dan juga dalam penerapan proses-proses yang relevan.

Kajian oleh Paladang et. al (2018) juga menggunakan kaedah Newman. Namun begitu, penyelidik menganalisa kesalahan bagi topik fungsi dalam menyelesaikan masalah matematik. Kesilapan yang dilakukan oleh pelajar dianalisis berdasarkan jenis kesalahan dalam prosedur Newman yang terdiri daripada kesilapan membaca soalan, kesilapan memahami masalah, kesilapan transformasi, kesilapan kemahiran proses dan kesalahan penulisan jawapan. Faktor penyebabnya ialah pelajar tidak memahami maksud simbol, ada simbol tertentu yang tidak dapat ditafsir dengan betul, lupa cara membaca simbol, lupa rumus yang mesti digunakan, tergesa-gesa ketika menulis rumus, mereka tidak menguasai bahan prasyarat, iaitu operasi aritmetik algebra, mereka kurang teliti dan tergesa-gesa dalam menyelesaikan masalah.

Dalam kajian ini, penyelidik mengkaji kesilapan yang kerap kali dilakukan oleh pelajar dalam langkah kerja statistik terutamanya bagi topik selang keyakinan sisihan piawai bagi satu populasi dan juga bagi topik ujian hipotesis min bagi satu populasi. Topik ini diambilkira sebagai topik kajian memandangkan majoriti pelajar mempunyai kadar kesalahan yang tinggi dari topik ini.

Metodologi

Kajian kes ini melibatkan seramai 23 orang pelajar. Markah penilaian akhir diambil dan dianalisa untuk membandingkan markah bagi setiap soalan. Terdapat lima topik utama yang diuji dalam penilaian akhir ini iaitu 1) Taburan Kebarangkalian, 2) Penganggaran, 3) Ujian Hipotesis, 4) Analisis Varians (ANOVA) dan 5) Regresi. Bagi topik Taburan Kebarangkalian, hanya subtopik Taburan Normal Sahaja yang diuji dalam penilaian akhir, manakala Taburan Binomial dan Taburan Poisson hanya diuji dalam quiz sahaja. Semua subtopik bagi topik-topik utama yang lain diuji dalam penilaian akhir, quiz, tugas berkumpulan dan juga ujian. Jadual 1 berikut merupakan soalan yang diuji kepada para pelajar mengikut topik yang telah ditetapkan.

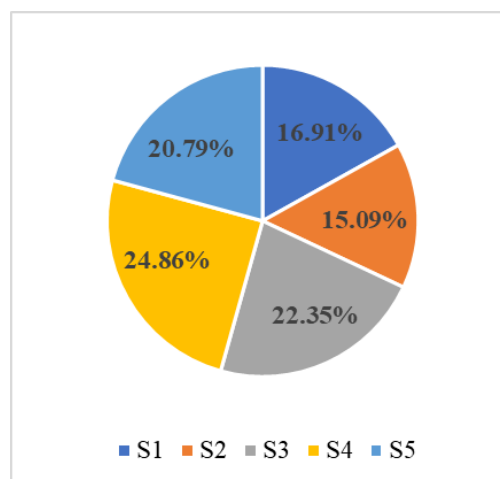
Jadual 1: Pembahagian Soalan mengikut Topik

Soalan	Topik
Soalan 1	Kebarangkalian Normal
Soalan 2	Selang Keyakinan (Sisihan Piawai – 1 Populasi) Ujian Hipotesis (Min – 1 Populasi)
Soalan 3	Ujian Hipotesis (Min – 2 Populasi Berpasangan) Ujian Hipotesis (Varians – 2 Populasi) Selang Keyakinan (Min – 2 Populasi)
Soalan 4	ANOVA
Soalan 5	Regresi

Perbandingan markah akan dibuat bagi menentukan topik mana satu yang menyumbang markah terendah. Setelah dikenalpasti, soalan yang mendapat markah agak rendah akan diteliti bagi mengetahui jenis-jenis kesilapan yang dilakukan oleh para pelajar bagi topik yang diuji dalam soalan tersebut.

Analisa dan Perbincangan

Berdasarkan Rajah 1, didapati peratus yang menjawab betul bagi soalan 2 mempunyai skor yang paling rendah iaitu sebanyak 15.09%. Ini menunjukkan ramai pelajar yang membuat kesilapan dalam penyelesaian terhadap soalan yang ke-2. Topik yang diuji dalam soalan 2 ini merangkumi topik selang keyakinan sisihan piawai bagi satu populasi dan juga ujian hipotesis min bagi satu populasi.



Rajah 1: Peratus markah mengikut soalan

Jadual 2 berikut menunjukkan jenis-jenis kesalahan yang dilakukan oleh pelajar bagi topik selang keyakinan sisihan piawai (1 populasi) dan juga ujian hipotesis min (1 populasi) bagi soalan 2.

Jadual 2: Jenis Kesilapan dalam Langkah Kerja Statistik

Kesilapan

1. Tidak memahami kehendak soalan
 2. Memasukkan nilai yang salah ke dalam formula
 3. Penggunaan jadual yang salah/pengambilan nilai yang salah dari jadual statistik
 4. Penggunaan ujian statistik yang salah
 5. Kesilapan dalam penetapan kawasan penolakan H_0
 6. Kesilapan membuat ayat kesimpulan dalam ujian hipotesis
 7. Tidak mengetahui jenis taburan yang digunakan
 8. Tidak memahami perbezaan di antara varians dan sisihan piawai
-

Berdasarkan tinjauan kertas jawapan pelajar yang melakukan pelbagai jenis kesalahan dalam menjawab soalan statistik ini, dapat disimpulkan bahawa antara kesilapan dalam menyelesaikan soalan statistik termasuklah dari segi salah tafsir memahami kehendak soalan dan seterusnya ini boleh menyebabkan pelajar menggunakan formula yang salah. Kesalahan dari segi proses memahami masalah ini merangkumi kesalahan dalam memasukkan nilai data yang salah ke dalam formula. Pelajar yang tidak mengetahui jenis taburan yang digunakan, penggunaan ujian statistik yang salah dan tidak memahami perbezaan di antara varians dan sisihan piawai juga boleh diidentifikasi sebagai pelajar yang tidak memahami soalan. Kesemua kesilapan yang dinyatakan ini merupakan salah satu tahap kesalahan dalam kaedah Newman iaitu tahap yang ke-2 (Kesalahan dalam Memahami Masalah). Manakala kesalahan yang lain iaitu kesilapan dalam penetapan kawasan penolakan H_0 , kesilapan dalam membuat ayat kesimpulan serta penggunaan jadual yang salah ataupun pengambilan nilai yang salah dari jadual statistik juga merupakan kesalahan dalam kaedah Newman bagi tahap yang ke-4 (Kemahiran Proses).

Kesimpulan

Secara keseluruhannya, dapat disimpulkan bahawa para pelajar kerap melakukan kesalahan terutamanya dalam proses memahami kehendak soalan. Pelajar juga didapati seringkali melakukan kesalahan dalam proses jalan kira termasuklah kesalahan yang melibatkan penggunaan jadual statistik dan membuat kesimpulan akhir bagi keputusan analisis yang diperolehi. Bagi menangani isu ini, pensyarah boleh mengambil pendekatan dengan meningkatkan kesedaran metakognitif pelajar. Ini memerlukan kerjasama yang baik di antara pensyarah dan pelajar supaya kesilapan dalam memahami soalan dan juga kesalahan dalam kemahiran proses dapat diatasi.

Rujukan

- Dirgantoro, K. P. S., Saragih, M. J., & Listiani, T. (2019). Analisis kesalahan mahasiswa pgsd dalam menyelesaikan soal statistika penelitian pendidikan ditinjau dari prosedur newman [An analysis of primary teacher education students solving problems in statistics for educational research using the newman procedure]. *Journal of Holistic Mathematics Education*, 2(2), 83-96.
- Mahlan, S. B., Shamsuddin, M., & Hamat, Muniroh. (2022). Analisa kesalahan pelajar bagi subjek statistik: Taburan normal. *Science & Digital Technology In E-Learning Future Trends*, Vol. 4, pp. 6-12.
- Paladang, K. K., Indraini, S., & Dirgantoro, K. P. S. (2018). Analisis kesalahan siswa kelas viii slh medan dalam mengerjakan soal matematika materi fungsi ditinjau dari prosedur newman [Analyzing students' errors in solving mathematics problems in function topics based on newman's procedures in grade 8 at Slh Medan]. *Journal of Holistic Mathematics Education*, 1(2), 93-103.
- Sari, R. K. (2018). Analisis Newman dalam menyelesaikan soal statistika ditinjau dari metakognitif tacit use. *Jurnal Tadris Matematika*, 1(2), 157-166.
- Shamsuddin, M., & Mahlan, S. B. (2021). Analisa kesalahan pelajar dalam subjek statistik: Kajian kes bagi semester pengajian secara atas talian. *Implication of Students' Performance and Obstacles Through Open Distance Learning (ODL) Teaching Methods During Movement Control Orders (Mco), COVID-19*, Vol. 2, pp. 86-99.

STUDENTS' MOST COMMON MISTAKES WHEN TAKING NOTES

*Muniroh Binti Hamat¹, Siti Balqis Mahlan², Maisurah Shamsuddin³, Siti Asmah Mohamed⁴

*muniroh@uitm.edu.my, sitibalqis026@uitm.edu.my, maisurah025@uitm.edu.my,
sitiasmah109@uitm.edu.my

^{1,2,3,4}Jabatan Sains Komputer dan Matematik,
UiTM Cawangan Pulau Pinang

ABSTRACT

The quality of notes and a student's academic success nearly usually go hand in hand. One of the most important skills one may acquire while attending college is note-taking. You'll get better grades and learn the academic content more thoroughly. Additionally, it qualifies a person for a career where clear and concise data is required. Taking good notes is an essential component towards achieving good grades. Good notes help you gather and create better essays, and they act as a basis for exam revision. Successful students recognise the significance of taking notes. The ability to summarise what you're reading shows how well you understand it. Unfortunately, many students are unaware of the best approach to take notes in class. As a result, students are frequently left with study notes that are incomplete, difficult to read, or disorganised. There are many ways to build better note-taking habits. In this paper, we will discuss on what is common mistake in note taking, the best solution and tips to prevent the mistake.

Keywords: *mistakes, good notes, grade, organised, disorganised*

Introduction

Every student takes notes in a unique style, which may not be effective for other students. However, it can be challenging to evaluate oneself sometimes. Whether the method they are using to take notes is effective enough? Are those notes worth the effort they invested in creating them? In the end, their goal is to effectively learn from the notes. Students must ensure that the most valuable resource (time) they are using to create the "near-perfect" notes is aiding in their ability to remember the material.

Students' notes, created in class or while reviewing course material, are an important tool for learning. Many students and instructors feel that note-taking is an obvious and intuitive skill to have, yet few consider or encourage best practices. Unfortunately, many students are unaware of or do not appreciate the benefits that effective note-taking may have on their learning, and the importance of cultivating their note-taking skills over the course of their education. (Friedman, 2014).

Notes taken on class lectures or discussions may serve as study aids, while notes taken during an interview may provide material for an essay, article, or book. (Nordquist, 2019). Having clear and concise notes to refer to is one of the best strategies to make studying for tests easier. Unfortunately, many students are unaware of the best approach to take notes in class. As a result, students are frequently left with study notes that are incomplete, difficult to read, or disorganised. The good news is that there are numerous approaches to developing better note-taking habits. Effective notetaking involves much

more than just writing down what has been taught. Even if it took hours to create them, poorly made notes frequently end up in a pile on the bookshelf and are never touched again.

Typical note-taking common mistakes and how to avoid them

Take too long notes

Although some students seem to have an intuitive sense for what notes to record, for everyone else, getting trained in specific note-taking strategies can significantly improve the quality of notes and the amount of material they remember later. (Boyle, 2013). Students' notes should serve as a tool to help them remember and recall important information in a quick and efficient manner, as well as a reference to the source of the information. Many students make the mistake of writing down every single word on the source material or said by the lecturer.

Although it would seem like an ideal way to get all the data, doing this can work against them. Writing too much can make it harder to locate important points later and can cause them to miss crucial thoughts and concepts. Instead of doing this, try to concentrate on writing down only the most important ideas and points. They can also quickly capture significant concepts by using shorthand or acronyms.

Not organised the notes

According to Andrew (2023), organising your tons of lecture notes is a valuable skill that can significantly enhance your learning experience and academic performance. Even if a student's notes are well-structured and concise, it might be difficult to understand how they relate to other information if they are not properly organised. It is critical that students' study notes be retained to ensure that references to previous material make sense. Perhaps their note-taking system is excellent, or they have simply discovered the ideal way to utilise these notes. When students return to review, though, they are met with a mountain of pages or a never-ending notebook that overwhelms them. When they need to add extra work to revision, it becomes difficult. Their technique to taking notes, as well as the final notes, should be well-organized. When their notes are not digital, the most difficult element is keeping them safe and organised in one spot. Organised the notes by number the pages, use an index and tag and use notetaking application.

No space to update the notes

It's time for review after a successful note-taking spree. It's natural to discover some additional information that they would like to include in their notes. Handwritten notes, unlike computerised notes, necessitate planning ahead of time. So, make sure they make margins on each page for when they revise and find something they want to add. Margins can also be used to jot down important questions, summaries, or illustrations. And, when they have finished a topic but haven't left any room for further

material in the preceding pages, it's a good idea to save a page or two for later. Almost often, students will discover some new and essential information to add to their notes.

Not reviewing the notes

If they don't go through their notes on a regular basis, they can forget important details or misinterpret key concepts. Ideally, they should not only check their notes on a regular basis, but also update them with new knowledge they have acquired subsequently, making new links to other notes, and reorganizing them within their digital brain. So, the best approach to accomplish this is to set aside some time each week or day to go over their notes. This will assist them with reinforcing what they have learnt and identifying any gaps in their comprehension. Rewriting the notes in a more organised and brief manner might also aid in their understanding of the content.

Writing everything they hear

Additionally, note-taking for different learning styles is crucial. Visual learners may benefit from diagrams and drawings, while auditory learners may prefer recorded lectures or verbal notes. (Majewski, 2023). When you take notes in the classroom, everything that the lecturer says may sound important. Instead of writing some things selectively, it is easier to record everything word to word. After all, more information is better, and you never know that you might miss an important point while trying to be selective, right? It sounds completely rational in theory, but it is a big failure in practice.

The secret to making good notes is not the amount of information you include. What matters is the quality of the information and the number of words employed to convey that information in writing.

Conclusion

Everyone has their own unique characteristics and traits that aid in their learning. Though there is no 'right way' to write college notes, there are several common elements that influence the quality of notes for many students. Similarly, some approaches are universally relevant and serve to improve the overall notetaking and learning experience. It is not necessary to stick to such strategies, but rather to adapt them to your specific needs. As you practise writing notes, these fundamental concepts will become second nature. Remember to have fun while creating notes that are most effective for you.

Avoid common mistakes to become a better learner. Now that you're aware of them, try to avoid making these typical mistakes to increase your learning efficiency and productivity. It's challenging, but we feel we can make it much easier for you. Known is a distraction-free knowledge management platform that offers several tools to address the errors described in this post, as well as an AI-powered personal assistant to aid you in capturing, managing, summarising, and organising your notes.

References

- Andrew, E. (2023). *Organising Your Lecture Notes: Effective Strategies for University Students*. Unicaf University.
- Boyle, J.R. (2013). *Strategic Note Taking for Inclusive Middle School Science Classrooms*. Remedial and Special Education. 34(2), 78-90.
<https://doi.org/10.1177/0741932511410862>
- Fery, A. (2022, May 7). *Can you take notes? Why is it important and 5 mistakes to avoid when taking notes in college*. Amanote. <https://amanote.com/blog/2022/05/17/can-you-take-notes-5-mistakes-to-avoid-when-taking-notes-in-college/>
- Five Common Mistakes that You Should Avoid While Taking Notes. (2020, November 25). *Steps To Steth*. <https://stealthtosteth.wordpress.com/2020/11/25/5-common-mistakes-that-you-should-avoid-while-taking-notes/>
- Friedman, M.C. (2014). Notes on Note Taking: Review of Research and Insights for Students and Instructors. *Harvard Initiative for Learning and Teaching*.
- Majewski, J. (2023, June 23). *What Should One Avoid While Taking Notes: Common Mistakes to Avoid*. <https://whenyouwrite.com/what-should-one-avoid-while-taking-notes/>
- Nordquist, R. (2019). *How to Take Better Notes During Lectures, Discussions, and Interviews*. Tried and True Methods and Tips from Expert Note Takers.

DEVELOPMENT OF MICRO CREDENTIAL VARIABLE IN C++ FOR NOVICE PROGRAMMERS.

*Azlina binti Mohd Mydin¹, Wan Anisha binti Wan Mohammad², Elly Johana binti Johan³

Syarifah Adilah binti Mohamed Yusoff⁴, Rafizah binti Kechil⁵

^{1,2,3,4,5}Jabatan Sains Komputer & Matematik (JSKM),
Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

**Corresponding Author*

ABSTRACT

There are many courses developed to support e-learning rapidly grown into a global issue in education throughout Massive Open Online Course (MOOC) and Micro-Credential (MC) in University Technology MARA. MC Variable in C++ (MCVC++) is one of the courses that is designed to help novice programmers to learn basic concepts in C++ programming. Students from multiple disciplines such as engineering, information technology, and computer business are required to study basic C++ programming. The C++ programming language is the foundation of all software and current programming languages. As novice learners, they will face problems in learning C++ program in short duration time. As a result, many students who are unable to grasp the most fundamental concept of programming are unable to write basic programs and also unable to acquire and understand more complex concepts. The learning outcome for this MCVC++ students will be able to understand the basic concept for variables in C++ programming and students also will be able to learn how to declare variables, where, and how to use variables in C++ programming. This paper explains the development process of the MCVC++ using action research model based on the guidelines provided by Institute of Continuing Education and Professional Studies (iCEPS) UiTM.

Keywords: *MC, novice programmer, C++ programming, action research model*

Introduction

In the trend of online learning many approaches are being applied to the process to make it easier and flexible. Massive Open Online Course (MOOC) and Micro-Credential (MC) approaches is a present technological innovation of teaching and learning in the modern higher education environment. As known, there are many key advantages of online learning includes flexibility and convenience, cost saving, self-paced learning and accessibility (Gautam, 2021). MC is designed to provide learners with a rapid and efficient method of acquiring specialized skills or knowledge relevant to their careers or personal interests. Educational institutions, online learning platforms, and professional organizations frequently provide these credentials.

C++ is a popular and evergreen general-purpose programming language for creating programs in a wide range of application domains. Despite the fact that it was introduced a long time ago, C++ is now the fourth most popular programming language (Cass, 2021). Nonetheless, due to the nature of formal language, many students continue to struggle with C++ (Aung et al., 2022). One of the topics covered in an introductory programming course is an introduction to data types, which includes declaring, initializing, data input and output. Learning computer programming is a difficult task for a novice (Prasad et al., 2021). Data from around the world show that an increasing number of students do not want to pursue a major in computer programming in higher education (Papadakis, 2020). One reason why novice fail to learn programming is that they struggle with relational reasoning (Corney et al. 2011)

due to some variable misconceptions (Kohn,2017). As a result, they are often unable to accurately understand the fundamentals of programming (Prasad et al. 2021) or to combine the various statements and structures of the programming language into a valid program (Sana'a et al., 2020).

A Micro-credential is a learning certification for a smaller set of courses or modules designed to provide learners with knowledge, skills, values, and competencies in a specific field of study (Selvaratnam & Sankey, 2020). Unlike conventional transcripts, which are controlled by the institution, students will have control over their micro-credentials and will be able to distribute them digitally (Matkin et al., 2020).

Micro-credential development in this paper entails the introduction of data types in C++. Data types define the type of data that a variable can hold, such as an integer variable holding integer data, a character type variable holding character data, and so on. Considering these factors, Micro-credential is used to introduce a smaller set of programming courses based on the MARA University of Technology (UiTM) syllabus that can be completed in a short period of time. Various short-term courses are offered through these micro-credentials program and can be used as credit in learning as long as they meet the Malaysian Qualifications Agency (MQA) criteria. The development of the Micro-credentials program is critical to UiTM because it is self-forming and will be effective in future.

Methodology

Action research is a research method that that been applied in this study whereby the model tries to examine and address a problem at the same time. This model is created by Kurt Lewin, an MIT professor in 1944. **Figure 1** shows the diagram of the action research model. In this modal, there are four (4) main steps known as planning, action, analysis and conclusions.

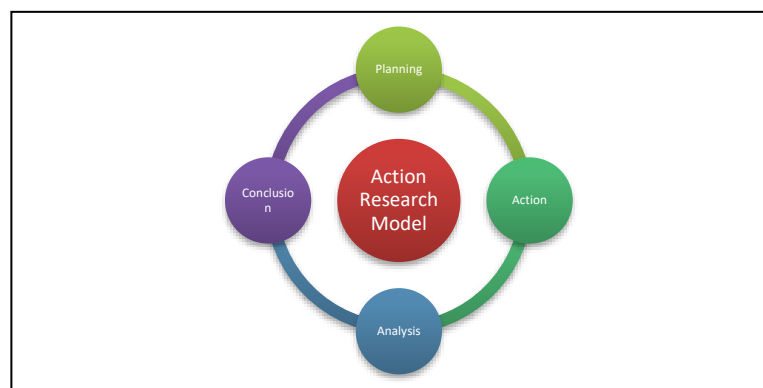


Figure 1: Action Research Model

Based on the model, the planning stage design is used, in which we specify the content demand, the content presentation, the number of assessments, and the style. Detailed explanations will be provided during the design phase. In the action stage, we begin to put the planning into action. Once the contents are complete, we post them to the ufuture online platform supplied by the Institute of Continuing Education and Professional Studies (iCEPS) UiTM. The ufuture is an online learning platform designed to benefit both students and instructors. Once the material and contents are complete, evaluations are performed by the selected people assigned by iCEPS to ensure that the MCVC++ course meets the iCEPS criterion. Once the MCVC++ archived the marks required then only the course will be published and can be accessed by the students. In the result and discussion, we will elaborate in detail the analysis stage that apply in MCVC++. In the conclusion stage, we will plan the any improvisations needed based on the analysis and feedback from the students.

Design and Development Phase

In the content development design, MCVC++ has fulfilled the requirements and guidelines as provided by iCEPS UiTM. Instructional design concepts are also applied in MC development guidelines provided by iCEPS UiTM. In the design stage firstly the total content and assessments are planned based on the requirement. Four (4) subtopics are identified, three (3) formative assessment and one (1) summative assessment are planned to complete the overall material for MCVC++. Once the topics and the type of content are defined, the storyboard is developed. Developers must focus on creating meaningful content with a clear storyline and applying educational theory-based instructions to make animation and videos more creative and interactive, which leads to a quality content presentation (Kurniawati, 2020).

The video content material for MCVC++ are developed using a variety of software like Canva, MS Power Point, Filmora and ClipChamp. Kapwing is one of the software that is used to edit video content. The content materials also have various forms like infographic, cartoon conversation, coding writing and simple example explanation. **Figure 2** below shows the various types of content material used in MC Variable in C++.

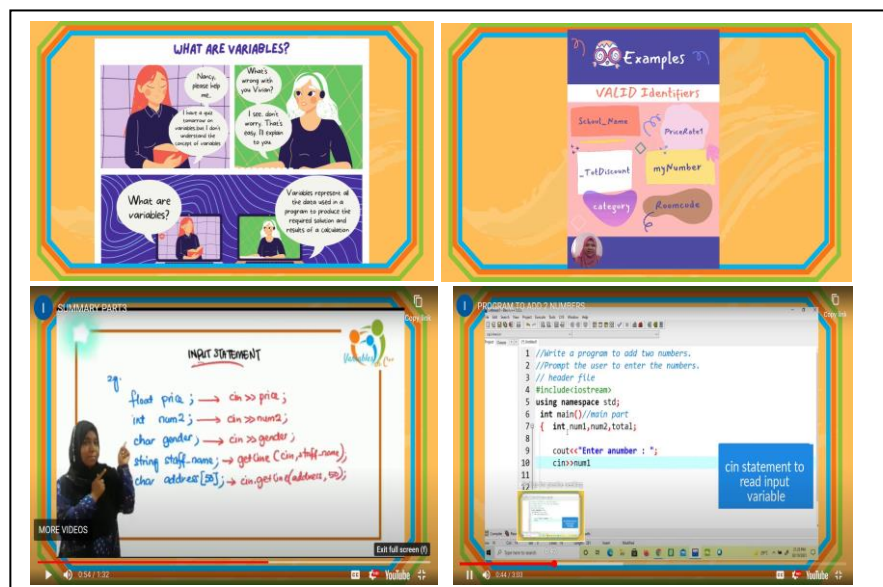


Figure 2: Variety of video notes content for MCVC++

MCVC++ also provides e-book with detail explanation as an additional material to help student understand better. Anyflip is used to convert the pdf material in the form of e-book. The content of the e-book is complete with additional examples and detail notes. **Figure 3** shows the layout of the e-book for MCVC++.

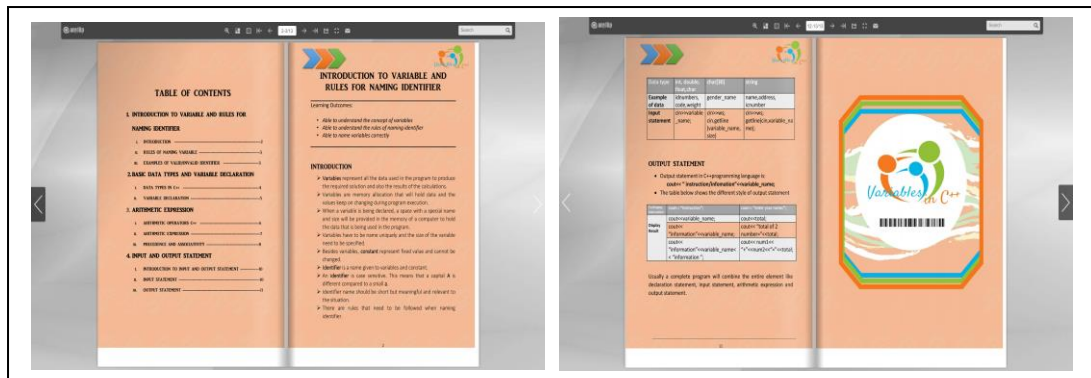


Figure 3: Layout of e-book content for MCVC++

MCVC++ has designed various styles of assessment to make sure the student is able to interpret and explain what they have learn. The questions are designed in the form of objective questions, structured questions and writing a complete program. **Figure 4** shows the layout of various types of assessment applied in MCVC++.

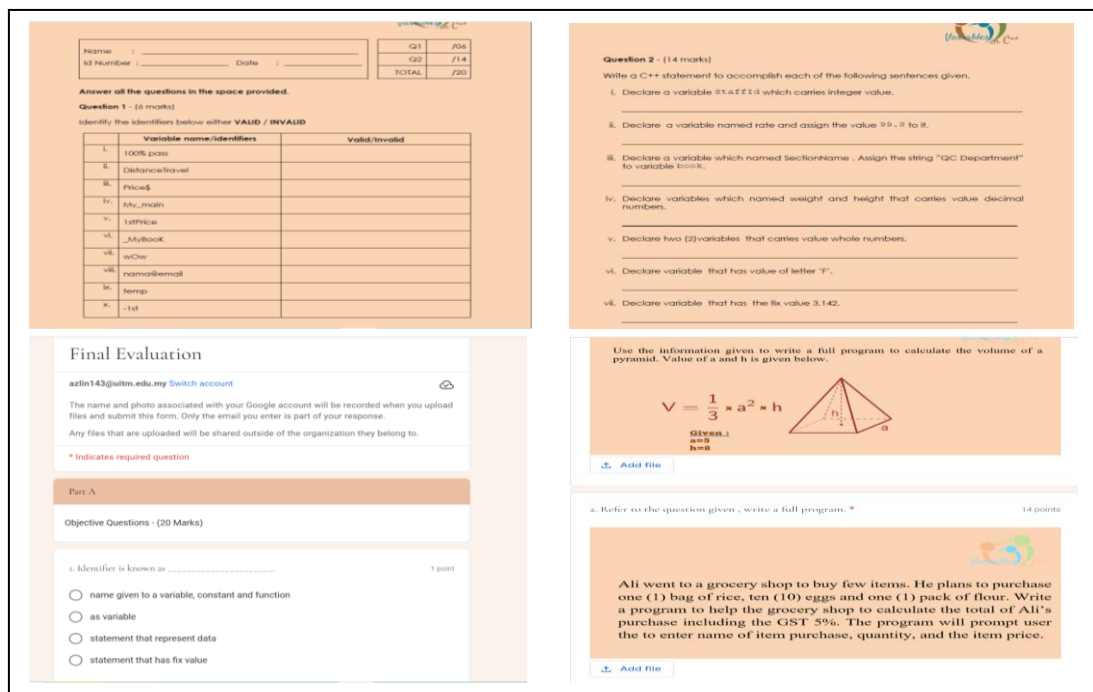


Figure4: Layout of various type assessment in MCVC++

Conclusion

MCVC++ is an MC course designed to assist students master the fundamentals of C++ programming. The courses are designed to assist students in understanding and mastering C++ programming skills. This course's content is provided in such a way that students may readily learn and apply it in their daily lives. Finally, the variety of information in these MCVC++ helps inexperienced programmers improve their comprehension of the fundamentals of the C++ programming language. In the future, additional modules and examples may be added to make this course more consistent and complete.

References

- Aung, S. L., Dim, N. K., Aye, S. M. M., Funabiki, N., & Kyaw, H. H. S. (2022). Investigation of Value Trace Problem for C++ Programming Self-study of Novice Students. *International Journal of Information and Education Technology*, 12(7), 631-636.
- Cass, S. (2021). Top Programming Languages: Our Eighth Annual Probe into What's Hot and Not. *IEEE Corney, M., Lister, R., & Teague, D. (2011). Early relational reasoning and the novice programmer: swapping as the 'hello world' of relational reasoning. In Proceedings of the Thirteenth Australasian Computing Education Conference (pp. 95-104). Australian Computer Society. Spectrum*, 58(10), 17-17.
- Gautam, P. (2021). Advantages And Disadvantages Of Online Learning. *eLearning Industry*. <https://elearningindustry.com/advantages-and-disadvantages-online-learning>
- George, T. (2023, June 22). *What Is Action Research? | Definition & Examples*. Scribbr. Retrieved August 19, 2023, from <https://www.scribbr.com/methodology/action-research/>
- Kohn, T. (2017, March). Variable evaluation: An exploration of novice programmers' understanding and common misconceptions. In *Proceedings of the 2017 ACM SIGCSE Technical Symposium on Computer Science Education* (pp. 345-350).
- Kurniawati, N. (2020). Creating Low-Cost Animation Video Using Online Platform: A Learning Media User Review. *Jurnal Pendidikan Kedokteran Indonesia - The Indonesian Journal of Medical Education*. doi: 10.22146/jpki.53166.
- Lister, R., Adams, E. S., Fitzgerald, S., Fone, W., Hamer, J., Lindholm, M., ... & Thomas, L. (2004). A multi-national study of reading and tracing skills in novice programmers. *ACM SIGCSE Bulletin*, 36(4), 119-150.
- Matkin, G., Charles, S., Alexander, J., Cartegena, H., Okhuysen, G., Hayes, G., ... & Jeantet, A. (2020). The University of California-Irvine report of the workgroup on alternative digital credentials (ADCs).
- Papadakis, S. (2020). Evaluating a teaching intervention for teaching STEM and programming concepts through the creation of a weather-forecast app for smart mobile devices. In *Handbook of research on tools for teaching computational thinking in P-12 education* (pp. 31-53). IGI Global
- Prasad, A., Chaudhary, K., & Sharma, B. (2022). Programming skills: Visualization, interaction, home language and problem solving. *Education and Information Technologies*, 1-27..
- Robins, A., Rountree, J., & Rountree, N. (2003). Learning and teaching programming: A review and discussion. *Computer science education*, 13(2), 137-172.
- Robins, A. V. (2019). 12 novice programmers and introductory programming. *The Cambridge handbook of computing education research*, 327.
- Sana'a, M. A., Dousay, T. A., & Jeffery, C. L. (2020, October). Integrated learning development environment for learning and teaching C/C++ language to novice programmers. In *2020 IEEE Frontiers in Education Conference (FIE)* (pp. 1-5). IEEE.
- Selvaratnam, R., & Sankey, M. (2020). Survey of micro-credentialing practice in Australasian universities 2020. *ACODE Whitepaper*.

A STUDY OF MENTAL HEALTH AMONG STUDENTS DURING MOVEMENT CONTROL ORDER (MCO)

*Syarul Heiry Yahaya¹, Norazah Umar², Rozita Kadar³ and Nursakirah Ab Rahman Muton⁴
* syarul509@uitm.edu.my¹, norazah191@ppinang.uitm.edu.my², rozita231@uitm.edu.my³,
nursakirah.arm@usm.my⁴

^{1,2,3}Jabatan Sains Komputer & Matematik (JSKM),
Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

⁴Pusat Pengajian Sains Komputer,
Universiti Sains Malaysia, 11800, Penang

**Corresponding author*

ABSTRACT

The need for mental health support is critical in today's world, which is leading to more research into its causes. Mental health is important because it shows how well a person is feeling emotionally, mentally and socially. There are many reasons why someone might feel sad or anxious, but a few main reasons have been discovered. Several studies have shown that things as different as age, the way we act and the way we learn can affect our mental health. Things like living environment, surrounding community and financial factors make a big difference in mental health. The pressure to succeed, along with the desire to fit in, can make them feel depressed and sad. Therefore, this study explores how this affects people, especially students in college. The aim of this study is to identify the factors and the relationship between the factors identified in affecting the level of depression among students. The results of this study reveal that gender and campus location do not exert a significant influence on depression scores or the severity of depression levels.

Keywords: *depression, mental health, movement control order, tertiary level*

Introduction

In the modern era, the emphasis on mental well-being has become the main focus. Mental health acts as a guardian of emotions, thoughts, and a sense of belonging in society. It is a complex aspect that shadows the landscape of emotions and human existence, with depression being one of its indicators. Cultivating mental health includes practicing self-care, cultivating healthy relationships, seeking help when needed, managing stress, and engaging in activities that bring joy and satisfaction.

Exploration into factors influencing internal emotional states has grown, and an important dimension of this understanding revolves around the study of depression. However, it is important to acknowledge that mental health challenges are universal and can affect individuals regardless of age, gender, background or socioeconomic status. Researchers investigate the causes of depression and the complex interplay of components such as emotions, behaviors, and external conditions that contribute to the emergence of feelings of depression (Benny et al., 2022; Bogardus et al., 2022; Chowdhury et al., 2022; Johnson et al., 2020; Niu et al., 2022; Rahmandani & Amarangani, 2023). Just like physical health, getting support for mental health concerns is very important. Just like seeking help for physical conditions, it is important to extend the same level of attention and care to our mental health.

For young people especially as students in higher education, are not exempt from this problem. Depression and anxiety are big issues for them. College or university is an exciting time for them

because going to university signifies a transition to adulthood and greater independence. They get to make their own decisions about their academics and daily life. At the university, students learn about themselves and develop life skills such as communication and problem solving. Yet, it is important to note that while university life can be exciting, it also comes with challenges and responsibilities, and they might experience academic pressures, social adjustments, and financial concern. While trying to cope with the new changes and challenges, some students struggle with depression. This issue is pertinent that it has drawn particular attention in recent years as depression among university students are multifactorial that require further investigation. Apart from that, some college students, especially those in their early years, can feel really sad and left out. They really want to be liked and have friends, so when they feel excluded, it makes them feel even worse. Not having a good way to check and help students during these tough times shows that we really need good plans to help them.

Thus, the study aims to investigate the mental health status of UiTM students in its two campuses; UiTM Permatang Pauh and UiTM Negeri Sembilan. The objective of this study is:

- i. To compare the level of depression between genders;
- ii. To compare the level of depression between campuses and;
- iii. To obtain a relationship between the level of depression and gender.

In the next section, this paper explores a review of the related work on the depression issues that arise among students followed by a section containing a detailed explanation of the research methodology. Then, the paper presents the analysis and result of the study as well as the discussion of the findings. Finally, conclusions and recommendations for future research are drawn in the final section.

Literature Review

Mental health refers to the condition of individual mental well-being that includes the emotional, psychological, and social well-being that facilitates individuals in managing challenges in life and controlling their capabilities (WHO, 2022). It directly affects how an individual think, feel and act; it is also determining how an individual handle the stress, make decisions and establish interpersonal communications. However, an individual mental health can change over time based on various factors. If the mental health is not being well managed, it could lead to poor mental health such as depression, anxiety, and stress.

Our exploration will lead us into the realm of university life, where students are navigating the pursuit of academic excellence. The pursuit of success often ushers in a cloud of stress and unhappy. In today's dynamic and interconnected world, the flow of social interactions can also wield a substantial influence over our emotional well-being. The disruption wrought by the COVID-19 pandemic added another layer of complexity. The shift to remote learning disrupted established routines and instigated feelings of isolation. This transformation gave rise to a medley of emotions, including anxiety, stress, and loneliness. These sentiments did not merely dissipate; rather, they persisted, affecting our vitality, concentration, and daily functionality. The context of the pandemic has exacerbated the prominence of depression and intense anxiety among students. The absence of definitive strategies to assist students during these challenging times underscores the urgency of formulating effective plans to bolster their mental health.

For young adults, the transition to college or university marks an exhilarating phase, symbolizing the transition to adulthood and increased autonomy. This period offers opportunities for self-discovery and the development of essential life skills like effective communication and problem-solving. Nevertheless, the excitement of university life is accompanied by a set of trials and responsibilities, including academic pressures, acclimatization to new social dynamics, and financial concerns. Amid the endeavour to navigate these adjustments and challenges, some students grapple with the weight of depression. This issue has garnered significant attention in recent times, as depression among university students arises from multifaceted sources that necessitate further exploration.

Depression among college students is a significant and concerning issue that has received a growing amount of attention over the years. Numerous stressors and challenges associated with the adjustment to university life could trigger or exacerbate depression. Many aspects of college life increase the risk of developing depression as such some students are unprepared for university life since they must leave home and adjust to a new way of living. Depression could cause a negative impact to the students academically and to their interpersonal communication. Earlier study that was conducted by Naushad et al. in 2014 indicated that 41.2 % pre university college students suffering from moderate depression due to poor socio-economic background and lack of social activities in the campus. Similarly, a study conducted by Islam in 2016 shows that approximately 30% of their respondents from one of the university in the central region of Malaysia suffering from depression and almost 5% of them suffering from severe depression. Meanwhile, a study by Liu, Ping and Gao (2019) demonstrated that between 20 to 43% of undergraduate's students in China suffered from depression, anxiety and stress.

The prevalence of anxiety and depression among college students has increased dramatically since the beginning of the COVID-19 pandemic, and several studies have shown that the COVID-19 had a negative psychological impact on university college students. The quarantine order, which affects people's activities and routines, is one of the causes of the rise in depression (WHO,2021). Specifically, in Malaysia context, the movement control order (MCO) has been implemented in September 2021 that designed to control the spread of COVID19 virus by restricting movement and social interaction. The restrictions on travel, the shifting of work arrangements to the home, and the shift of learning mode to online learning have reduced face-to-face contact, resulting in an increase in mental illness. Students are experiencing technology fatigue due to their excessive reliance on devices for learning, socialising, and leisure activities, which leads to feelings of burnout and exacerbate mental health. A recent study by Wong et al (2023), has demonstrated that 21.4% university students in one of the universities located in central region of Malaysia suffering with severe depression and the depression is likely to occur if the students was diagnosed with depression earlier.

Looking ahead, our journey into the realm of depression will continue its descent into deeper understanding. By comprehending the interplay of internal and external factors, we aspire to illuminate this crucial subject and identify avenues for improving the circumstances of those grappling with it. The promotion of mental well-being involves the cultivation of self-care practices, nurturing healthy relationships, seeking aid when needed, managing stress, and engaging in activities that cultivate joy and contentment. However, it is imperative to acknowledge that mental health challenges are widespread and can affect individuals irrespective of age, gender, background, or socioeconomic status. Analogous to physical health, seeking support for mental health challenges is of paramount importance.

Methodology

The research was conducted in MARA University of Technology during covid-19 pandemic when all universities in Malaysia were closed and teaching mode were transformed into an e-learning environment based using several online platforms preferred by lecturers. In order to assess the level of depression, anxiety and stress among tertiary level students, a questionnaire with a psychometric characteristics of the 21-item version (DASS-21) was administered to 286 students joining the online seminar conducted by Counseling Department of the university. Of the 286 students who took part in the study, several data were omitted resulting in a dataset with a total of 276 entries. Demographic information was collected regarding campus, faculty and gender. In completing the questionnaire, the individual is required to indicate the presence symptoms of depression, anxiety, and stress in the past week. Each item was assessed using a four-point likert scale from 0 to 3, where 0 represent 'Did not apply to me at all (never)'; 1 represent 'Applied to me to some degree, or some of the time(sometimes)'; 2 represent 'Applied to me to a considerable degree, or a good part of time(often)'; and 3 represent 'Applied to me very much, or most of the time(almost always)'. According to Ramli et al. (2017), the process of factor analysis led to the identification of seven questions from the DASS 21 that can be categorized under the domain of depression as listed in table 1.

Table 1:Dass 21 items for Depression

Item	Question
D3	I couldn't seem to experience any positive feeling at all
D5	I found it difficult to work up the initiative to do things
D10	I felt that I had nothing to look forward to
D13	I felt down-hearted and blue
D16	I was unable to become enthusiastic about anything
D17	I felt I wasn't worth much as a person
D21	I felt that life was meaningless

The total score for seven items mentioned in table 1 needs to be multiplied by two before determining the level of depression because the DASS 21 is a short form version of the DASS 42. DASS severity ratings for depression as shown in table 2 were used to classify the level of depression of respondents.

Table 2: DASS severity ratings (Depression)

Score	Severity
0-9	Normal
10-13	Mild
14-20	Moderate
21-27	Severe
28-42	Extremely severe

Source: Gomez, F. (2016)

A basic descriptive analyses was conducted using SPSS version 25. The mean, frequency and percentage for each item and severity of depression was recorded. For comparative analyses, the sample was grouped according to gender and their level of depression. Besides gender, an analysis was also done to compare the level of depression in UiTM Penang campus with other campuses. For further analyses, gender based mean differences in depression among respondents were determined by applying

the two independent sample t-tests. Results were considered significant at $p \leq 0.05$. In addition, the chi-squared test was used to discover if there is a relationship between the two categorical variables gender and level of depression.

Reliability Analysis

Based on the output of reliability statistics obtained (Table 3), Cronbach's Alpha value resulted greater than 0.6, therefore this research instrument is reliable. Having tested the validity and reliability of the proven results of the questionnaire is valid and reliable performance.

Table 3 : Cronbach's Alpha For Each Area

Area	Value
Depression	0.905

Result and Discussion

The data analysis was done descriptively, and then the results were presented in tables and figures. The inferential statistics of the T-test were used to examine the difference between gender and DASS scores on depression. This test is used to explore whether both genders show differences in DASS scores. Next, a chi-square test was used to discover if there was any association between depression level of the score with gender and campus location.

The survey was distributed via online Facebook live on 19 March 2021. Students need to fill up the questionnaires in the google form and 286 responses were received. After separating some of the duplicate and missing data, only 276 responses were analysed. Table 4 shows among them, only 206 are female students and 70 students are male. There were students from UiTM campus and also other campuses of UiTM. Of overall respondents, 217 (78.6%) were from UiTM Penang campus while 59 (21.4%) were from other campuses of UiTM.

Table 4: Percentage of Respondents by Characteristics

Characteristic		N	Percentage (%)
Gender	Male	70	25.4
	Female	206	74.6
Campus	UiTM Penang	217	78.6
	Others	59	21.4

Table 5 shows the total score for depression. The mean score for depression for all respondents is 2.46. Noted that a scale of 2 for depression already falls to a mild level. Meanwhile, the median value for depression is 2 which means that more than 50% of the respondents are still in the normal to mild level of depression.

Table 5: Total Score of Depression

Mean	2.46
Standard Deviation	1.349
Median (Min, Max)	2 (1, 5)

Thereafter, the scores were recorded into five levels of severity. The results showed that more than 50% of the respondents have a normal to a mild level of depression (Table 6). On the other hand, the depression level for severe and extremely severe in this study, 22.9%.

Table 6: Result of Severity

Type		N	Percentage (%)
Depression Level	Normal	104	37.7
	Mild	37	13.4
	Moderate	72	26.1
	Severe	30	10.9
	Extremely Severe	33	12.0

Inferential statistics of T-tests (Table 7) revealed all variables, such as gender and campus, were not found to be significant. However, we can see from the result in depression, the average score for female was higher than that for males. Another interesting finding was that, even though there were no statistically significant differences, respondents whose campus was located other than UiTM Penang recorded slightly lower score in depression criteria.

Table 7: Inferential Statistics of T-test

	Depression	N	Mean (sd)	P value
Gender	Male	70	2.20 (1.42)	0.071
	Female	206	2.55 (1.38)	
Campus	UiTM Penang	217	2.50 (1.43)	0.392
	Others	59	2.32 (1.25)	

To determine if any factor is associated with the level of depression, a Chi-square test has been conducted. From the result (Table 8), gender and campus showed statistically not significant at 95% confidence level for depression level. From the finding, females tend to have depression score severely to extremely severe.

Table 8: Result of Chi Square Test

Depression		Normal		Mild		Moderate		Severe		Extreme		p-value
		Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	
Gender	Male	35	50	7	10	15	21.4	5	7.1	8	11.4	0.159
	Female	69	33.5	30	14.6	57	27.7	25	12.1	25	12.1	
Campus	UiTM Penang	82	37.8	28	12.9	53	24.4	25	11.5	29	13.4	0.501
	Others	22	37.3	9	15.3	19	32.2	5	8.5	4	6.8	

Conclusion

More than 50 percent of students had a normal to mild level for score in depression. However, gender and campus were not found to be significant. However, we can see from the result in depression, the average score for female was higher than males. This study also indicated that there was no association of different genders and different campuses with depression levels.

References

- Ahorsu DK, Strong C, Wang H, Griffiths MD, Lin C. COVID-19-Related Variables and Its Association with Anxiety and Suicidal Ideation: Differences Between International and Local University Students in Taiwan. *Psychol Res Behav Manag.* 2021; 14:1857–66. <https://doi.org/10.2147/PRBM.S333226> PMID: 34815723
- Bahar Moni AS, Abdullah S, Leong Bin Abdullah MFI, Kabir MS, M Alif S, Sultana F, et al. Psychological distress, fear and coping among Malaysians during the COVID-19 pandemic. *PLoS One.* 2021;September:1–21. <https://doi.org/10.1371/journal.pone.0257304> PMID: 34506576 7.
- Benny, C., Patte, K. A., Veugelers, P., Leatherdale, S. T., & Pabayo, R. (2022). Income inequality and depression among Canadian secondary students: Are psychosocial well-being and social cohesion mediating factors? *SSM - Population Health, 17*(December 2021), 100994. <https://doi.org/10.1016/j.ssmph.2021.100994>
- Bogardus, J., Armstrong, E. S., VanOss, T., & Brown, D. J. (2022). Stress, Anxiety, Depression, and Perfectionism Among Graduate Students in Health Sciences Programs. *Journal of Allied Health, 51*(1), E15–E25.
- Chowdhury, U., Suvro, M. A. H., Farhan, S. M. D., & Uddin, M. J. (2022). Depression and stress regarding future career among university students during COVID-19 pandemic. *PLoS ONE, 17*(4 April), 1–14. <https://doi.org/10.1371/journal.pone.0266686>
- Gomez, F. (2016). A guide to the depression, anxiety and stress scale (DASS 21). Central and Eastern Sydney primary health networks.
- Islam, M.A., Low, W.Y., Tong W.T., Yuen, C.C.W. & Abdullah, A. (2016). Factors Associated with Depression among University Students in Malaysia: A Cross-sectional Study. Presented in the 2nd International Meeting of Public Health. <https://knepublishing.com/index.php/KnE-Life/article/view/2302/5092>
- Johnson, O. A., Olaniyi, S. F., John, S., Sheila, O., Daniel, O., Imam, A., & Olaiya, A. P. (2020). Baseline and Postintervention Assessment of Sexual Violence and Condom Use among Female Sex Workers in a Semiurban African Community. *Social Health and Behavior.* <https://doi.org/10.4103/SHB.SHB>
- Liu, X., Ping, S., & Gao, W. (2019). Changes in Undergraduate Students' Psychological Well-Being as They Experience University Life. *International Journal of Environmental Research and Public Health.* 16(16), 2864, <https://doi.org/10.3390/ijerph16162864>
- Marzo RR, Vinay V, Bahari R, Chauhan S, Anak D, Ming F, et al. Since January 2020 Elsevier has

- created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19. The COVID-19 resource centre is hosted on Elsevier Connect, the company ' s public news and information. *Clin Epidemiol Glob Heal.* 2021; 12(January):1–7. 6.
- Musa, R., Fadzil, M. A., & Zain, Z. A. I. N. I. (2007). Translation, validation and psychometric properties of Bahasa Malaysia version of the Depression Anxiety and Stress Scales (DASS). *ASEAN Journal of Psychiatry*, 8(2), 82-89.
- Niu, G. feng, Shi, X. han, Yao, L. shuang, Yang, W. cheng, Jin, S. yu, & Xu, L. (2022). Social Exclusion and Depression among undergraduate students: the mediating roles of rejection sensitivity and social self-efficacy. *Current Psychology*. <https://doi.org/10.1007/s12144-022-03318-1>.
- Naushad, S., Farooqui, W., Sharma, S., Rani, M., Singh, R & Verma, S. (2014). Study of proportion and determinants of depression among college students in Mangalore city. *Nigerian Medical Journal.* 55(2), 156 - 150.
- Rahmandani, A., & Amaranggani, A. P. (2023). Forgiveness-Hope Relationships Considering the Risk of Depression: Samples from Public School Students in A Religious Country. *International Journal of Islamic Educational Psychology*, 4(1), 61–84. <https://doi.org/10.18196/ijiep.v4i1.18177>
- Sharma R, Bansal P, Chhabra M, Bansal C, Arora M. Severe acute respiratory syndrome coronavirus-2-associated perceived stress and anxiety among indian medical students: A cross-sectional study Severe Acute Respiratory Syndrome Coronavirus - 2 - Associated Perceived Stress and Anxiety among Indian Medica. *Asian J Soc Heal Behav.* 2021; 4(3):98–104. 8.
- Sun P, Wang M, Song T, Wu Y, Luo J, Chen L, et al. The Psychological Impact of COVID-19 Pandemic on Health Care Workers: A Systematic Review and. *Front Psychol.* 2021; 12(July):1–19. 4.
- Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. *Int J Environ Res Public Health.* 2020; 17(5):1729. <https://doi.org/10.3390/ijerph17051729> PMID: 32155789 5.
- Wong, S,S., Wong, C.C., Ng, K.W., Bostanudin, M.F.& Tan, S.F. (2023) Depression, anxiety, and stress among university students in Selangor, Malaysia during COVID-19 pandemics and their associated factors. *PLoS ONE* 18(1), <https://doi.org/10.1371/journal.pone.0280680>

SENTIMENT ANALYSIS USING MACHINE LEARNING ALGORITHM

*Syarifah Adilah Mohamed Yusoff¹, Nurul Izzah Mohd Rahiman², Wan Anisha Wan Mohammad³
Azlina Mohd Mydin⁴ and Rozita Kadar⁵
*syarifah.adilah@uitm.edu.my¹, 2022755587@student.uitm.edu.my², wanan122@uitm.edu.my³,
azlin143@uitm.edu.my⁴, rozita231@uitm.edu.my⁵

^{1,3,4,5}Jabatan Sains Komputer & Matematik (JSKM),
Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

²Kolej Pengajian Komputer, Informatik dan Media,
Universiti Teknologi MARA Cawangan Kuala Terengganu, Malaysia

*Corresponding author

ABSTRACT

In the current era of digitalization, technology has been deeply ingrained in society, serving as crucial tools not only for education but also significantly impacting the lifestyle of the community. One feature that emerges from social communications is the generation of diverse opinions and feedback across several domains, including books, people, hotels, products, research, events, and more. The phenomenon described, wherein feedback revolutionises the field, is commonly referred to as sentiment analysis, which has emerged as a captivating and burgeoning area of scholarly inquiry. This paper provides a foundational perspective and conceptual understanding of sentiment analysis, as well as the forthcoming challenges that this field will face.

Keywords: *sentiment analysis, opinion mining, machine learning, challenges*

Introduction

In the pre-internet era, individuals relied on many sources such as personal acquaintances, family members, consumer surveys, advertisements, and local communities to gather opinions regarding certain products and services. The proliferation of internet-based applications, driven by the widespread adoption of smartphones across all age groups, has significantly contributed to the expansion of social media platforms and blogs. Consequently, there has been an increase in the number of comments and evaluations pertaining to various daily activities.

Within a community, the opinions of others exert a substantial influence on our daily decision-making processes. These decisions encompass a wide range of choices, including the purchase of consumer goods like smartphones and the allocation of funds towards investments. Therefore, the perspectives can benefit organisations, governments, and individuals. One example involves the acquisition of consumer feedback pertaining to a marketing campaign, which enables an organisation to gauge the efficacy of said campaign or make necessary modifications to enhance its effectiveness. Meanwhile, collecting product feedback is advantageous for enhancing product quality, influencing income generation, and facilitating the evaluation of competitor goods (Hussein, 2018).

Sentiment analysis also known as Opinion Mining, a subfield within the discipline of natural language processing, focuses on the automated identification and classification of emotions and attitudes as expressed in written textual content. The procedure involves a number of crucial stages, which include preprocessing, feature extraction, and classification (Tan et al., 2023). Natural Language Processing (NLP) is a methodology that organises the extraction of various elements such as approaches, opinions, assessments, visions, perspectives, sentiments, emotions, feelings, excitements, and attitudes from a range of sources including verbal, nonverbal, Twitter, and databases. The process involves classifying opinions expressed in text as either "positive," "negative," or "neutral" (Balahur et al., 2010).

Level of Sentiment Analysis

Sentiment analysis can be categorised into multiple levels of analysis. Figure 1 shows the three main level of sentiment analysis.

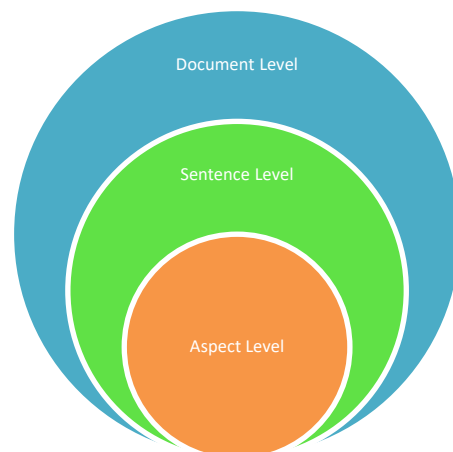


Figure 1: Three level of sentiment analysis

The task of document-level sentiment classification is a crucial issue within the field of sentiment analysis and opinion mining. It aims to evaluate the sentiment polarity of documents and online reviews (Shi et al., 2019). According to Rhanoui et al. (2019), when the quantity of words and noise words rises, the level of difficulty also increases, leading to a distortion in learning and complicating the prediction of polarity. The complete body of subjective text is considered the fundamental unit of information. The document is assumed to possess a viewpoint concerning a specific entity, such as a film, book, or hotel. This approach is not suitable when the text includes subjective viewpoints pertaining to many entities, such as non-forums and blogs. The entirety of the document is

categorised as either positive or bad. In order to facilitate the processing task, it is necessary to eliminate sentences that are not significant (Kolkur et al., 2015).

On the other hand, at the sentence level, the aim is to examine the statements and evaluate if they represented a positive, negative, or neutral attitude (Liu, 2012). The initial step is to determine if the sentence is subjective or objective in nature (Medhat et al., 2014a). Based on (Kolkur et al., 2015), the next step is the Sentiment Classification where this level will classify whether the sentence has positive, negative, or neutral sentiment. If the sentence is objective, then it is neutral, while if it the sentence is subjective, it is between positive or negative. The facts are contained in the objective sentence. It expresses no judgement or opinion about the item or thing, whereas subjective sentences express opinions.

Last but not least, aspect level refers to feature-based opinion mining and summarization. Classification is accomplished by finding and extracting product attributes from the source data (Patil & Yalagi, 2016). Aspect-level classification attempts to categorise sentiment in relation to certain properties of items (Medhat et al., 2014b). Based on the study from (Liu, 2012), aspect level examines the opinion itself rather than linguistic constructions. It is founded on the notion that an opinion is made up of a feeling (either positive or negative) and a target (of opinion). An opinion is only useful if its goal is recognised. There are two (2) types of opinions: regular and comparative opinions.

Approach used in Sentiment Analysis

There are three different approaches to deal with the sentiment analysis problem: (1) strategies based on lexicons, (2) techniques based on machine learning, and (3) hybrid approaches (Dang et al., 2020). Figure 2 shows that there are three types of machine learning approaches: unsupervised, semi-supervised, and supervised learning. Meanwhile, there are two types of Lexicon-based approaches: corpus and dictionary based.

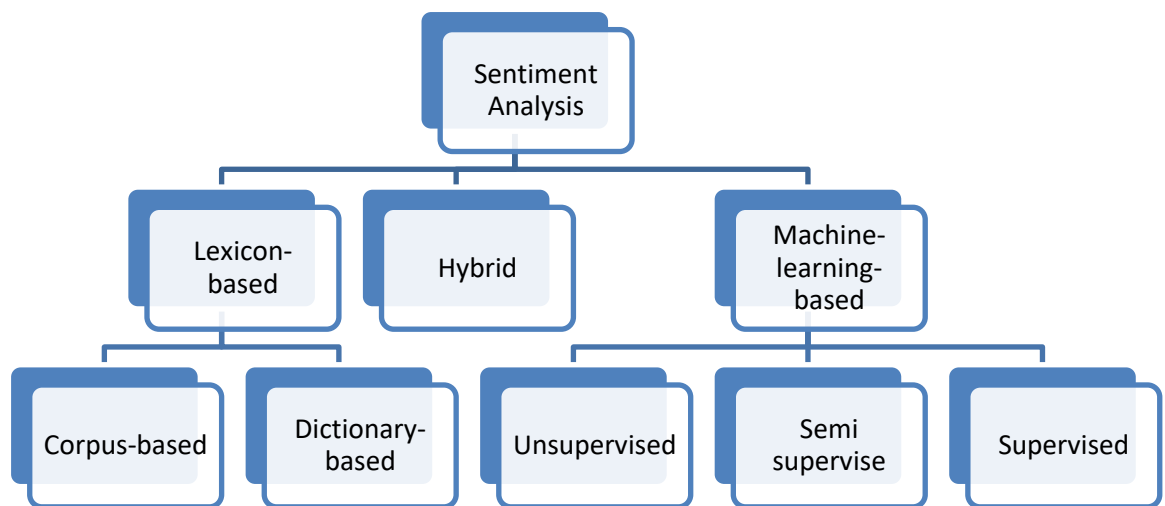


Figure 2: Sentiment Analysis Approaches

Implementation of Machine Learning for Sentiment Analysis

Work	Problem	Objective	Algorithm Used
Sentiment Analysis On E-Sports for Education Curriculum Using Naive Bayes and Support Vector Machine. (Ardianto et al., 2020)	The need to accurately analyse a large volume of comments on social media regarding e-sports education to separate positive and negative sentiments.	To measure opinions and separate positive and negative sentiments towards e-sports education	Naïve Bayes, Support Vector Machine (SVM)
Opinion Analysis for Emotional Classification on Emoji Tweets using the Naïve Bayes Algorithm. (Sendari et al., 2020)	Miscommunication can occur when Emojis are used separately within a message, leading to ambiguity of emotions conveyed.	The study aims to classify tweet content based on Emojis, identify emotions (e.g., anger, joy, sadness), and determine the dominant emotional trend on Twitter.	Naïve Bayes
Sentiment analysis of COVID-19 vaccine in Indonesia using Naïve Bayes Algorithm. (Pristiyono et al., 2021)	Concerns and uncertainties exist regarding public acceptance of COVID-19 vaccines in Indonesia.	To assess public opinion on the COVID-19 vaccine in Indonesia using social network	Naïve Bayes

Using Naïve Bayes Algorithm in detection of Hate Tweets. (Kiilu et al., 2018)	The presence of hateful speech on social media platforms, which can have negative impacts on users and incite violence.	To develop a reliable tool for detecting hate tweets and classifying hateful speech on social media.	Naïve Bayes
Sentiment Analysis of Government Policy on Corona Case Using Naive Bayes Algorithm. (Isnain et al., 2021)	Determining whether the sentiment expressed on Twitter regarding the policy is positive or negative.	To analyse public sentiment on Twitter about the New Normal policy and evaluate the performance of TF-IDF and N-gram using Naïve Bayes Classifier.	Naïve Bayes
App Review Sentiment Analysis Shopee Application in Google Play Store Using Naive Bayes Algorithm. (Pratmanto et al., 2020)	Analysing user sentiments towards the Shopee app based on Google Play Store comments.	Assisting Shopee's management in identifying positive or negative opinions and contributing to the development of related theories.	Naïve Bayes
Implementation of Sentiment Analysis on Twitter Using Naïve Bayes Algorithm to Know the People Responses to Debate of DKI Jakarta Governor Election. (Pratama et al., 2019)	Analysing vast social media data, like Twitter, poses challenges in extracting meaningful insights accurately.	To analyse Twitter sentiment on Jakarta's governor election debates, focusing on public response to three candidates.	Naïve Bayes
Sentiment Analysis of Tweets on Social Issues using Machine Learning Approach. (Kaur & Sharma, 2020)	Analysing the sentiments of people related to five major social issues (corruption, women violence, poverty, child abuse, illiteracy) using tweet data collected from 2006 to July 2020.	To analyse sentiments in tweets about social issues using machine learning and NLP techniques.	Decision Tree, Naïve Bayes, Random Forest (RF), Logistic Regression (LR), Support Vector Machine (SVM), K-nearest Neighbours (KNN), Shastic Gradient Descent (SGD)
Sentiment analysis for customer review: Case study of Traveloka. (Diekson et al., 2023)	Analysis of sentiments from Twitter users regarding the services provided by Traveloka.	To determine the sentiment of Twitter users regarding Traveloka's services and assess customer satisfaction.	Naïve Bayes, Logistic Regression (LR), Support Vector Machine (SVM)
Sentiment Analysis of YouTube Movie Trailer Comments Using Naïve	Analysis of viewers' comments and opinions about the	To conduct sentiment analysis on viewers'	Naïve Bayes

Bayes. (Novendri et al., 2020)	Money Heist series in order to classify their sentiments.	comments using the Naïve Bayes algorithm to determine the opinions and sentiments expressed about the Money Heist series.	
--------------------------------	---	---	--

Challenge in Sentiment Analysis

Sentiment analysis in every aspect of social issues have discovered a lot of insight feedback came across from huge information circulate from online conversation. Anyhow, the complexity of human language constitute challenge for AI to interpret the real meaning of the sentence. For example, Figure 3 depicted a consumer feedback on a product of a handphone.

- | |
|--|
| <ol style="list-style-type: none"> (1) I bought a Zfold3 Samsung handphone 3 months ago. (2) I simply love it (3) The camera quality is fantastic (4) The flip screen is amazing for reading (5) However, my husband thinks it too heavy to put in his pants pocket |
|--|

Figure 3: Consumer feedback on a product

This feedback shows both positive and negative sentiment, where the first statement until forth indicate positive based on the word “love”, “fantastic” and “amazing”. On the fifth statement, the sentence indicates the negative word such as “too heavy”. Hence, how would AI decide the feedback is positive/negative/neutral.

The meaning of a word depends on the context it is used in. Sarcasm, polarity and polysemy are example of challenges happen in understanding the real intention of a sentence. Sarcasm refer to a way in expressing a thought in opposite way, example is when the intention is negative but the sentence is positive, example “I am soooooo happy the item shipped after 2 weeks”. In such case, the sentiment analysis tool can classify the sentence as positive, but in reality, it is negative. Polarity is used to identified the level of satisfaction, some feedback can be very apparent such as “It was terrified experience”. Other feedback “the experience is unexpected”, the level of satisfaction is unclear, infact the level of positive or negative satisfaction is unknown. Polysemy is a sentence that have multiple related meaning, “your customer support is killing me VS your product is killing me”. Then it become more challenging for algorithm to differentiate the intended meaning. Negation detection such as “no,

not, -non, -less, dis” does not mean the whole statement is negative, example is “it is not unhealthy”. Some of the modern negation detection methods are not sufficient in detecting and classify the statement correctly and bound to make many errors (Simmering & Perry, 2023).

Multilingual data which is happen to be the most critical and complicated problems in every cultural post since English is most of spoken language and mix in every community spoken slang. Conflict with this limitation, some of the analysis might get lost in translation due to the sentiment tool are primary trained to categorized word in one language (Yilmaz, 2023). Example is Malay slang “Yesterday’s concert was Best Gila!” the direct translation might be negative, but “Best Gila” is a slang used to say “awesome” and suppose to be a positive statement.

Sentiment analysis primarily relies on textual statements for determining emotions. However, emojis, which are considered out-of-vocabulary words, have become integrated into sentences as a means of expressing emotions and enhancing the accuracy of sentiment prediction. It is important to note that emojis may be subject to varying interpretations across different groups. Therefore, it is imperative for sentiment analysis technologies to possess the capability of incorporating emojis in order to enhance the accuracy of the analysis.

Conclusion

Sentiment analysis is regarded as a significant justification for comprehending the genuine needs and contentment of consumers, as well as a potent instrument for predicting the future viability of products and services. The utilisation of machine learning and Artificial Intelligence in addressing upcoming challenges serves to highlight the fact that sentiment analysis remains a comparatively underexplored area of research.

References:

- Ardianto, R., Rivanie, T., Alkhalifi, Y., Nugraha, F. S., & Gata, W. (2020). Sentiment analysis on E-sports for education curriculum using naive Bayes and support vector machine. *Jurnal Ilmu Komputer Dan Informasi*, 13(2), 109–122.
- Bhadane, C., Dalal, H., & Doshi, H. (2015). Sentiment analysis: Measuring opinions. *Procedia Computer Science*, 45(C), 808–814. <https://doi.org/10.1016/j.procs.2015.03.159>
- Dang, N. C., Moreno-García, M. N., & de la Prieta, F. (2020). Sentiment analysis based on deep learning: A comparative study. *Electronics (Switzerland)*, 9(3). <https://doi.org/10.3390/electronics9030483>

- Diekson, Z. A., Prakoso, M. R. B., Putra, M. S. Q., Syaputra, M. S. A. F., Achmad, S., & Sutoyo, R. (2023). Sentiment analysis for customer review: Case study of Traveloka. *Procedia Computer Science*, 216, 682–690.
- Hussein, D. M. E. D. M. (2018). A survey on sentiment analysis challenges. *Journal of King Saud University - Engineering Sciences*, 30(4), 330–338. <https://doi.org/10.1016/j.jksues.2016.04.002>
- Isnain, A. R., Marga, N. S., & Alita, D. (2021). Sentiment Analysis Of Government Policy on Corona Case Using Naive Bayes Algorithm. *IJCCS (Indonesian Journal of Computing and Cybernetics Systems)*, 15(1), 55. <https://doi.org/10.22146/ijccs.60718>
- Kaur, C., & Sharma, A. (2020). Sentiment analysis of tweets on social issues using machine learning approach. *International Journal of Advanced Trends in Computer Science and Engineering*, 9(4), 6303–6311. <https://doi.org/10.30534/ijatcse/2020,310942020>.
- Kiilu, K. K., Okeyo, G., Rimiru, R., & Ogada, K. (2018). Using Naïve Bayes Algorithm in detection of Hate Tweets. *International Journal of Scientific and Research Publications (IJSRP)*, 8(3). <https://doi.org/10.29322/ijsrp.8.3.2018.p7517>
- Kolkur, S., Dantal, G., & Mahe, R. (2015). *Study of Different Levels for Sentiment Analysis*.
- Liu, B. (2012). *Sentiment Analysis and Opinion Mining*. Morgan & Claypool Publishers.
- Medhat, W., Hassan, A., & Korashy, H. (2014). Sentiment analysis algorithms and applications: A survey. *Ain Shams Engineering Journal*, 5(4), 1093–1113. <https://doi.org/10.1016/j.asej.2014.04.011>
- Novendri, R., Callista, A. S., Pratama, D. N., & Puspita, C. E. (2020). Sentiment Analysis of YouTube Movie Trailer Comments Using Naïve Bayes. *Bulletin of Computer Science and Electrical Engineering*, 1(1), 26–32. <https://doi.org/10.25008/bcsee.v1i1.5>
- Patil, P., & Yalagi, P. (2016). *Sentiment Analysis Levels and Techniques: A Survey*.
- Pratama, Y., Roberto Tampubolon, A., Diantri Sianturi, L., Diana Manalu, R., & Friez Pangaribuan, D. (2019). Implementation of Sentiment Analysis on Twitter Using Naïve Bayes Algorithm to Know the People Responses to Debate of DKI Jakarta Governor Election. *Journal of Physics: Conference Series*, 1175(1). <https://doi.org/10.1088/1742-6596/1175/1/012102>
- Pratanto, D., Rousyati, R., Wati, F. F., Widodo, A. E., Suleman, S., & Wijianto, R. (2020). App Review Sentiment Analysis Shopee Application in Google Play Store Using Naive Bayes Algorithm. *Journal of Physics: Conference Series*, 1641(1). <https://doi.org/10.1088/1742-6596/1641/1/012043>

- Pristiyono, Ritonga, M., Ihsan, M. A. al, Anjar, A., & Rambe, F. H. (2021). Sentiment analysis of COVID-19 vaccine in Indonesia using Naïve Bayes Algorithm. *IOP Conference Series: Materials Science and Engineering*, 1088(1), 012045. <https://doi.org/10.1088/1757-899x/1088/1/012045>
- Rhanoui, M., Mikram, M., Yousfi, S., & Barzali, S. (2019). A CNN-BiLSTM Model for Document-Level Sentiment Analysis. *Machine Learning and Knowledge Extraction*, 1(3), 832–847. <https://doi.org/10.3390/make1030048>
- Sendari, S., Zaeni, I. A. E., Lestari, D. C., & Hariyadi, H. P. (2020). Opinion analysis for emotional classification on emoji tweets using the Naïve bayes algorithm. *Knowledge Engineering and Data Science*, 3(1), 50–59.
- Shi, T., Wang, S., Rakesh, V., & Reddy, C. K. (2019). Document-level multi-aspect sentiment classification for online reviews of medical experts. *International Conference on Information and Knowledge Management, Proceedings*, 2723–2731. <https://doi.org/10.1145/3357384.3357828>
- Simmering, P., & Perry, T. (2023, February). *10 Challenges of sentiment analysis and how to overcome them Part 2*. ESOMAR. <https://researchworld.com/articles/10-challenges-of-sentiment-analysis-and-how-to-overcome-them-part-2>
- Steinberger, R., Kabadjov, M., Zavarella, V., van der Goot, E., Halkia, M., Pouliquen, B., & Belyaeva, J. (2010). Sentiment analysis in the news. *Proceedings of the 7th International Conference on Language Resources and Evaluation, LREC 2010*, 2216–2220
- Tan, K. L., Lee, C. P., & Lim, K. M. (2023). A Survey of Sentiment Analysis: Approaches, Datasets, and Future Research. In *Applied Sciences (Switzerland)* (Vol. 13, Issue 7). MDPI. <https://doi.org/10.3390/app13074550>
- Yilmaz, B. (2023, September 8). *Top 5 Sentiment Analysis Challenges and Solution in 2023*. AIMultiple. <https://research.aimultiple.com/sentiment-analysis-challenges/>

KAJIAN FAKTOR-FAKTOR PERMASALAHAN PEMBELAJARAN MATEMATIK DI KALANGAN PELAJAR KEJURUTERAAN DI UiTM CAWANGAN PULAU PINANG

*Rozita Kadar¹, Wan Nur Shaziayani Wan Mohd Rosly², Sharifah Sarimah Syed Abdullah³, Syarifah Adilah Mohamed Yusoff⁴ and Mohd Saifulnizam Abu Bakar⁵

*rozita231@uitm.edu.my¹, shaziayani@uitm.edu.my², sh.sarimah @uitm.edu.my³, syarifah.adilah @usm.edu.my⁴, mohdsaiful071@ppinang.uitm.edu.my⁵

^{1,2,3,4,5}Jabatan Sains Komputer & Matematik (JSKM),
Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

*Corresponding author

ABSTRAK

Matematik adalah subjek yang kritikal dalam struktur pendidikan, dimana seringkali diperhatikan bahawa kebanyakan pelajar menghadapi cabaran dalam memahami konsep matematik. Cabaran ini terhasil dari pelbagai faktor, termasuk perbezaan pembelajaran individu, kaedah pengajaran, dan juga faktor peribadi yang mempengaruhi proses pembelajaran. Kepentingan mengenal pasti dan membantu pelajar yang menghadapi kesukaran dalam matematik menjadi langkah asas dalam menangani isu ini secara berkesan. Oleh itu, kajian ini bertujuan untuk mengenal pasti pelajar yang menghadapi kesukaran didalam pemahaman matematik. Pengelasan pelajar ini menjadi asas untuk melaksanakan kaedah pengajaran dan pembelajaran yang berkesan untuk menangani keperluan pelajar-pelajar semasa proses pembelajaran. Kajian ini menggunakan pendekatan pemerhatian dan penilaian prestasi pelajar dalam teknik pengumpulan data. Dengan menggunakan ujian penilaian matematik, pemerhatian dalam kelas, dan maklum balas daripada pensyarah, gambaran menyeluruh tahap pemahaman matematik setiap pelajar terhasil. Pendekatan ini memastikan pemahaman yang menyeluruh terhadap cabaran yang dihadapi oleh pelajar-pelajar yang menghadapi kesukaran dan menyumbang kepada pembangunan strategi yang sesuai untuk penambahbaikan. Hasil dari dapatan ini adalah sebagai satu langkah untuk menangani isu cabaran pelajar didalam mempelajari matematik. Dengan pendekatan yang digunakan dalam kajian ini, diharap ianya merupakan satu alternatif kepada kaedah pengajaran dan pembelajaran matematik pada masa hadapan.

Keywords: Pembelajaran Matematik, Pelajar Lemah, Gagal Matematik, Faktor Kegagalan, Cabaran

Pengenalan

Matematik adalah satu subjek yang luas diperbincangkan dalam bidang akademik kerana banyak masalah yang timbul dikalangan pelajar dalam mempelajari matematik. Permasalahan yang dihadapi oleh pelajar dalam mempelajari matematik berterusan dibincangkan. Menurut Wardhani (2019) permasalahan pelajar dalam mempelajari matematik boleh dipecahkan kepada 6 faktor iaitu permasalahan persepsi, permasalahan pada penggunaan prosedur, konsep, dan prinsip, miskonsep terhadap proses dan kegiatan visual, permasalahan penggunaan deduktif aksiomatik, dan lemahnya hubungan dan penalaran dalam sesuatu bahagian dalam matematik.

Hasil penelitian yang dilakukan oleh Dirgantoro (2019) juga dapat disimpulkan bahwa permasalahan yang dialami mahasiswa dalam mempelajari matematik termasuk: permasalahan memahami konsep dasar, permasalahan dalam melakukan operasi penguraan, permasalahan memahami masalah dalam soalan-soalan yang diberikan, dan ketidaktelitian dalam proses pemecahan masalah.

Kajian juga dijalankan oleh Budiarto (2007) menyatakan keupayaan pelajar dalam membuat pembuktian sangat lemah. Begitu juga kajian yang dijalankan oleh Budiarto (2008) mendapati kesalahan-kesalahan yang dilakukan pelajar adalah dalam pola yang sama.

Dalam kajian ini, telah dibuat pengumpulan data dikalangan pelajar dipusat pengajian tinggi. Data yang diperoleh daripada penilaian ini tidak hanya memberikan gambaran tentang tahap kesukaran matematik setiap pelajar tetapi juga menerangkan punca-punca yang mungkin tersembunyi. Punca-punca ini boleh merangkumi pengetahuan asas, amalan pembelajaran yang tidak efektif, sehingga kesukaran dalam memahami konsep matematik. Dengan mengenali punca-punca ini, pendidik dan pihak berkepentingan boleh menyesuaikan kaedah mengajar yang perbagai untuk menangani isu-isu tertentu serta meningkatkan kemungkinan hasil yang berkesan.

Tujuan Kajian

Tujuan kajian ini adalah untuk lebih memahami cabaran yang dihadapi oleh pelajar-pelajar peringkat pra-diploma, diploma dan sarjana muda dalam pembelajaran matematik. Keputusan untuk menjalankan kajian pada minggu ke-9 adalah strategik, dengan memberi peluang yang mencukupi untuk pengamatan yang bermakna, namun masih mempunyai ruang untuk penambahbaikan yang mungkin kepada pelajar-pelajar sebelum tamatnya kursus pada minggu ke-14.

Manfaat Kajian

Kajian ini adalah sebagai langkah mula untuk mengenal pasti pelajar yang menghadapi masalah dalam pembelajaran matematik dan menangani masalah yang dihadapi oleh mereka. Hasil kajian ini sebagai ukuran pemahaman pelajar terhadap matematik, dengan itu membolehkan strategi pengajaran dan pembelajaran yang berkesan sejak dari awal dapat dilaksanakan untuk membantu mereka yang dikenalpasti sebagai lemah secara akademik. Dapatan kajian ini dapat membuka jalan bagi langkah proaktif, membantu pelajar yang kurang cekap dengan melaksanakan tindakan sokongan tepat pada masanya dan mengatasi cabaran pembelajaran yang mereka hadapi.

Metodologi Kajian

Kajian ini dijalankan adalah untuk meningkatkan kualiti pendidikan matematik bagi pelajar-pelajar diperingkat pra-diploma, diploma dan ijazah sarjana muda dalam bidang kejuruteraan. Pandangan yang diperoleh dari kajian ini dijangka akan mempengaruhi pembangunan pendidikan yang tidak hanya menangani kelemahan akademik tetapi juga faktor-faktor yang mempengaruhi penglibatan dan prestasi pelajar dalam matematik.

Kajian ini dijalankan semasa minggu ke-9 dari tempoh kuliah selama 14 minggu. Responden terdiri daripada pensyarah-pensyarah yang mengajar kursus-kursus matematik kepada pelajar-pelajar kejuruteraan di Universiti Teknologi MARA Pulau Pinang. Seramai 30 orang pensyarah telah diminta untuk terlibat dalam pengamatan dan pemantauan terhadap pelajar-pelajar dalam kelas masing-masing

untuk mengenal pasti mereka yang dikategorikan sebagai pelajar-pelajar lemah secara akademik. Dalam konteks ini, kelemahan akademik didefinisikan sebagai pelajar-pelajar yang menunjukkan tahap penglibatan yang rendah didalam kelas dan memiliki markah penilaian di bawah 50%.

Pensyarah-pensyarah membantu dalam memberi maklumat berkaitan tahap prestasi pelajar kerana mereka bertanggungjawab untuk mengajar pelajar-pelajar kejuruteraan dalam matematik. Pandangan dan pengamatan mereka dianggap sangat berharga dalam mengenal pasti pelajar-pelajar yang mungkin menghadapi kesulitan dengan kandungan mata pelajaran tersebut. Mereka diminta untuk membuat pengamatan mereka sepanjang sesi pengajaran hingga minggu ke-9, dengan memberi tumpuan kepada penglibatan dan prestasi pelajar-pelajar. Untuk memudahkan proses ini, satu templat yang standard untuk Laporan Pengajaran dan Pembelajaran disediakan.

Data yang diperlukan dalam laporan-laporan termasuk maklumat asas seperti nama pensyarah, kelas yang diajar, senarai nama pelajar-pelajar lemah, cabaran-cabaran tertentu yang dihadapi oleh pelajar-pelajar ini, dan pendekatan-pendekatan yang dicadangkan untuk penambahbaikan. Laporan Pengajaran dan Pembelajaran dijangka memberikan gambaran menyeluruh mengenai isu-isu yang dihadapi oleh pelajar-pelajar, dalam konteks persekitaran pembelajaran. Maklumat berdimensi pelbagai ini penting bagi pembangunan intervensi yang berkesan dan disesuaikan dengan keperluan individu. Setelah Laporan Pengajaran dan Pembelajaran disiapkan, mereka akan memuat naik ke Google Drive yang telah ditetapkan untuk pensyarah-pensyarah tersebut. Platform digital ini memastikan pengumpulan laporan-laporan tersebut untuk analisis lanjut. Penggunaan templat yang standard dan platform yang sama membantu meningkatkan kecekapan proses pengumpulan data.

Selepas pengumpulan laporan-laporan, peranan menganalisis data diserahkan kepada Ketua Jabatan Matematik. Langkah ini adalah penting kerana ia bertujuan untuk menyatukan maklumat yang dikumpulkan dari pensyarah-pensyarah yang berbeza dan kelas-kelas mereka masing-masing. Proses analisis melibatkan mengenal pasti cabaran yang dihadapi oleh pensyarah dan pelajar serta mengenalpasti pelajar-pelajar lemah akademik di dalam kelas. Pendekatan ini memudahkan pemahaman yang lebih holistik terhadap isu-isu berkaitan pengajaran dan pembelajaran, sekaligus membolehkan pembentukan strategi pengajaran dan pembelajaran secara menyeluruh.

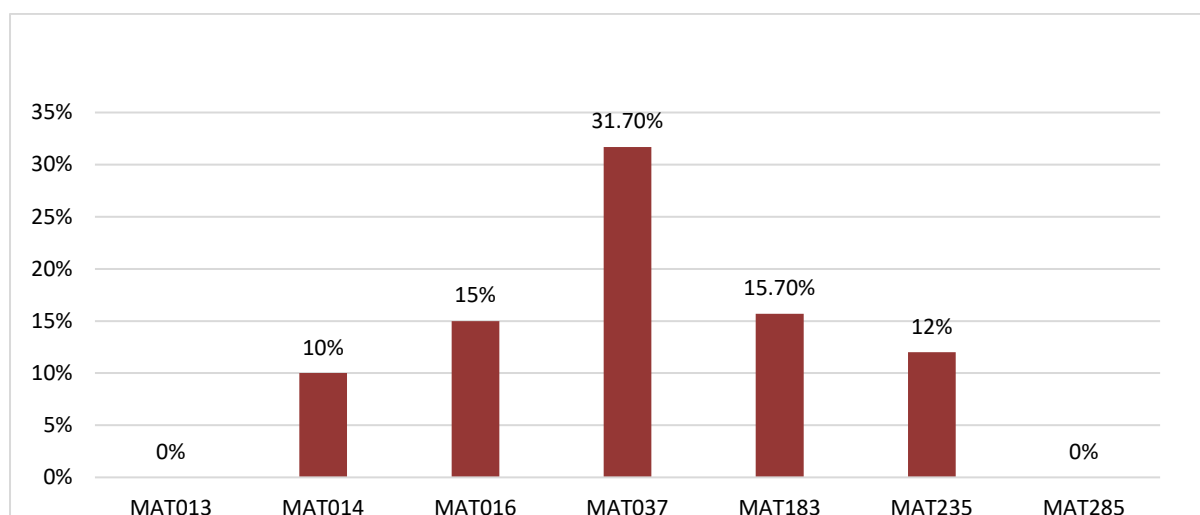
Hasil Kajian

Hasil dapatan dari pengumpulan data ini dianalisa dengan mendapatkan peratus keseluruhan pelajar lemah untuk setiap kursus dengan menggabungkan keseluruhan kelas. Kod kursus yang ditawarkan pada semester ini mengikut peringkat pengajian adalah seperti Jadual 1 dibawah:

Jadual 1: Kod kursus mengikut peringkat pengajian

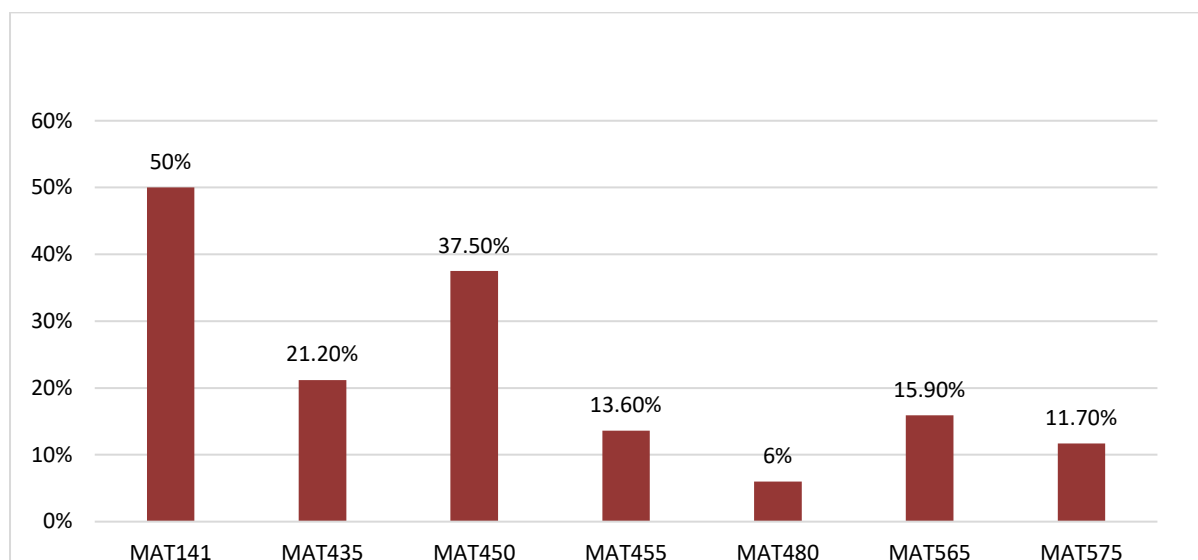
Peringkat Pengajian	Kod Kursus Matematik
Pra-Diploma	MAT013, MAT014, MAT016, MAT037
Diploma	MAT183, MAT235, MAT285
Sarjana Muda	MAT414, MAT435, MAT450, MAT455, MAT480, MAT565, MAT575

Pada Gambarajah 1, menunjukkan peratus pelajar lemah peringkat pra-diploma dan diploma pada semester ini yang pengamatan dibuat pada minggu ke-9. Didapati kod kursus MAT037 mempunyai peratus pelajar lemah yang tinggi iaitu 31.07%. Pelajar yang mendaftar dengan kursus ini adalah pelajar pra-diploma yang terdiri dari pelajar yang kurang penguasaan Matematik diperingkat sekolah. Selebihnya adalah kod kursus MAT014 dan MAT016 dengan 10% dan 15% peratus pelajar lemah. Untuk kod kursus MAT013, tiada pelajar yang dikategorikan sebagai lemah. Peringkat diploma pula, tiada banyak perbezaan peratus pelajar lemah untuk kod kursus MAT183 dan MAT235 iaitu 15.7% dan 12% dan didapati tiada pelajar yang dikenalpasti sebagai lemah untuk kod kursus MAT285.



Gambarajah 1: Peratus Pelajar Lemah dalam Matematik Peringkat Pra-Diploma dan Diploma pada Minggu ke-

Gambarajah berikutnya (Gambarajah 2), menunjukkan peratus pelajar dikategorikan sebagai lemah diperingkat Sarjana Muda. Dikenalpasti peratus pelajar lemah paling tinggi ialah kod kursus MAT141 iaitu 50%. Perkara ini disebabkan oleh silibus kursus ini merangkumi Matematik Tambahan dimana pelajar kurang asas matematik tambahan kerana pelajar-pelajar ini tidak mengambil Matematik Tambahan diperingkat sekolah. Seterusnya peratus tinggi adalah kod kursus MAT450 iaitu 37.5%, diikuti MAT435(21.2%), MAT565(15.9%), MAT455(13.6%), MAT575(11.7%) dan MAT480(6%).



Gambarajah 2: Peratus Pelajar Lemah dalam Matematik Peringkat Sarjana Muda pada Minggu ke-9

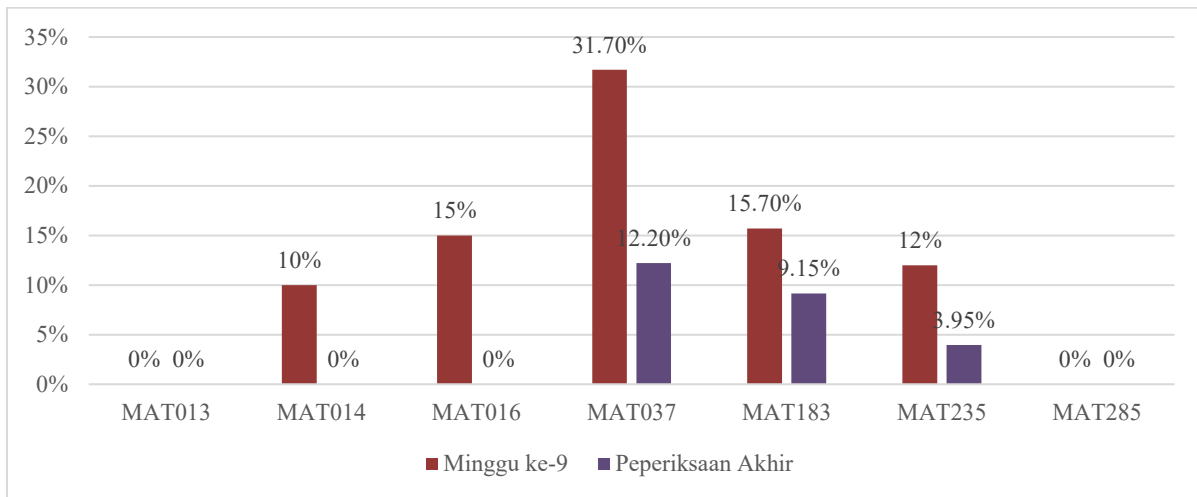
Selain dari mengenalpasti peratus pelajar lemah untuk sesuatu kod kursus, kajian ini juga mengenalpasti faktor-faktor penyebab dalam menyumbang kepada peratus lemah pelajar ini seterusnya beberapa pendekatan telah diambil untuk mengurangkan peratus pelajar lemah untuk setiap kod kursus. Antara faktor-faktor penyebab yang menyumbang kepada peratus pelajar lemah adalah seperti dibawah:

Dari pemerhatian ini didapati beberapa pelajar menghadapi cabaran dalam pembelajaran matematik. Kelemahan dalam asas kalkulus, minat yang kurang, dan kurang pemahaman terhadap topik adalah beberapa isu utama. Pelajar juga seringkali terlupa formula penting dan mengambil masa yang lama untuk memahami konsep.

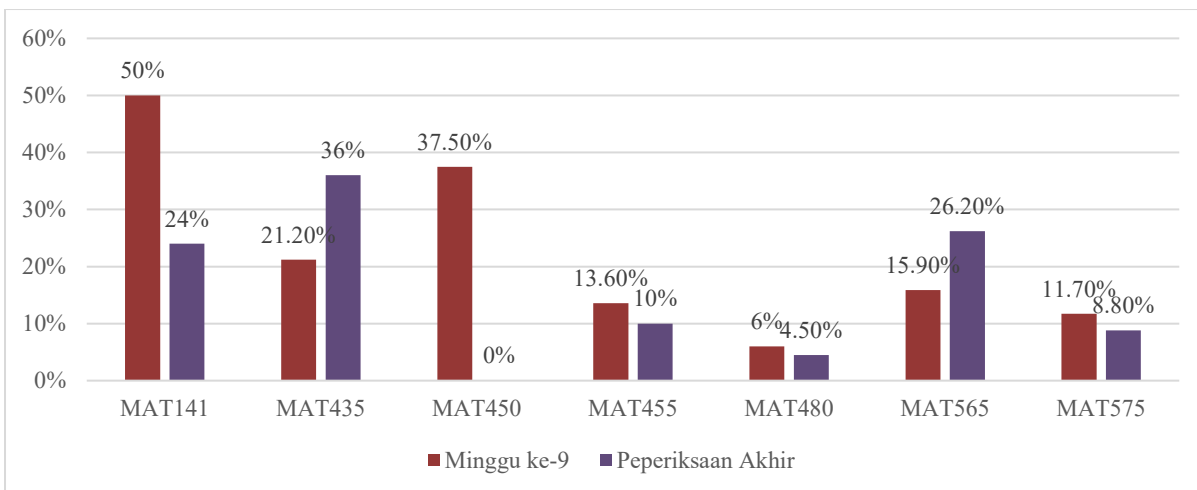
Terdapat juga beberapa pelajar yang enggan bertanya atau merujuk kepada pensyarah yang mengajar, mereka lebih suka bertanya kepada rakan sebaya. Kekurangan keaktifan dalam kelas juga menyebabkan beberapa pelajar malu untuk bertanya jika tidak memahami sesuatu konsep serta cenderung kurang membuat latihan bagi setiap topik yang dipelajari, yang boleh mengakibatkan kekurangan kefahaman. Kemahiran berbahasa Inggeris yang lemah seringkali membuat pelajar sukar memahami kehendak soalan, yang boleh mempengaruhi prestasi mereka dalam ujian.

Faktor-faktor lain adalah jadual kuliah yang padat merupakan satu cabaran utama dalam proses pembelajaran pelajar. Pensyarah seringkali menghadapi masalah untuk mengadakan kelas ganti atau kelas tambahan kerana jadual pelajar yang terlalu padat. Selain itu, pelajar juga kekurangan masa untuk mengulangkaji pelajaran kerana terlalu banyak tugas yang perlu disiapkan dan dihantar. Ini menyebabkan pelajar seringkali terpaksa fokus pada tugas dan mengabaikan pengulangan kajian yang penting. Selain itu, beberapa pelajar hanya membuat latihan yang diberikan oleh pensyarah sahaja dan tidak berminat untuk melakukan latihan tambahan, yang boleh menghalang perkembangan kefahaman mereka dalam subjek tersebut.

Selepas beberapa usaha telah dilakukan oleh pensyarah-pensyarah, prestasi pelajar kearah yang lebih positif dan pada Gambarajah 3 dan Gambarajah 4 dibawah telah menunjukkan perbandingan peratus pelajar lemah pada minggu ke-9 dibandingkan dengan peperiksaan akhir Didapati peratus pelajar lemah semakin menurun dan terdapat juga kursus yang 100% boleh mengatasi pelajar lemah dimana didapati 100% pelajar telah lulus untuk kursus berkenaan. Ini menunjukkan pendekatan yang digunapakai oleh pensyarah-pensyarah menuntukan perkembangan positif kepada pelajar.



Gambarajah 3: Perbandingan Peratus Pelajar Lemah dalam Matematik Peringkat Pra-Diploma dan Diploma pada Minggu ke-9 dan Peperiksaan Akhir



Gambarajah 4: Perbandingan Peratus Pelajar Lemah dalam Matematik Peringkat Sarjana Muda pada Minggu ke-9 dan Peperiksaan Akhir

Perbincangan

Kajian ini adalah satu penyelidikan permulaan yang penting dengan tujuan untuk memudahkan pengenalan dan penyelesaian bagi pelajar yang dikategorikan sebagai lemah akademik, terutamanya dalam subjek matematik. Dapatan daripada kajian ini tidak hanya memberi gambaran tahap pemahaman pelajar terhadap matematik tetapi juga memberikan peluang untuk melaksanakan strategi intervensi awal bagi mengatasi kesulitan pembelajaran yang dihadapi oleh pelajar.

Berbaki selama 5 minggu untuk tamatnya minggu kuliah, beberapa pendekatan telah dilakukan oleh pensyarah-pensyarah untuk membantu pelajar-pelajar dalam meningkatkan kemahiran dan pemahaman matematik. Bagi mengatasi masalah ini, penting untuk meningkatkan penyampaian matematik yang lebih menarik dan memberi peluang kepada pelajar untuk mencari bantuan tambahan. Pelajar perlu lebih berusaha dalam proses pembelajaran matematik dan bekerjasama dengan pensyarah serta rakan sebaya. Dengan usaha bersama, pelajar boleh mengatasi cabaran matematik dan meningkatkan pencapaian mereka dalam kursus ini.

Penting untuk menggalakkan pelajar untuk berkomunikasi dengan pensyarah, lebih aktif dalam kelas, rajin membuat latihan, dan memperbaiki kemahiran berbahasa Inggeris adalah faktor untuk meningkatkan pencapaian dalam pembelajaran matematik. Adalah penting juga untuk mencari penyelesaian yang lebih baik bagi jadual kuliah pelajar serta menggalakkan pelajar untuk melakukan lebih banyak latihan untuk memastikan pemahaman yang mendalam dalam kursus matematik.

Kajian ini menganjurkan pendekatan proaktif, di mana pelajar yang dikenalpasti dan dibantu sebelum kesukaran mereka bertambah teruk. Pelajar yang memperlihatkan kurang kefahaman dalam pengetahuan asas matematik mungkin mendapat faedah daripada kelas tambahan atau latihan yang lebih banyak. Pendekatan pembelajaran yang sesuai boleh memberikan harapan untuk mengurangkan kesan negatif cabaran pembelajaran dan meningkatkan potensi kejayaan akademik pelajar. Dengan itu, pensyarah memainkan peranan penting dalam mengenal pasti pelajar yang menghadapi kesukaran dan melaksanakan proses pembelajaran yang efektif.

Kesimpulan

Kajian ini memberi tumpuan kepada mengenal pasti pelajar yang berdepan kesukaran tanpa mengira jantina mereka dan bertujuan untuk mencipta persekitaran pembelajaran yang sesuai untuk semua peringkat pelajar. Strategi pemulihan pelajar yang dicadangkan oleh kajian ini merangkumi pelbagai pendekatan. Pendekatan-pendekatan ini disesuaikan untuk menangani keperluan individu yang dikenal pasti dalam kalangan pelajar yang berdepan kesukaran.

Pentingnya ditekankan bahawa matlamat kajian ini bukan sekadar untuk meningkatkan gred pelajar dalam matematik tetapi untuk meningkatkan kecekapan matematik secara menyeluruh dan

meningkatkan keyakinan diri. Dengan mewujudkan pengalaman pembelajaran yang positif dan menanamkan perasaan pencapaian, pelajar lebih cenderung untuk terus terlibat dan bermotivasi dalam usaha matematik mereka.

Dapat disimpulkan, kajian ini berperanan sebagai titik mula yang penting dalam usaha menyokong dan meningkatkan pelajar-pelajar yang menghadapi kesukaran dalam matematik. Dengan mengenal pasti pelajar-pelajar ini melalui pelbagai kaedah penilaian, rangka kerja kaedah pengajaran yang bersesuaian terbentuk. Rangka kerja ini mendorong kerjasama di antara pensyarah-pensyarah, semua bekerja menuju matlamat bersama untuk memupuk kecekapan matematik dan keyakinan akademik.

References:

- Budiarto, M. T. (2007). Kemampuan Deduktif Aksiomatik Mahasiswa Jurusan Pendidikan Matematika FMIPA IKIP Surabaya. *Penelitian Peningkatan Kualitas Pembelajaran RI. I BATCH II, Proyek PGSM. Pusat Penelitian IKIP Surabaya.*
- Budiarto, M. T., Khabibah, S., & Setianingsih, R. (2008). Membangun Level Abstraksi Siswa SMP dalam Memahami konsep Geometri. *Penelitian Fundamental Tahun Pertama, Pusat Penelitian Unesa Surabaya.*
- Dirgantoro, K. P. S. (2019). Analisis kesulitan mahasiswa PGSD pada mata kuliah geometri. *JNPM (Jurnal Nasional Pendidikan Matematika)*, 3(1), 13-26.
- Wardhani, I. S. (2020, February). Geometri dan Permasalahannya dalam Pembelajaran Matematika di Sekolah (Suatu Penelitian Meta Analisis). In *Prosiding SI MaNIs (Seminar Nasional Integrasi Matematika dan Nilai-Nilai Islami)* (Vol. 3, No. 1, pp. 124-129).

ArabKafa3: PERSUASIVE ARABIC LANGUAGE E-LEARNING PORTAL

Siti Saudah Binti Mohd Ghani¹, *Elly Johana Binti Johan², Wan Anisha Wan Mohammad³,
Azlina Mohd Mydin⁴ and Syarifah Adilah Mohamed Yusuf⁵

^{2,3,4,5}Jabatan Sains Komputer & Matematik (JSKM),
Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

¹ Fakulti Sains Komputer & Matematik (FSKM)
Universiti Teknologi MARA, Cawangan Terengganu, Malaysia

**Corresponding author*

ABSTRACT

The Al-Quran and Fardu Ain Class Program (KAFA) has been in place since 1990 with the goal of strengthening the foundations of Islamic education for children aged 7 to 12. The approach stresses reading the Al-Quran with tajwid and strengthening Fardu Ain's principles among his students, including knowledge of Arabic, and writing Jawi. Students who are not fluent in Jawi may struggle with Arabic comprehension. However, students currently show less interest in learning Arabic, and learning portals have become popular but not always effectively designed. To address this, the Arabic e-learning portal, ArabKafa3, will use persuasive technology principles like tunneling, liking, cooperation, and self-monitoring. In this project, three objectives have been identified that is to identify the requirements for developing Arabic Language E-Learning portal, to design and develop Arabic Language E-Learning portal using persuasive technology, and to evaluate the functionality and usability of Arabic Language E-Learning portal. ArabKafa3 targets third year KAFA students, utilizing the ADDIE Model methodology and incorporating persuasive technology in interface design. Testing for efficiency and effectiveness, functionality testing using test cases, expert evaluation, and usability testing have been made to ensure the portal's success in enhancing Arabic learning for primary 3 KAFA students.

Keywords: *Persuasive Technology; KAFA; Arabic, ADDIE Model Introduction*

Introduction

The Al-Quran and Fardu Ain Class Program (KAFA) had been in place since 1990 with the goal of strengthening the foundations of Islamic education for children aged 7 to 12. The approach stresses reading the Al-Quran with tajwid and instilling Fardu Ain's principles in his students, such as arabic knowledge and writing Jawi. KAFA Primary School was the first medium for developing a generation of Arabic Language masters. However, learned in KAFA schools differs significantly from learned in government-aided daily primary schools due to insufficient infrastructure, a short period of time, and some of the teachers being graduates of modest academic education (Ros et al. 2022). The success of the teacher was determined by the learned process of the students' reactions as well as their interaction in the lesson. Students who were not fluent in Jawi would struggle to read and understand Arabic. According to a previous study, students believed they had low self-confidence and motivation, and they were also sceptical of their ability to master Arabic because Arabic was a difficult language (Kassim et al. 2017). One of the major issues in teaching and learning Arabic was students' passive attitude (Lubis et al. 2014).

Technology could be used as persuasive tools to persuade students to learn in an enjoyable manner. Persuasive Technology (PT) refers to technologies that aimed to change an individual's behavior through persuasion and social influence (Caraben et al. 2014). Aside from motivation and persuasion, strategy was the most important component of PT architecture (Oinas-Kukkonen 2013;

Oinas-Kukkonen & Harjumaa 2018). To design a system based on PT architecture, the persuasive technique or strategy to motivate behavioral changes should be carefully considered. According to the findings of Nor Aziah et al. (2017), the Persuasive System Design (PSD) designed by Oinas-Kukkonen & Harjumaa (2018) was a comprehensive framework for planning and evaluating the PT.

The PSD model proposed by Oinas-Kukkonen (2018) consists of four design principles that should be considered when developing a prototype or application. The four categories were primary task support, dialogue support, system credibility support, and social support. The primary tasks support focusing on what the primary tasks should be. Dialogue support refers to computer-human dialogue that aids in the achievement of goals. The system credibility support category discusses how to design a system so that it was more realistic and persuasive. The social support category describes how to design the system so that it motivates users by leveraging social influence.

There was a total of 28 principles of PSD as explained by Oinas-Kukkonen & Harjumaa (2018). Not all PSD principles had been applied in this researched domain. Recognizing the problem and the positive impact of persuasive technology in education, an arabic language e-learning portal (ArabKafa3) had been developed through the adaptation of persuasive technology involving the principles of tunneling from primary task support category, liking and self-monitoring from dialogue support category as well as cooperation from social support category as shown in Table 1

Table 1: Persuasive Technology Principles Adapted in ArabKafa3

Requirement	Description	Category	Persuasive Technology Principles
An e-learning portal should guide students in the process of changing their attitudes by favourably impact for action that brought them closer to the desired behaviour.	Used the ArabKafa3 to guide students through a process or experience provides opportunities to persuade along the way.	Primary Task Support	Tunneling
An e-learning portal should have a looked and felt that appeals to students.	Arabkafa3 was visually attractive for students was likely have been more persuasive.	Dialogue Support	Liking
An e-learning portal should provide means for students to track their performance or status.	ArabKafa3 monitors one's own performance or status and assists the student in reaching goals.	Dialogue Support	Self-monitoring
An e-learning should provide means for cooperation.	ArabKafa3 could persuade students to adopt a desired attitude or behaviour by leveraging people's natural desire to cooperate.	Social Support	Cooperation

ArabKafa3 could help students learn Arabic because the characters appeared with colors, text, images, sounded, animations, and movies. In addition, the inclusion of woodwall, a web application with interesting educational and interactive quiz-based games, would increase children's interest in ArabKafa3. ArabKafa3 was developed using the ADDIE model methodology, and the interface design of ArabKafa3 based on persuasive technology principles was discussed in this study.

Methodology

The ADDIE model was used in the development of Arabkafa3. By modifying the process in the ADDIE model, the method was used to define the progress required to complete the project. The five phases of the ADDIE model are depicted in Figure 1.

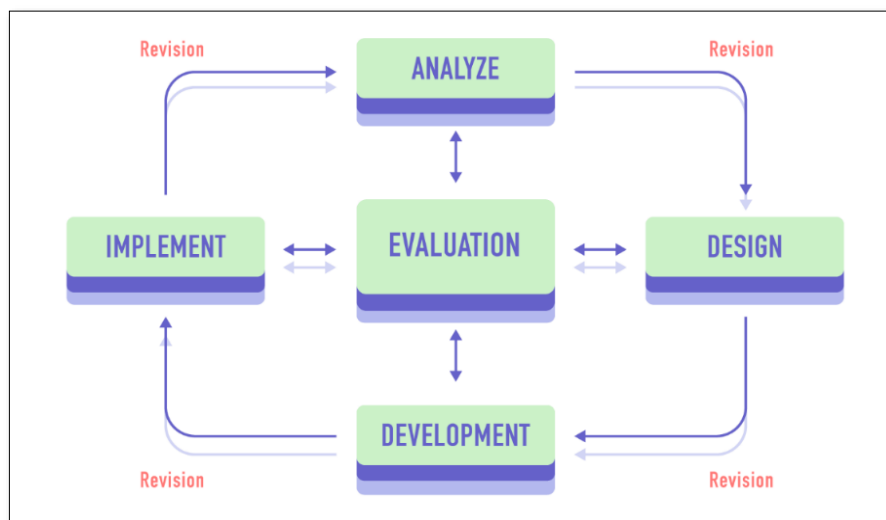


Figure 1: Phase in ADDIE Model
 (Source: <https://www.learnupon.com/blog/addie-5-steps/> -Eoghan Quigley, 2022)

The ADDIE model described a process that had a systematic flow and began at the beginning. There were five phases involved: analysis, design, development, implementation, and development. These five steps demonstrated dynamic, customizable training in the development of powerful training and performance support systems. The five phases of the ADDIE model were applied to Arabkafa3. Table 2 depicts the project framework for this e-learning portal.

Table 2: The Project Framework

Phase	Objective	Activities	Technique / Tool	Outcomes
Analysis	To identify the requirements for developing Arabic Language E-Learning Portal	Identify the current business and problem statement	Observation	Current business processes and problem statements are identified
		Conduct Interviews	Interview through Google Meet	Analyzed results to support the problem statement
		Planning the process throughout this project	Microsoft Excel	Gantt Chart
Design	To design and develop the Arabic Language E-learning Portal using persuasive technology.	Design Sitemap	Draw.io	Sitemap
		Design Storyboard	Microsoft PowerPoint	Storyboard
		Design Wireframe	Microsoft Word	Wireframe
Development		Develop interactive education e-learning portal consisting of multimedia elements	-Adobe Animate -Adobe Photoshop -Adobe Audition -Live Movie Maker -Google Site	Create text, video, image, buttons, sound, animation, record, and contain quizzes and lessons.

Implementation	To evaluate the functionality and usability of Arabic Language E-Learning e-learning portal.	ArabKafa3 publish in Web App.	Web Application used link from google sites on the website	ArabKafa3 System is implemented.
		E-learning portal functionality is tested		Functionality test e-learning portal
Evaluation		Create suitable questionnaire	Research for a suitable Questionnaire	Functionality testing result
		Test the e-learning portal usability.	Respondent from expertise	Usability testing result

Results and discussion

ArabKafa3 was evaluated from the standpoint of its users during the usability evaluation. The evaluation included 40 respondents who provided valuable feedback. This feedback enabled the developer to understand the improvements needed to improve ArabKafa3, making it more user-friendly and widely accepted. The evaluation used descriptive statistical methods such as mean, mode, and standard deviation to effectively analyse the data. These measures aided in gaining valuable insights from the feedback of respondents. The questions in the evaluation section focus:

- A. Usefulness: Assessing the degree to which ArabKafa3 is helpful and beneficial to users.
- B. Satisfaction: Measuring user satisfaction with the e-learning portal and its features.
- C. Ease of Use: Evaluating how user-friendly and straightforward ArabKafa3 is to navigate and interact with.
- D. Ease of Learning: Gauging the perceived ease of learning and understanding the content provided by the portal.

Table 3 displays the mean, mode, and standard deviation values of user evaluations for all constructs in ArabKafa3. The mean values range from 4.65 to 4.69. Notably, construct C has the highest mean, representing "ease of learning," with a mean of 4.69 (SD = 0.48). This indicates that respondents are particularly interested in the ease of learning provided by this e-learning portal across all constructs. Figure 2 shows a bar chart depicting the overall results of the constructs.

Table 3: Analysis of the overall results with mean, mode, standard deviation

No.	Construct	Mean	Mode	Standard Deviation (SD)
A	Usefulness	4.67	5	0.54
B	Ease of Use	4.67	5	0.52
C	Ease of Learning	4.69	5	0.48
D	Satisfaction	4.65	5	0.52

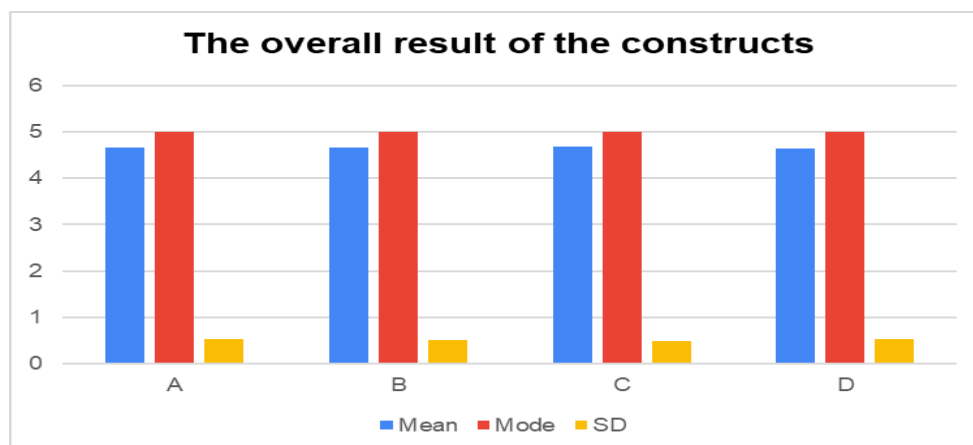


Figure 2: An analysis of the graph's overall results of the construct

Conclusion

The multimedia elements and the presence of persuasive technology within ArabKafa3 have proven to be effective in assisting Kafa year 3 students in better learning and understanding Arabic. ArabKafa3 e-learning portal has been accepted as an additional resource that provides a creative approach to enhancing students' learning experiences.

Corresponding author

Elly Johana binti Johan, Jabatan Sains Komputer & Matematik (JSKM), Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

References

- Caraben, A., Ferreira, M. J., Belim, V., Lyra, O., & Karapanos, E. (2014). SmartHolder. Proceedings of the 2014 Conference on Interaction Design and Children - IDC 14. doi:10.1145/2593968.2610487.
- Kassim, N., Damit, S. A., & Taat, M. S. (2017). Pengaruh Sikap Pelajar dan Pengajaran Guru Terhadap Penguasaan Bahasa Arab Dalam Kalangan Pelajar PPIB, UMS. *Jurnal'Ulwan*, 2(1), 125-142.
- Lubis, M. A., Alias, Z. A. F. F. I., & Shahrudin, H. N. (2014). Pelaksanaan Pengajaran dan Pembelajaran Bahasa Arab dalam Kurikulum Bu'uth Al-Azhar di Sekolah Agama Bantuan Kerajaan (SABK). *Jurnal Pendidikan Malaysia*, 39(1), 51-61.
- Mustafa, Ahmad Farid Fadhli & Mohamad, Abd. (2014). Tahap penguasaan bahasa Arab: kajian melalui ujian penempatan bahasa Arab (APT). In Conference: 2nd World Conference on Islamic Thought and Civilization Di Casuarina@Meru, Ipoh, Perak.
- Nor Aziah, D., Fauziah, R., Zan Azma, N., Noraidah, S. & Zurina, M. (2017). Persuasive web design for online Islamic education. 6th International Conference on Electrical Engineering and Informatics (ICEEI), p.1-6.

- Oinas-Kukkonen, H. (2013). A foundation for the study of behavior change support systems. *Personal and Ubiquitous Computing* 17(6):1223-1235.
- Oinas-Kukkonen, H. & Harjumaa, M. (2018). Persuasive systems design: key issues, process model and system features. *Routledge Handbook Of Policy Design* :105-123.
- Ros, F. W. C., Arifin, Z., & Yahya, S. A. (2022). Tinjauan Semasa Tahap Pemahaman dan Penguasaan Pelajar Sekolah Rendah KAFA: Prospek Pembangunan Bahan Bantuan Mengajar di Era Revolusi Industri 4.0 [Trend study of the Level of Understanding and Proficiency of KAFA Primary School Students: Prospects for t. *BITARA International Journal of Civilizational Studies and Human Sciences* (e-ISSN: 2600-9080), 5(1), 10-22.

KAJIAN KES : KESALAHAN PELAJAR DALAM TOPIK PERSAMAAN PEMBEZAAN

*Maisurah Shamsuddin¹, Siti Balqis Mahlan², Muniroh Hamat³, Fadzilawani Astifar Alias⁴
*maisurah025@uitm.edu.my, sitibalqis026@uitm.edu.my, muniroh@uitm.edu.my,
fadzilawani.astifar@uitm.edu.my

^{1,2,3,4}Jabatan Sains Komputer & Matematik (JSKM),
Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

*Corresponding Author

ABSTRACT

Pendidikan matematik adalah penting bagi pelajar bermula dari peringkat sekolah rendah sehingga ke peringkat universiti. Dalam proses pembelajaran matematik, pemahaman yang kukuh terhadap asas matematik perlu diberi penekanan sebelum mempelajari matematik kalkulus. Justeru itu, satu kajian dijalankan bagi mengenalpasti kesalahan pelajar dalam salah satu topik kalkulus terutama bagi kesalahan yang melibatkan asas matematik. Seramai 30 orang pelajar yang mengambil matematik kalkulus terlibat dalam kajian kes ini. Markah penilaian akhir matematik kalkulus pelajar telah dianalisa menggunakan deskriptif statistik dan didapati bahawa keseluruhan markah bagi topik persamaan pembezaan peringkat kedua adalah yang paling rendah. Kertas jawapan bagi topik ini telah disemak dengan teliti bagi melihat kesalahan yang dilakukan oleh pelajar. Di dapati bahawa pelajar masih lagi lemah dalam asas matematik terutama pada soalan yang memerlukan penyelesaian membandingkan pekali dan persamaan serentak atau linear. Pelajar juga lemah dalam asas pembezaan dan pengamiran walaupun markah keseluruhan bagi topik tersebut adalah yang tertinggi berbanding soalan lain. Oleh itu, pelajar perlu tingkatkan lagi usaha dan memahami secara menyeluruh asas matematik yang terkandung di dalam topik persamaan pembezaan supaya dapat menguasai topik tersebut dengan lebih baik. Para pensyarah juga perlu memberi lebih penekanan dan memberi lebih latihan tambahan terhadap soalan yang melibatkan asas matematik.

Keywords: asas matematik, algebra, deskriptif, persamaan pembezaan, kalkulus

Pengenalan

Matematik merupakan salah satu subjek yang dianggap sukar bagi kebanyakan pelajar. Di peringkat pengajian tinggi, matematik kalkulus dipelajari dalam program pembelajaran dan sangat penting kepada pelajar terutama yang memilih bidang kejuruteraan. Pelajar perlu menguasai konsep asas yang melibatkan pembezaan dan pengamiran sebelum mempelajari topik peringkat tinggi seperti persamaan pembezaan. Namun begitu, terdapat segelintir pelajar sukar untuk memahami dan menguasai persamaan pembezaan.

Terdapat beberapa kajian telah dijalankan bagi mengenal pasti permasalahan ini. Antaranya adalah kajian kes yang dijalankan oleh Muhammad, D. (2003) yang berkaitan dengan masalah pemahaman asas persamaan pembezaan. Masalah yang dikenalpasti adalah pelajar kurang menguasai konsep pembezaan, kurang pemahaman berkaitan konsep pengamiran dan tidak menguasai ungkapan algebra dalam penyelesaian matematik. Pelajar yang didapati sering melakukan kesalahan ini adalah kerana mereka masih mempunyai kelemahan dalam memahami sesuatu topik yang dipelajari. Kajian ini juga mencadangkan bahawa pensyarah perlu memainkan peranan penting dengan membimbing

pelajar yang mempunyai masalah ini sebaik mungkin supaya ianya dapat di atasi dengan baik.

Penguasaan pelajar terhadap asas pengamiran serta aplikasinya juga adalah penting bagi pelajar memahami persamaan pembezaan dengan lebih baik. Menurut kajian oleh Faizatulhaida Md Isa, Azlina Bt Hassan, & Siti Hajar Bt Said (2017) , pelajar cuai ketika menjawab soalan dan banyak melakukan kesilapan jenis transformasi. Mereka sangat lemah dalam kemahiran pengiraan yang melibatkan penambahan, penolakan, pembahagian atau pendaraban dengan betul terutamanya melibatkan penyelesaian berbentuk pecahan. Salah satu punca yang dikenalpasti adalah pelajar sangat lemah dalam ungkapan algebra. Kajian oleh Nuri Rahmiaty, Nazariah Nazariah, Muhammad Yani (2021) juga mendapati bahawa pelajar banyak melakukan kesalahan konsep asas dan tidak memahami soalan dan banyak melakukan kesalahan dalam operasi algebra. Semua kesalahan ini menunjukkan bahawa tahap penguasaan pelajar terhadap asas matematik dan kalkulus adalah sangat lemah dan langkah-langkah penambahbaikan perlu dilaksanakan.

Selain itu, kajian oleh Ika Meika dan rakan-rakan (2023) juga mendapati bahawa punca-punca berlakunya kesilapan semasa menjawab soalan pengamiran adalah kerana pelajar tidak memahami dengan baik konsep penyelesaian dalam pengamiran, pelajar kurang menguasai konsep awal kalkulus, kurang kebolehan dalam menterjemahkan simbol matematik, pelajar masih bergantung kepada kaedah hafalan untuk mengingati rumus dan langkah-langkah dalam menyelesaikan soalan, serta tidak dapat meyertakan kaedah yang tepat dalam menyelesaikan sesuatu soalan.

Secara keseluruhannya, pemahaman asas matematik yang kukuh terutama dalam konsep algebra, asas pembezaan dan pengamiran adalah prasyarat penting dalam menguasai matematik kalkulus diperingkat tinggi serta aplikasinya. Oleh itu kajian ini dijalankan bagi melihat sejauh mana tahap pemahaman dan penguasaan pelajar dalam soalan yang melibatkan matematik kalkulus. Kajian ini penting bagi mengetahui kesalahan yang sering dilakukan oleh pelajar dan langkah-langkah penambahbaikan dapat dilaksanakan supaya kesalahan yang sama tidak akan berulang serta tidak menjejaskan prestasi pelajar.

Metodologi

Kajian kes ini melibatkan seramai 30 orang pelajar Universiti Teknologi Mara cawangan Pulau Pinang yang mengambil subjek kalkulus. Analisa data dijalankan terhadap penilaian akhir yang telah diambil oleh pelajar. Penilaian akhir ini terdiri daripada 5 soalan utama di mana masing-masing merangkumi beberapa konsep di bawah tajuk kalkulus seperti dalam Jadual 1. Markah yang di peruntukan untuk setiap bahagian adalah berbeza dan jumlah keseluruhan adalah sebanyak 100 markah. Setiap markah

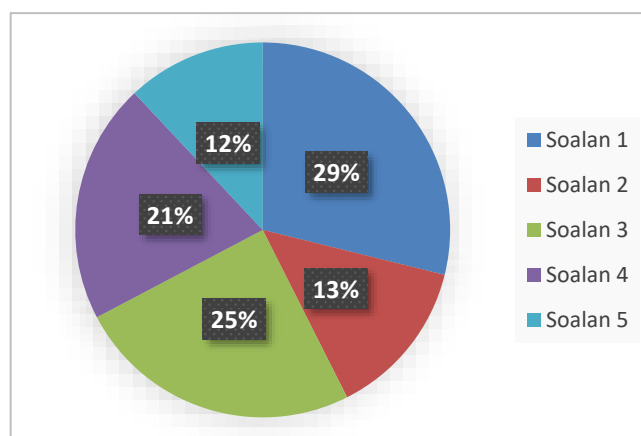
yang diperolehi dinilai dan kemudiannya dianalisa menggunakan deskriptif statistik. Bahagian soalan yang mendapat jumlah markah keseluruhan terendah akan disemak dan diteliti bagi melihat kesalahan yang di lakukan oleh pelajar.

Jadual 1: Tajuk setiap soalan bagi penilaian akhir

Soalan	Topik
1	Kaedah Pengamiran
2	Hukum L'hospital dan Pembezaan Separa
3	Pembezaan bagi 2 atau lebih pembolehubah
4	Persamaan Pembezaan peringkat pertama serta aplikasi
5	Persamaan Pembezaan peringkat kedua

Keputusan dan Perbincangan

Rajah 1 di bawah menunjukkan peratus markah keseluruhan bagi setiap soalan yang dianalisa. Di dapati bahawa majoriti pelajar dapat menjawab soalan 1 dengan baik iaitu sebanyak 29% yang merangkumi topik kaedah pengamiran. Di ikuti oleh soalan 3 (25%) dan soalan 4 (21%). Ini menunjukkan bahawa pelajar masih lagi dapat menguasai topik kaedah pengamiran, pembezaan separa dan persamaan pembezaan peringkat pertama serta aplikasinya. Pelajar juga hanya mendapat secara purata 13% betul untuk soalan 2. Manakala peratus markah terendah adalah daripada soalan 5 iaitu 12%. Oleh yang demikian, soalan 5 akan diteliti dan kesalahan pelajar akan dianalisa berdasarkan topik persamaan pembezaan peringkat kedua.



Rajah 1: Peratus Markah mengikut soalan

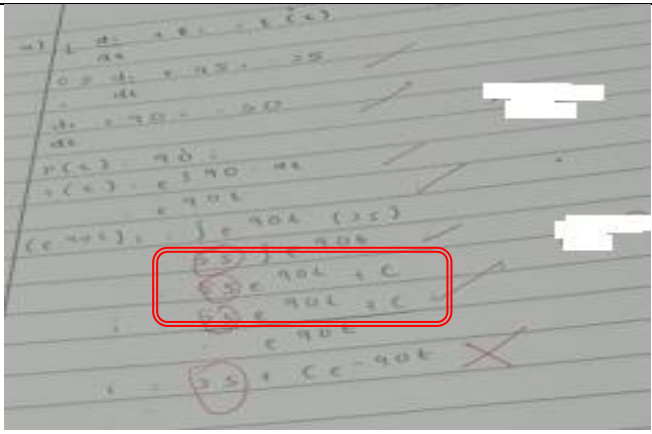
Analisa kesalahan bagi topik yang menghasilkan peratus markah terendah iaitu topik persamaan pembezaan peringkat kedua telah dikenalpasti dan kesalahan yang sering dilakukan oleh pelajar adalah seperti berikut :

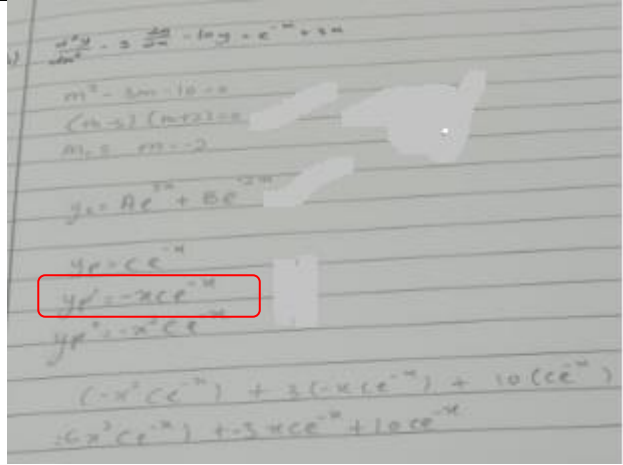
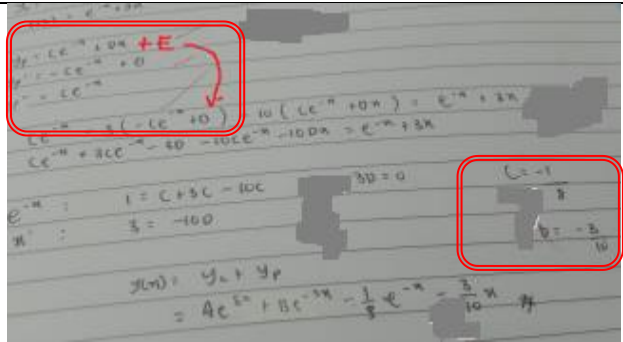
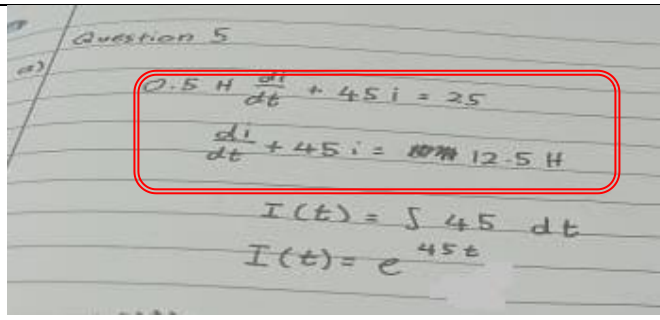
1. Tidak menyatakan fungsi bagi persamaan Yp dengan betul
2. Kesilapan menyelesaikan persamaan linear bagi membandingkan pekali
3. Menukar persamaan pembezaan kepada bentuk piawai bagi kaedah linear dengan asas yang salah.
4. Tidak menyelesaikan masalah sehingga akhir dengan hanya menjawab separuh sahaja
5. Kesalahan dalam pembezaan
6. kesalahan dalam pengamiran
7. Menggunakan kaedah dan formula yang salah

Kesalahan-kesalahan tersebut kebanyakannya melibatkan kaedah penyelesaian topik itu sendiri, asas matematik algebra, asas pembezaan dan pengamiran. Walaupun pelajar dapat menjawab soalan 1 hingga 4 dengan agak baik, tetapi kesalahan asas masih juga dilakukan oleh pelajar untuk soalan 5. Pelajar juga tidak dapat menyelesaikan soalan dengan lengkap dan hanya menjawab separuh sahaja. Ada di antara pelajar tidak langsung mencuba untuk menjawab setiap soalan tersebut. Keadaan ini berkemungkinan kerana pelajar tidak dapat mengingati kaedah yang perlu digunakan dan kurang mengulangkaji topik yang sukar difahami.

Seterusnya, gambaran kesalahan dan penjelasan kesalahan yang dilakukan oleh pelajar telah juga di analisa dan perinciannya adalah seperti jadual 2 berikut:

Jadual 2: Gambaran kesalahan serta penjelasan kesalahan

Gambaran Kesalahan	Penjelasan Kesalahan
	<p>Kesalahan : Kesalahan pelajar adalah tidak menyelesaikan pengamiran fungsi eksponen dengan betul.</p> <p>Penjelasan: Pelajar memahami soalan dan menggunakan kaedah yang betul. Pelajar</p>

	<p>dapat menguasai kaedah ini tetapi asas dalam pengamiran pelajar ini adalah lemah.</p>
	<p>Kesalahan : Menyatakan fungsi yang salah untuk Yp. Kaedah pembezaan fungsi eksponen untuk mencari pembezaan pertama dan kedua adalah salah.</p> <p>Penjelasan : Pelajar menguasai dan memahami penyelesaian untuk soalan ini, tetapi tidak menguasai cara untuk menyatakan fungsi Yp berdasarkan f(x) yang diberi.</p>
	<p>Kesalahan : Salah melakukan pengiraan bagi persamaan menggunakan kaedah perbandingan pekali.</p> <p>Penjelasan : Pelajar telah melakukan kesilapan bermula daripada menyatakan fungsi Yp. Kaedah perbandingan adalah betul. Pelajar cuai ketika melakukan pengiraan.</p>
	<p>Kesalahan : Pelajar hanya melakukan pembahagian disebelah kiri persamaan.</p> <p>Penjelasan : Pelajar mengetahui kaedah penukaran ke bentuk piawai, tetapi pelajar tidak menyelesaikannya dengan cara yang betul.</p>

Kesimpulan

Kesimpulannya, walaupun pelajar dapat menjawab soalan matematik kalkulus melalui topik yang melibatkan pembezaan dan kaedah pengamiran, pelajar masih lagi melakukan kesalahan konsep asas terutama dalam asas pembezaan dan asas pengamiran, lalai dalam pengiraan dan tidak menyelesaikan masalah sehingga jawapan akhir. Matematik asas yang dapat dikenalpasti adalah dalam asas algebra termasuk penyelesaian persamaan serentak dan penyelesaian persamaan menggunakan kaedah

perbandingan pekali. Pelajar perlu menguasai asas matematik kerana ia merupakan prasyarat penting dalam penguasaan matematik kalkulus dan kemudian mengaplikasikannya dalam bidang-bidang sains dan kejuruteraan. Kemahiran matematik yang kukuh menjadi asas kepada pemahaman yang mendalam dan penyelidikan dalam bidang kejuruteraan yang pelbagai dan mencabar. Para pensyarah juga perlu memainkan peranan penting dalam memastikan pelajar menguasai konsep asas matematik dengan baik bermula daripada peringkat awal pembelajaran matematik kalkulus. Perbanyakkan latihan dan aktiviti supaya pelajar lebih minat dan cenderung untuk mempelajari matematik.

Rujukan:

- N. Rahmiaty, N., Nazariah, N., & Yani, M. (2021). Error Analysis Of First High School Students In Solving Algebra Problems. *Jurnal Ilmiah Pendidikan dan Pembelajaran Matematika*, 1(2). <http://ejournal.unmuha.ac.id/index.php/jippma/article/view/1127>
- Mohamad, D. (2003). Tinjauan Masalah Pemahaman Asas Persamaan Pembeza Di Kalangan Pelajar Kejuruteraan-Satu Kajian Kes. *Gading Jurnal Akademik*, 1(8), 65-70.
- Faizatullhaida Md Isa, Azlina Bt Hassan, & Siti Hajar Bt Said. (2017). Analisis Kesilapan Dalam Soalan Asas Dan Aplikasi Pengamiran Kursus Matematik Kejuruteraan 2. *Politeknik & Kolej Komuniti Journal of Social Sciences and Humanities*, 2(1), 198–208. Retrieved from <https://app.mypolycc.edu.my/journal/index.php/PMJSSH/article/view/142>
- Ika Meika, Ratu Mauladaniyati, Asep Sujana , Nenden Suciyati Sartika , Nais Pebriyani. (2023) Analisis Kesalahan Dalam Hasil Belajar Mahasiswa Pada Mata Kuliah Kalkulus Integral. *Jurnal Program Studi Pendidikan Matematika* 12(2),2663-2675. DOI: <http://dx.doi.org/10.24127/ajpm.v12i2.5651>

SIG CS@e-Learning
Unit Penerbitan
Jabatan Sains Komputer & Matematik
Kolej Pengajian Pengkomputeran, Informatik & Media
Universiti Teknologi MARA Cawangan Pulau Pinang



e-ISBN : 978-629-98755-0-5