Feedback On The Usage Of The Department Of Mechanical Engineering Project Unit Portal, Politeknik Mukah

Mohd Ghafran Mohamed[1]*, Nur Adilla Kasim[2], and Marlina Mohamad[3]

Politeknik Mukah,
96400 Mukah, Sarawak, Malaysia.

*Corresponding Author's Email: mohd.ghafran.poli@gmailcom

Article History: Received 15 August 2023; Revised 3 September 2023; Accepted 15 November 2023

Abstract

The teaching and learning strategy (PdP) used today should be modified to meet the demands of 21st-century education and technological improvements. The JKM PMU Project Unit Portal is a simple-to-use Android application and user-friendly web platform. The current web infrastructure is used to construct the JKM Project Unit Portal and mobile application, PMU. User input on portal usage is collected to understand user needs and experiences better, address problems, tailor the portal to users' demands, increase safety and privacy, and foster better connections between portal administrators and users. The JKM Project Unit Portal and mobile application are used by the Department of Mechanical Engineering at Politeknik Mukah. The three research goals are the overall level of usage, the relationship between learning strategies, interface design, interaction design, and gender-based differences in interaction design. 101 Mechanical Engineering Diploma students at Politeknik Mukah enrolled in Project 1 (DJJ40182) and Project 2 (50193) for the second session of 2022–2023 and partook in a survey that was done using a questionnaire. The minimal average score for learning techniques or information design in this collaborative learning system is 4.4, which is considered to be a high level. The three variables were analysed using Pearson correlation to determine their relationship, which revealed a strong and positive link. Additionally, with a t-value (99) = 2.25 and a p-value = 0.823 (P>0.05), the findings of the independent t-test study on interaction design between two separate samples revealed no discernible variation in interaction design depending on gender. Overall, this designed learning system satisfies the requirements of collaborative learning via the portal and has garnered a great deal of support.

Keywords: Final Year Project; Google Site; Teaching & Learning.

1.0 Introduction

Effectiveness means achieving desired outcomes or goals (Morard et al., 2020). In the era of IR4.0, technology should be optimally utilized to produce the best products and services to meet stakeholder needs while minimizing wastage. The current implementation of teaching and learning approaches should be tailored to the advancements in technology and the requirements of 21st-century education, in line with the seventh shift of the Malaysian Education Development Plan, which emphasizes leveraging the use of Information and Communication Technology (ICT) to enhance the quality of teaching and learning in Malaysia (Ismail et al., 2021).

Google Sites has become popular in educational media development, promoting collaboration, organization, and content sharing. Its integration with other Google tools and compatibility with mobile devices makes it a versatile option for educators to enhance their teaching and engage students in various educational activities (Lenthera et al., 2022). Smartphones are a key enabler of IR4.0, as they provide access to digital technology and data on the go, which can be leveraged to drive innovation and enhance productivity across various industries (Mellone et al., 2012). Mobile-Based Learning (MBL), aimed at assisting students in understanding learning material concepts interactively, can provide an enjoyable environment, capture students' interest, and offer a wealth of information compared to traditional learning methods (Suarez et al., 2018).

2.0 Problem Statement

The JKM PMU Project Unit Portal is a user-friendly and easily accessible web portal platform with an Android application. The JKM Project Unit Portal and mobile application are developed through an existing online platform. The three main components in producing the web portal and mobile application are G-Site, AAB files, and the Google Play console. In addition to empowering digital practices, it is developed to assist lecturers and students in accessing important information about student projects in JKM. To better understand user needs and experiences, user feedback is implemented to help enhance user experience, address issues, tailor the portal to user requirements, improve security and privacy, and foster better relationships between portal administrators and users. Without feedback, the development of the portal may not adequately meet user needs and expectations. Encouraging feedback and engaging in open communication with users is crucial to enhancing the portal's functionality, addressing issues, and creating a better user experience.

3.0 Objective

There are three research objectives, namely:

i. To identify the overall usage level of the web portal and mobile application of the Project Unit in the Department of Mechanical Engineering, Politeknik Mukah.

ii. To identify the relationship between learning strategies, interface design, and interaction design.

iii. To identify the differences between genders in terms of interaction design.

4.0 Literature Review

Conventional learning methods in the present era are perceived as no longer relevant with the changes brought about by the IR4.0 era. Learning through applications is an educational innovation to address the challenges of diverse learning resource availability. One appropriate type of media for creating teaching materials is the Google Sites application. Yushtika & Herpratiwi

(2022) conducted a study on developing Google Sites as a learning medium to enhance the effectiveness of elementary school students learning. The SLR (Systematic Literature Review) method was employed in this study, with data collection conducted through documentation and reviewing all articles related to Google Sites. Based on the findings presented in the study results table, it is evident that Google Sites can be utilized as a medium or learning method in the classroom, particularly in the 21st century and the technological, industrial revolution, through the presence of the Google Site media or method.

Devya (2022) also conducted a study on developing valid, practical, and effective learning media using Google Sites. This research falls under the category of research and development (R&D). The learning media product was created using the Google Sites platform, following the ASSURE development model. Based on the validity analysis, the percentage is 82.9% (valid), while the practicality rating is 90.6% (highly practical). The effectiveness of the learning media is indicated by the average pre-test score of students, which was 67.81 and increased to 84.69 in the post-test stage. Additionally, observation results show a 53.7% increase in student engagement in activities before and after using the Google Sites learning platform. Improvement in numeracy skills, as evidenced by the learning outcomes, reached 81.25% proficiency.

Nur Aiman (2021) conducted an action research study to measure the perceptions of teachers at SMK Sultan Mansor Shah towards the digital school management innovation introduced as a school management documentation practice using the Google application system, known as the Integrated Application System for School Management (SIAeP). The study sample comprised fifteen respondents, including committee secretaries, student affairs units, and co-curricular units. An initial survey was conducted based on a questionnaire. The survey results indicated that SIAeP is not burdensome, can be implemented quickly, and is cost and energy-saving. The free and easily accessible GAFE application allows teachers to use SIAeP without incurring high costs while saving energy and time. In the context of the rural school under study, the respondents' positive perceptions towards digital documentation practices indicate a positive impact of the introduced SIAeP intervention (Aiman, 2021).

Downloading applications from the Google Play Store for Android users and the Apple Store for Apple users provides significant convenience for all levels of users accessible through smartphones. It can be published on the Google Play Store using Android applications (Tam et al., 2022). The advantages of learning using Google Sites are as follows: Firstly, Google Sites are easy to create and free of charge. Secondly, it allows users to collaborate in its usage. Thirdly, it provides 100 MB of free online storage. Fourthly, it can be easily searchable using the Google search engine. Students no longer need to download materials teachers provide, saving data and internet memory.

Moreover, teachers no longer need to be confused in delivering content. It is because students can access it through Google Sites. The display on Google Sites can also be made as engaging as possible to prevent students from feeling bored during online learning activities (Sairin, 2022).

5.0 Methodology

This study involved 101 Diploma in Mechanical Engineering students enrolled in the Project 1 (DJJ40182) and Project 2 (50193) courses at Politeknik Mukah for the second semester of the academic year 2022/2023. In the final week of their studies, they were requested to evaluate the usability of the Portal, encompassing aspects of learning strategies, interface design, and interaction design. Data analysis was conducted based on the questionnaires received from the respondents and expert assessors. This study utilized an adapted and modified questionnaire instrument from the items available at http://m.domaindlx.com/collabweb/. The data was then analysed using the Statistical Package for the Social Sciences (SPSS) software. Subsequently, descriptive and inferential statistics processed and analysed the obtained data. A Five-Point Likert Scale was employed, where a value of 1 represented "Strongly Disagree," 2 represented "Disagree," 3 represented "Neutral," 4 represented "Agree," and 5 represented "Strongly Agree." Respondents were asked to select one number to indicate their agreement with the portal's usability statements.

6.0 Results and Discussion.

The questionnaire items will be analysed using frequency and percentage methods for the items in Section A, which is Student Information. For the items in Section B, which utilize the Likert scale, the analysis will be conducted using minimum scores. The findings of this section will be presented in tabular form. The calculations will be done manually with the assistance of Microsoft Excel. The reliability test results for the adapted and processed questionnaire, without changing the original meaning of the sentences (Othman et al., 2020), yielded a Cronbach's alpha value of 0.985.

6.1 Analysis of Section A: Study Sample Profile

The research findings found that the respondents comprised 80 male participants, representing 79.2%, while 21 female participants represented 20.8%. The respondents comprised 36 students from DKM4A class, accounting for 35.6%, 34 students from DKM4B class, accounting for 33.7%, and 31 students from DKM4C class, accounting for 30.7%. Through a profile survey, the researcher was also able to determine the preferred medium of accessing the portal, with 77.2% choosing Google Site, 13.9% choosing Apps Store, and 9% choosing iPhone Home Screen. Previous researchers (Mat et al., 2019) supported the findings, indicating that the students are prepared to engage in technology-based teaching and learning processes.

6.2 Level of Portal and Mobile Application Usage in the Mechanical Engineering Department Project Unit, Politeknik Mukah

Based on Table 1, the average minimum score for the overall design of information or learning strategies used in this collaborative learning system

is 4.29, indicating a high level. This result means most respondents agree with using the learning strategies implemented in the learning system through this developed portal. These findings demonstrate that technological adaptation, as stated by Picciano (2015), can enhance the achievement of collaborative learning goals and objectives more effectively.

Table 1: Overall Minimum Scores for Learning Strategies.

No	Learning Strategy	Min	Standard Deviation
1	B1 - The collaborative learning strategies used have captured my attention and motivated me to continue learning.	4.23	0.719
2	B2 - The collaborative learning strategies employed on this website have aided me in effectively mastering the project requirements.	4.27	0.706
3	B3 - This website has facilitated my understanding of the course project requirements.	4.26	0.702
4	B4 - The learning strategies implemented have encouraged me to collaborate within a group.	4.33	0.723
5	B5 - This software encourages me to think creatively and critically.	4.30	0.729
6	B6 - The search feature enables me to interact with peers for collaborative discussions.	4.30	0.729
7	B7 - Through discussions with fellow students, I have been able to enhance my analytical skills.	4.30	0.715
8	B8 - Taking responsibility for learning, whether individually or in a group, strengthens academic development.	4.35	0.655
10	B9 - Students can share their life experiences.	4.25	0.740
11	B10 - Engaging in small group activities fosters higher-order thinking skills and enhances individuals' ability to apply knowledge.	4.30	0.729
	Overall minimum score	4.29	0.629

The research findings indicate that collaborative learning utilized through the web platform has captured students' interest in continuous learning (B8), as evidenced by the highest minimum score of 4.35 for that question item. Furthermore, question item B4 obtained the second-highest minimum score of 4.33, while question items B5, B6, B7, and B10 obtained the third-highest

minimum score of 4.30. On the other hand, item B1 recorded the lowest minimum score of 4.23

A total of 10 question items were presented to obtain views and assessments regarding the developed interface design. The question items pertained to the system's screen layout, colours, typography, and multimedia elements. Overall, the interface design for this learning system is rated as high, with a minimum average score of 4.28, as shown in Table 2.

Table 2: Overall Minimum Scores for Interface Design.

No	Interface Design	Min	Standard Deviation
1	C1 - The portal uses a font (typeface) that is easy to read.	4.37	0.689
2	C2 - The screen layout of the portal is suitable as a learning medium.	4.33	0.650
3	C3 - The displayed simulations are appropriate.	4.34	0.697
4	C4 - The choice of colours used on the website is suitable.	4.36	0.687
5	C5 - The audio used on the website is appropriate and meets the requirements.	4.26	0.688
6	C6 - The provided navigation system is easily identifiable in its functions.	4.28	0.695
7	C7 - The audio used does not distract students' attention from the content.	4.24	0.635
8	C8 - The website is free from spelling errors.	4.16	0.703
9	C9 - The graphics used in this software are attractive and assist learning.	4.21	0.712
10	C10 - The animations used are appropriate in aiding the learning process.	4.25	0.669
	Overall Minimum Score	4.28	0.596

Table 2 shows that the minimum score for item C1 is very high at 4.37, indicating that the developed learning system uses a font (typeface) that is easy to read. It is because, according to Tamrin & Azman (2021), the text design, including the chosen font type, should be clear and legible for effective information delivery when developing applications for learning purposes. The second-highest minimum score is for item C4, which is 4.36. Here, respondents state that the choice of colours used on the website is appropriate. This finding is supported by previous researchers who stated that colours play an important role in stimulating thinking and capturing

users' interest (Ariffin et al., 2020). Item C3, on the other hand, has the third-highest minimum score of 4.34. Item C8 records the lowest minimum score, which is 4.16.

Overall, the design of interactions for the developed learning system is at a high level, with an average minimum score of 4.28. This finding indicates that users enjoy using interactive and user-friendly computer programs and smartphones.

Table 3: Overall Minimum Scores for Interactive Design.

No	Interaction Design	Min	Standard Deviation
1	D1 - The website encourages students to provide feedback.	4.28	0.750
2	D2 - Users can easily access the required information.	4.35	0.685
3	D3 - The website's structure does not lead students to get lost while navigating.	4.23	0.705
4	D4 - Students find it easy to access the required information.	4.28	0.695
5	D5 - The presentation of information within the website is easy to follow.	4.28	0.709
6	D6 - Electronic communication facilities (such as opinion spaces, email, etc.) are provided on this website.	4.26	0.702
7	D7 - There are multiple forms of information access provided by this website.	4.26	0.688
8	D8 - The website provides links to other relevant websites.	4.30	0.686
9	D9 - The website structure enables students to focus on what they want to achieve in their learning.	4.28	0.634
10	D10 - The website provides opportunities for students to interact.	4.29	0.683
	Overall minimum score.	4.28	0.589

Based on Table 3, it is found that all items obtained a high level of interpretation with a score of 4.28. The portal is designed as a Responsive Web Design (RWD), an approach to dynamically develop websites and adapt the layout and content to the screen size of users' mobile devices (Baturay & Birtane, 2013). The development of this portal facilitates students and lecturers to access up-to-date information, reference materials, and students' project status, thus overcoming the weaknesses of the previous project-based learning (PBL) course. It also facilitates interactive and dynamic learning and serves as a reference for students (Lip et al., 2018). Item D2 obtained a

minimum score of 4.35, indicating that users can easily access the required information. The second highest minimum score is 4.30 for item D8. The third highest minimum score is 4.29 for item D10. The lowest minimum score for interaction design is item D3, which is 4.23.

6.3 The relationship between learning strategies, interface design, and interaction design.

Pearson's correlation analysis was conducted to identify the relationship between the three variables. Table 4 shows the correlation coefficients obtained from the analysis conducted.

Table 4: Overall Relationship.

Constructs	Pearson Correlation Coefficient (r)	Level of Significance	Interpretation of Strength of Relationship
Learning Strategies and Interface Design	0.883**	0.00	High
Learning Strategies and Interaction Design	0.887**	0.00	High
Interface Design and Interaction Design	0.907**	0.00	Very High

** Significant level at 0.01

The study found that the Pearson correlation coefficient between learning strategies and interface design is r = 0.883, P = 0.00 ($p < 0.05$). This finding indicates a positive and strong relationship between both variables at a high level of correlation. The Pearson correlation coefficient between learning strategies and interaction design is r = 0.887, P = 0.00 ($p < 0.05$).

This result also indicates that both variables have a positive and strong relationship at a high level of correlation. Furthermore, the study revealed that the Pearson correlation coefficient between interface design and interaction design is r = 0.907, P = 0.00 ($p < 0.05$). This finding demonstrates that both variables are positively and strongly related at a very high level of correlation.

Learning strategies, interface design, and interaction design in education are interconnected and mutually influential (Nordin & Singh, 2016). This finding is because delivering information and learning experiences depends on the structure and arrangement of visual and functional elements in the learning interface. Furthermore, the learning interface can provide opportunities for interaction, effective collaboration, and appropriate feedback among students, instructors, and learning materials. The findings are supported by Yusof et al. (2019) & Nor et al. (2022), stating that these three elements work together to create an effective and interactive learning experience.

6.4 The difference between genders in terms of interaction design.

The researcher conducted an Independent Samples t-test to identify differences in interaction design based on gender. Before determining whether the t-statistic differs significantly, the researcher performed a Levene's test to assess whether the variances of both groups are equal or significantly different. The results of Levene's test indicated F = 0.346 (P > 0.05), suggesting that the variances of interaction design for males and females are not significantly different. In other words, both variances are equal. Therefore, the researcher looked at the t-value under the "Equal Variances Assumed" section. The results of the independent samples t-test analysis can be explained in Table 5.

Table 5: Results of Independent Samples t-test Analysis (interaction design).

	Gender	N	Mean	Value T	df	Sig.
Interaction Design	Male	80	4.29	2.25	99	0.823
	Female	21	4.25			

Based on Table 5, there is no significant difference in interaction design based on gender, with t(99) = 2.25 and p-value = 0.823 (P>0.05). Looking at the mean values, male students have a mean of 4.29, while female students have a mean of 4.25. This result indicates that there is no significant difference in terms of mean values.

Gender difference is not a significant factor in influencing interaction design. According to Lei & So (2021), the acceptance of interaction design depends on individuals with diverse preferences and needs, and interaction design should involve an inclusive approach to cater to individual diversity rather than gender in the context of learning.

7.0 Conclusion.

The overall average minimum score for the information design or learning strategies used in this collaborative learning system is 4.4, indicating a high level. Pearson correlation analysis was conducted to identify the positive relationship between all three variables with a very high level of correlation. Furthermore, the results of the independent samples t-test on interaction design showed no significant difference based on gender, with a t-value (99) of 2.25 and a p-value of 0.823 (P>0.05). Overall, the developed learning system meets the characteristics of collaborative learning through the portal and has received excellent feedback. Based on the data collected through the questionnaire, it is evident that the developed learning system meets the characteristics of collaborative learning through the portal and has received very positive feedback. Both male and female students can engage in collaborative learning through this website without significant differences.

Acknowledgements
The researchers would like to express their gratitude to the Project Unit of the Department of Mechanical Engineering and the Research, Innovation, and Commercialization Unit of Politeknik Mukah for the funding provided for this project.

Author Contributions
Mohd Ghafran M.: Conceptualisation, Methodology, Software, Writing-Original Draft Preparation;
Nur Adilla K.: Software, Validation, Supervision, Writing-Reviewing and Editing;
Marlina M.: Data Curation, Validation.

Conflicts Of Interest
The manuscript has not been published elsewhere and is not under consideration by other journals. All authors have approved the review, agree with its Submission and declare no conflict of interest in the manuscript.

References
Ariffin, A., Hasnan, N., Zakaria, N., Rubani, S. N. K., & Hamzah, N. (2020). Pembangunan bahan e-pembelajaran berasaskan model Needham lima fasa bagi topik konkrit. *Online Journal for TVET Practitioners*, 5(2), 63-70. https://penerbit.uthm.edu.my/ojs/index.php/oj-tp/article/view/6177

Baturay, M. H., & Birtane, M. (2013). Responsive web design: a new type of design for web-based instructional content. *Procedia-Social and Behavioral Sciences*, 106, 2275–2279. https://doi.org/10.1016/j.sbspro.2013.12.259

Devya, L. M. (2022). Analysis of Elementary School Students' Responses to Implementing the 2013 Curriculum through Distance Learning During the Covid-19 Pandemic. Universitas Negeri Malang. http://dx.doi.org/10.17977/um009v31i12022p001.

Ismail, S., Saad, R., Radzi, N. A. A., Idris, N. A., & Aziz, N. E. M. (2021). Tahap penggunaan inovasi teknologi maklumat dan komunikasi (ICT) dalam pengajaran dan pembelajaran (PDP) pensyarah Kolej Universiti Islam Melaka. *Jurnal'Ulwan*, 6(2), 173–194.

Lei, S. I., & So, A. S. I. (2021). Online teaching and learning experiences during the COVID-19 pandemic–A comparison of teacher and student perceptions. *Journal of Hospitality & Tourism Education*, 33(3), 148-162. https://doi.org/10.1080/10963758.2021.1907196

Lip, R., Hashim, S., & Musa, M. K. (2018). Pembangunan Dan Penilaian Tahap Kesesuaian Penggunaan E-Modul Asas Animasi 2D Berdasarkan Teori Konstruktivisme Model Needham 5 Fasa. *Politeknik & Kolej Komuniti Journal of Life Long Learning*, 2(1), 16–27. https://app.mypolycc.edu.my/journal/index.php/PKKJLLL/article/view/51/21

Mat, M. Z., Bacho, F., & Rapin, S. (2019). Kesediaan Pelajar dalam M-Pembelajaran bagi Pengajaran dan Pembelajaran di Kolej Komuniti Tawau, Sabah. *Politeknik & Kolej Komuniti Journal of Life Long Learning*, 3(1), 103–111. https://app.mypolycc.edu.my/journal/index.php/PKKJLLL/article/view/61/30

Mellone, S., Tacconi, C., & Chiari, L. (2012). Validity of a Smartphone-based Instrumented Timed Up and Go. Gait \& Posture, 36(1), 163–165. https://doi.org/10.1016/j.gaitpost.2012.02.006

Morard, B., Olena, P., Viktoriya, M., Olga, D., & Denys, S. (2020). Lean management tools to improve the production system. Researchgate.Net, 21(176).

Nor, M. A. A. M., Othman, F. W., & Ayub, N. (2022). Usability And Acceptance Of Augmented Reality (AR) Applications For SKR 3302 Vehicle Air Conditioning System Maintenance Course At Kolej Komuniti Pasir Salak. *Politeknik & Kolej Komuniti Journal of Social Sciences and Humanities*, 7(1), 31–40. https://app.mypolycc.edu.my/journal/index.php/PKKJLLL/article/view/108/67

Nordin, H., & Singh, D. (2016). Ulasan Elemen Reka Bentuk Antara Muka bagi Meningkatkan Keterlibatan Pelajar terhadap E-Pembelajaran di Institusi Pengajian. *MyJICT-Malaysian Journal of Information and Communication Technology*, 1(2). http://fstm.kuis.edu.my/myjict/wp-content/uploads/2016/02/J3-Hazwani-89-108.pdf

Othman, N., Md Ghazali, C., Md Zabit, M. Z. & Abdul Hadi, N. (2020). Penerokaan Dan Pengesahan Instrumen Kompetensi Matematikdalam Kalangan Guru Matematik Sekolah Menengah. *Jurnal Penyelidikan Dedikasi. Universiti Pendidikan Guru Kampus Ipoh.* 18 (2), 14-29. https://myjms.mohe.gov.my/index.php/jd/article/view/12230

Picciano, A. G. (2015). Planning for online education: A systems model. Online Learning, 19(5), 142–158. https://eric.ed.gov/?id=EJ1085774

PubianY., & HerpratiwiH. (2022). Using the Google Site Media In Learning To Increase The Effectiveness Of Learning Participants Education Elementary School. *Akademika : Jurnal Teknologi Pendidikan*, 11(01), 163-172. https://doi.org/10.34005/akademika.v11i01.1693

Sairin, Fajri, C., & Susanto. (2022). Pengembangan Website Guru Melalui Google sites Di SMA Al Wafi Islamic Boarding School Depok. *Jurnal Pengabdian Kepada Masyarakat*, 2, 12–17. https://ojs.unsulbar.ac.id/index.php/sipakaraya/article/view/1950

Suarez, A., Specht, M., Prinsen, F., Kalz, M., & Ternier, S. (2018). A review of the types of mobile activities in mobile inquiry-based learning. Computers & Education, 118, 38–55. https://doi.org/10.1016/j.compedu.2017.11.004

Tam, G. H., Roslan, H., & Sari, S. (2022). E-Learning Mobile Software for Arduino & Its Application (ELA). *Progress in Engineering Application and Technology*, 3(1), 430-443. https://penerbit.uthm.edu.my/periodicals/index.php/peat/article/view/6156

Tamrin, R., & Azman, M. N. A. (2021). Pembangunan Aplikasi Berasaskan Android Bagi Sub Topik Asas Pemilihan Pakaian Mata Pelajaran Sains Rumah Tangga Tingkatan 4. *Asian Pendidikan*, 1(1), 28-36. https://doi.org/10.53797/aspen.v1i1.4.2021

Yusoff, A. F. M., Hamat, W. N. W., & Basir, N. K. (2019). Penggunaan aplikasi web 2.0 dalam proses pengajaran dan pembelajaran kursus mata pelajaran umum (MPU) di politeknik. *e-BANGI*, 16(5), 1-13.

Zainudin, N. A. (2021). Peningkatan Persepsi Positif Amalan Pendokumentasian Pengurusan Sekolah Dengan Menggunakan Sistem Aplikasi Google. *Jurnal Pengurusan dan Kempimpinan Pendidikan. Institut Aminuddin Baki*. 34(1), 13-22. http://eprints.iab.edu.my/v2/1214/1/A2-2021.pdf