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The Effectiveness Study of DBS10012 Engineering Science Mobile Application Development

Chang Sheue Nee[1]*, Mudzalifah Akbar[1]

[1]Department of Mathematics, Science & Computer, Politeknik Mukah, KM 7.5 Jalan Oya, 96400, Mukah, Sarawak, Malaysia

*Corresponding author: changsn@pmu.edu.my
Please provide an **official organisation email** of the corresponding author

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Abstract

Due to the Covid-19 outbreak and Movement Control Order (MCO), which was put in place to stop the potentially fatal outbreak, all higher education institutions across the country were forced to close. As a result, all the instruction, learning and assignment submission for students is done online. It might be difficult for students to submit their finished assignments to their lecturer, especially for those who live in rural areas and struggle with internet connectivity. Students may have to pay a high cost and drive to the city to obtain an internet connection. Images are the sole way to upload students; however, sometimes the pictures are too large, and sending them to the lecturer may take a day. Therefore, smart educational application for Engineering Science course was developed to provide high quality and effective learning and submitting lab work report to Polytechnic students. This application was created using the AppSheet platform's user-friendly features and can be used on a range of platforms, including phones, tablets, and web browsers. This application compiles all relevant learning materials, including videos of demonstrations, lab sheets, rubrics and others for students reports. Lecturers can get student reports in the form of spreadsheets, but they must autocrat spreadsheets to get student reports in the form of PDF files. There are 44 students from the Mechanical Engineering Department and Civil Engineering Department who are participating in this survey. This effectiveness study of a development DBS10012 Engineering Science Mobile application show that the content and interactive application is interesting, and the information provided is very helpful to students, the average overall mean score is 4.33 and 4.34 respectively. From this study, it was discovered that the goals for creating this application were successfully met. As a result, Students will be motivated to learn more in this course and submit their reports on time by this clever educational application.

Keywords: - Mobile application, Covid-19, Engineering Science DBS10012

1. Introduction

All higher education institutions across the nation had to close because of the Covid-19 epidemic and Movement Control Order (MCO), which was implemented to stop the dangerous outbreak (Sabli et al., 2021). Due to this circumstance, the teaching, learning process and turn in students' assignment are entirely conducted online. But now the issue arises. Students find it challenging to turn in their completed assignments to lecturers especially for those who living in rural locations have the difficulty of their internet connectivity (Sabli et al., 2021). Students might need to travel to the city to get internet line and it might require a hefty price. Students can only be posted by taking images, but occasionally the pictures are too big, and sending them to the teacher might take a day. Some students struggle to turn in their assignments on time. As a result, using information technology in the teaching and learning process is crucial given the current circumstances (Kapasia et al., 2020). To provide high quality and efficient lab work submission to Polytechnic Students, Smart Educational App to Submit Lab Work of Engineering Science was developed.

This application was developed to provide high quality, effective learning and submitting reports to all Mukah Polytechnic students who are taking Engineering Science (DBS10012), especially in their first semester. DBS10012 is a compulsory course that must be taken by students of engineering at Mukah Polytechnic. This course introduces the physical concepts required in engineering disciplines. Students will be able to perform experiments to mastery physics concepts. This application gathers all related learning tools, such as demonstrations videos, lab sheets, rubrics, and others for student's report. The use of demonstrative videos has grown in importance because they allow students to comprehend the procedures of the practical work but not only through text (labsheets) but also through verbal, visual explanations and illustrations.

This application was developed to provide high quality, effective learning and submitting reports to all Mukah Polytechnic students who are taking Engineering Science (DBS10012), especially in their first semester. DBS10012 is a compulsory course that must be taken by students of engineering at Mukah Polytechnic. This course introduces the physical concepts required in engineering disciplines. Students will be able to perform experiments to mastery physics concepts. This application gathers all related learning tools, such as demonstrations videos, lab sheets, rubrics, and others for student's report. The use of demonstrative videos has grown in importance because they allow students to comprehend the procedures of the practical work but not only through text (lab sheets) but also through verbal, visual explanations and illustrations.

This Smart Educational Application has several benefits. The application's ability to be used on a range of devices, including phones, tablets, and web browsers, is its initial advantage. Students can conveniently access all the course-related information in a single location using an application. It was created using user-friendly features of the AppSheet platform. Before entering the lesson, students can view the demonstrations video. It can be beneficial to have a better understanding of what to accomplish in the practical class. Hence, before their practical class, students can be better prepared. Students just input their data into the app after class and submit it to their lecturer. There is no need for students to submit their work in hard copy, which saves paper and cost savings. In addition, before the due date for submission that was specified by their lecturer, students may alter their work at any moment. Besides that, lecturers can easily upload and distribute the most recent course content or requirements to the students.

2. Literature Review

In the era of advanced technology, mobile learning has been widely used in all sectors especially in the educational sector (Furió et al., 2015). Mobile learning is denoting learning that involves the use of mobile devices. The term is fully defined as "learning in multiple contexts using personal electronic devices through social and content interaction" (Shraim & Crompton, 2015). This is mainly because the mobile learning environment can offer a wide range of new and exciting learning opportunities via wireless technology (Bernacki, Greene, & Crompton, 2020). According to Wee (2020), this learning is much more interactive and involves more exposure, exchange and cooperation with others. It can deliver educational materials and content to users of personal pocket devices like iPads, smartphones, tablets, and personal digital assistants (PDAs).

Over the past two decades, mobile learning has been implemented. Yet, most high education sectors do not adopt to this learning method, and their personnel is unaware of its components (Mahyoob, 2020). Students require specialized social support throughout the transfer to a new educational environment to increase their focus and motivation for online learning during this critical crisis (Eccles et al., 1997; Roeser & Eccles, 1998).

While the Mobile applications are running on a small handheld mobile devices like computer, iPad and tab which is portable, easy to use (R. Islam, R. Islam & Mazumder, 2010). They have become ubiquitous in everyday life (Baran, 2014). By using these mobile applications, students can explore and revolutionize their thinking by using mobile devices to enhance the abilities and talents of students to access the world. Students can get facility of mobile application like contact friends, browse internet, file content management, document creating and handling entertainment (R. Islam, R. Islam & Mazumder, 2010).

3. Methodology

This smart application is developed by using Appsheet Platform was utilised to integrate the data and create the app with the platform's most well-liked features. All the application's data was stored in the cloud. Google Drive (specifically, Google Sheet) was chosen as the database storage design. While Autocrat was added to database to generate the students' report in PDF file. Instantly publish the application and distribute it to students and instructors. This software may support a range of devices, including smartphones, tablets, and web browsers. While lecturers can obtain student reports using spreadsheets, they must autocrat spreadsheets to obtain student reports in PDF files.

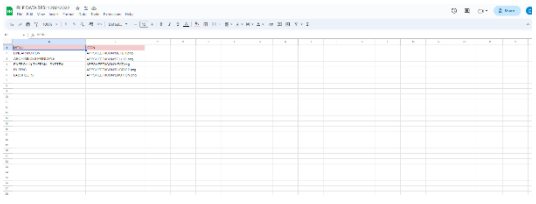

Fig. 1. Google spreadsheet was used to store the data in cloud (google drive)

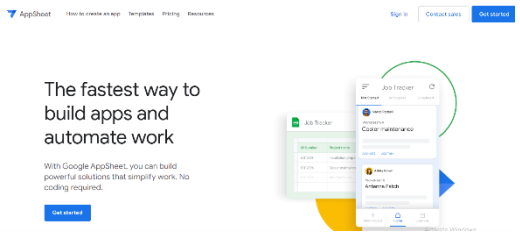

Fig. 2. Appsheet was selected as application development platform for this study application

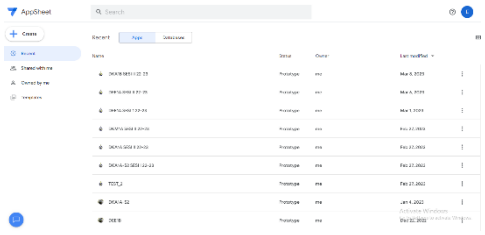

Fig. 3. Appsheet interface for this mobile application study by connecting to Google spreadsheet data storage

Fig. 4. Appsheet interface for this mobile application study by connecting to Google spreadsheet data storage

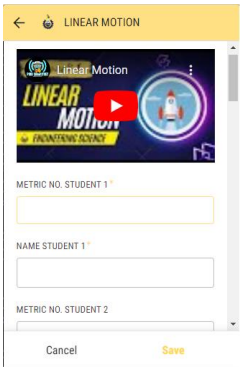

Fig. 5. Students have to fill in data (For example, Lab work 1-Linear motion) in this interface

4. Result and Discussion

Following the submission of students' reports via a mobile application. Purposive sampling was used to pick 44 students in Mechanical Engineering and Civil Engineering from Mukah Polytechnic in Sarawak, and they were asked to fill out a questionnaire. A questionnaire survey was given and collected to know the result of students' perceptions. The questionnaire contains three sections. The first section focused on obtaining students' demographic profiles such as gender, programme and semester. The second section in the questionnaire is related to this application content. There were 10 questions in this section to determine students' perception. The questions were slightly modified to suit this application contents and it is adapting from Wee (2020). While the third section is related to the interaction of the application to users. This questionnaire was adapted from Sabli et al., (2021). The questionnaire was assessed by a five-point Likert format: Strongly Disagree (5), Disagree (4), Moderate (3), Agree (4) and Strongly Agree (5). All the responses were collected online through Google Forms.

Table 1. The reliability test item

Reliability Statistics	
Cronbach's Alpha	No of Items
0.89	10

From the analyzed questionnaire, the results are as follows. The reliability of data was processed by using SPSS software which was tested by using Cronbach's Alpha method. The result of the Cronbach Alpha reliability test score was 0.80, which is above 0.60 at a satisfactory level. This shows respondents comprehend the question of the disseminated survey.

According to Table 2, there were 41 students from semester 1 and 3 students from semester 2 took DBS10012 course as respondents.

Table 2. The demographic profile of the respondents

Demographic Profile	n=40	%
Gender		
Male	21	47.73
Female	23	52.27
Programme		
DKM	22	50
DKA	22	50
Semester		
1	41	93.18
2	3	6.82
Gender		
Male	21	47.73
Female	23	52.27

The Table 3 demonstrates that the respondents use this mobile application frequently and the mean ranges from 4.25 to 4.43. According to the findings above, it shows that respondents are very satisfied with the application created. This demonstrates that there is a great deal of student interest in using mobile application for online learning and submitting their Lab Work report for DBS10012 course. The demonstration videos shown are in order has the highest mean rating of 4.43 for this aspect, and it is crucial for before

students attend their practical class. This findings from (Yahaya & Salam, 2014) that the issue of user acceptance rely on how easily users feel and can be followed when using any form of application are supported by the results. In general, most respondents concurred that using mobile applications to support their learning and report submission was pleasurable. However, this application is facilitating the submission process is associated with the lowest mean value in this aspect which is 4.25. Students may be quite unfamiliar with this application, and they are still adapting. This high-level usability is also consistent with the find of Seels, et at., 1994 study, which also have to consider how long a user uses an application before becoming accustomed to it.

Table 3. Mean and Standard deviation for application contents

No	Item	Mean	Standard Deviation
1	The content of the application corresponds to every lab work.	4.34	.479
2	The details are easy to understand.	4.34	.479
3	The demonstration videos were shown are in order.	4.43	.501
4	The demonstration video shown are easy to follow.	4.30	.553
5	The details of the demonstrated video are arranged in systematic way.	4.32	.471
6	All the details provided are sufficient.	4.30	.462
7	This application's language is simple to understand.	4.32	.471
8	All the details are well presented and interesting.	4.41	.497
9	Data/ Reports are easy to submit.	4.30	.509
10	This application is facilitating the submission process.	4.25	.438

Table 4 demonstrates that respondents use this mobile application at a reasonably high rate, with mean values ranging between 4.23 and 4.45. The greatest mean value for this aspect indicates that this application can be installed by using smartphone, tablet and laptop and this application is useful during COVID-19 pandemic. AppSheet serves as a framework for developing apps, and Google Sheets serves as the data repository. This app has emerged as a brand-new hub for collecting all relevant teaching and learning resources, and its adaptability was demonstrated by the fact that it can be used on a wide range of devices, including an iPhone, an Android phone, a tablet, and even a PC web browser (Wee, 2020). Mobile application learning is made possible by computing and communication tolls like smart phones, laptops and PDAs that are connected to wireless networks (Sarrab, Elgamel & Aldabbas, 2012). The most recent communication technology, not only makes life easier for people on a daily basis but also helps teachers improve their instructional strategies (Abachi & Muhammad, 2014). Mobile learning gives students the chance to practise skills and make use of the best technical resources to attain learning objectives (Samad et al., 2021). The primary factor that must be stressed is the importance of thinking about a design that makes sure mobile devices and educational applications generate chances to improve student learning rather than complicate or obstruct learning sessions (Samad et al., 2021). In general, most of the respondents agreed that this application is easy to use. While the elements contained in this application are interactive, according to the lowest mean value in this aspect, which is 4.23. As a result, it can be concluded from this study that the goals for developing this application were met.

Table 4. Mean and Standard deviation for interactive of application

No	Item	Mean	Standard Deviation
1	This application is easy to install.	4.34	.479
2	This application can be used by android and iOS systems.	4.34	.479
3	This application is user friendly.	4.36	.487
4	This application can be installed by using smartphone, tablet and laptop.	4.45	.504
5	The application interface is good.	4.32	.518
6	This application is useful during COVID-19 pandemic.	4.45	.504
7	The instructions in the application make it easy for the user to explore the content of the application.	4.34	.479
8	The icons available on this application are easy to use.	4.34	.526
9	The elements contained in this application are interactive.	4.23	.476
10	Overall, this application is easy to use.	4.32	.471

4. Conclusion

Google sheets was used as the application data storage platform and Appsheet as the application development platform to create a successful smart educational application for the Engineering Science course. This application has emerged as a brand-new hub for collecting all relevant learning resources and its adaptability was demonstrated by the fact that it can be used on a wide range of devices, including iPhone, an Android phone, a tablet and even a PC web browser. This application was designed with user friendly features, including icons for every lab work, rubrics and lab sheet. Lecturers can obtain their students' report through spreadsheets, and they must autocrat the spreadsheets in order to obtain students reports in PDF files. Finally, users may occasionally provide

suggestions on how to improve this application-to-application creators.

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References

Abachi, H. R., & Muhammad, G. (2014). The impact of m-learning technology on students and educators. *Computers in human behavior*, *30*, 491-496. https://doi.org/10.1016/j.chb.2013.06.018.

Baran, E. (2014). A review of research on mobile learning in teacher education. *Journal of Educational Technology & Society*, *17*(4), 17-32.

Bernacki, M. L., Greene, J. A., & Crompton, H. (2020). Mobile technology, learning, and achievement: Advances in understanding and measuring the role of mobile technology in education. *Contemporary Educational Psychology*, *60*, 101827.

Eccles, J. S., Midgley, C., Wigfield, A., Buchanan, C. M., Reuman, D., Flanagan, C., & Mac Iver, D. (1997). Development during adolescence: The impact of stage–environment fit on young adolescents' experiences in schools and in families (1993).

Furió, D., Juan, M. C., Seguí, I., & Vivó, R. (2015). Mobile learning vs. traditional classroom lessons: a comparative study. *Journal of Computer Assisted Learning*, *31*(3), 189-201.

Islam, R., Islam, R., & Mazumder, T. (2010). Mobile application and its global impact. *International Journal of Engineering & Technology*, *10*(6), 72-78.

Kapasia, N., Paul, P., Roy, A., Saha, J., Zaveri, A., Mallick, R., ... & Chouhan, P. (2020). Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India. *Children and youth services review*, *116*, 105194. https://doi.org/10.1016/j.childyouth.2020.105194.

Mahyoob, M. (2020). Challenges of e-Learning during the COVID-19 Pandemic Experienced by EFL Learners. *Arab World English Journal*, *11*(4), 351–362. https://doi.org/10.24093/awej/vol11no4.23.

Sabli, H. M., Joney, S. K. S., & Nasaruddin, M. S. M. (2021). Development of DPB6043 E-Notes Business Project Mobile Applications. *International ABEC*, 118-122.

Samad, M. R. A., Ihsan, Z. H., & Khalid, F. (2021). The use of mobile learning in teaching and learning session during the Covid-19 pandemic in Malaysia. *Journal of Contemporary Social Science and Education Studies (JOCSSES)*, *1*(2), 46-65.

Sarrab, M., Elgamel, L., & Aldabbas, H. (2012). Mobile learning (m-learning) and educational environments. *International journal of distributed and parallel systems*, *3*(4), 31.

Seels, B., & Richey, R. C. (1994). Redefining the field: A collaborative effort. *TechTrends: Linking Research and Practice to Improve Learning*, *39*(2), 36-38.

Shraim, K., & Crompton, H. (2015). Perceptions of using smart mobile devices in higher education teaching: A case study from Palestine. *Contemporary Educational Technology*, *6*(4), 301-318.

Wee, B. S. (2020). *The Effectiveness Study of a Developed Smart Educational App in Electronic Circuits Course*. 1–7.

Yahaya, N. S., & Salam, S. N. A. (2014). Mobile learning application for children: Belajar bersama Dino. *Procedia-Social and Behavioral Sciences*, *155*, 398-404. https://doi.org/10.1016/j.sbspro.2014.10.312.