

Development of e-LogBook for Civil Engineering Project Modules

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Abstract

Updating and filling in a logbook is part of what students taking Civil Engineering Project 1 and 2 modules must do weekly. The logbook usage carries twenty per cent of the total marks for each module. However, students encounter some problems with the current paper-based logbook. From the pilot study, students sometimes forgot to bring their logbook during a meeting. Since they always have to carry it during their research activities, their paper logbook on some pages are tearing and wearing, and sometimes they even lost it. With these problems and the world currently facing the COVID-19 pandemic, having a face-to-face meeting is not advisable, so converting a paper-based logbook to a digitalised version is appropriate. Therefore, this study aims to develop a mobile app version for e-LogBook and assess the developed application's functionality and effectiveness. The first stage was to identify the content of the e-LogBook and the suitable platform(s) in developing mobile apps. The next phase was to assess the application by deploying a questionnaire survey to project supervisors and students currently taking the modules (June 2020 Session). Results indicated that most of the respondents are satisfied with the overall function and effectiveness of the e-LogBook apps developed. The average mean score for both categories is more than 4.00. Thus, the application eliminated the problems associated with the current use of paper-based logbook and appropriate to the current requirements due to the pandemic.

Keywords: - Civil engineering project, e-LogBook, functionality, mobile application development

1. Introduction

Civil Engineering Project 1 (CEP 1) and 2 (CEP 2) are part of the essential modules that Civil Engineering students of Polytechnic need to pass to fulfil their diploma course requirement. Students will be completing these two modules in a group of a maximum of four students. CEP 1 is a prerequisite for CEP 2. Students will form their group in CEP 1, where they will need to produce a project proposal. Apart from the proposal, an assessment would also be on their other skills such as communication, group works, planning, and decision-making. If their proposed project is approved, they will implement it during the CEP 2.

Students will be assigned with one supervisor that provides help, support, and guidance. Abiddin (2006) stated that supervision is a process of observing, assisting and motivating students in gaining quality learning results. In this instance, advising students on the reading materials, selecting project title, objectives, scope, methodology, and many more related to and helping students execute their project effectively (Agricola et al., 2020). These tasks are all done during the project meeting. The meetings are held weekly or monthly, depending on the module requirement or arrangement made with the supervisor. As for CEP 1 and CEP 2 in this study, the meeting is conducted every week as per the modules requirement.

The meeting is a platform for students and their supervisor to communicate and interact with each other. During the meeting, students will present their project progress and outcome. They will also ask their supervisor if they have any query and the like. The session provides the supervisor with the opportunity to assess students understanding of their project and their research knowledge and skills (de Kleijn et al., 2015). As part of the supervision process, the supervisor also needs to provide feedback based on the student's progress report. Students need to jot down their work progress and important outcome and information in their logbook. The notetaking will also include feedback from and discussion with their supervisor.

A logbook is part of the CEP 1 and CEP 2 assessment: representing twenty per cent of the total marks. Therefore, students need to make sure that they are regularly updating their logbook and showing it to their supervisor. Using paper book logs means that the supervisor does not have access to it outside the meeting. Students also encounter a few problems regarding the paper-based logbook. A pilot study is deployed to gain more data on these two and probably other problems. A survey is distributed to 20 civil engineering students currently taking CEP 1 and CEP 2 (December 2019 Session). From the survey, all respondents (100%) agreed that the presently used logbook would waste on cost and paper usage, easy wear and tear, as they have to bring it with them most of the time. The students

sometimes forgot to bring it during the meeting (100%), which will cause them problems with their supervisor. These results indicate the need for a better logbook that is more effective for both the students and supervisor, and could help solve the problems.

To get access to logbooks anywhere and anytime, save on cost and paper usage, prevent wear and tear, and never forget to bring it for the meeting; the solution would be to convert paper logbook into mobile phone application. This solution is parallel with the evolution of information and communication technology, specifically in the education sector. Mobile Apps is a program uploaded in a gadget that can be used anytime and anywhere (Rashedul et al., 2010). According to the authors, there are many different types of apps that have been developed and continue developing specifically for mobile gadgets. The development is to simplify users in contacting their friends, peers, and family, and surf the internet. The apps also help with file management, scheduling, and even entertainment. Moreover, with the current pandemic COVID-19, where a face-to-face meeting is not advisable, having mobile apps to communicate, exchange information, and work more effectively is extremely necessary.

Therefore, this paper aims to develop a mobile application for the logbook to overcome the problems identified and help make the supervision process more effective.

2. Literature Review

Logbook stated in Oxford Learner's Dictionaries online is "an official record of events during a particular period of time, especially a journey on a ship or plane" (Oxford Learner's Dictionaries, 2021). It mainly used to maintain records of activities either daily, weekly or any other time according to the requirement. The recorded activities can be used as a guideline and provide endorsement or proof of involvement. Other uses of the logbook are to note and track down income and spending (Devamany, 2018), help motivate students in their learning (Suhaimi, 2006). For instance, in the fishery sector, the logbook is used for logging in data such as fleet register, fishing operations like mesh size, gear types, and vessel characteristics and location (Hintzen et al., 2012). In medical practices, particularly in a residency program, the logbook is a convenient tool in helping postgraduate medical residents organise their clinical activities according to the curriculum and their supervisors in providing feedback and performance monitoring (Gondal et al., 2017).

The development of digital technology has turned much of everything into digitalisation. The

logbook has also been converted into an electronic logbook (e-logbook). A panel-surgical electronic logbook is a mobile version used for operative details entered into the patient mobile device by the surgeons (Smolski and Turo, 2014). A study by Gondal et al. (2017) indicated that the electronic logbooks are better than its paper-based version in terms of monitoring and assessment tool. According to the authors, the e-logbook has improved the quality of learning, training, and skills as it enhances students efficiency through formative feedback and evaluations from their supervisors.

Portable devices like mobile phones always remain with its owner throughout the day. Moreover, to some people, it stays through to the night. The owner usually brings their mobile phone with them wherever they go. With emerging technology, mobile phones nowadays are equipped with various features and functions accessed via mobile apps where they provided users with diverse ways of communication, information gathering, entertainment, gaming, shopping, health tracking, and financial management to name a few (Balapour et al., 2019). These features can be downloaded (some are for free) using mobile application stores such as Google Play Store and Window Phone Store and can be accessed via a single mobile phone or smartphone. Therefore, it would be very convenient to carry around a small device that can do all those things.

There are various ways in developing mobile apps. One way is by running on the device operating system or via the platform(s), which requires expertise in programming languages, and mobile web application (Ahmad et al., 2018). With the rapidly increasing number and diversified platforms, many applications have been developed to suit users needs and requirements in making their daily lives, works, or routines easier. A smartphone that can substitute a computer on a particular scale has much potential in its usage despite having privacy and security issues. However, a study by Balapour et al. (2020) suggested that users have different perceptions of this privacy-security of mobile apps. Users view would depend on the apps information sensitivity. Therefore, as long as the mobile apps are still in use and demand, they will continue to expand, improve and growing. In the educational sector, smartphone usage has become one of the tools in teaching and learning processes. Some studies indicated that smartphone usage has positively (depending on the field of majoring) impact students academic performance (Han and Yi, 2019). It aids students in web-based and e-learning, especially this past year when some areas in this world are locked down due to the COVID-19 pandemic. Online learning and even online-based activities have now been a new norm not just in education but also in

other sectors as well. People need to try as best as they can to avoid face-to-face interaction.

3. Methodology

3.1 Application Development

There are five phases in developing the e-LogBook mobile apps. The phases adopted from instructional system development (ISD) mapped out in Gustafson (1991). The first stage is an analysis that analyses the problems and their roots and identified problems limitations and solutions. Next is a design where objectives and development strategy are determined based on data obtained in the first phase. The third phase is a development that an application starts to develop. In this stage, evaluation is carried out for correction and improvement and modification if necessary. The fourth phase is an implementation to introduce the application to real users. The final stage is an evaluation in determining the product effectiveness and the adequacy or, in this case, the application developed. This design model is a systematic process in developing technological source that includes analysis of achievement, application design, development, implementation, and assessment (Reiser and Dempsey, 2007). The model emphasizes repetition in every phase. Each phase is connected. If one stage is ineffective, the process will be repeated until it reaches its intended function ultimately.

The mobile e-LogBook application is developed using Android Studio and Google Firebase Console software with an android application package (APK). The Android Studio is chosen because any application for phones, tablets or wearables gadgets can be created using the platform (Drongelen, 2015). The other reason is that it is free of charge for those wanting to develop professional Android applications. The APK, on the other hand, is a package file format that is being used in Google's Android operating system (Bezobrazov et al., 2016). It is a file format that can install application software on any android mobile phones. Shanmugapriya and Tamilarasia (2011) mentioned that a mobile phone with an android platform nowadays had been a necessary telecommunication tool, especially for students and teachers or lecturers. It is not just for two-way communication but also an instrument to disseminate information and teaching and learning materials, provide feedback and many more.

3.2 Data Collection

The study deployed a survey design via questionnaire for data collection. There are two types of questionnaires; one for students and the other one is for supervisors. Both instruments are divided into three sections; Section A, B, and C.

Section A is to gain respondents' demographic such as gender and current semester for students. Section B includes questions regarding the functionality of the e-logbook, e.g., timesaving, and ease of use. On the other hand, Section C revolves around inquiries of the design such as on the suitability of font type and size, the background and user satisfaction of the apps. Section B and C use the five scores Likert Scale from strongly disagree (score 1) to strongly agree (score 5). Respondents were asked to give their rate based on the five-scale score for each question in the two sections.

The questionnaire via Google Form is distributed through simple random sampling. As previously mentioned, there are two types of samples: students and supervisors. For students, participants are from students in their fourth and fifth semesters.

Students are taking the civil engineering project module during these two semesters and are using a logbook to jot down all the activities regarding their project throughout the semester. The fourth-semester students take DCC5191 – Civil Engineering Project 1, and the fifth semester are taking the DCC6203 – Civil Engineering Project 2. DCC5191 is a prerequisite for DCC6203, meaning that students, in a group of 3 to 4 students, will develop their project proposal in their fourth semester and executed their project in their fifth semester. The study involved twenty (20) students for each semester and ten (10) supervisors for June 2020 learning session.

4. Finding and Analysis

4.1 The e-LogBook Application

Figure 1 below shows the flow of the application. It started with the application's front inter-face where it shows either to join (for new user) or to login for those who already have registered (Figure 2; right side).

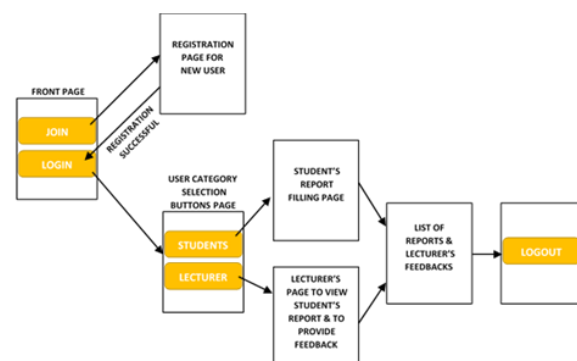


Figure 1: The flow of mobile e-LogBook platform

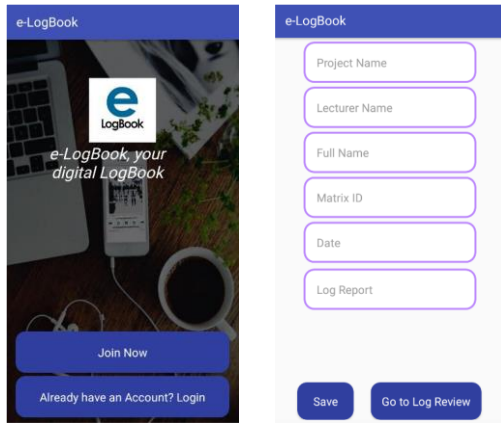


Figure 2: Front page and registration page

New user(s) will register their particulars, as shown in Figure 2 on the left side. Once the registration completed, the user is directed to the login page, as shown in Figure 3.

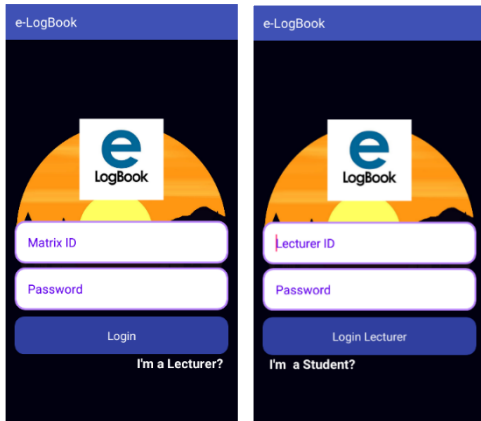


Figure 3: Login page for student and supervisor

Since there are two categories of users: student and lecturer/supervisor, they need to log in accordingly as shown in Figure 3 above.

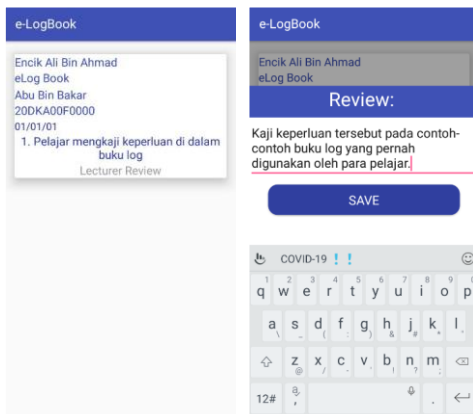


Figure 4: Student's report and supervisor's review

After logging in, the student can start filling in their weekly report of their project progress (Figure 4; left side). A similar process applies to the supervisors as well. After the supervisor reviews the student's report, they will give their feedback, as shown on the right side of Figure 4.



Figure 5: Supervisor's feedback page

Figure 5 above shows the examples of the supervisor's feedback on student's weekly report. Through the e-LogBook application, both student and supervisor can update and keep track of the project progress anywhere and anytime they want. In this instance, the student cannot give any excuse of forgetting to update their weekly report or overlook making amendments to their project as per the supervisor's feedback. It would be more appropriate during this pandemic COVID-19, where having a face-to-face meeting is not advisable. Therefore, using e-LogBook would be best for both parties.

4.2 Data Analysis

The e-LogBook was assessed based on its functionality and overall design. Quantitative data gained were analysed using descriptive analysis. Table 1 showed respondents' gender for both students and supervisors. The table illustrated that male respondents are dominant in both categories, 67% for students and 60% for supervisors.

The next phase is the analysis of the questions in Section B and C. Table 2 below shows the students' score based on their assessment of the functionality of the e-logbook. The majority of the students strongly agreed that the apps' usage could save users time (92.5%). 87.5% of students also strongly agree that the app is easy to use, and the guideline provided is easy to understand. With 90% each, students strongly agreed that the application platform is simple and not complicated and saves cost in printing costs. The highest score would be that the apps could be used without internet access (95%). This function would be preferable, as the students' current location, especially around the hostel, does not have good internet coverage. Overall questions mean at the highest level ($M > 3.33$) between 4.83 to 4.95 with a standard deviation of less than 0.90. The average mean is 4.88, which is relatively high. This result showed that students are satisfied with the overall functionality of the application.

Table 1: Respondents' Gender.

Categories	Male		Female		Total Number
	Number	Percentage (%)	Number	Percentage (%)	
Students	27	67	13	33	40
Supervisors	6	60	4	40	10

Table 2: Functionality Assessment by Students.

No	Item	Percentage (%)					Mean	SD
		1	2	3	4	5		
1	Time saving	0	0	2.5 (1)	5 (2)	92.5 (37)	4.90	0.38
2	Easy to use	0	2.5 (1)	0	10 (4)	87.5 (35)	4.83	0.56
3	Guideline provided is easy to understand	0	0	2.5 (1)	10 (4)	87.5 (35)	4.85	0.43
4	Platform used is not complicated	0	0	2.5 (1)	7.5 (3)	90 (36)	4.88	0.40
5	No need to have internet access	0	0	0	5 (2)	95 (38)	4.95	0.22
6	Cost saving; paperless	0	0	0	10 (4)	90 (36)	4.90	0.30
Average							4.88	

Note: SD = Standard Deviation

Table 3: Functionality Assessment by Supervisors.

No	Item	Percentage (%)					Mean	SD
		1	2	3	4	5		
1	Time saving	0	0	0	80 (8)	20 (2)	4.20	0.20
2	Easy to use	0	0	0	60 (6)	40 (4)	4.40	0.25
3	Guideline provided is easy to understand	0	10 (1)	0	60 (6)	30 (3)	4.10	0.42
4	Platform used is not complicated	0	0	0	70 (7)	30 (3)	4.30	0.23
5	No need to have internet access	0	0	10 (1)	50 (5)	40 (4)	4.30	0.32
6	Easy to give feedbacks to students	0	0	20 (2)	60 (6)	20 (2)	4.00	0.32
Average							4.22	

Note: SD = Standard Deviation

As for supervisors' evaluation (as shown in Table 3), at the highest mean of 4.40, 60% agreed, and 40% strongly agreed that the apps ease usage. The lowest average is at 4.00, where although most of them are agreed; however, two of the respondents slightly agreed on the app's ease of use in giving feedback. The overall mean is still at the highest ($M > 3.33$) in between 4.00 to 4.40, with the average of 4.22 indicating that the majority of the supervisors are satisfied with the functionality of the e-logbook.

The subsequent analysis is for Section C, where respondents are asked to assess the apps overall design. The assessment is on the suitability of the font type and size, background, and overall satisfaction of the e-LogBook.

Figure 6 shows that students and supervisors are all satisfied with the apps. Even though the supervisors' assessment value is lower than the students', the mean attained on all questions on both categories is at the highest level ($M > 3.33$). As Fetaji et al. (2008) explained, receiving aspect of any

application would depend on how much the users feel at ease while using the apps. The e-logbook font type and size used are suitable, has an interesting background and the overall design is not distracting the users. The apps are designed to overcome the problem mentioned in Section 1 (i.e., cost exert in printing, forgot to bring the logbook during the meeting, etc.). Sreerambhatla (2010) stated that users' satisfaction would increase if the apps created based on the clients' needs. In this regard, the logbook is a mandatory requirement as it is part of the modules' assessment criteria that carries twenty per cent of the total marks. Most of the respondents satisfied with the apps are probably due to this mandatory requirement. Moreover, the apps also eliminated the current problems facing the students. The apps also appropriate in the pandemic situation, where a face-to-face meeting is not desirable.

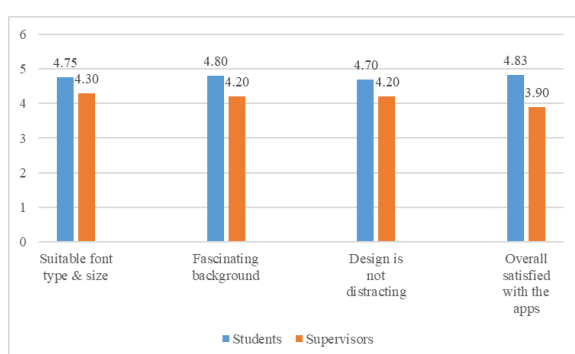


Figure 6: Students and supervisors' assessment on the design of the application

5. Conclusion

The e-logbook has fulfilling its intended purposes. From the analysis, the assessment showed that the min score values attained are at the highest level for all items. Although it still needs improvements in some areas, the e-logbook can be very useful for civil engineering project 1 & 2. Some of the enhancement would be allowing both students and supervisor to upload documents and pictures. This admission could help in better information sharing and would be a one-stop-centre where everything is reachable in one place. Hopefully, with an upgraded and better version, the apps could be used in the Civil Engineering Department of Politeknik Mukah and in other departments and other institutions for everyone involved to carry their tasks, roles, and responsibility seamlessly.

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