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Innovation Of Labwork Using Blippar Application For Teaching And Learning At PUO

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ABSTRACT

Mobile technology has become popular worldwide with a broad range of users, including students from all levels of education. Although the impact of mobile technology in classrooms has been extensively studied, less is known about teachers' perceptions on how mobile technology impacts learning in the classroom. The teaching and learning of engineering courses are always challenging due to its complex and abstract nature, and the mathematics involved. With diminishing resources such as academic staff career movement, lack of competent professional staff, inadequate laboratory infrastructures, teaching and learning of engineering courses become harder and it is progressively becoming difficult to teach basic engineering laboratory courses effectively. As a result, students cannot achieve effective learning outcomes. To overcome these challenges, a quick-response (QR) code with an application which is 'Blippar' has been developed to enhance students' learning outcomes. This approach is cost effective, user-friendly, and attractive. The method comprises a video clip of a demonstration and conduction of a real laboratory experiment. Students can easily use this application on their smartphones or tablets to view creative video clips about procedures of geotechnical experiments such as moisture content, soil hydrometer test and direct shear test. Other than that, information on safety guidelines was also inserted in this application. This application was aimed for students in their fourth semester of civil engineering course at Politeknik Ungku Omar (PUO), Ipoh. A questionnaire was distributed to study the significance of 'Blippar' application in Geotechnical Engineering lab work. The data was analyzed by using the Statistical Package for the Social Sciences (SPSS). In the results, it demonstrates that the p-value is 0.002, passing the alpha value of > 0.001. So, it proved the importance of innovation in 'Blippar' based teaching and learning. This 'Blippar' application also verified by some experts from the PUO. This innovation provides an explorative way of approaching the numerous possibilities that arise in teaching and learning using mobile technology.

1.0 Introduction

Should discuss the problem statement, the background of the study, the contribution, the research objective and the question in paragraph form. The summary of paper structure also should be briefly discussed. The subtopic must be written as follows: Education is a very powerful instrument for social change and transformation. Innovative teaching practice is the only way to enhance the quality of our education. The problems that society faces are essentially the problems

of educational institutions which are required to be innovative as they teach new skills and develop new insights and approaches towards the solving social problems which the nation faces. Students must be empowered to be able to withstand the global challenges of the 21st century. The Oxford Dictionary defines innovation as "the introduction of novelties, the alteration of what is established methods" which is what this article strives to do. A key performance indicator of any education institution is the education quality in especially teaching and learning areas (Nicolaides, 2012).

1.1 Background of study

Academic efforts aimed at integrating methodologies associated with the use of mobile devices, the potential of the Internet of Things (IoT), and the role of experimental education in civil engineering. This integration is developed by encompassing the use of sensors, microcontrollers, app development, and fabrication. An explorative way of approaching the numerous possibilities that arise in civil engineering with IoT, automation, monitoring, and control of civil engineering processes represent accessible and affordable ways for application in classrooms and in educational laboratories for beginners. The approach implies the fusion of three realms which are the phenomenology and mathematics of varied civil engineering problems, the systematic use of digital fabrication technologies and electronic prototyping platforms and the creative and visual way of developing codes provided by block-based development platforms (Crook, 2013).

Mobile technology has become popular worldwide with a broad range of users, including students from all levels of education. Although the impact of mobile technology in classrooms has been extensively studied, less is known about teachers' perceptions on how mobile technology impacts learning and its relation to Applications (Apps) use in the classroom. This situation is problematic since we know that teachers' perceptions have a great influence on their teaching practices (Arnhem, 2016).

1.2 Significance of study

Integrating quick response (QR) codes and 'Blippar' technology into geotechnical engineering lab work proves to be a transformative approach, enhancing both efficiency and engagement. By seamlessly connecting physical samples with digital insights, this innovative combination offers a dynamic platform for data analysis and visualization. The integration of QR codes and 'Blippar' opens a gateway to a more interactive and efficient learning experience. In this dynamic environment, physical specimens seamlessly connect with digital information, allowing for enhanced data analysis, visualization, and exploration. This introduction marks the dawn of a transformative era in geotechnical engineering education, where the marriage of tangible samples and Augmented Reality (AR) technologies promises to redefine the way, we understand and engage with the complexities beneath our feet.

1.3 Research objectives

i. To create lab work details using 'Blippar' application.

ii. To implement innovation in teaching and learning of lab work.

iii. To get verification from the experts on the impacts of 'Blippar' application

1.4 Scope of study

The researchers' inspiration for creating a QR code with an application which is 'Blippar' originated from the challenges faced by students at Polytechnic Ungku Omar (PUO) in finishing their geotechnical lab works. A QR code is created with an application which is 'Blippar'. This application contains some high-quality video clips. Polytechnic students can easily use this application on their smartphones or tablets to view creative video clips about procedures of geotechnical experiments such as moisture content, soil hydrometer test and direct shear test. Other than that, the information on safety guidelines is also inserted in the video of this

application. Students can easily get information on the laboratory rules and are able to get their lab sheets for experiments. With 'Blippar' application, students can quickly find the lab sheets and download it at any time. It also helps the students to understand and retain the information better by associating ideas, words, and concepts with videos. Besides that, the QR code will be placed at the geotechnical laboratory of PUO, Ipoh. This application is aimed for students in their 3rd and 4th semester of civil engineering. The questionnaire was distributed to 3rd and 4th semester students, Bachelor of Civil Engineering in Technology (BCT) students, senior lecturers of PUO and lab technician to study on the significant of 'Blippar' application in geotechnical lab work. The data analysis was done using the latest version of Statistical Package for the Social Sciences (SPSS). Finally, the product was verified by experts in geotechnical engineering field at PUO, Ipoh.

2.0 Literature review

Currently, the explosive rise of mobile technology has resulted in a new age for e- learning. Smartphone applications are extensively used in schools, workplaces, and daily life as smartphones and tablets grow more powerful, portable, and handy for users to use whenever and wherever in daily life. Innovative mobile learning application design enables users to work together with others, in addition to studying information comfortably. For students who have access to smartphones and tablets, mobile learning applications will become vital with these characteristics. Applications for smart phones provide a significant deal of comfort for educators as well as learners (Kalyani, 2018). The use of IOT has brought a revolution in the teaching learning process. Since their early youth, the current generation of students (Generation Z) has had access to the Internet, computers, smartphones, and other such gadgets. In general, in contrast to previous generations, these students are at the forefront of adopting new technologies. As a result, both evolution and revolution are necessary in the school setting. AR is becoming increasingly significant in IOT learning. The view of a physical real-world environment through a device (smartphone, tablet, etc.) that includes photos, video, and audio is known as AR. AR does not replace physical reality; rather, it enhances it by incorporating multimedia aspects. AR technology comes in several developments, such as QR codes. QR codes are two-dimensional bar codes that can be scanned with smartphones and tablets using free QR reader software. The codes can be connected to instructor-created content or to a website (Pilkington, 2021).

2.1 Teaching and learning process

2.1.1 Traditional Method of Teaching and Learning

In past centuries, the main duty of teachers has been to share information, serving as the source of all knowledge. A traditional method normally comprises a classroom with rows of students seated in front of a teacher who lectures and presents material to them using a blackboard, while the students either listen passively or, if the teacher is lucky, take the teacher's notes. Undoubtedly, technology has changed how every sector operates, including the teaching and learning process. The traditional method of teaching experienced several improvements, going from being teacher-focused to student-focused, face-to-face education to applying projectors and smart boards, but still requiring the instructor to be present in the classrooms (Enzai, 2020).

There are several challenges that traditional learning faces today and that need to be changed to bring more fun learning experience to students. In most cases, access to quality education suffers in traditional classrooms because not all teachers are equally good or skilled enough to teach students. To provide students with a quality education, teachers must be trained, and curriculum must be standardized, which both are difficult tasks. Additionally, parents also have specific expectations for what and when their children should learn. Another issue with traditional learning is that it frequently overlooks innovation. It has the potential to make learning feel boring and discouraged. It is critical for students to feel free to be creative and express themselves. When the lessons restrict innovation, it may destroy motivation and make students feel as if their time is being wasted. The most important sources of information are lecturers and

books. Students struggle to learn new things, and their knowledge is limited to what students have learned from books and lectures (Adel et al.,2021).

Memorization is often the goal of traditional learning. Lecturers provide an explanation, students take notes, and they are assessed on the material. However, this traditional teaching doesn't work for every student. Not all students learn through verbal or auditory instruction. The verbal learning type is the most usually suited in traditional education. However, a large percentage of students learn through different methods, such as hands-on learning and group projects. Students don't want to attend school or classes because having a difficult time grasping the material in the classroom. This is one of main reason why students don't prefer the traditional method of learning. Other than that, it also can be stressful and anxious for students when don't understand their assignments. Sometimes stress happens physically, such as headaches or feeling sick (Puspitarini & Hanif, 2019).

2.1.2 AR Education System in Engineering Program

In a world where technology is being applied more and more in everyday life, the potential and effective use of technology in education has been growing in significance. Engineering education involves the use of technology to help students grasp abstract ideas and principles. AR is a technology that can be used to create effective and engaging technological solutions and learning resources (Tuli et.al, 2022).

In the modern classroom, it is quite challenging to convey knowledge and give explanations that are crystal clear. Some topics students find challenging to understand because they lack virtual experience with the things they are learning. Textbooks are the main way that students gain knowledge, but the only problem in textbooks is the 2D diagram present in the books. Since students lack virtual experience, it is very difficult for them to fully understand the working of any diagram, for example human heart that how exactly it looks and function. A concept known as AR for the education system was developed to solve this problem. University lecturers and even students have the opportunity using AR to understand complicated concepts. Teaching new development abilities, enhancing students' brains, and developing their excitement in studies are all made possible by the involvement and experimentation that AR technology offer. AR Applications directly in the offline classroom, where teachers may explain the subject, offer the visual representation of the information, and support students as well, is now the most common application for AR in education (Nigam et.al, 2022).

Considering the development of information technology and digitalization, education is forced to accept new learning models and develop innovative methods of instruction. Additionally, colleges and universities are required to quickly transition to online learning because of pandemic restrictions and to stop the virus's spread (COVID19). AR applications interaction and programs provide many advantages, including improved engagement and interaction, and can assist to reduce the negative effects of the problems of face-to-face education. There are several problems in the current educational structure that may be observed in online learning contexts, particularly in practical classes. One of the main issues is the lack of communication between the lecturer and the students, the difficulties the teacher has in solving the problems of specific students, and the students' disinterest in the lessons. Teachers need to find innovative materials and modern methods to enhance the distant learning experience to solve these issues. Information technologies are being used in education more and more, and AR and mobile phones are two of the technologies that have led to the greatest advances in the field of education. Furthermore, there has been a significant growth in the usage of mobile devices; almost 50% of students use them to study and get more information on the subjects that are being taught in the classroom. Due to its many characteristics and advantages such as instant access to information, the capacity to access online learning resources, high mobility, universality, and ubiquity mobile devices are frequently used. Nearly all people own a mobile device nowadays, and 74.43% of them use the

Android operating system. As a result, android smartphones are the focus of learning application development to reach as many people as possible. Furthermore, according to a 2017 survey, mobile devices are the ones that people choose to utilize AR technology on since they are more affordable, portable, and easy to use than laptops or desktop computers. Then there are other products, like smart glasses, that are also commonly used for AR applications (Criollo et.al, 2021).

2.1.3 Innovative Methods of Teaching and Learning

Education is a method of helping the learning of information, skills, beliefs, and habits. Basically, sharing and receiving information must be the two main parts of education. In the end, a teacher does their best to share information as students understand it. The goal of education is to prepare students for the workforce by fostering their creativity, knowledge, and independent thought in addition to their acquisition of literacy. A student's success is influenced by their teacher and the creative teaching methods they use. In addition to improving education, the implementation of innovative method in educational institutions have the potential to strengthen leadership, inspire individuals, and motivate efforts to meet the nation's human development goal (Revathi et.al, 2019).

The best strategy to improve teaching and learning outcomes is through advanced teaching. Around the world, several innovative methods of teaching are currently in use. E- learning is included in hybrid education in addition to face-to-face instruction. Details on technology and multimedia use are provided. It describes how to use smart devices for a variety of functions, including teaching, creating test questions, assessing students, providing feedback, and doing research. As educators who want to inspire and develop a learning spirit as well as passion on the part of students, applying new teaching and learning approaches is important. While lecturers can educate, it is the responsibility of education to make sure that the material is understandable to students from a variety of cultural and linguistic backgrounds and that they quickly become familiar with the required standards. Most of the time, poor performance among students is caused by a lack of understanding of the standards of assessment or what the lecturer requires of them. Therefore, lecturers should work hard to use innovative methods to ensure that the learning process for the students is as free flowing as possible and that the method that they use is helpful for learning. Short lectures, simulations, role-playing, portfolio creation, and problem-based learning (PBL) are just a few of the innovative methods of learning and teaching that may be used to meet the increasing technology advancements and developing workplaces of the near future (Iyappan, 2018).

2.2 Blippar application

'Blippar' for education is a user-friendly and simple app and web interface for developing, publishing, and viewing AR features. It is free for educators and social organizations. The full of features online creation tool helps teachers establish accounts for students. Teachers may easily bring augmented reality into the classroom with the help of 'Blippar' for Education, which offers a user-friendly interface. On the 'Blippar' for Education Blog, students can keep up with ' Blippar' for education, a set of tools and a network for teachers who work together. The program includes a creation tool, teacher dashboard, and access to a network of 'Blippar' users. Moreover, in 2016, 'Blippar' for Education published a few new features, such as a modified Help Centre and the ability to produce 360-degree views. 'Blippar' predicts launching more features in the future year (Arnhem, 2016).

2.2.1 Application of QR Code

One of the areas that uses many innovative technologies in its growth is educational activity. By doing so, it is possible to enhance the learning process, different careers, bring in potential candidates, and help students develop the essential abilities. The learning experience may be enhanced by using innovative technology to deliver the material being studied in new ways. The usage of QR codes in educational activities should be mentioned among these new technologies

(Deineko et.al, 2022). The use of AR in education has opportunities to improve student performance since it is an innovative way to bring virtual reality into the real world. The Saudi Ministry of Education integrated technology into its educational system by building an educational portal called iEN, which offers many technologies that support education, such as AR experiments, e- textbooks, learning games, video clips, and TV channels. With the help of this project, Saudi Arabia was better prepared to switch to remote learning, which allowed for a quick and simple change in the educational system during the COVID-19 coronavirus an epidemic. The benefits of using QR codes as an AR to improve student performance in Saudi education were investigated in the current study. The results showed that students did not experience any technical difficulties when using technology in their learning processes and that students who used QR codes in their education performed at higher levels than those who did not. That, however, could be influenced by the way their generation (the "alpha generation") used technology and how it affected their way of life (AlNajdi, 2022).

3.0 Methodology

'Blippar' was used in the development of AR. 'Blippar's free AR creation platform is used to develop and share AR material that is particularly designed for geotechnical lab work. The development and distribution of AR experiences is made simple by this platform. Students can access full information on geotechnical lab procedures from the developed material. Videos on the process and work of each lab activity such as moisture content test, soil hydrometer test and direct shear test were inserted in the 'Blippar' application. It helps students to understand geotechnical lab work better. With this, students may view a video sample of how the geotechnic lab work is implemented by just scanning the QR code that has been provided. Students can access the application easily and watch the procedures videos when enter the laboratory. So, students get the experiment videos to do self-study without asking for anyone's help.

A google form was used to create the questionnaire. This questionnaire is to record validation data from lab technicians, senior lecturers, and students studying civil engineering at PUO to determine the innovation of lab work using 'Blippar' application for teaching and learning. According to the study, 72 respondents from the Civil Engineering Department replied to the questionnaire based on this study. This study's element involved an analysis of data related to questionnaire responses. As a result, frequency tables and charts were used to analyze the data and show the questionnaire's results. In addition, the researcher performed regression analysis and provided the mean and standard deviation for each statistic related to the questionnaire. This application was verified by 2 experts, which were Madam Norasiah and Sir Maliki. The 2 experts from PUO's geotechnical department tested the application and provided insightful feedback. Expert recommendations were acquired as well for future application improvements.

4.0 Discussion of analysis and findings

72 questionnaires had been distributed to the respondents to get some data. All the questionnaires distributed were completed and tested by using the SPSS software version 29.0. The questionnaire was created using a Google Form. This is to document validation data from Ungku Omar Premier Polytechnic Civil Engineering students, lecturers, and lab technician to determine the innovation of lab work using 'BLIPPAR' application for teaching and learning. According to the study, 72 respondents from the Civil Engineering Department replied to the questionnaire based on this study. This part of the research comprised data analysis regarding responses gathered from the questionnaire. Therefore, the findings of data were analyzed by using frequency tables, and charts to represent the findings of the questionnaire. The researcher also provided mean and standard deviation for each questionnaire question statistics and performed regression analysis.

Table 1.1: The respondents in PUO

Position in PUO					
		Frequency	Percent	Valid percent	Cumulativepercent
Valid	Lecturer	4	5.6	5.6	5.6
	Student	63	87.5	87.5	93.1
	Lab technician	5	6.9	6.9	100.0
	total	72	100.0	100.0	

4.1 Effectiveness of AR Applications in Enhancing the Learning Experiences

The data that was collected is based on the effectiveness of AR applications in enhancing the learning experiences as shown in table 1.2. Based on the respondents' opinion, AR application in improving the learning experience compared to traditional teaching method is very effective as all the results agreed to this question.

Table 1.2: The results based on effectiveness of AR applications in enhancing the learning experiences.

In your opinion, how effective is AR applications in enhancing the learning experiences compared to traditional teaching methods?					
		Frequency	Percent	Valid percent	Cumulativepercent
Valid	Effective	72	100.0	100.0	100.0

4.2 SPSS analysis

A parameter T-test was used for analysis to determine whether all the variables are significant. Based on table above, it shows that p-value is 0.002 which is more than alpha value of p >0.001. It showed that innovation for teaching and learning using "Blippar" is significant.

Table 1.3: SPSS analysis of questionnaire variables

One-Sample Test						
	Test Value = 66.5					
	t	df	Significance		Mean Difference	95% Confidence Interval of the Difference
			One-Sided p	Two-Sided p		Lower
Q1	46.378	72	.002	.002	4.086	3.91
Q2	43.285	72	.002	.002	4.214	4.02
Q3	44.262	72	.002	.002	4.214	4.02
Q4	42.369	72	.002	.002	4.214	4.02
Q5	40.793	72	.002	.002	4.200	3.99
Q6	42.620	72	.002	.002	4.186	3.99
Q7	16.861	72	.002	.002	2.800	2.47
Q8	39.850	72	.002	.002	4.129	3.92
Q9	43.675	72	.002	.002	4.357	4.16
Q10	46.268	72	.002	.002	4.229	4.05

4.3 Verification from the experts

A verification form was given to 2 experts to test and approve the 'Blippar' application. The experts from the geotechnical department of PUO tested the application and gave some good comments. Recommendations were also received from the experts for the application to be upgraded in the future.

4.4 Summary

The data collected through questionnaires for the innovation of lab work using the 'Blippar' application provided valuable insights into the implementation of this in the teaching and learning method. Participants, including educators and students, have offered feedback on usability, effectiveness, and overall satisfaction. Most participants expressed positive sentiments regarding

the integration of the 'Blippar' app, citing improved engagement and interactive learning experiences during lab sessions. Some respondents highlighted the importance of comprehensive training for both educators and students to maximize the benefits of the 'Blippar' application. This suggests that further emphasis on AR technology in teaching and learning methods may enhance overall user experience. The data from the questionnaires underscores the potential of the 'Blippar' application as an innovative tool for lab work teaching and learning. Addressing feedback and refining implementation strategies will contribute to the ongoing success of this educational innovation.

5.0 Conclusion and future research

The 'Blippar' application's user-friendly interface has made it easier for it to be seamlessly integrated into the lab activities that are already in place, which has improved and expedited the learning process. Integrating QR codes and 'Blippar' technology into geotechnical engineering lab work proves to be a transformative approach, enhancing both efficiency and engagement. By seamlessly connecting physical samples with digital insights, this innovative combination offers a dynamic platform for data analysis and visualization. The integration of QR codes and 'Blippar' opens a gateway to a more interactive and efficient learning experience. In this dynamic environment, physical specimens seamlessly connect with digital information, allowing for enhanced data analysis, visualization, and exploration. The incorporation of 'Blippar' is a prime example of how innovation can enhance teaching, learning, and overall educational experiences as the institution develops and adopts new educational technologies. Moreover, by incorporating interactive demonstrations, case studies, 3D models and collaborative platforms, this innovation can create a multifaceted and interactive learning environment, catering to diverse learning styles and maximizing the benefits of QR codes and 'Blippar' in geotechnical engineering lab work.

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Author Contributions

Panbarasi: Conceptualization, Methodology, Writing-Reviewing and Editing, Supervision; **Nagavaissnavi**: Data Curation, Validation, Writing-Original Draft.

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.

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