POLITEKNIK MALAYSIA
Sultan Salahuddin Abdul Aziz

FINAL REPORT FINAL YEAR PROJECT 1

MOBILE LEARNING FOR EDUCATION : STRUCDEE MOBILE APPS

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MOBILE LEARNING FOR EDUCATION : STRUCDEE MOBILE APPS

1. We, MUHAMMAD SYAHMI BIN MOHD SHABRI and MUHAMMAD FAKHRUL HAZIQ BIN ISHANI are students from POLITEKNIK SULTAN SALAHUDIN ABDUL AZIZ SHAH with the address 'Persiaran Usahawan, Politeknik Sultan Salahuddin Abdul Aziz Shah, Shah Alam, Selangor

2. we acknowledge that the 'Project above' and the intellectual property contained therein are the result of my original work/ invention without taking or copying any intellectual property from other parties.

3. we agree to transfer ownership of the intellectual property of 'the Project' to 'the Polytechnic' to meet the requirements for the award of the Diploma in Civil Engineering to me.

Prepared by:

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In front of me :

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APPRECIATION

Sincere appreciation to DR. AINUL HAEZAH BINTI NORUZMAN as the supervisor for our final year project. Because, always give good guidance throughout the study. And gave us a lot of knowledge throughout our studies.

Appreciation is also extended to any party who has given us a lot of help, especially in producing this work.

ABSTRAC

STRUCDEE MOBILE APPS is an application that will be produced by us in addressing the problems of students, especially civil engineering in answering questions related to Shear Force Diagram (SFD) and Bending Moment Diagram (BMD). Our main purpose in the production of this application is to apply the use of technology in the Education sector especially in civil engineering. As we see now, as a result of the Corona Virus disease outbreak (COVID 19) the Education sector is experiencing huge problems as most of the institutes of learning have been closed for not wanting the virus to spread to more people. Because of this, many students have problems in the learning session because they cannot feel the same learning session as before. Therefore, we agreed to produce this application to help students and instructors in understanding and mastering learning especially Shear Force Diagram (SFD) and Bending Moment Diagram (BMD). STRUCDEE MOBILE APPS is an application that can solve questions related to SFD and BMD by simply entering important data such as beam length, force and others. In addition, this application is also able to analyze questions by simply using the camera to analyze questions using a computer vision system. The application is able to solve questions from the categories of continuous beam and simply supported beam. In collecting data to produce this application, we use quantitative methods (through boring questionnaires), qualitative (through interviews and observations) and literature review which are previous studies that have inspired us to produce this application. To produce this application, we use ANDROID STUDIO software and MIT APP INVENTOR which is software specially designed for programing and producing applications.

ABSTRAK

STRUCDEE MOBILE APPS adalah aplikasi yang akan dihasilkan oleh kami dalam menangani masalah para pelajar khususnya kejuruteraan awam dalam menjawab soalan yang berkaitan dengan Shear Force Diagram (SFD) dan Bending Moment Diagram (BMD). Tujuan utama kami dalam penghasilan aplikasi ini adalah untuk menerapkan penggunaan teknologi dalam sektor Pendidikan khusunya dalam kejuruteraan awam. Seperti yang kita lihat sekarang, akibat dari bencana wabak penyakit Corona Virus (COVID 19) sektor Pendidikan mengalami masalah yang besar kerana kebanyakan dari institute pengajian telah ditutup kerana tidak mahu virus ini tertular kepada lebih ramai orang. Oleh kerana hal ini, ramai para pelajar yang mengalami masalah dalam sesi pembelajaran kerana mereka tidak dapat merasakan sesi pembelajaran yang sama seperti sebelum ini. maka, kami bersepakat untuk menghasilkan aplikasi ini untuk membantu para pelajar dan para pengajar dalam meemahami dan menguasai pembelajaran khususnya Shear Force Diagram (SFD) dan Bending Moment Diagram (BMD) . STRUCDEE MOBILE APPS ini adalah aplikasi yang boleh menyelesaikan soalan yang berkaitan SFD dan BMD dengan hanya memasukkan data-data penting seperti Panjang rasuk, daya dan lain-lain. Selain itu aplikasi ini juga mampu menganalisa soalan dengan hanya menggunakan kamera untuk menganalisa soalan dengan menggunakan sistem computer vision. Aplikasi mampu menyelsaikan soalan dari katagori continuous beam dan simply supported beam. Dalam pengumpulan data untuk menghasilkan aplikasi ini, kami menggunkan kaedah quantitative (melalui boring soal selidik), qualitative (melalui sesi temu bual dan pemerhatian) dan literature review iaitu kajian-kajian terdahulu yang banyak memberikan kami inspirasi untuk menghasilkan aplikasi ini. untuk menghasilkan aplikasi ini, kami menggunakan software ANDROID STUDIO dan MIT APP INVENTOR yang merupakan software yang direka khas untuk programing dan menghasilkan aplikasi.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

From time to time, place to place and everywhere, we often hear from human lips around the world, about the use of digital technology and mobile applications in the Education sector. In the ‘FINAL YEAR PROJECT’ assignment this year, we have agreed to produce a new product that has been innovated for students especially in the field of civil engineering which is a mobile application called ‘STRUCDEE MOBILE APPS’. This STRUCDEE application is a learning -based application to help students especially in the subjects of structural mechanics and structural theory. The assistance provided is to help students solve questions related to Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) by entering only important details such as beam length (L), force (P/F), support (roller, pin. Or fixed)) etc. However, the special feature of this application is that, students can also use the camera to analyze the question diagram without having to enter details. This is because these applications use a computer vision system or Computer Vision to analyze drawings and images in 2 or 3 dimensions and then convert them to digital data to be read by a computer(Saundarajan et al., 2020). With this application, it is likely to help students understand this subject especially SFD and BMD

1.2 RESEARCH BACKGROUND

The Education Sector in Malaysia is now increasing from time to time. However, now many sectors are affected by the outbreak of corona virus or better known as Covid19 which has hit the world, including Malaysia. Among the affected sectors, the Education sector also experienced significant constraints because learning institutions such as schools, institutions of higher learning, skills institutions and others had to be closed by the Malaysian government because it did not want the Covid19 epidemic to spread more widely and severely(Cruz et al., 2019). Now, the education sector is done online (online) which has many shortcomings such as lack of interaction between students and instructors that can reduce students' understanding of a learning. In addition, the problem of internet network is also the biggest problem faced by the majority of students and teachers at this time, especially those in rural areas or those far from urban areas. Students, especially the B40 group, have some difficulty in terms of the ability to have appropriate devices in online learning such as computers, laptops and so on(Saundarajan et al., 2020). If this kind of thing continues, it will have a severe impact on students in the future and will also have a severe impact on the country in terms of the learning sector. With this application even faced with problems such as coronavirus (covid19) to some extent will help civil engineering students in understanding and solving questions related to Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) which is an important topic in subjects mechanic of structure and theory of structure.

1.3 PROBLEM STATEMENT

A thing cannot run away from any problem. The main problem faced by civil engineering students now is none other than having difficulties and misunderstandings in solving questions related to Shear Force Diagram (SFD) and Bending Moment Diagram (BMD). This is because, although this topic is a basic and main topic in the subject of mechanics of structure and theory of structure, there are still many senior and junior

students who experience this problem. With the STRUCDEE mobile application is able to help students because this application will also display the work done to obtain answers.

In addition, students also experience problems in the aspect of time that is time constraints in solving Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) questions. This is because, to solve this question requires quite a lot of time because it has a relatively long work path and Students also need some time to make Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) and this does not include correcting answers if students make mistakes. With this application, students can solve the questions of Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) easily because students only need to analyze the question by using the camera on the smartphone to get the answer.

The next problem faced by the students is, lack of guidance from the instructors. This is because, as a result of the system online learning makes it difficult for students to meet with the instructor in case of any misunderstanding. If these problems persist, this will result in students experiencing setbacks in this subject.

1.4 PROJECT OBJECTIVE

Objective of project :

I. Introduce to the community about the application of STRUCDEE
II. Apply the use of STRUCDEE application in the daily life of students
III. To asses students performance in SFD and BMD topics

In a matter there must be a mission or goal to be achieved by the perpetrator or creator of a study. The main objective for the project we want to create is to introduce to the community about the application of STRUCDEE in helping students especially civil engineering in solving questions related to Shear Force Diagram (SFD) and Bending Moment Diagram (BMD). As we all know, our goal is to help the industry in terms of learning. Because, based on some interactions between employees and employers in this industry states that most of the institutes of learning do not understand and remember about the learning they learn in a school. This can show us that, before this pandemic corona virus (COVID19) occurred students from before have also experienced such problems let alone if the students When the country is facing pandemic corona virus (COVID19). This matter should not be underestimated because it will burden the students when faced with working situations in this industry.

The next objective is to apply the use of STRUCDEE application in the daily life of students, especially civil engineering in solving questions related to Shear Force Diagram (SFD) and Bending Moment Diagram (BMD). as is well known, the use of piuntar telephones has become of interest to society in our country due to the improvement of technology over time. However, the use of a mobile application for a person is uncertain because, it depends on the situation and time for the use of an application. Thus, our aim is to apply to students to use this application in solving questions related to Shear Force Diagram (SFD) and Bending Moment Diagram (BMD). This is because, using this application will be easier for students than using the usual way. This is in line with the purpose of technology, which is to facilitate in doing something.

1.5 PROJECT QUESTION

The questions in our study/project are based on what, who, when and how.

I. What is meant by learning and what do students face during the learning process ?
II. Who is involved in this problem ?

III. When do students face this problem

IV. How to solve this problem

1.6 SCOPE OF PROJECT

The scope of our project is limited to students and lecturers at our polytechnic, namely POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH only. Several students (were selected and interviewed using the google form platform to assist in our research. After getting a response from the students, we aim to produce an application that is able to make calculations for Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) questions that are in the category of continuous beam and simply supported beam.

1.7 IMPORTANCE OF THE PROJECT

In every thing must have its own pros and cons. In the current era, the use of the telephone has become an obligation on every individual regardless of age and gender. Even today's children already have smartphones even at such a young age. Now, when the country is facing a corona virus pandemic (COVID19) most industries have changed direction by using more technology such as smartphones, especially the Education industry. So, it is not surprising that even at a young age to own gadgets already need knowledge and skills in using gadgets such as computers, laptops and smartphones. This time, we will explain about the importance or benefits of our STRUCDEE mobile application product in order to provide a more in -depth explanation about this project.

Among the benefits of our products are, being able to increase one's intellectual power over time. This is because, we expect by using this STRUCDEEE application can

attract one’s interest in making Exercise questions related to Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) more because with this application it is easier to solve. Thus at the same time, it can further enhance students' understanding in this subject.

Furthermore, by using this STRUCDEE application can apply the use of technology more in the Education sector. As can be seen now, the use of technology can also bring harm to an attacker for example, addiction in playing online games, using social media in the wrong way and so on. But with the advent of this application can educate the generations of today and will come to use technology more and carefully. Thus, it can increase the guarantee of a bright future for our developing country.

1.8 DEFINITION OF TERMS

Google Form

Google form is a service from Google that allows you to create surveys, Q&A with online form features that can be customized to suit your needs. So you can get answers directly from the audience that fills out the survey. Google currently continues to innovate from various platforms it has, including google docs, one of the features of which also presents Google forms. It is usually used for several things such as creating a questionnaire, creating a quick opinion count, creating an online registration form, then managing it and much more.(Pratama et al., 2019)

Software

Software is a collection of data that is formatted and stored digitally in the form of programs or instructions to execute a command that is inputted to a computer device. In Indonesian, software itself is called software or can be called software.

Shear Force Diagram (SFD)

Shearing force diagram is a simple diagram that presents the variation of shear forces along a beam. In the shearing force diagram, the values of the shearing forces are placed vertically. While the value of x is placed horizontally, where x = 0 is at the left end of the rod and x = length of the rod is at the right end of the rod (beam)

Bending Moment Diagram (BMD)

Bending moment diagram is a simple diagram that presents the variation of bending moments along a beam. In the bending moment diagram, the values of the bending moments are placed vertically. While the value of x is placed horizontally, where x = 0 at the left end of the rod and x = length of the rod is at the right end of the rod.

1.9 SUMMARY

The summary of chapter 1 discusses the introduction and description of the product or project that will be carried out by our group to complete the Final Year Project (FYP) this year which is an Education -based mobile application that is STRUCDEE MOBILE APPS. This application is created by using special software to create applications such as Photomath and so on. The main problem that inspired us to create this application is the misunderstanding and problems faced by students in solving questions related to Shear Force Diagram (SFD) and Bending Moment Diagram (BMD). Therefore, the main objective of our project is to solve the problem, that is, to help students to solve the Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) questions more easily and quickly. With this application can help students, especially civil engineering in improving learning in line with the improvement of technology in this age.

CHAPTER 2:
LITERATURE REVIEW

2.1 Introduction

A literature review is a thorough summary of prior research on a particular subject. The literature review examines research journals, books, and other materials that are relevant to a certain study topic. This past study should be enumerated, described, summarised, objectively evaluated, and clarified in the review. It should provide a theoretical foundation for the study and assist you in determining the scope of your study. The literature review recognises the efforts of earlier researchers, assuring the reader that your study is well-thought-out. By acknowledging a prior work in the subject of study, it is expected that the author has read, evaluated, and assimilated that work into the current work.

2.2 Definition of Learning

As was noted by Lachman (1997), most textbook definitions of learning refer to learning as a change in behavior that is due to experience. This is essentially a very basic functional definition of learning in that learning is seen as a function that maps experience onto behavior. In other words, learning is defined as an effect of experience on behavior. Many researchers have claimed that such a simple functional definition of learning is unsatisfactory (e.g., Domjan, 2010; Lachman, 1997; Ormrod, 1999, 2008). Most important, it has been argued that a simple functional definition has difficulties dealing with the fact that changes in behavior are neither necessary nor sufficient for learning to occur. First, latent learning effects suggest that changes in behavior are not necessary for learning to occur.

Conceptual definitions of learning successfully convey the messages about different theoretical perspectives on learning, but suffer from the lack of operability. For instance, many

frequently used in mathematics education discourse conceptualizations of learning, such as learning as acquisition, learning as participation, learning as problem solving or learning as assimilation and accommodation, refer to the key processes involved, but are insufficient in order to operationally capture the essence of the intended change (Sfard, 1998; Skinner, 1950; Von Glasersfeld, 1995).

The original concept of a learning disability is difficulty learning in sprite of normal or above normal intelligence (Shaywitz & Shawitz,1993).

The concept of learning styles encompasses not only a large body of written materials but also what seems to be a thriving set of commercial activities. The writings that touch on the learning-styles concept in its broadest sense include several thousand articles and dozens of books. These figures may seem surprisingly large, but one should keep in mind the sheer number of different schemes or models of learning styles that have been proposed over the years. For example, in a relatively comprehensive review, (Coffield et al. 2004) described 71 different schemes, and they did not claim that their list was exhaustive.

Learning objects are elements of a new type of computer-based instruction grounded in the object-oriented paradigm of computer science. Object orientation highly values the creation of components (called "objects") that can be reused in multiple contexts (Dahl & Nygaard, 1966).

Consequent with the nature of concepts, concept learning traditionally has been measured by a learner's ability to recognize instances of the concept. Recognition ability depends both on generalizing across examples and on discriminating examples from nonexamples (Tennyson & Park, 1980).

It is a common feature of human existence that we constantly learn about our own abilities by observing the consequences of our actions. For most people there is an attribution bias to this learning: we tend to overestimate the degree to which we are responsible for our

own successes (Wolosin, Sherman, and Till 1973), Langer and Roth (1975), Miller and Ross (1975)]. As Hastorf, Schneider, and Polifka (1970) write, "We are prone to attribute success to our own dispositions and failure to external forces."

2.2 Learning Classification

A contrasting view posits that when an item is presented to be classified, it acts as a retrieval cue to access information associated with similar stored exemplars and this specific exemplar information is the basis for category judgments (Medin & Schaffer, 1978).

Classification decisions are based on relative likelihood. This decision rule is related to that of signal detectability theory (Swets, Tanner, & Birdsall, 1961)

A classification scheme for learning environments is a descriptive scheme of types that covers existing and theoretically possible learning environments in schools (De Corte, Geerligs, Lagerweij, Peters, & Vandenberghe, 1981; Elshout- Mohr, Van Hout-Wolters, & Broekkamp, 1999).

The WPT is a non-motor probabilistic classification task involving incremental learning over many trials considered to occur without any explicit knowledge (Knowlton, Squire, & Gluck, 1994).

2.4 Characteristics of Effective Learning

Use a reflexivity exercise by (Braun & Clarke, 2012, Hesse-Biber, 2007). We ask our students to spend a few minutes reflecting and making notes on two things prior to beginning analysis: 1) the assumptions, if any, they hold about the research topic; 2) their values and life experiences, and how all this might shape how they read and interpret the data. Many students

struggle with this exercise, especially the second part, but come to appreciate its value after completing their analysis, as it can help them be reflective and reflexive, and to gain ‘deeper’ analytic insight into the data.

A few felt the teaching staff were too enthusiastic about TA and qualitative methods; it’s unclear what impact this might have in the classroom, as enthusiasm is usually seen positively in the teaching environment (Frenzel, Goetz, Lüdtke, Pekrun & Sutton, 2009).

A relatively new strand of work on learning theory concerns what is known as 'self-efficacy' (Wood and Bandura, 1989). In this theory the learners' beliefs in themselves are reinforced or reduced and the effects on achievement noted. In general, the stronger the feeling of 'self-efficacy' the better the level of achievement.

Moreover, the individual's feeling is influenced by the school attended. If the teachers hold positive views about ability and about their teaching skills, they are more likely to produce academic learning in their classrooms (Bandura, 1992).

A further development of models of learning came with the introduction of the theory of adaptive instruction (Wang et al, 1990). This theory positioned the learning of the individual within the learning environment of the school and hypothesised that the better match of the two would lead to optimum learning.

In relation to learning, attribution theory illuminates how we understand and react to our achievement, whether we judge it to be the result of internal factors - (lack of) ability or (lack of) effort, or external factors - poor teaching or scarcity of books. The attributional model of achievement motivation theory is described by Atkinson (1957). The model stresses "the degree of perceived personal responsibility for success or failure." (Eiser and Van der Pligt, 1988, p. 68).

PBL is conducted in small groups and so it is important for facilitators to know how small groups work in order to achieve the optimal learning experience for all the students in the group (Newble & Cannon, 1983). For both the facilitator and the students, the skills of listening, speaking, and arguing are key.

The duration in working memory is approximately twenty seconds and if information in working memory is not processed efficiently, it is lost and is not transferred to longterm memory for storage (Kalat, 2002). LOs must present the information and include strategies for learners to process the information in working memory. Since working memory has limited capacity, information in LOs should be organized or chunked in appropriate-sized pieces to facilitate processing.

The amount of information transferred to working memory is dependent on the amount of attention that was paid to the incoming information and whether there are existing cognitive structures to make sense of the information. LOs must use effective interfaces to attract and maintain attention and provide activities that facilitate the recall of related existing cognitive structures to help process the new information. If the relevant cognitive structures are not present, pre-instructional LOs such as advance organizers should be included as part of the instructional event (Ausubel, 1974).

According to (Brown et al. 1989), knowledge should be acquired through enculturation, where learners make sense of knowledge based on how it is used in a practical sense. Enculturation can be promoted by encouraging learners to further develop their own personal LOs after interacting with the prescribed ones. These personalized LOs can be stored in the students' personal directory.

Quality teaching is a notion that has arisen as a result of educational research, principally of the last two decades, concerned with identifying the factors that impact most directly on student achievement and wellbeing. Although quality teaching is not defined as a particular teaching method, it entails the application of contextually suitable and appropriate

pedagogies to engage the full learning capacities of students. In a quality teaching regime, therefore, teaching and learning are not perceived to be simply the transmission and reception of knowledge (Newmann, 1991) but, rather, as providing those conditions where both students and teachers are actively, critically and reflectively engaged in knowledge-making and growing as human persons.

2.5 Smart Learning

Making learning systems smart has been the objective of many researchers in both the fields of computer science and education. Since the early 1980s, researchers have developed intelligent tutoring systems (ITSs) that incorporate artificial intelligence techniques in educational applications (Martens and Uhrmacher 2002; van Seters et al. 2012). As the aim of developing ITSs is to support individual students to learn by adapting the learning interfaces or materials based on their needs, ITSs are also called “adaptive learning systems” (Graf et al. 2010; Kinshuk and Lin 2003). Moreover, along with the popularity of computer networks and the World Wide Web, many learning systems have been implemented in the form of web-based learning systems (Karampiperis and Sampson 2005).

Smart environments for learning, as a result of intensive research in the area of Ambient Intelligence (AmI), deserve also attention of the large community oriented on e-learning and technology enhanced learning. Smart environments could be naturally considered to be a new degree of computer enhanced learning, with a considerable number of new facilities. Related to this, the area of Ambient Intelligence can be studied from several perspectives. As (Bureš, Čech and Mls 2009) pointed out, besides its technological perspective, social perspective, or ethical perspective, we can also identify an educational perspective of Ambient Intelligence. The educational perspective deals with problems and challenges related to proper education in relevant AmI areas.

The context aware and ubiquitous learning as being naturally close to the educational perspective of AmI as well as to the idea of smart learning environments, was defined and studied by several authors. (Winters, Walker and Rousos 2005) pointed out that ubiquitous computing has tremendous potential for framing learning, particularly in informal and socially constructed contexts. To reach this potential it is necessary for the current desktop-focus development of technology in education to be challenged through the design, development and testing of new ubiquitous prototypes for learning.

On the other hand,(Bomsdorf 2005) considered ubiquitous learning as the next step in performing e-learning and by some authors it was expected to lead to an educational paradigm shift, or to new ways of learning. The potential of ubiquitous learning results from the enhanced possibilities of accessing learning content and computer-supported collaborative learning environments at the right time, at the right place, and in the right form.

Interesting ideas about learning in smart environments can be found in (Winters, Walker and Rousos, 2005). According to it, learning is no longer viewed only as a form of delivered instruction, undertaken within the confines of traditional educational environments. It is now understood as a social process that happens at a time and place of the learner's choosing, continuing throughout one's life. It is collaborative, evolving and informed by a process of self-paced development.

If we took into account the ISTAG scenario Annette and Solomon in the Ambient for Social Learning (Ducatel et al., 2001) that could serve as an ideal case for a smart learning environment, which was undoubtedly context-aware as well as ubiquitous at the same time, the popular view of "anywhere and anytime learning" should be considered as impractically broad. According to (ElBishouty, Ogata, Rahman and Yano 2010), the challenge in the information-rich world is not to provide information at anytime and at anywhere but to say the right thing at the right time in the right way to the right person.

The most important role of this technology is to support the smart learning environment (SLE) which contains many connected sensors and devices that deliver services at anywhere and at time (Chin and Chen 2013).

The achievement of learning outcomes into a smart classroom culture is determined by the university's ability to evaluate its objectives and educational strategies to encourage active interactions among the groups of students (Omae et al. 2017). Therefore, learners could cooperate to learn and work together to produce solutions for problem situation proposed by the teacher in the context of collaborative learning process (Tesavrita, et al. 2017).

(Jonassesn 1999) described that the essential components in the constructivist learning environments include: problem, question or project as the focus of the environment, related cases, information resources, cognitive tools, conversation and collaboration tools, and social/contextual support.

(Zhixian Zhong 2005) pointed out that learning activity, learning context, learning resources, learning tools, learning community, scaffolds, evaluation, teachers, and learners are the key elements of learning environments.

2.6 Mobile Learning

Increased development in technology coupled with a range of needs and expectations from a range of stakeholders have made it imperative for educational organizations to constantly upgrade their strategies and policies in teaching and learning as a way to remain effective and competitive. The penetration of information technology (IT) has made learners to become increasingly computer literate. The increased use of these mobile devices like handphones, iPad, smartphones, tablets and PDAs is an international phenomenon (Goggin, 2006) Students bring these technology anywhere, at anytime for their daily affairs.

Mobile learning also covers the delivery and support of learning using mobile ‘phones and in the last five years, mobile ‘phones have steadily assumed a place in further and higher education in the USA, the Far East/Pacific Rim and the UK (Garner et al, 2002), (Briggs & Stone, 2002), (Alsop et al, 2002), supporting distance learners and part-time students. There has also been a growing understanding of mobile ‘phones’ potential for supporting learning (Attewell & Savill-Smith, 2003) and of the evolution of cultural life and social behaviour with the take up of mobile ‘phones in many parts of the world (Plant, 2001).

This generation shares some common characteristics: think and process information very much different from their predecessors’, do multitasks, prefer multimedia to written texts, collaborate and network, want to have fun at work and at school, hence, opt for games than “serious” work and for them speed and innovation are a part of life (Prensky, 2001; Pedró, 2006; Tapscott, 1999).

These young people have grown up surrounded by technology, become socially attached to the digital media that causes an increase in socially isolating activities. They use jargons that older generations are not familiar with (Pedró, 2006) and are more comfortable with a customised, collaborative and interactive learning (Sánchez, Salinas, Contreras and Meyer, 2011).

Mobile learning emerges due to person-to-person communication done via mobile devices (Nyíri, 2002).

These ‘tiny’, ‘portable’ and ‘autonomous’ devices have made some researchers defined mobile learning based on the physical dimensions of the devices (O’Malley, Vavoula, Glew, Taylor, Sharples, and Lefrere, 2003; Georgiev, Georgieva, and Smrikarov, 2004).

Research on the teaching and learning through mobile learning has become a rapidly evolving area (Preece, 2000; Frohberg, 2002; Vavoula, Pachler and Kukulska-Hulme, 2009).

Computing devices have become ubiquitous on today college campuses. From notebook computers to Wireless phones and Handheld devices1 (or W/H devices for short), the massive infusion of computing devices and rapidly improving Internet capabilities have altered the nature of higher education (Green, 2000).

The place independence of W/H devices provides several benefits for e-learning environment like allowing students and instructors to utilize their spare time while traveling in a train or bus to finish their homework or lesson preparation (Virvou & Alepis, 2005).

Research on the introduction of ICT in education (Welch & Brownell, 2000) has shown that it is effective only when developers understand the strengths and weaknesses of the technology and integrate technology into appropriate pedagogical practices.

2.6.1 Factors Influencing Mobile Learning In Education

There are considerable numbers of factors that motivate learners and educators to use mobile applications.To successfully adopt mobile learning, attention must be given to these influential factors. The researchers analysed and synthesized the factors by looking at the literature in which the mobile devices were utilized as the teaching and learning tools. Thus, the influential factors were classified into three main categories with several subcategories. The three main categories are the features of the devices, user's expectations and pedagogical advantage.

2.6.1.1 Features of the Devices

Features of the devices were further subcategorized into three aspects, namely: usability, technical and functional (Economides and Nikolaou, n.d.).

2.6.1.2 Usability

From the usability aspect,mobile learning tools are small, light, and portable (Ahonen, Pehkonen, Syvanen and Turunen, 2004; Cavus and Ibrahim, 2009). These features make the learners feel at ease as learning is no longer constraints to the classroom with bulky backpacks containing piles of books and other learning materials.Such freedom makes the process of transmitting knowledge becomes flexible and can be carried out anytime and everywhere.

2.6.1.3 Functional

Functionally, the devices can provide instant and spontaneous information (Cavus and Ibrahim, 2009; Eteokleous and Ktoridou, 2009; Cohen, 2010). There are times when learners really need to get certain information fast. For example, quick answers to specif ic questions as definitions, formula and equation. The devices will help the learners to quickly search such information. Continuity is another functional aspect. Mobile learning is a learning model that allows the learners to gain learning materials anywhere and anytime. To be able to continue with the learning without the constraints of time and location is an important element that affects how learners may be motivated to use their mobile applications (Lan and Sie, 2010) Learners' access to information and learning material does not necessarily stop because of their location.Indeed learners can access and interact at various places and in a variety of situations.

2.6.2.1 Ownership

Naismith and Corlett (2006) surveyed many successful mobile learning projects in the proceedings of the mLearn conferences from 2002-2005, and identified five critical success features. One of five crucial factors mentioned in the study is ownership. From the point of view, learners will become more motivational, more active in communication and learn much better when they either own the learning tool or treat it as if they own it(Luckin, Brewster, Pearce, Siddons-Corby and du Boulay, 2004; Attewell and Webster, 2005).

2.6.2.2 Privacy

In comparing mobile devices with other computing devices (such as laptop and PC), of course, the former offers the learners a sense of privacy. Mobile applications provide the private virtual world to the learners that make them feel safe and motivated. Having a sense of privacy will provide many reasons for learners to interact with the device. The learners can access information and download independently from other learners (BenMoussa, 2003; Zhang, 2003; Virvou and Alepis, 2005).

2.6.2.3 Self-Regulated Learning (Control of the Learning)

Researchers stress the importance of allowing learners to exercise more control over their own learning. The learners are more likely to attend to learning experiences if they are encouraged to take a more active role in their learning (Watts, 1997; Selfe, 1999). Mobile learning opens up the opportunity for the learners to be at the centre of the learning process, play an active role starting from determining their goal until the evaluation stage (Makoe,2010). Once they are actively engaged with the task, they are more likely to develop learning strategies that will aid their learning development, hence, contribute to their motivation. Unlike other digital media, a mobile device can be carried around all the time and gives its users great amount of control over how and when to access their mobile devices.

2.6.2.4 Flexible Learning

High mobility of learners today makes flexible learning imperative. Mobile learning opens up more opportunities for learning to take place regardless of place and time. The learners have the freedom to exist indifferent location than the teachers, to study at their on

pace and time provided that they have the hardware and network infrastructure (Cavus and Al-Momani, 2011).

2.6.2.5 Life-long Learning

Due to the current economic, social change, and transition to knowledge-based society, life-long learning has become a critical national agenda in most countries. Mobile learning is seen as one tool that can materialize life-long learning. HandLeR (n.d.) and a similar project undertaken at the Tampere University of Technology (Finland) (Ketamo, 2002) have explored life-long learning through mobile devices.

2.6.2.6 Fun

Games are considered as an important factor affecting the usage of mobile applications.(Prensky 2007)argues that digital games are not just for fun, or for basic review of school subjects, they can also be used solely for learning. The learners learn all the skills that are embedded in each level in the game, become engaged and motivated and do not realize that they are in fact learning. This is where Prensky argues that as learners play the game, they feel a rush and engagement they do not normally feel while 'learning' in school. Thus, these digital games have become the substitute to a world of learning where everything learners learn is old-fashioned, and simply boring.

2.6.3 Pedagogical Advantage

The researchers highlighted some empirical studies that have proven mobile devices can support the pedagogical approaches or strategies below.

2.6.3.1 Collaborative Learning

Social inclusion is the key to collaborative learning. The learners work together towards one common goal.Because of their accessibility, mobile devices support inclusion and allow for more opportunities for participation, and as a result, learning becomes more successful. Many researchers advocate the use of mobile technology that maximize learners' inclusion in the learning process (Virvou and Alepis, 2005; Selfe, 1999;Hawisher and Selfe, 1999; Warschauer, 2003; Phipps, Sutherland and Seale, 2002; Uzunboylu, Cavus and Ercag,2009).

2.6.3.2 Blended Learning

Blended learning which combines classroom instructions with mobile learning can enhance and maximize the face-to-face and online methods Uzunboylu, Cavus and Ercag, 2009; Bonk and Graham, 2006; Ocak, 2010). The learners can carry out their assignments and projects using mobile devices after a class session with their instructor.

2.6.3.3 Interactive Learning

Mobile technologies also support interactive learning environment (Cavus and Uzunboylu, 2009; Sharples,Taylor and Vavoula, 2005). The mobile devices function as the interactive agents that allow varying levels of interactivity and engagement with the technology, thus enable the process of coming to know happens which indicates that the learning is taking place.

2.6.3.4 Experiential Learning (Learning in Context)

The mobility of the devices allow for learning which is not constrained to the educational environments. The tools develop the connection between school and other everyday activities (Sharples, 2003). This gives the notion that education can go beyond the classroom context and ‘t hings’ that are relevant to the learning itself can be brought into the classroom and the different aspects of the visit can be enhanced for purposes of learning (Chen,Kao, Sheu and Chiang, 2002; Lonsdale, Baber, Sharples, Byrne, Arvanitis, Brundell and Beale, 2004).

2.6.3.5 Problem-Based Learning

KNOWMOBILE project in Norway (Smørdal and Gregory, 2005) is one example that mobile learning supports Problem-Based Learning. PDAs and smart-phones were used for experiment in medical education ofstudents from the School of Medicine at University of Oslo. In problem-based learning, the learners actively discover and work with content that they determine to be necessary to solve the problem given by the teacher.

2.7 Table of Previous Research Regarding Modern Learning in Application

Now, modern learning using very simple and concise learning applications and more interesting knowledge software will be able to develop a more advanced education system. The existence of applications can give an efficient impact that introduces a digital learning system, which shows the effectiveness of student learning. Below in Table shows the list of researchers who conducted modern learning using a application for education.

AUTHOR	TITLE	PLACE	SOURCE	YEAR	NOTES
Samsiah Bidin, Azidah Abu Ziden	Adoption and application of mobile learning in the education industry	Malaysia	Article	2013	The evidences reviewed confirm the significant use of mobile learning in the education industry. Mobile learning is gaining its popularity as it is accepted to be an effective technique of delivering lesson and acquiring knowledge as its main strengths are anytime and anyplace. It can be utilized in many ways in the education industry.

Ira Mutiaraningru, Arif Nugroho	Mobile assisted language learning application in higher vocational education in Indonesia	Indonesia	Article	2021	Education today should adapt to the emerging mobile environment. Language learning has stepped forward to more personal learning tools by integrating smartphones as an aid for mobile learning. It is also recommended to be used for vocational higher education students as part of informal learning during the COVID-19 pandemic situation.
Carol C. Choo, Bhavani Devakaran, Peter K.H. Chew and Melvyn W. B. Zhang	Smartphone Application in Postgraduate Clinical Psychology Training: Trainees' Perspectives	Singapore	Article	2019	e-platform was convenient, the learning style was engaging, which helped to build confidence, and facilitate practical learning of skills. The qualitative results were helpful in understanding the users' perspectives and experience of

					the novel application, indicating that future research in this innovative area is necessary.
E.Snashall andS.Hindocha	The Use of Smartphone Applications in Medical Education	Liverpool	Open Medicine Journal	2016	The increase in popularity of medical apps is in part due to the immediate access to electronic medical text and portability of the device to enable use anywhere. There is also evidence to show that medical apps have demonstrated an improvement in patient care. Apps facilitate lifelong learning, an essential component not only of undergraduate education but required to continue in a medical career.Handheld computers in

					medical education are already recognised by professional bodies such as the General Medical Council
Mayank Roy, ,Fernando Dip, Armando Rosales, Matthew Roche, and Robert R. Hutchins,	Smartphone Application as an Education Platform in HepatoPancreato-Biliary Surgery	Switzerland	Surgical Education	2019	Mobile applications are some of the methods used in current surgical training. Some forms of smartphone applications (SA) have been used as a novel and successful method to teach surgical trainees. SA has the potential to cover some of the challenges in surgical teaching because of reducing teaching hours and the generation gap. SA can act as a single source for multiple information, such as clinical guidelines, podcasts, textbooks, and videos, and

					preparatory examination materials, such as multiple-choice questions.By providing immediate access to all this information, SA can help in consolidation of knowledge.
Aijaz Ahmed Arain, Zahid Hussain, Wajid H.Rizvi, , Muhammad Saleem Vighio	An analysis of the influence of a mobile learning application on the learning outcomes of higher education students	Pakistan	Article	2017	The use of M-Learning is on the rise in educational institutions. The rapid growth of mobile technologies has provided learners with great opportunities to learn inside as well as outside the classrooms. The use of mobile Apps for universal access to online learning and education could provide a wealth of knowledge to researchers, instructors and educators who plan to utilize M-

					Learning for their learners.. The key benefit of M-Learning is its mobility aspect which enables students to exchange information anywhere and at anytime, removing the problem of physical presence of students in the locality of an institute.

Siti Zaharah Mohid, Norbadriyyah Homan,Roslinda Ramli & dSyukri Adnan	Pembangunan Aplikasi Mudah Alih Pembelajaran Asas Jawi	Kolej Universiti Islam Antarabangsa Selangor (KUIS) Selangor, Selangor, Malaysia	International Conference on Information Technology and Multimedia	2016	Mobile Based Learning or Mobile Based Learning (MBL) developed to help students in understanding the concept of interactive learning materials can provide a fun environment, attract students while providing a variety of information compared to traditional learning methods. Learning through MBL is not limited by space and time and learning can be done anywhere

Yousef Mehdipour , ,Hamideh Zerehkafi	Mobile Learning for Education: Benefits and Challenges	India	International Journal of Computational Engineering Research	2013	The term M-Learning or "Mobile Learning", has different meanings for different communities, that refer to a subset of E-Learning, educational technology and distance education, that focuses on learning across contexts and learning with mobile devices. Mobile learning has many different definitions and is known by many different names, like M-Learning, U-Learning, personalized learning, learning whilemobile, ubiquitous learning, anytime / anywhere learning, and handheld learning

2.3 Summary of Chapter

In conclusion, this chapter reviews previous studies on learning the use of applications effectively. The search for this past study aims to be the inspiration to develop an application for education and objective to the positive impact on learning. At the same time, students will thrive in terms of changes in the technological environment of new education. Thus, this literature review is complete about the authentic sources of the study sought through the article.

CHAPTER 3
METHODOLOGY / DESINGN

3.1 INTRODUCTION

In creating something must meet the criteria and the right ways to get the desired and satisfactory results. This is because, without using the right materials and methods will have a detrimental effect on the end result of the project and will make the project deflected as a failure. Albert Einstein once said ‘do something thoughtfully and carefully, because people who are not careful always end in failure’. So, in this chapter 3 we will explain in more depth and precisely about the framework and methodology to produce this STRUCDEE mobile application. In addition, we will also describe the methods we used to collect the data and information that will be used to produce this project.

3.2 DESIGN PROJECT

The study was conducted in stages, starting with the collection of information. Our study began by examining and analyzing the current situation and views of students about the learning they face with a somewhat different environment from before that is online learning sessions. The study was also conducted by collecting and reviewing the projects that have been produced with the goal of Education to produce new ideas that are better and effective in addressing problems that could not be curbed by previous studies. The purpose of our study is none other than to introduce STRUCDEE application for use by students in improving the effectiveness of technology -based learning.

Survey methods were also used in this study. This is because, this method is able to collect a lot of information and has been used by many researchers before. apart from surveys, our group also used other methods such as interviews and so on.

3.2.1 PROJECT PRODUCTION METHOD

As described, our group started the study by conducting an interview session on 16 students who were selected to undergo a question and answer session conducted using the google form platform. In the question-and-answer session we give questions that emphasize on the learning techniques that students like. As we all know, in learning there are many techniques and styles that a person can use to help them in understanding something of learning. There are some students who find it easier to have a face-to-face learning session between students and instructors, there are also those who prefer to just listen to voice recordings from the instructor which are available a lot on social sites such as facebook and others.

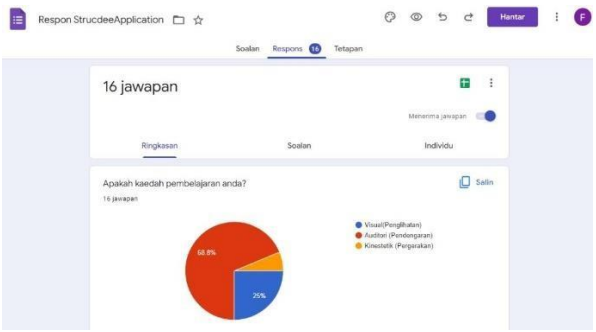


Figure 3.2.1 shows a chart of responses from selected students

Based on the question and answer session, the results showed that, most of them preferred the auditory learning session because most of the respondents said that something is easier to remember by listening to it carefully than by just looking.

To produce this product, we will use tools made specifically to create mobile applications. The tools used are definitely computers that have the appropriate specs to be used in designing applications. The use of low spec computers will give problems in the use of heavy software. Thus will cause damage to the computer.

In addition, we will also use software specially designed to design this STRUCDEE application, among others, Android Studio and Mit App Inventyor. This is because, both of these softwares are already commonly used by most creators and application designers. Therefore, we also agree to use this software to ensure the success of our products. For the use of this software, we will learn the basics needed to design the application by way, participate in seminars or classes organized by external parties because at POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH there is no specific study on designing this application.

3.2.2 DATA COLLECTION

In a study should have data that needs to be collected to study the problem and determine the objectives and solutions to the problem. In this study, we use two methods to help us in collecting information, namely, quantitatively (through questionnaires), qualitatively (through interviews and observations) and we also use literature review method where we collect information based on previous studies .

3.2.2.1 QUANTITATIVE

Quantitative is the method of data collection that we use to leverage data to be the source of our study. Quantitative is the way in which data is collected through boring questionnaires that we have distributed to students, especially civil engineering at

POLITEKNIK SULTAN SALAHUDIN ABDUL AZIZ SHAH. The questionnaires were distributed using google form which contained questions related to our study. A total of 16 people have responded to the google form provided.

Google form link:
https://docs.google.com/forms/d/e/1FAIpQLScUAPBJWE4u7wKLa1959YFXHdM0MXB-0mY49IA1DjItuOCJNw/viewform?usp=sf_link

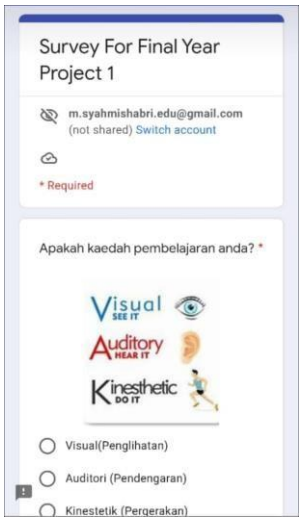


Figure 3.2.2.1 show the question from the questionnaire

3.2.2.2 QUALITATIVE

Qualitative is the second method we use to collect our data. Qualitative is a way of gathering information through interviews and observations of some students, especially civil engineering. We have conducted interview sessions with several students from civil engineering to assist us in leveraging information. From the aspect of observation, throughout our experience as a civil engineering student kai knew that to solve questions related to Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) most students experience problems especially from the aspect of time.

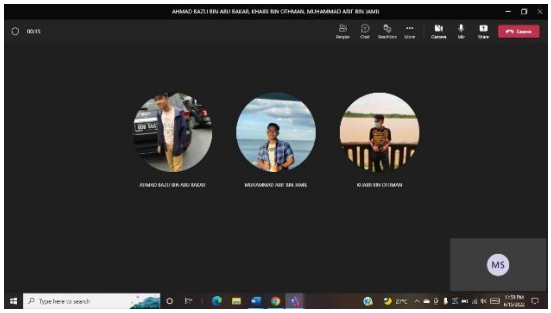


Figure 3.2.2.2 show the interview session

3.2.2.3 LITURATURE REVIEW

In the previous chapter 2 we have described about the previous research articles relevant to our study.

3.2.3 MATERIALS AND EQUIPMENT

In this sub-topic we will explain about the tools we use to produce our products. To produce this STRUCDEE application product, we use two selected software for coding and programing our application, namely ANDROID STUDIO and MIT APP INVANTOR.

3.2.3.1 ANDROID STUDIO

Most of the smartphones circulating in the community are Android -based. Android itself is the result of the development of Google and Linux. The development of the latest applications can not be separated from the so -called Android Studio.

Basically, applications developed using Android Studio can bring in revenue as well. It's just that Android Studio requires in -depth knowledge of how to use it. Not just to compile the application, but need design skills as well as testing as well.

So what exactly is Android Studio? Android Studio is an open source builder application created with Eclipse IDE, which is the Java IDE. Anyone can create the desired application using Android Studio.

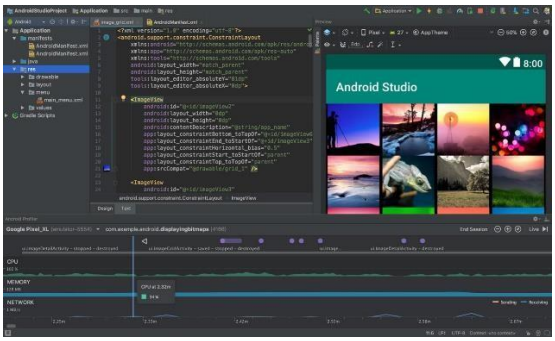


Figure 3.2.3.1 show the example of Android Studio content

System requirements :

Windows	Mac	Linux
• Microsoft® Windows® 7/8/10 (32- atau 64-bit) • RAM minimum 3 GB, RAM yang disarankan 8 GB; tambah 1 GB untuk Android Emulator • Ruang disk minimum yang tersedia 2 GB, Disarankan 4 GB (500 MB untuk IDE + 1,5 GB untuk Android SDK dan gambar sistem emulator) • Resolusi layar minimum 1280 x 800	• Mac® OS X® 10.10 (Yosemite) atau lebih baru, hingga 10.13 (macOS High Sierra) • RAM minimum 3 GB, RAM yang disarankan 8 GB; tambah 1 GB untuk Android Emulator • Ruang disk minimum yang tersedia 2 GB, Disarankan 4 GB (500 MB untuk IDE + 1,5 GB untuk Android SDK dan gambar sistem emulator) • Resolusi layar minimum 1280 x 800	• Desktop GNOME atau KDE *Telah diuji pada Ubuntu® 14.04 LTS, Trusty Tahr (distribusi 64-bit yang mampu menjalankan aplikasi 32-bit)* • Distribusi 64-bit yang mampu menjalankan aplikasi 32-bit • GNU C Library (glibc) 2.19 atau lebih baru • RAM minimum 3 GB, RAM yang disarankan 8 GB; tambah 1 GB untuk Android Emulator • Ruang disk minimum yang tersedia 2 GB, Disarankan 4 GB (500 MB untuk IDE + 1,5 GB untuk Android SDK dan gambar sistem emulator) • Resolusi layar minimum 1280 x 800

Figure 3.2.3.1 show Android Studio system requirement

3.2.3.2 MIT APP INVENTOR

MIT App Inventor is a platform to simplify the process of creating a simple application without having to learn or use too many programming languages. We can design android applications as desired by using various layouts and components available. App Inventor allows new users to program computers to create software applications for the Android operating system. App Inventor uses a graphical interface, similar to the user interface on Scratch and StarLogo TNG, which allows users to drag-and-drop visual objects to create apps that can run on Android devices. In creating App Inventor, Google has conducted research related to educational computing and completed Google's online development environment.

Mit App Inventor system requirement :

To use App Inventor, your computer must meet the following system requirements:

Computer and operating system

- Macintosh (with Intel processor): Mac OS X 10.5, 10.6+
- Windows: Windows XP, Windows Vista, Windows 7+
- GNU/Linux: Ubuntu 8+, Debian 5+ (Note: GNU/Linux live development is only supported for WiFi connections between computer and Android device.)

Browser

- Mozilla Firefox 3.6 or higher (Note: If you are using Firefox with the NoScript extension, you'll need to turn the extension off. See the note on the troubleshooting page.)
- Apple Safari 5.0 or higher
- Google Chrome 4.0 or higher
- App Inventor does not support Microsoft Internet Explorer. Windows users should use Chrome or Firefox

Phone or Tablet (or use the on-screen emulator)

- Android Operating System 2.3 ("Gingerbread") or higher

Figure 3.2.3.2 show the Mit App Inventor content

3.2.4 METHODS OF DATA ANALYSIS

once the project is completed we will perform data collection by performing a comparison test between the use of manual method and the use of this application in solving Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) questions. then data will be collected using a questionnaire session

The data we have collected will be analyzed and displayed in the form of a pie chart. This is because, with the pie chart display it will be easier for us to analyze the data and understand the data that has been collected. For example, the data we collected from the questionnaire session and the interview session will be compiled and displayed in the form of a pie chart.

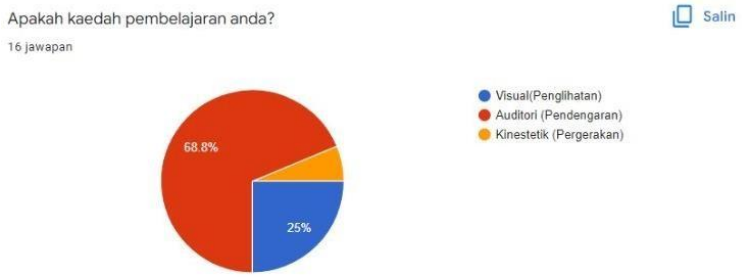


Figure 3.2.4(1) show the pie chart from the questionnaire

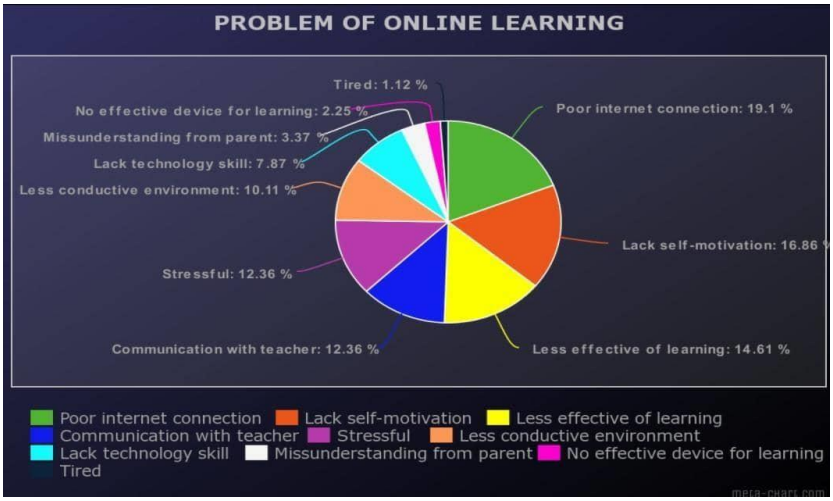


Figure 3.2.4(2) show the pie chart from the interview session

3.3 SUMMARY

The summary discusses the methods used in producing this project. in this chapter, we have explained about the method of data collection that we use in collecting information that is by using quantitative, qualitative and literature review methods. In addition, we have also explained about the tools that will be used in producing our products, namely Android Studio and Mit App Inventor. Finally, in this chapter we have also described the methods we use to compile and analyze the data that have been successfully collected. So with this we can see that this chapter 3 will give a great influence because it will continue with the upcoming chapters that are chapters 4 and 5.

NO	ACTIVITIES / WEEKS	10/3	17/3	24/3	31/3	7/3	28/4	5/5	12/5	19/5	26/5	2/6	9/6	16/6	23/6
1	BRIEFING FYP 1														
	MEETING WITH SUPERVISOR														
2	DESIGN THINKING FYP														
3	SEMINAR1: PREPARATION OF CHAPTER 1 (INTRODUCTION)														
4	PRESENTATION OF PROJECT TITLE PROPOSAL														
5	MEETING WITH SUPERVISOR														
6	SEMINAR : PREPARATION OF CHAPTER 2 (LR)														
7	PROGRESS PRESENTATION														
8	MAKE A REPORT FOR CHAPTER 2 AND 3														
9	BRIEFING ISOLMS														
10	PREPARATION OF CHAPTER 3 (METHODOLOGY)														
11	MEETING WITH SUPERVISOR														

12	MAKE A REPORT CHAPTER 3														
10	PRESENTATION 2 (LAST PROPOSAL)														

CHAPTER 4
DATA ANLYSIS

4.1 INTRODUCTION

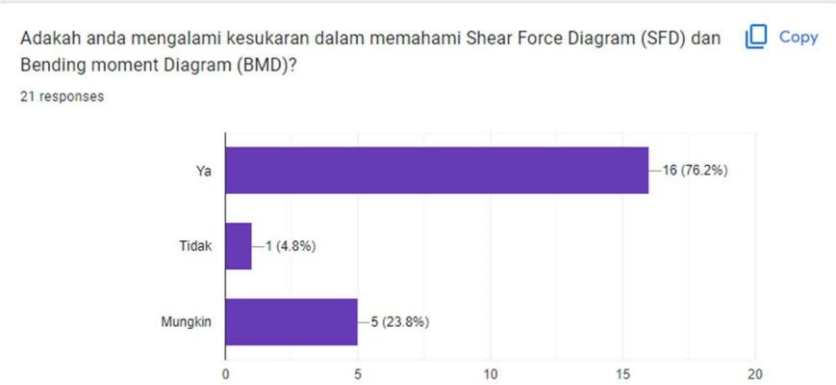
In this chapter will be explained in detail the data analysis that has been done and findings obtained from studies that have been conducted. This chapter is divided into two parts namely detailed analysis and general analysis. Project analysis provides critical data support to technical in project production. Project analysis is a parameter for creating reports to see progress project. Data collection is the process of gathering and obtaining information on a specific topic. Based on the research conducted, this topic will be discussed analysis of research data on STRUCEE MOBILE APPS that has been conducted through questions a survey of some respondents, especially students of the 2nd semester of the Civil Engineering Diploma. Several surveys have been created to aid the process this data collection. In addition, there is a collection of data from the tests conducted against STRUCDEE MOBILE APPS by comparing the use of manual methods and the use of applications. Data which has been collected will be analyzed and interpreted to assess the achievement of the study objectives.

4.2 PURPOSE OF DATA ANALYSIS

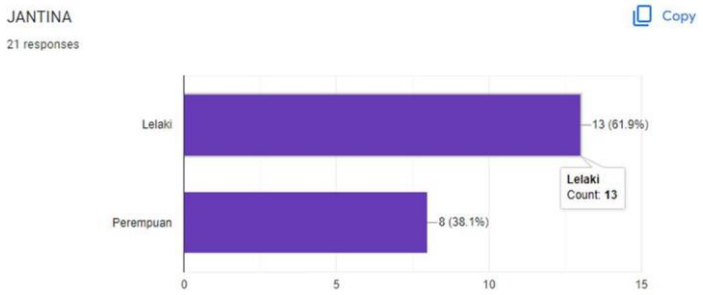
The analysis carried out is related to the findings of the study obtained, namely contains an interpretation that includes the entire scope of the objective project that has been presented in chapter 1. In connection with that, the discussion in This analysis will focus on answering all the project questions that have been presented in chapter 1 which involves student questionnaires, joint interviews supervisors and test questions to the community.

4.3 DATA COLLECTION

A total of 8 women and 13 men have collaborated to provide feedback on STRUCDEE MOBILE APPS. Most of the respondents are students from DKA2B and DKA2C classes. The analysis of the questionnaire also showed that 76.2% of all respondents experienced problems in solving questions related to SFD and BMD while 23.48% of all respondents indicated the possibility of this problem. From the data collected it can be confirmed that many students have problems solving SFD and BMD questions.



(Data chart of students' problems in solving SFD and BMD questions)



(Data chart of student gender)

In the questionnaire, we set the allotted time for students to complete the questions as 10, 15 and 20 minutes. The data we obtained is as much as 52.4% of all respondents need about 15 minutes to solve the SFD and BMD questions and as much as 14.3% of the whole need about 10 minutes while the remaining 33.3% of all respondents need about 30 minutes to solve SFD and BMD questions. In addition, the data showed that 95.2% of all students who responded experienced problems in checking their answers when solving the SFD and BMD questions. This

shows that students have many problems in solving SFD and BMD questions. This is consistent with the problem statement in chapter 1.

(Chart of time student for answering the equestion)

(Chart shows the percentage of students who have problems in checking answers)

In addition to using questionnaires, we also use online and offline face-to-face methods. In this process, we ask respondents to solve the SFD and BMD questions that we have set with two methods, namely manually using a calculator, and using our application. What we found was that during the manual process students took around 15 minutes, some even up to 30 minutes. They face problems in calculating RA and RB values. They also take a lot of time in making the Shear Force Diagram (SFD) and Bending Moment Diagram (BMD). For online meetings we use the Microsoft Teams platform that has been provided by Politeknik Sultan Salahuddin Abdul Aziz Shah.

(Online meeting with respondents)

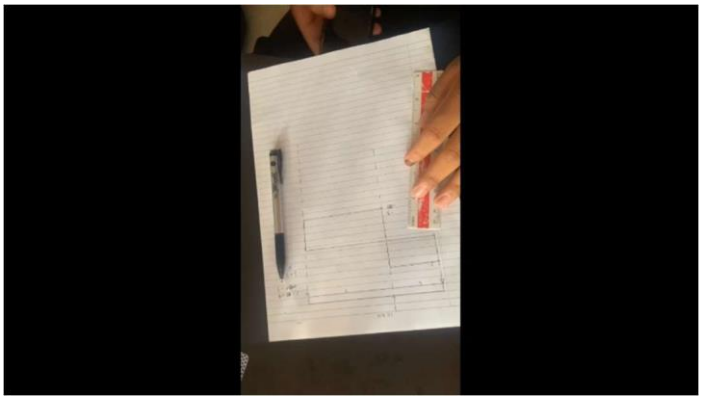
(Face to face with one of the respondent)

4.4 COMPARISON OF THE USE OF THE STRUCDEE MOBILE APPLICATION WITH THE USE OF MANUAL METHODS

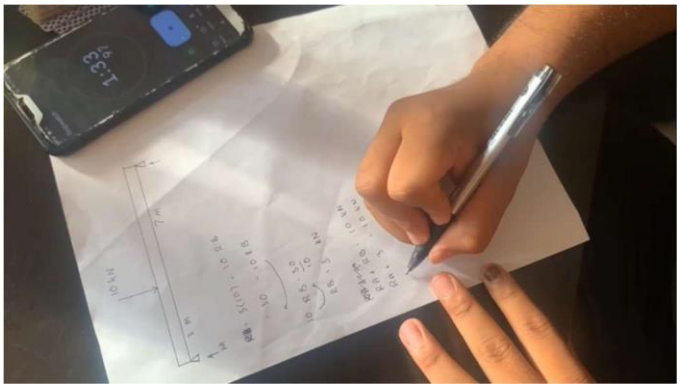
To get more accurate data and experience, we ourselves have tried to solve a SFD and BMD question by using two methods, namely manual calculation and Pengiran by using this application at the same time to be able to make a comparison between these two methods. Our purpose in making this comparison is to identify differences and draw conclusions for our project.

MANUAL

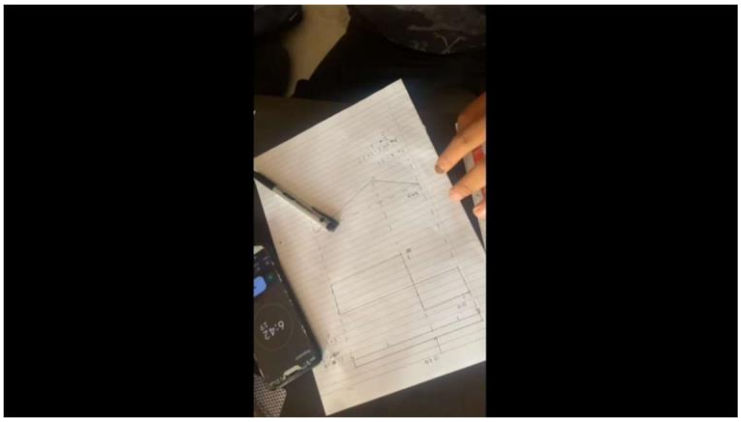
In this manual process I start the calculation by finding the RA value using a calculator. In the process of calculating the RA I found that the time I spent to get the RA value was around 1-2 minutes. After getting the RA value I continued the calculation to find the RB then went into the calculation and drew the Shear Force Diagram (SFD) and Bending Moment Diagram (BMD). The time I spent on completing the Rb calculation and drawing the SFD and BMD diagrams was around 4 minutes. So, the total time I allotted was around 6.43 minutes to solve this question.



(SFD and BMD drawing with manual method)



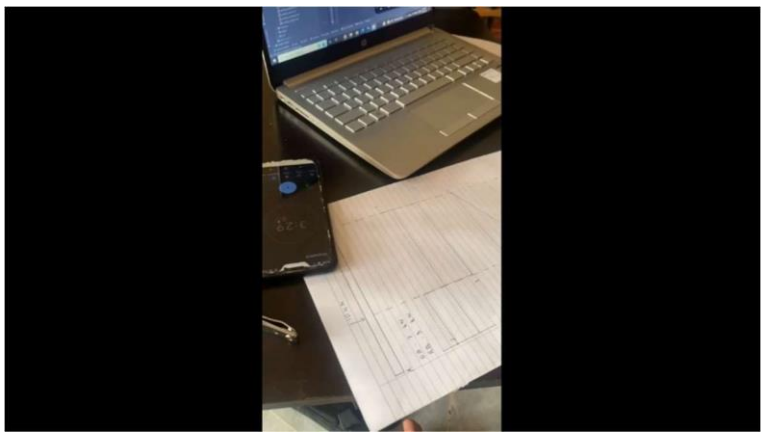
(Calculating RA and RB with manual method)



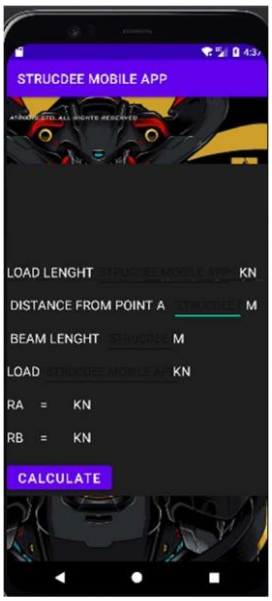
(The amount of time allocated, 6.43 minute)

USING APPS

In the process of using the application, I started calculating the RA and RB values at once by just entering the load values, the beam length, and the load distance from point A. The total time I allocated to get the RA and RB values was less than 1 minute. Then, having obtained the RA and RB values, I continued by finding the value of each point on the SFD and BMD by entering the RA and RB values and a few other points. After getting the values of each point on the SFD and BMD I proceeded by sketching the Shear Force and Bending Moment Diagrams. The time allocated in this process is around 2.54 minutes. So, the total time I spent to solve this question was only about 3-4 minutes. Based on this comparison, it can be seen that the time allotted to solve the SFD, and BMD questions can be reduced by 50% from the original time or the use of manual methods.



(Time taken to complete the task, 3.23 minute)



(Content on application)

CONCLUSION

Overall, in this chapter the findings of the study have been explained in detail based on all research instruments that are respondent questionnaires also from experiments Finished. The respondents consisted of civil engineering students in semester 2 at Sultan Salahuddin Abdul Aziz Shah Polytechnic, final semester student. The results found are very agree and agree when compared to disagree or strongly disagree. With this result, the application test can achieve what it wants found on the objectives and scope of the study. Therefore, the objective for STRUCDEE MOBILE APPS can be achieved brilliantly.

CHAPTER 5

(DISCUSSION AND CONCLUSION)

INTRODUCTION

In this chapter, the findings of the study that has been presented will be discussed, together with the extent to which these findings are suitable to address the research questions that have been posed. Comparison of the outcomes of hypotheses that were successful in meeting the goals of the research will serve as the basis for the discussion. A conclusion regarding the research is reached by debate, and through it, some recommendations may be made for future investigations, particularly in the area connected to the topic of the study.

PRODUCT SUMMERY

Creating this application required the use of specialised software, which can also be used to make programmes like Photomath and others. The primary challenge that prompted us to develop this application was the confusion and difficulties that students had while attempting to find solutions to topics that were connected to shear force diagrams (SFD) and bending moment diagrams (BMD) (BMD). Because of this, the primary purpose of our research is to find a solution to the issue, namely to assist students in more efficiently and effectively resolving the problems posed by the Shear Force Diagram (SFD) and the Bending Moment Diagram (BMD). Students, particularly those studying civil engineering, may benefit from using this programme in their efforts to enhance their learning in a manner that is consistent with the general progression of technology in this age. The cost of producing this application may range anywhere from RM 250 to RM 500, depending on whether or not it requires Google registration and whether or not it includes error resolution. At the conclusion of this project, the application that we developed was successful; nevertheless, it was unable to access the camera since doing so needed a significant financial investment of tens of thousands of ringgit

DISCUSSION

Before a group begins implementing the project that they propose, it is highly vital and helpful for that group to have done good and faultless project planning. This is due to the fact that project planning is the scheduling of activities or work contained in a project for each activity that is planned and agreed upon work that can be done with a schedule efficiently, quickly, and systematically planning and trying to avoid occurring problems and minimise project costs. Throughout each step of this procedure, efficacy evaluations have been carried out. It has been put through its paces in terms of how well it handles problems with SFD and BMD in the tests that have been performed. Students, who are our responders, have evaluated and provided feedback on this product. Next, we have also carried out this research, and the findings, which can be summarised as very satisfied and impactful, indicate that it is highly effective for the process of reducing the amount of time spent on problem resolution. Regarding our goods, we have solicited comments and suggestions from members of the community as well as from our own users. They gave our product positive comments, as did the external panel that was present during the PITEC PSA programme that was hosted at SULTAN SALAHUDDIN ABDUL AZIZ SHAH POLYTECHNIC.

CONCLUSSION

It is possible to draw the following conclusion from the construction of this application: the fact that this STRUCDEE MOBILE APPS application exists means that it has the potential to provide numerous advantages to both students and teachers when it comes to the process of answering SFD and BMD questions. It is evident, based on the findings of our study, that our programme has the potential to cut by around fifty percent the amount of time that is typically required to address this problem.

Students will no longer be forced to do extensive calculations in order to answer problems, which will allow for a reduction in the amount of labour that is necessary to do so. If the learning session has reached the week of exams, the polytechnic retains the right to close this application; nonetheless, the administration of the polytechnic has full rights to utilise this application. In general, students will find that using STRUCDEE MOBILE APPS makes it feasible to make it easier for them to answer problems. Students are able to simply and rapidly answer problems involving SFD and BMD thanks to the benefits offered by this programme.