

**POLITEKNIK UNGKU OMAR**

**HYDRAULIC LAB GUIDANCE IN  
APPLICATION (HY-LAB)**

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**CIVIL ENGINEERING DEPARTMENT**

**SESSION 1: 2023/2024**

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**This report has been submitted to the Department of Civil  
Engineering as part of the conditions for awarding the Diploma in  
Civil Engineering**

**CIVIL ENGINEERING DEPARTMENT**

**SESSION 1: 2023/2024**

## DECLARATION OF AUTHENTICITY AND OWNERSHIP

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Done and truly acknowledged

by the said;

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)

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as Project Supervisor on the date:.....)

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## **PENGHARGAAN**

Alhamdulillah, bersyukur ke hadrat Ilahi kerana dengan limpah kurnia-Nya kami dapat menyiapkan projek dan laporan pada masa yang telah ditetapkan. Dengan berkat, usaha gigih dan kerjasama dari semua ahli kumpulan kami, Hydraulic Lab Guidance in Application (Hy-Lab) dapat disiapkan dengan jayanya.

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Tidak lupa juga diucapkan ribuan terima kasih kepada rakan-rakan seperjuangan yang banyak memberi sokongan dan pendapat kepada kami dalam menyiapkan projek ini. Selain itu, tidak dilupakan kepada semua pensyarah yang terlibat secara langsung dan tidak langsung dalam penghasilan projek ini.

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Sekian, terima kasih.

## **ABSTRAK**

Hy-lab ialah aplikasi yang pelajar boleh memahami dan menjalankan eksperimen dengan lebih mudah. Kesukaran memahami eksperimen dan helaian makmal, sama ada di bawah pimpinan pensyarah atau tanpa sebarang bimbingan melalui kuliah atau kaedah visual, adalah situasi yang mungkin sering kita amati dalam bengkel. Selain itu, sebelum memasuki makmal, pelajar kerap tidak menjalankan eksperimen penyelidikan. Mereka memerlukan masa untuk menyelesaikan percubaan kerana ini. Objektif utama projek ini adalah untuk mencipta aplikasi untuk makmal hidraulik. Selain itu, untuk membangunkan garis panduan aplikasi makmal hidraulik. Akhir sekali, ialah meminta pelajar di jabatan kejuruteraan awam menguji aplikasi untuk memastikan ia berfungsi. Aplikasi ini mempunyai dua eksperimen makmal, Kesan Jet Air dan Ciri Bendalir, yang merupakan antara ciri yang paling ketara. Bahan eksperimen ini termasuk helaian makmal, video membimbing pengguna melalui prosedur, borang analisis data, foto peralatan dan banyak lagi. semuanya memberikan maklumat tentang eksperimen. Oleh itu, dengan menggunakan bantuan yang diberikan dalam aplikasi ini, pelajar akan dapat menyelesaikan eksperimen dengan lebih cepat dan lebih mudah.

## **ABSTRACT**

Hy-lab is an application that students can comprehend and conduct experiments more easily. Difficulties comprehending experiments and lab sheets, either under the leadership of a lecturer or without any guidance through lectures or visual methods, are situations that we may observe frequently occurring in laboratory. Additionally, before entering the lab, students frequently do not research experiments. They will need time to complete the experiment because of this. The main objective of this project is to create an application for a hydraulic laboratory. Moreover, to develop hydraulic laboratory application guidelines. The final step is to have students in the civil engineering department test the application to ensure it is functional. This application has two lab experiments, Water Jet Impact and Fluids Characteristic, which are among its most significant features. This experiment's materials include lab sheets, videos guiding users through the procedures, data analysis forms, equipment photos, and more. all of which provide information about the experiment. Thus, by using the assistance given in this application, students will be able to complete experiments more quickly and with greater ease.

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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 INTRODUCTION**

This project is an inspiration based on the problems that exist in student of hydraulic laboratory. This idea of building and creating Hy-lab applications is a very useful solution and can benefit students a lot. Students need a long time to understand and complete the experiments given by the lecturer. Our motivation to create this application stems from a common issue that arises for students who want to start conducting experiments. As a result, this application was created to help students with their work as they conduct these experiments. This project has the benefit of being portable and having an intuitive application.

### **1.2 BACKGROUND OF STUDY**

Hydraulics is the study of the practical applications of fluids, mainly liquids, in motion. It is related to fluid mechanics, which provides most of its theoretical foundation. Hydraulics is concerned with the flow of liquids in pipes, rivers, and channels, as well as its restriction by dams and tanks. Some of its concepts also apply to gases, usually in circumstances where density fluctuations are minimal.

A hydraulic study assesses both the steady-state (during operation) and transient (short-term change) flow conditions of a fluid pipeline, ensuring safety risks are mitigated and operating limits are appropriate. The study can look at these conditions within a pipeline terminal, as well as in mainlines between terminals, and is typically performed using

computer simulation and engineering judgement. Steady-state studies verify that fluid pressures, velocities, and flow rates are within acceptable limits (as defined by code, client standards, and equipment requirements). These are assessed at worst-case conditions, varying fluid density, temperature, and flow rates. [1]

Mobile technological advancements have enabled the development of a wide range of applications that may be utilised by people on the go. Developers frequently neglect the notion that users would want to interact with such devices while they are on the move. When developing for small, portable devices, difficulties such as small screen sizes, restricted connection, high battery consumption rates, and limited input modalities arise. The context in which they are employed is one of the most serious difficulties. Because these devices are meant to allow users to utilise them while mobile, the influence of their use on the user's mobility is a significant factor in the application's success or failure.

Applications is a small computer programs that run-in phone device. One may consider them as compact personal computers which are primarily to be used for making phone calls. Several vendors offer similar devices, therefore smart phones can be categorised based on the mobile operating system that they run. [2]

### **1.3 PROBLEM STATEMENT**

The problem faced by students in civil engineering department at Ungku Omar Polytechnic:

The problem statement is students have a problem to understand the lab sheet without any guidance by lecture and visual procedure. This also often happen and it will cause difficulty for students to understand and starting the experiment.

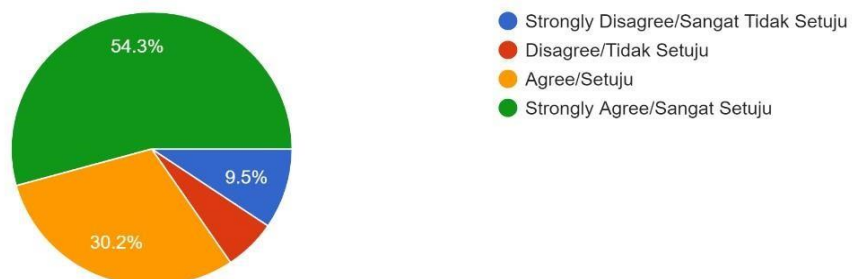
Next, difficulties with filling out the experimental data. This is because students need to use different paper, which will lead to handwritten mistakes, tears, loss and other damages.

Lastly, students' time is affected because more research is needed to get the right data. Before starting the lab work, each student will usually look for relevant information. This also will slow down the lab work process and their time.

The questionnaire includes 6 questions which is 3 of them are related to problem faced by students and other questions are related to the use of application in hydraulic lab guidance. So, there are some of the questions and the results from the questionnaire in the Google Forms:

Do you find it difficult to understand and learn from the hardcopy lab sheet? Adakah anda merasa sukar untuk memahami dan belajar daripada helaian makmal salinan kertas?

116 responses



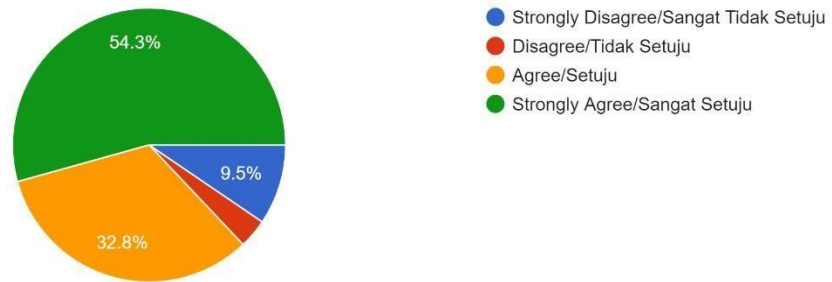
Do you feels overwhelming if you need to pay to print out the lab sheet given by lecturer. Adakah anda merasa terbeban jika perlu mengeluarkan duit...rtas kerja makmal yang diberikan oleh pensyarah?

116 responses



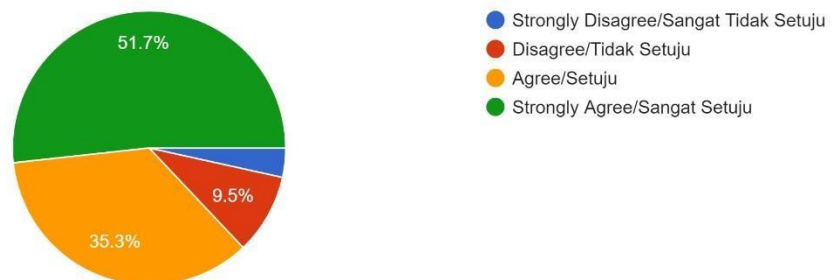
Do you feel hard to understand the lab sheet if there are no images and videos displayed? Adakah anda berasa sukar untuk memahami kertas kerja makmal jika tiada imej dan video dipaparkan?

116 responses



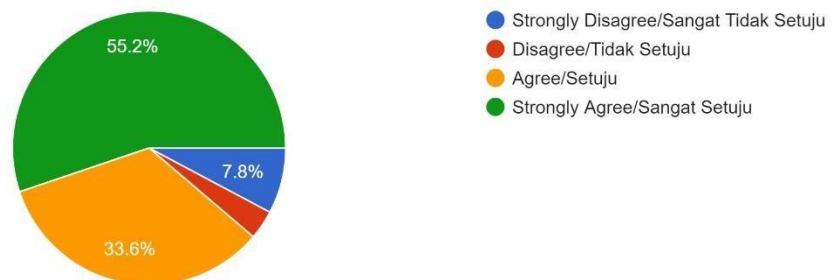
Do you think the application can help you to perform the hydraulic lab work? Adakah anda fikir aplikasi itu boleh membantu anda melaksanakan kerja makmal hidraulik?

116 responses



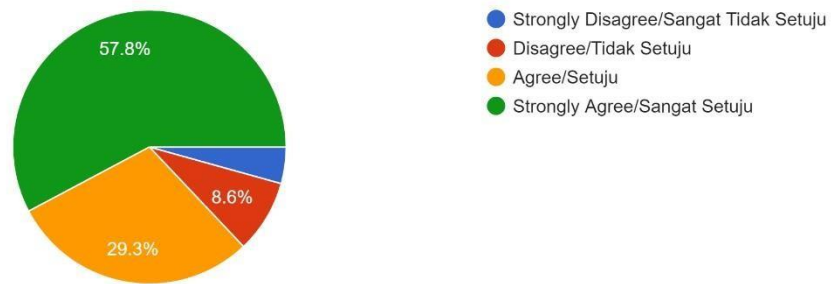
I agree that using the application to perform the hydraulic lab work can save my money. Saya bersetuju bahawa menggunakan aplikasi untuk mel... makmal hidraulik boleh menjimatkan wang saya.

116 responses



I agree that using the application in the hydraulic lab sheet is fun and easy to understand. Saya bersetuju bahawa menggunakan aplikasi dalam ke...aulik adalah menyeronokkan dan mudah difahami.

116 responses



**Figure1.1:** Questionnaire by Google Form

## 1.4 OBJECTIVES

The hydraulic lab guidance using application objectives includes some of the following:

- i. To design an application for hydraulic laboratory.
- ii. To create a guidance of hydraulic laboratory in application.
- iii. To test the application is functional to the students in civil engineering department.

## 1.5 SCOPE OF THE STUDY

The scope of Hydraulic Lab Guidance in Application includes some of the following:

- i. This project use Mobincube software to create the application.

- ii. Google sites are used to enter data analysis.
- iii. The application contains lab sheets that students can print out, photos of the equipment, videos showing the process, and a data analysis form that students can fill out.
- iv. The application is focusing to student of hydraulic lab.

## **1.6 EXPECTED RESULT**

The expected result of this project is to make it easier for students of hydraulic laboratory to understand the experiment more clearly. For instance, when students use this application in learning, it can help students in making these experiments more easily. This is because in this application it will be shown how to operate the experiment through video that showing the process (procedure), lab sheet, the apparatus used for the experiment (image), and the data analysis form that students can fill out. Furthermore, since all the information needed for the experiment is included in the application, students can save time by not having to look it up themselves.

## **1.7 SUMMARY**

In summary, the application is an effective way to be used by students of hydraulic lab as a guidance in hydraulic laboratory works. Furthermore, there are many advantages to use application as a guidance of hydraulic lab especially for students to learn and understand about the hydraulic lab works. This is because, by using the application as a guidance for hydraulic lab, they offer an overview in different forms such as visual and audio educational materials in the application.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

Today's students are part of the digital generation. They utilise technology for learning and personal use. They utilise technology inside of schools and outside of schools. In order to meet the needs of these students, education must change from traditional learning to learning with technology. Teachers need to learn how to properly integrate technology into their classrooms through technology professional development and ongoing support. Teachers also need to integrate technology that today's students want to use. With effective technology integration, students will be able to create using technology while learning and become successful. The purpose of technology in education is to enhance teaching and the learning process teaching, learning, educators, students, and classrooms have all been affected by the integration of technology in education. It has greatly changed education in how teachers teach and how students learn. More effective instruction and a higher calibre of learning environment will increase student performance. Technology has many benefits but there are also some challenges. [3]

In hydraulic engineering, laboratory work is essential for the growth of students' practical abilities and comprehension of conceptual ideas. Traditional laboratory work, on the other hand, can be time-consuming and may not necessarily give students a thorough understanding of the subject. The use of application in a hydraulic laboratory is a relatively new and innovative method that can give students more resources and opportunities to interact with the content. The purpose of this literature review is to

investigate the efficacy of employing apps for teaching and learning in hydraulic engineering lab work. With the help of the application we create, students may learn more quickly and efficiently. Mobincube was used to construct this app. Our app includes lab sheet, apparatus, procedure of video, and data analysis form that students can fill out. With this, students may find all the information they need related to the experiments without having to search Google or YouTube for it.

The use of these apps in teaching and learning has been explored in several studies, which aims to provide a current overview of mobile apps usage in higher education. Besides exploring the actual use of apps, the technology acceptance model was applied to examine students' perceptions, which involve perceived usefulness and perceived ease of use, towards adopting mobile apps for educational purposes, and their overall attitude toward such adoption. Both quantitative and qualitative methods were used to collect data from 150 undergraduate students in Business, Education, and Engineering in Hong Kong. The results show undergraduate students use mobile apps frequently to engage in learning activities related to their academic studies, with a particular focus on communication and collaborative working, accessing academic resources, and checking a dictionary. [4]

## **2.2 TEACHING AND LEARNING**

Teaching can be defined as engagement with learners to enable their understanding and application of knowledge, concepts and processes while learning is the acquisition of knowledge or skills through study, experience, or being thought. “We know that teachers come to teacher training with ideas about the teaching/learning process formed from the years they have spent as students themselves.” As teachers we tend to think that teaching is all about teachers and our role; in fact, the most important aspects of the educational process are the students and what they learn. This leads us to consider what we mean by 'learning'. As you read the educational literature and, more

specifically, educational psychology, you find many differences in theories and definitions. The results of the research generally show the process of teaching and learning was optimal in terms of learning materials, teaching methods, assessment, the students' performance and the teacher performance as well. [21]

Furthermore, teaching should include the presentation of effective learning strategies as well as the introduction of autonomous learning methods. The application of contextual teaching and learning in the teaching and learning process can give students the opportunity to express their ideas freely, think creatively, and use their knowledge comprehensively so that student learning outcomes will increase. It argues that, for teaching and learning to be relevant and effective, the focus must be on learning rather than teaching, on the learning process rather than the product. Changes in teaching approaches for these individuals are multidimensional and include the design of new teaching strategies. For example, making something that can interest students. the use of new teaching approaches and changing beliefs (pedagogical assumptions and learning theories) about learning and teaching in higher education.[22][23]

### **2.2.1 Types of Teaching and Learning**

Nowadays, smartphones have become one of the necessary tools for college students. In addition, there are some mobile smart terminals such as IPAD, Android tablet, which we can get information from without having to open a book or note. Relevant research shows that smartphone usage has reached more than 120% as it is one of the most important assets in today's world. [24]

As a result of the large number of smart technology products, some students are not interested in learning in the classroom, who prefer to use these smart devices to play games, surf the Internet, movies and other activities that are not related to classroom teaching because they prefer to do activities something interesting rather than something boring. This is said to be so because, they are often sleepy during study time

due to the teaching method itself and the activities carried out during the study are very uninteresting .With the development of information technology, especially the Internet of Things (IoT) technology that is widely used in education by applying IoT technology to increase student interest in classroom learning or lectures which has become a hot topic in the field of modern higher education applications .In some cases, apps connect directly to IoT devices using the device's WiFi hotspot capabilities, which either process requests directly.[26]

Based on a study conducted by Anitah in 2010, especially if in the teaching and learning process the teacher only uses monotonous lecture methods that will reduce students' interest in learning because students may feel bored or think it is not interesting for them because they have to open a book or understanding the lab sheet given by the teacher makes them lazy to do it. This is said because, students nowadays just want to make something easy without any problems.

If the display of learning content is not well designed or just like a learning textbook, it cannot increase students' motivation because they will quickly get bored. Educators or teachers need to be innovative and creative in teaching methods to students so that the learning process is more interesting and can achieve the learning target. This can happen if teachers continue to update teaching materials by using various learning methods by leveraging technology. Very practical technology can easily lift the learning process. With the use of visual technology, teachers can facilitate the learning process with educational matters. Other learning media such as the internet are very easy to reach.

Traditional methods use repetition and memorization of information to teach students, this means they do not develop their critical thinking, problem solving and decision-making skills because of the possibility that students are lazy to think. At that time, education or knowledge was only focused on the skills needed to survive. Then came the era of widespread application of science and technology in our daily lives that we have used at the present time. This was also the period when science and technology began to develop the fastest. [26]

### **2.2.2 Advantages of Teaching and Learning of Application in Education**

The advantages of learning combined with educational application technology are, firstly to accommodate slow participants more individually to attract students' interest in doing laboratory work without having to open or understand the lab sheet, secondly, to stimulate students' interest to learn in making reports without having to bother to write rather just fill in the table or space that has been provided in the application. From the benefits obtained, the use of technology in education is believed to improve results and motivate the students themselves.

Improving learning outcomes directly is an indicator of effectiveness and efficiency in implementing learning. So, the development of learning by taking advantage of the development of technology is very important and should be used by teachers or educators as best as possible. A development will have a positive or negative effect depending on how it is used by humans. However, with the introduction of technology into the world of education as it is now, the role of teachers and parents is very important, to support the education of students' personality. The role of teachers to organise and choose the best for students is very important so as not to leave the positive aspects of this educational technology for the learning process.

## **2.3 HYDRAULIC LABORATORY**

The Hydraulics Laboratory is a state-of-the art facility used to conduct a variety of experiments pertaining to water. The hydraulic lab is equipped with four major facilities: Flume, hydraulic bench, water jet, pipe friction and pump and turbine. The specific objectives of the Hydraulics Laboratory course are to provide the student with an opportunity to explore the fundamental principles of fluid mechanics through

experimentation and demonstrate and analyse key hydraulic phenomena using hands on physical devices. [5]

### **2.3.1 Open Channel**

An open channel experiment is a duct in which the liquid flows with a free surface exposed to atmospheric pressure. Along the length of the duct, the pressure at the surface is therefore constant and the flow cannot be generated by external pressures but only by differences in potential energy due to the slope of the surface. The flow channel is one of the most important tools available for the teaching of hydraulic principles. The flow channel has been designed to allow students a wide range of experiments on water flow in an open channel under different flow conditions and analyse the effects of test models of various shapes on water flow. It also allows the verification of the

Chezy equation and Manning's friction factor. In addition, studies of 'specific energydepth' relationships, the effect of various weirs and flumes, hydraulic jump and the determination of hydraulic mean depth can also be carried out. [6]

### **2.3.2 Impact of Water Jet**

The impact of water jet experiment is a way to understand fluid pressure by using the pressure to accelerate the fluid to a plate by a high velocity in a jet which in result will generate force due to impulse. It enables the force developed by a jet of water affecting upon a stationary object to be measured. The objective of this experiment is to investigate the validity of theoretical expressions for the force exerted by a jet on target of various shapes. The shapes can be categorised into three geometries which are plate, hemisphere and slope. For this experiment, only the slope deflector is used at an

angle of  $120^\circ$ . The procedure of this experiment is by changing the amount of load placed on the weight pan and time is recorded for the volume of water to reach 5.0L to measure the flow rate of the water jet at different weight. The higher the load's weight gave a lower time taken for the water to reach 5.0L which resulted in a higher flowrate of the water jet. [7]

### **2.3.3 Fluid Characteristics**

Fluid characteristic are intimately related to fluid behaviour. It is obvious that different fluid can have grossly different characteristic. For example, gasses are light and compressible. Whereas liquid is heavy and relatively incompressible. To quantify the fluid behaviour differences, certain fluid properties are used. The fluid properties are mass density, specific weight, specific gravity and specific volume. [8]

In this experiment, the fluids used are water, distilled water, and seawater. Water is a special natural resource because it is the only one on earth that is found in all three physical states depending on the surrounding temperature: liquid, solid and gas. Also, there are three methods to determine the characteristics of the fluid, the first using a hydrometer and thermometer, the second using a density bottle. The both of this method is used to determine the density of liquid and water. Lastly, using a hydrostatic pressure apparatus which is to determine the density of water. The objectives of this experiment are to determine the density of liquid and solid provided using different methods and compare the result obtained with standard value. [9]

## **2.4 APPLICATION**

An application, also referred to as an application program or application software, is a computer software package that performs a specific function directly for

an end user or, in some cases, for another application. An application can be self-contained or a group of programs. The program is a set of operations that runs the application for the user. Some types of applications include is Word processors, Database programs, Web browsers, Deployment tools, Image editors, Communication platforms. [10]

### 2.4.1 Types of Application

#### i. Mobincube



**Figure 2.1:** Logo Of Mobincube

Mobincube is really easy to use, offering a high level of customization so that user can create the app that best fits on their needs. Basically, user just need to add screens (pages) to the app, add elements (pictures, texts, videos, etc.) to those screens, set actions in those elements to let users interact, etc. If the user doesn't know where to start, they can use some of their step-by-step 100% customizable templates. For those advanced users with software development skills, Mobincube allows them to add their own pieces of HTML/JavaScript code in order to increase the functionality and interact

with other parts of the app. Mobincube is the best web-based tool that allows any internet user to build compelling mobile Apps for free, it can publish worldwide, and earn money. Mobincube offers a huge flexibility and the best functionality to build mobile apps. Also, it can create mobile apps that are compatible with any mobile, whether it's Android, iPhone, iPad, Windows Phone, Blackberry, or any other model. With Mobincube, it can publish the apps on APK downloader, Google Play, Apple's App Store, Microsoft Phone Store. These apps are fully customizable and monetizable. [11]

ii. Thunkable

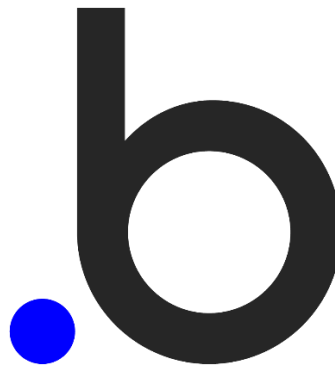


**Figure 2.2:** Logo Of Thunkable

Thunkable is a visual programming platform allowing users to create mobile applications for Android and iOS devices without prior programming knowledge. With Thunkable, users can create apps using a drag-and-drop interface, which means they can simply drag and drop different code blocks onto a canvas to build their app. Besides, Thunkable was created in 2015 by a group of MIT graduates who wanted to make it easy for anyone to create mobile applications. This platform is designed to be

userfriendly and accessible, with a range of templates and tutorials to help users get started. [12]

iii. Bubble.io



**Figure 2.3:** Logo of Bubble.io

Bubble.io is at the same time a visual programming tool and a cloud platform. The programming tool is used to build an application, while the cloud platform hosts and runs them. Besides, Bubble.io lets user to build the web applications. The applications can be accessed in a browser on a computer, tablet, or phone. Applications have a database and users can create an account, save data, retrieve data, etc. Bubble's powerful editor is open-ended, and like a traditional programming language, there's no fixed set of possibilities. By combining different data and logic operations, users can create very simple to extremely complicated applications. Bubble does not generate native apps for iOS and Android. Some users have managed to successfully deploy apps to both stores. [13]

For the purpose of this project, we will be building and creating Hy-lab apps using Mobincube. We discovered that Mobincube offers users definite advantages. Additionally, the Mobincube's convenience of usage with the included tools. Moreover,

Mobincube offers a platform for developing mobile apps without the need for coding knowledge. Its unique benefit is that it can publish applications on several platforms, which makes it perfect for businesses who want to reach a wide range of customers on different kinds of devices.[27]

#### **2.4.2 The Use Of Application For Education**

##### **i. Mobincube**

This Mobincube is perfect for students to learn. This is because this apps can be built using their step-by-step wizards or using advanced edition mode. This makes Mobincube the most suitable platform for teaching students of different ages and skills, even for splitting the teaching experience into several lessons. [14]

##### **ii. Thunkable**

Thunkable has two fundamental purposes: it is a great way for beginners to learn the fundamentals of coding, and it is a great tool for prototyping and building low-code complete apps. The Thunkable is good to use especially to students. This is because students can code apps for their own phone or tablet, whether they have an iPhone or Android. [15]. Design and create an app by dragging and dropping, components and connecting them with logic book, or remix an existing project. Also, integrate into variety of learning areas, with a focus on Project Based Learning. [16]

##### **iii. Bubble.io**

The Bubble is used to create interactive, multi-user apps for desktop and mobile web browsers. This application has been created a platform where students can create

applications and express their logic without code, opening up to educational value to everyone. [17]

### **2.4.3 Advantages Of Application**

#### **i. Mobincube**

The advantages of Mobincube for users is Mobincube provides analytics and reporting tools to help track performance. Also, the platform has a drag-and-drop interface and users can access customizable templates. Besides, users can add multimedia, such as audio, images and video. Next, Mobincube supports push notifications and in-app purchases, allows e-commerce and social media integration, can integrate their apps with AdMob for monetization and the mobile app builder supports Android, iOS and windows platforms. Lastly, the free education plan is a advantages of Mobincube for education. Teachers and students will have full unlimited access to most of the premium services of Mobincube for free, so that they can build apps without ads, manage remote content with our Cloud, send push notifications, use Google Analytics, etc. [18]

#### **ii. Thunkable**

The advantage of Thunkable is that it provides drag-and-drop components. Apart from having an excellent user interface, it has options such as drag-and-drop, which can allow the users to explore their full potential through Thunkable by unlocking all native mobile phone features. Besides, integrate a no-code backendless backend into the applications, and the users can enjoy features like a visual relational

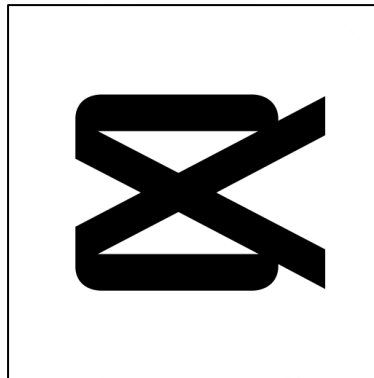
database, user management, bulletproof security, and highly scalable serverless hosting. Therefore, the Thunkable also provides no geographical limitations. The users can work from any location, eliminating the need to be confined to offices or rooms. Lastly, being naturally native with full functionality is one of the advantages of this app. The Thunkable unlocks all the features of the mobile and gives the exact same immersive experience.[19]

### iii. Bubble.io

The advantages of Bubbles are economic. This is because learning to code on our own requires a significant investment in terms of time and money. But with Bubble, users can build it if they don't know how to code. Consequently, Bubble makes users road to software development cheaper and quicker. On the other hand, users can complete their applications faster. This is because Bubble has done the groundwork for users, and they just need to drag-and-drop prebuilt modules in their desired places. Also, users can test the app before rolling it out. This can reduce the development cost by a great deal. Lastly, the advantage of this app is enhanced productivity; with this app, things can be built faster. This means the IT team won't feel stuck or overwhelmed by requests from other departments. There's no long waiting for apps to complete, as what took months to create can be completed within days or hours. Lastly, it can make powerful apps without teaching skills. Bubble isn't just a no-code tool with basic templates like most tools on the market. Its visual programming capability makes it possible to build complex apps by simply placing elements on pages. So, users just click and drag a template into place. Besides, they don't just drag and drop images to activate fields and texts; they can also customise them so that they function as they wish. [20]

## 2.5 VIDEO MAKING

### 2.5.1 Capcut



**Figure 2.4:** Logo of Capcut.

Capcut is an application that can be used as a special application for editing video, audio and images. With Capcut, users may edit a wide range of videos, including ones regarding entertainment, health, food, and even educational resources. Given how popular social media is among students these days especially capcut using it as a teaching tool is highly suitable for educational institutions. Teachers can use Capcut as a tool to not only watch videos that have been edited to make them engaging and comprehensive, but also to make sure that students never get bored and are motivated to study. [28]

With the help of the capcut, students can expand their horizons and learn about current events in addition to academic content. Therefore, employing capcut is a productive and successful learning method. From students to adults, the capcut program is a modern tool that anyone may utilize. There are a lot of benefits to utilizing Capcut, including the ability to create engaging instructional videos from the videos we edit in the program. Because we can create video that serves as a guide for conveying the subject

matter and accommodates contemporary learning styles, using Capcut as educators is incredibly beneficial.

Using educational videos to enhance the environment of based learning is both possible and highly successful in the current online learning process. When learning videos are used instead of text-based learning materials, the desire of learners to learn is increased significantly. Students may see the instructional content directly in the video, making the learning process feel more authentic. Students can repeat videos they have already watched, even on YouTube. Therefore, educators can repeat lessons to students who struggle with understanding until they fully grasp them. [28]

## **2.6 SUMMARY**

The chapter's summary discusses the journal that was examined, which is the hydraulic laboratory guide in application. This release also discusses the app's functionality. The advantages of the application in the lab are also covered in this article. Based on the results and the literature review done using data from previous research, it is possible that this project will have an impact on everyone, especially on hydraulic laboratory students and lecturers because it can make their work easier. The employment of these apps in this project has the potential to significantly affect the outcome. The software used in this project helps to develop applications that are both efficient and inexpensive.

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

What is methodology? Methodology is the systematic and theoretical analysis of procedures and principles used to achieve a goal. It involves the overall approach and framework used to conduct research, investigate a problem, or achieve a specific objective. Methodology outlines the steps, techniques, tools, and strategies employed to gather data, analyse information, and draw conclusions. In various disciplines, different methodologies are utilised. These methodologies guide researchers in designing experiments, collecting and interpreting data, and establishing reliable findings. The choice of methodology depends on the research questions, the nature of the subject matter, and the overall goals of the study.

#### **3.2 DESIGN**

Our Hy-Lab application is designed based on the following aspects. We create a clean and intuitive layout for the app by using simple design with easy navigation and identifiable elements in the app. Secondly, we maintain a consistent colour scheme, wording and visual elements throughout the app to create a attractive user experience. Moreover, we will design the app to be compatible with different screen sizes. We have understood the students and their needs for a better way to learn about hydraulic experiments and will design the app based on these criteria. We also designed the app's navigation and information in a way that makes it easy for students to understand and

navigate through the app. Furthermore, students can share detailed feedback to us when they perform actions or encounter errors to keep us informed and improve the application via google forms. As aesthetics go, we use icons and images that are visually appealing, easy to understand, and relevant to the app's functionality. And finally, we incorporate intuitive gestures, such as swiping, tapping, or pinching, to enhance the user experience.

### **3.2.1 Material**

We use Mobincube software to create the application. Mobincube is the name of a software that allows users to create applications on phones and tablets. Mobincube gives an easy tutorial on how to create applications easily and efficient with no coding knowledge required.

## **3.3 PRODUCT TESTING**

Product testing is done to test functionality of projects towards targeted users. In our case, Civil Engineering students. Students will be required to download the application before attending their hydraulic laboratory courses. We will conduct product testing by conducting a Google form where students can rate and give us feedback about the functionality of the app towards them which is whether the app helps them to understand hydraulic experiments better by using visual aids like videos, notes(procedures, apparatus photos, lab sheets, objectives and data analysis that can be printed out) and other information that helps them to better understand the experiment. We will allow the students to test out the app for a few laboratory classes and let them review the app after given time. We will make reviews mandatory in case students don't want to give us feedback so we can continue to improve the application.

### 3.4 DEVELOPMENT OF THE RESEARCH

#### 3.4.1 METHODOLOGY FLOW CHART

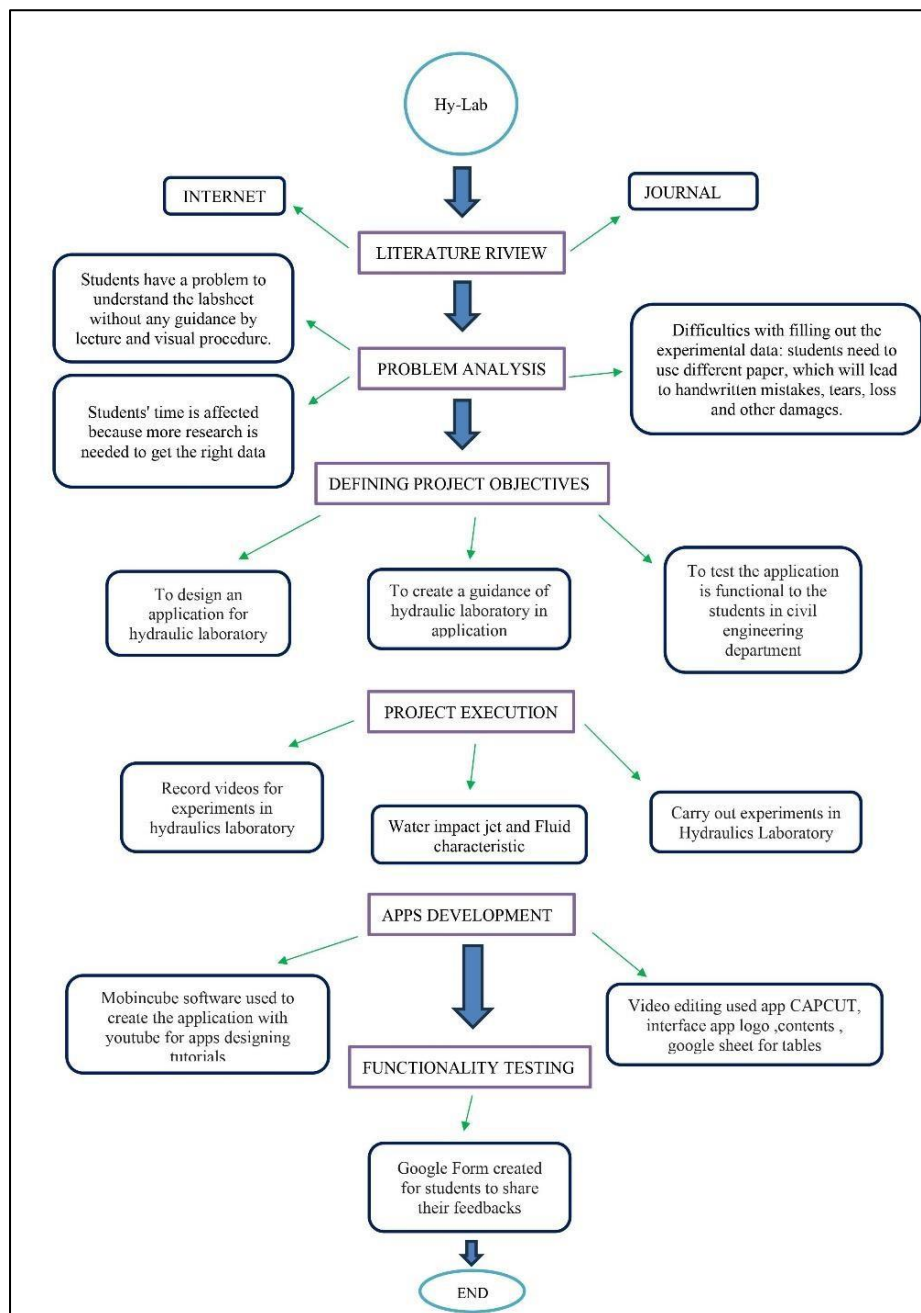


Figure 3.1: Methodology Flow Chart

### 3.4.2 GANTT CHART

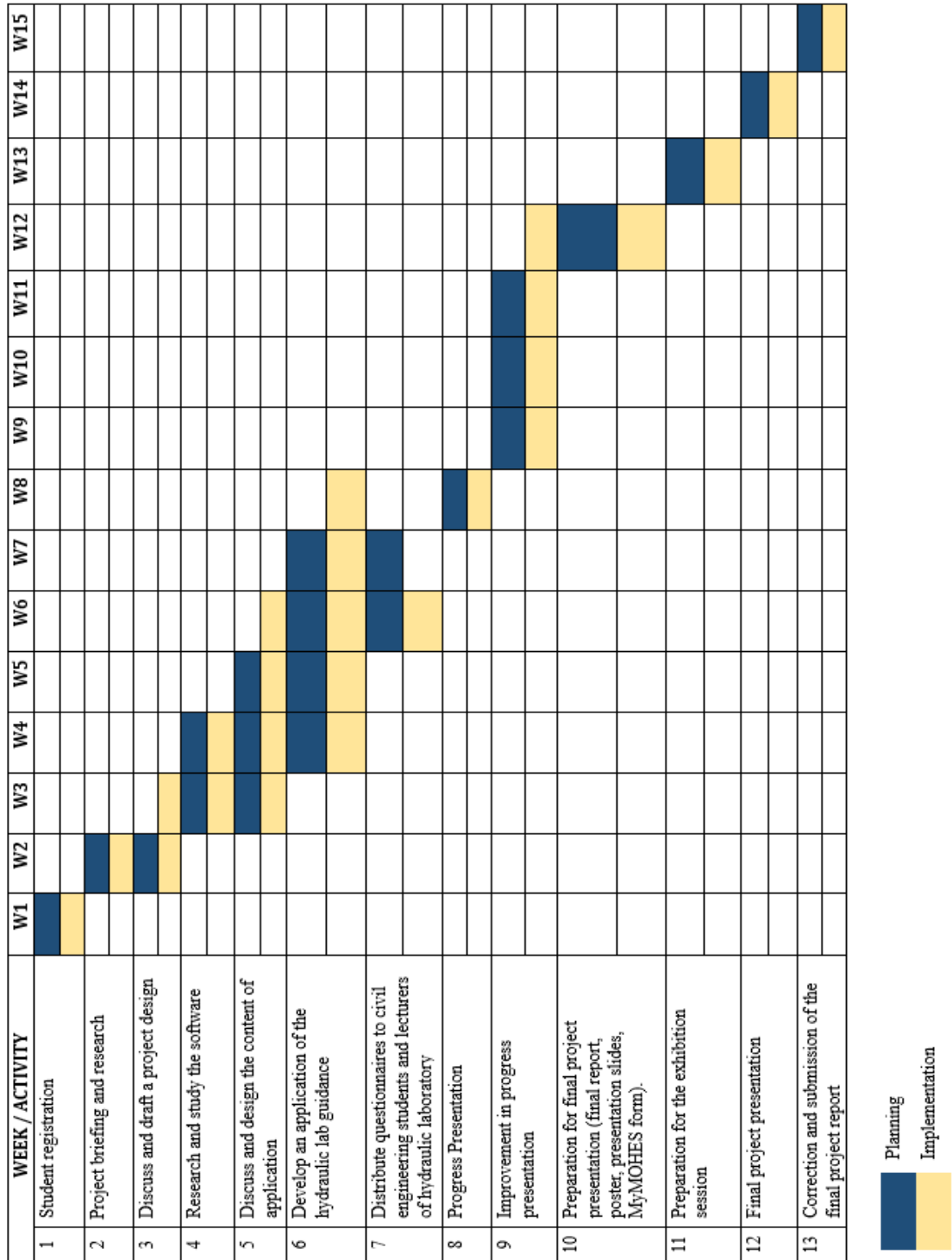


Table 3.1: Gantt Chart

### **3.5 SUMMARY**

In summary, We will be designing an app to assist civil engineering students in their hydraulic laboratory courses as it involves a lot of practical work and requires deep understanding of the theories that lead to the experiments. We will design this app based on the flow chart given and the specifications given in the design category.

## **CHAPTER 4**

### **RESEARCH FINDINGS AND DISCUSSION**

#### **4.1 INTRODUCTION**

The purpose of this chapter is to provide more information about the overall flow of the test in achieving its objectives from start to finish. The collection of information and study data related to progress is important to the success of this Hydraulics Lab Guidance In Application (HY-LAB) project process to advance and address concerns related to the effectiveness of students in the hydraulics laboratory. For that reason, data collection is done in a planned and detailed manner, for example by creating a Google form to collect information. This is important to ensure the authenticity and integrity of the data so that it can accurately reflect the project being worked on. In order to achieve the project objectives set at the beginning of the project, the analytical approach used will be described in this chapter. Subsequent recommendations in the project improvement process will consider the issues raised in this chapter.

#### **4.2 INTRODUCTION OF RESULT AND DATA ANALYSIS**

For this part of the chapter, the researcher will try to collect information by using primary and secondary sources. primary sources are obtained from observation and distribution of questionnaires. While secondary sources are collected from the internet and journals. The purpose of this chapter is to provide more information about the overall flow of the test in achieving its objectives from start to finish. The technique

used depends on the results of the tests that have been carried out. Experiments were used in this study to collect test data and evaluate data collection using Google Forms.

Before everything, it is important to deny that the HY-LAB application produces the desired results. To create an interacting and interconnected system that acts according to a set of rules to form a unified whole. HY-LAB application allows students to use lab sheets and analysis data easily by simply downloading the HY-LAB application from the APK file that has been provided. The benefit of operating HY-LAB this application is that it is easier for students to conduct experiments by only following the procedure videos available in the apps. It can reduce the lecturer's burden to give an initial briefing to do any of the available experiments and can save students' time from printing lab sheets. Other than that, this application is quite basic, easy to operate

1. Primary Data

Information collected by means of primary sources is not obtained anywhere else except through the efforts of the researchers themselves.

2. Questionnaire

The use of a questionnaire is very important and suitable to collect an abundance of data. Data collected can be used to visualize a graph that is presentable and simpler to compare with each other. Around 55 people will answer the questionnaire about HYLAB application and give an opinion about it on the last questionnaire.

3. Secondary Data

Secondary data is obtained from past studies. These are in the form of written sources such as journals, articles, and the internet. Except will be taken to support the researcher's study.

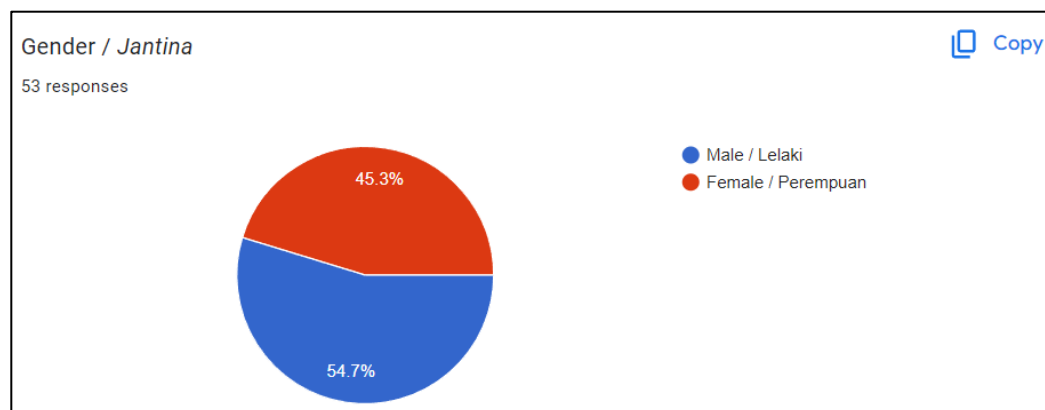
#### **4.2.1 Data Analysis**

The data was analyzed using Google Forms to gather feedback about our app. There are 10 questions, starting with applicant information, followed by questions

related to the HY-LAB application. There are 53 people involved in this analysis. The opinion of students who took the hydraulics lab course at Ungku Omar Polytechnic shows that this application is suitable and useful to use when doing hydraulics lab in the hydraulics laboratory.

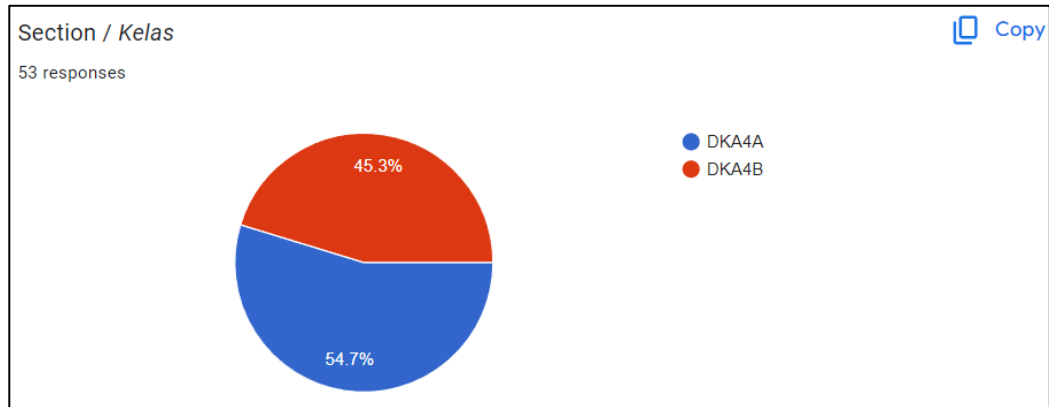
The application has been tested on all the students we focus on, ie sem 4 & 5 and received feedback about this product. This HY-LAB application needs to be improved in the data analysis section in order to make it easier for students to use.

The main purpose of this data analysis is to answer the final objective which is to test the functionality of the HY-LAB application to students by distributing questionnaires to students. This questionnaire needs to be answered by the students that we have specified which are 4th & 5th semester students only. This application was created specifically for the 4th semester students especially because they are required to take the hydraulics lab course.



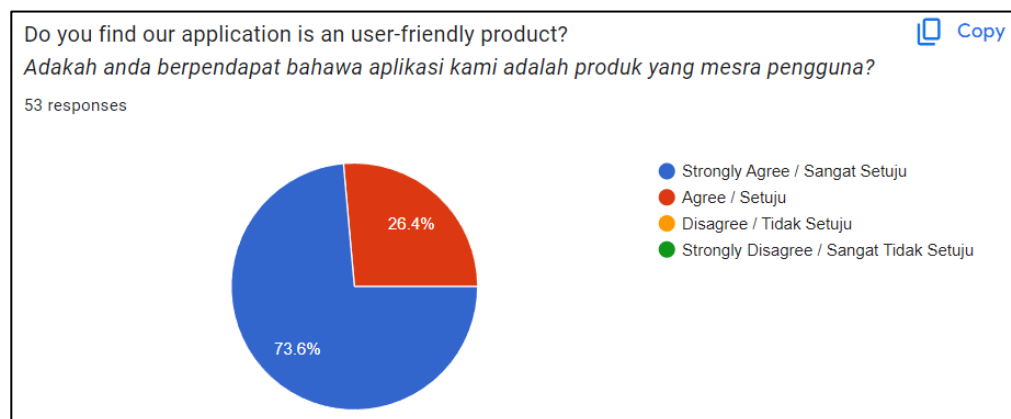
**Figure 4.1:** Respondent gender percentage

The first chart is the gender of the respondents, where there are more men than women at 54.7% men and 45.3% women. This is normal because men are more attracted to engineering related applications than women. The difference is not a huge gap between the sexes.



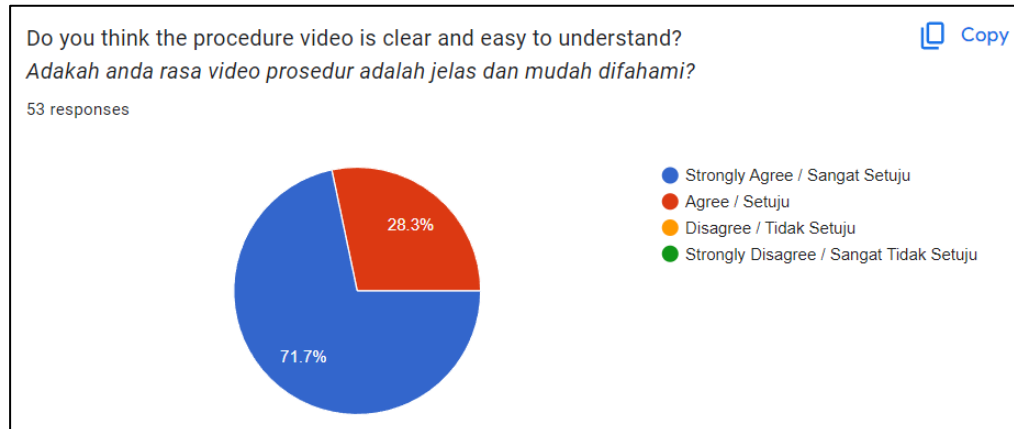
**Figure 4.2:** Percentage of respondent class

The second chart is the DKA4A class of respondents, where there are more students than the DKA4B class which is 54.7% 4A and 45.3% 4B. This is normal because there are more students in class A than in class B. The difference is not a big gap between classes.



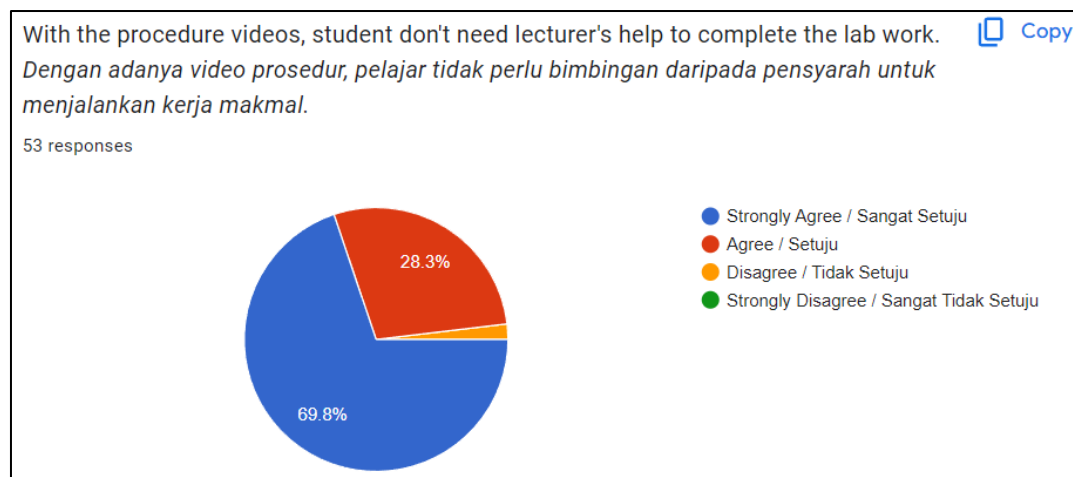
**Figure 4.3:** Percentage for user-friendliness

As we can see in the diagram, the percentage to know whether our application is user friendly or not is the highest for the response that strongly agrees with 73.6% compared to only agreeing just 26.4% while there is no response for disagreeing.



**Figure 4.4:** Percentage for procedural video

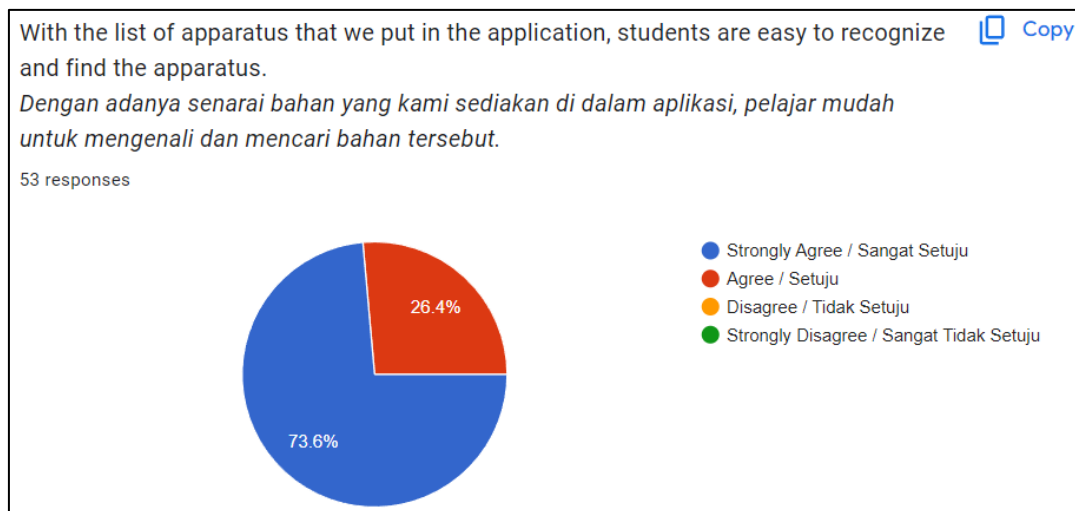
The percentage shows that the procedure video is easy to understand because the percentage reaches 71.7% for strongly agreeing. therefore, we are confident that the videos we have provided are very clear and easy to follow.



**Figure 4.5:** Percentage for No need for lecturer guidance

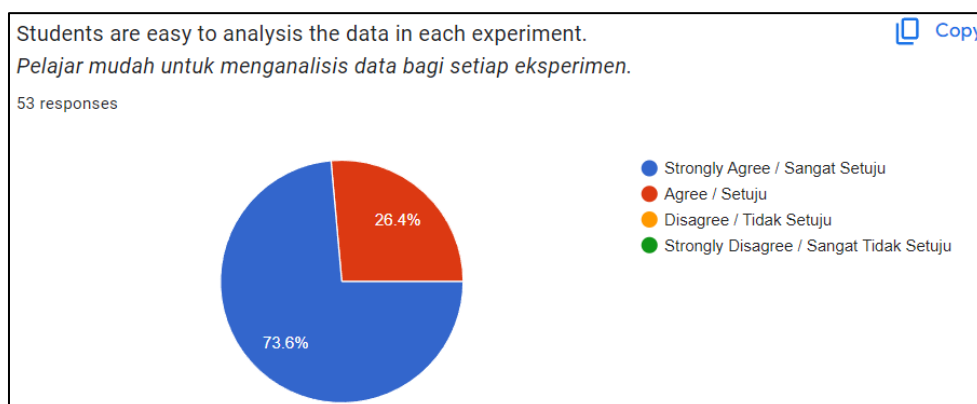
The percentage shows that with the video procedure students do not need to rely 100% on the lecturer but only do experiments based on the apps, therefore, a percentage of

68.8% for the category strongly agree and there are only a few percent who disagree because maybe they prefer explanations rather than seeing videos.



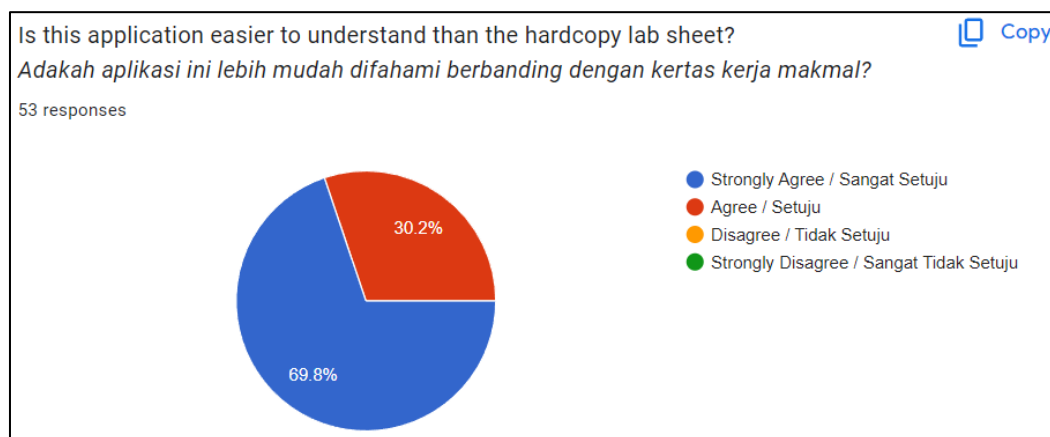
**Figure 4.6:** Percentage for Easy to find tools and materials

The percentage shows that with the help of tools and materials and pictures can make it easier for students to handle it. Because of that, many students strongly agree with a percentage of 73.6%.



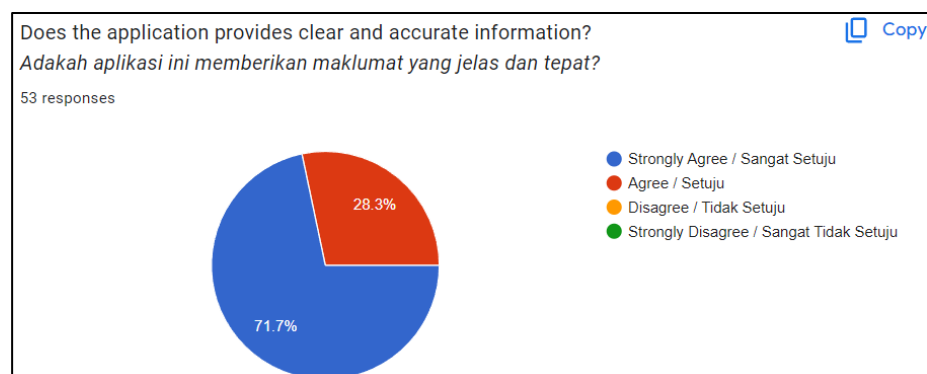
**Figure 4.7:** Percentage for Easy for students to analyze data

With the google sheet website that we have included in our apps, it is easier for students to analyze data, thus, the percentage of those who strongly agree with the convenience of our apps is 73.6%.



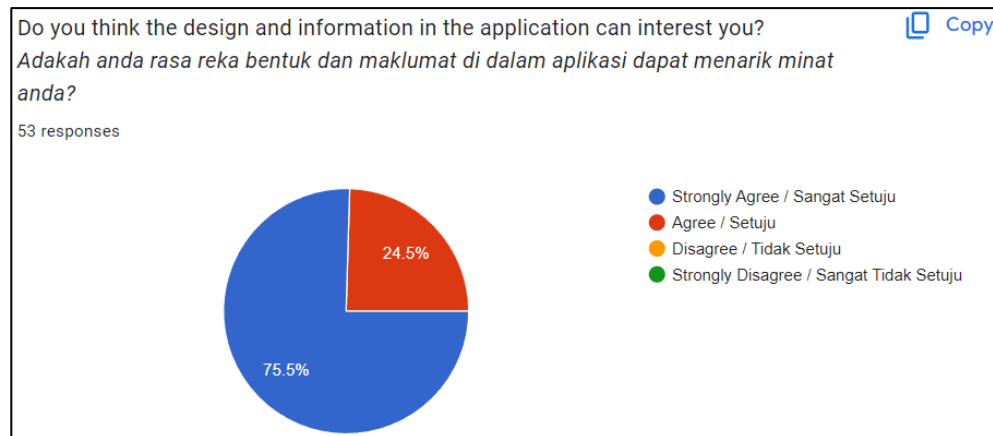
**Figure 4.8:** Percentage for Easy to understand

With these apps, students can understand more easily than before who were only guided by manual lab sheets, so we created these apps that are full of facilities for students to conduct experiments.



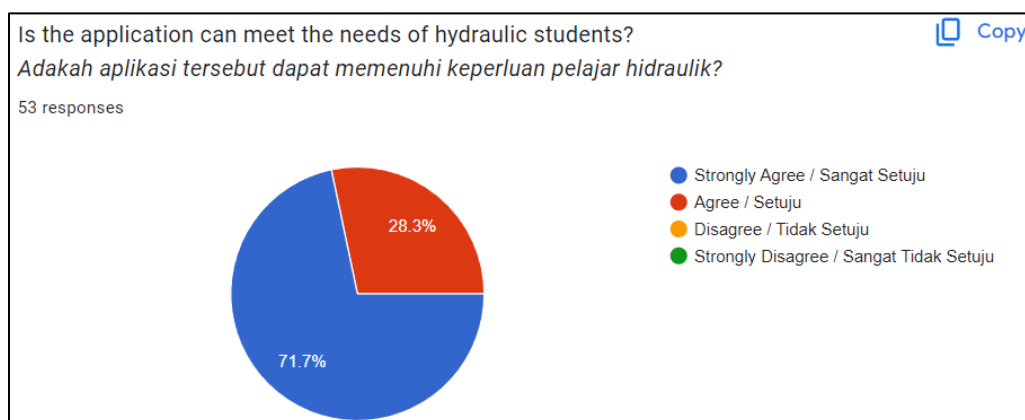
**Figure 4.9:** Percentage for clear and accurate information

A percentage of 71.7% said they strongly agree that these apps provide very accurate and clear information.



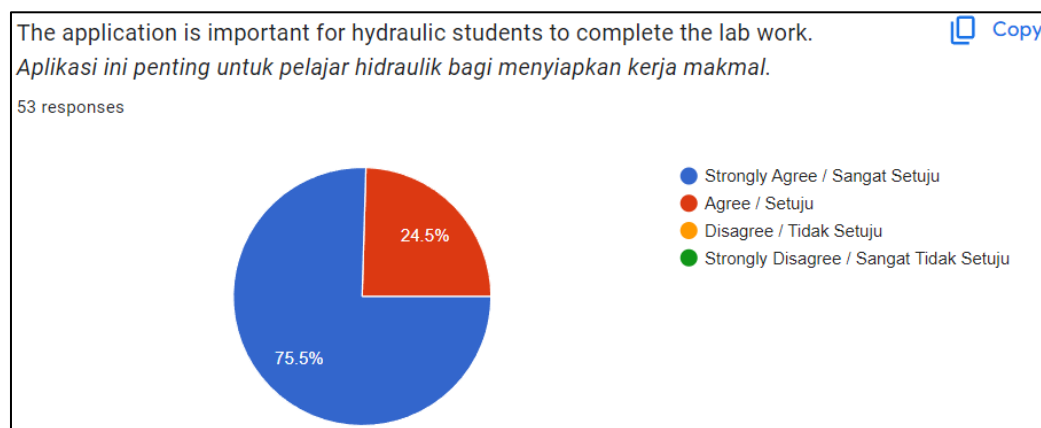
**Figure 4.10:** Percentage of apps design

As we can see in the diagram, the design of these apps can attract the interest of students because the percentage obtained as much as 75.5% who strongly agree has been able to prove that our apps are very neat and orderly.



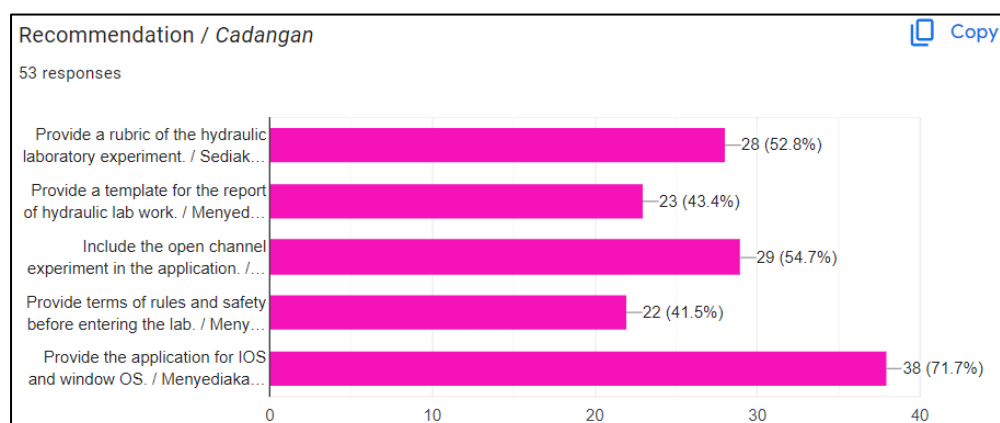
**Figure 4.11:** Percentage the needs of hydraulics students

The percentage of 71.7% for those who strongly agree that these apps can meet the needs of hydraulics students because our apps are equipped with all the necessary requirements when conducting experiments such as labsheets.



**Figure 4.12:** The percentage of the importance of apps

It is proven here that these apps are important for completing laboratory work quickly and easily because many students who responded strongly agreed with the statement.



**Figure 4.13:** The percentage of recommendation

### **4.3 DISCUSSION**

Hydraulics Lab Guidance in Applications, also known as the first quality Hylab not only for students but also for lecturers, aims to increase their virtues and facilities by incorporating 4 experiments in one application. The purpose of the application is to reduce the problem of difficulty or misunderstandings while facilitating students in the learning session. The findings of this study can be attributed to the findings of previous studies on the effectiveness of HY-lab in enhancing facilities and understanding among students.

A theory related to learning applications is the concept of convenience and fast that refers to applications designed and created for the convenience of students to facilitate laboratory work. Previous research in this area has found that learning -related applications can be impacted on producing excellent students and in improving Potential in technology skills.

### **4.4 SUMMARY**

In Summary, the findings of Hy-Lab applications can be attributed to the 21st century learning method which is clearly stated using online only. This HY-LAB application can also be convicted of effectiveness in enhancing students and faculty and facilities.

## **CHAPTER 5**

### **CONCLUSION**

#### **5.1 INTRODUCTION**

Hy-Lab application was created to aid civil engineering students who take the hydraulics laboratory course who have difficulty learning the experiments using the traditional method. Hy-lab is a unique approach to overcome difficulty learning by using e-learning concept where all videos, notes ,guides about each experiment is in the app and is easier for students to understand. That being said, Our app has a few challenges like suited for android platform, technological issue, no experiment template, etc. Students can also share their feedback on the app using a google form we created. The app will also make lecturer's job easier that they dont have to explain much about the experiments to students. Overall, it is a good guide to students who take the course.

#### **5.2 CONCLUSION**

This application was created with the idea to assist civil engineering students. Hy-Lab was created using the mobincube software and other video editing tools to improve content and to make it easier for students to access. It also provides students with data tables for them to fill in their values of the experiments. The app can also be opened offline. All students need to do is give the application a download. Students can also view the videos in the app to understand how experiments are done. We hope this application manages to fulfill student's needs.

### **5.3 RECOMMENDATION**

These are some suggestions for further research to strengthen the research findings in the field under study:

1. Provide a rubric of the hydraulic laboratory experiment.
2. Provide a template for the report of hydraulic lab work according to the prescribed format.
3. Insert the open channel experiment in the application to complete all the experiments in the hydraulic laboratory.
4. Make the application is accessible for IOS and window OS user.
5. Provide terms of rules and safety before entering the lab.

### **5.4 LIMITATION**

The Hydraulic Lab Guidance in Application (HY-LAB) is an application that promises convenience for hydraulic students. However, like any technology, HY-LAB application has its limitations that need to be addressed before it can be fully adopted in real-world applications. Some of the limitations identified in the project include:

1. Accessibility: one of the main challenges for the hy-lab application is this application is cannot be access by IOS and window users. Furthermore, students nowadays are commonly use Apple products such as Iphone that use IOS software.
2. Cost: the challenges when the application needs to be published, its need to pass through Google Console and have a payment before the application published.

3. Design: limitation while construct the design that need to insert in the application. Challenges of recording the videos of procedure for 4 hydraulic lab experiments, edit the procedure videos and collect all the data to put in the data analysis section.
4. Validation and publish: the most challenging is to publish the application in the play store or google play, the application needs to pass through the quality check (QC) by the google console within 3 to 4 weeks.

When developing a hydraulic lab guidance in application (HY-LAB), it's crucial to address these limitations through thorough testing, validation, user training, and regular updates to ensure the application's effectiveness and reliability. Additionally, obtaining feedback from users and experts in the field can help identify and address any unforeseen limitations.

## **5.5 SUMMARY**

Hy-Lab has the potential to guide students and increase marketing potential by introducing and reinovating the app or creating a new app to assist students in other courses who take other laboratories. Being said, this application is currently made available to android users and we hope to make this application available to IOS users later on as this app is currently in its demo stages. We are also waiting for more student feedback so we can add improvements to this app before making it mainstream in the college. We hope all recommendations are added and all issues are solved regarding the app.

## CHAPTER 6

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