



## **DIPLOMA IN BUSINESS STUDIES**

### **COMMERCE DEPARTMENT**

#### **SMART ID PSA**

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# DECLARATION OF ORIGINALITY

## SMART ID PSA

### SESSION: SESI I 2022/2023

1. We,

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2. We verify that Smart ID PSA and its intellectual properties are our original work without plagiarism from any other sources.
3. We agree to release Smart ID PSA intellectual properties to Polytechnic Sultan Salahuddin Abdul Aziz Shah to fulfil requirement of being awarded **Diploma in Business Studies** to us.

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as our supervisor on date:

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## **ABSTRACT**

In Malaysia, polytechnics have been employing matrix cards as student identification. The majority of higher education institutions, as well as polytechnics, have adopted matrix cards as a unique identification tool. However, the current matrix card has a limited amount of information written and a small amount of surface space. As a result, researchers provided Smart-ID with a QR code with additional information to improve the current matrix card. The matrix card will contain a link to each student's data in a QR code generated using a QR generator. By scanning the QR code on the front of the student identity card, the generated QR code can identify pupils. The user can access the database and enter the student's personal information by scanning any QR code converted into digital data. The new Smart ID improves the current matrix card, which speeds up information retrieval. It can also do the process of taking attendance during class.

**Keywords: Smart-ID, Matrix card, polytechnic, QR code**

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# CHAPTER 1

## INTRODUCTION

### 1.1 INTRODUCTION

The multipurpose student card is one of the solutions for educational institutions that can be as straightforward as a matrix card for identification purposes. It can also be multifunctional intelligent cards used for various purposes in addition to identification, such as access to the library, doors, the cooperative shop, and attendance tracking.

The student identification card is essential for the students to identify themselves as students at the institute. In this project, the researcher will mainly focus on the identification card of the students at Polytechnic Sultan Salahuddin Abdul Aziz Shah (PSA).

Quick Response Codes (QR codes) encode information into a matrix barcode that can be read and decrypted by various devices, including mobile phones and computer tablets. QR codes have become one of the most widely used two-dimensional barcodes. QR codes can store virtually any type of data up to a few thousand bytes. Coupled with a moderately equipped mobile device, it paves the way for several commercial and educational uses. QR codes store data using patterns of black dots and white spaces arranged in a square grid. Print code can be scanned and translated into human-readable information with the help of an imaging device, like a camera or a scanner. However, nowadays, the most common way to check QR codes is to use your smartphone's camera and a specialized app for reading QR codes.

This project will be a steppingstone for a new matrix card with QR codes. This QR code will be used to store student information or to identify student identification in PSA. Besides, it can be used when the student matrix card is missing or fall into the hand of an unknown person to guide the person into returning the card to the student. QR code also can be used to track of the students' attendance effectively and efficiently.

## 1.2 BACKGROUND OF THE PROJECT

PSA is in Shah Alam, Selangor. It is an education institute with over 3757 students from all over Malaysia of different races, religions, and backgrounds. PSA offers numerous programs, including religious studies, degrees, and diplomas. There are several departments in PSA, the commerce department, the electrical engineering department, the civil engineering department, and the mechanical engineering department. The commerce department provides diploma programs in business studies, insurance, marketing, and international business. The Civil Engineering Department provides diploma programs in wood-based technology, civil engineering, and building services. The Electrical Department offers diploma programs in engineering electronics (communication), engineering electronics (medical), and engineering electronics (control). The Mechanical Department provides diploma programs in mechanical engineering and mechanical engineering (packaging). There are students from semester one through semester six. The student ID card used at PSA is known as a matrix card. The student's name, IC number, matrix number, and faculty of study are all listed on the matrix card.



Figure 1.2 Student's Matrix Card

Matrix card is known and mandatory to be worn by PSA students from the first time they begin their study until they graduate. The matrix card is unique for the students to identify them as PSA students. The current matrix card contained simple information displayed on the card. The card contains the student's picture, name, personal identification, matrix number, and study faculty. The students typically receive their

matrix card in the fourth week after entering the PSA, which is on the first semester of the Diploma.

When students fully embrace the polytechnic's principles, standards, and academic identity as an essential part of their fundamental self-concept, they become identified with the PSA. A matrix card is a specific type of social identification that shows how students describe themselves concerning their membership in a polytechnic. The matrix card can also access campus facilities, sports equipment, and library books on loan.

A penalty will be imposed on students who do not wear or carry the matrix card in the PSA. Because of that, students should be more aware and bring the matrix card before entering the institute and, most importantly, be careful not to misplace it. A lost matrix card should be returned to the *Jabatan Hal Ehwal Pelajar* department (JHEP) to avoid fraud.

The space on the matrix card is quite limited for displaying the students' information. The information is inadequate to identify over three thousand students in PSA. Sometimes students failed to bring their matrix cards to class, making it difficult for the lecturer to record the attendance. Due to their compliance with PSA's regulations, the students are also unable to break the rules. As a result, the researcher intends to embed the QR Code to wrap up the students' information. These proposals benefit PSA, lecturers, students, and all relevant parties with the use of matrix card with QR Code.

### **1.3 PROBLEM STATEMENT**

The use of technology in PSA is expanding rapidly. With the rapid growth of technologies, PSA must also improve its system to be on par with technology in other educational institutions. Researchers can see that some institutions still relied on manual handwritten attendance sheets for student identification in class, including PSA. If an upgraded ID card or matrix card was introduced, it would significantly change the whole use of it specifically in PSA. Identifying a student would be much easier and save time, efficiency, and reliability. Thus, the matrix card will play an essential role as it is the primary tool for student identification throughout their polytechnic years.

According to a survey on using the existing matrix cards in PSA, 59.3% of respondents recommended to include the students' contact information on the matrix cards. In comparison, 77.8% indicated using them to verify attendance. Meanwhile, 46.3% of respondents requested that information be published, such as the student's academic advisors' names, and 29.6% suggested that information on accommodation be included.

It is not possible to display all the information on the current matrix card due to the restricted space available. Therefore, to maximize the use of the matrix card's latest advancement, also known as Smart-ID, it is necessary to use QR codes, which can be inexpensively integrated into the card and, more importantly, with necessary information. Thus, mobile phones and QR scanning apps can easily find information details and can be use anytime and anywhere in PSA.

## **1.4 PROJECT OBJECTIVE**

The objectives of this project are:

1.4.1 – To provide all necessary information of students at PSA using matrix card.

1.4.2 – Through creation of QR Code which will be embedded on current matrix card.

## **1.5 PROJECT QUESTION**

The questions for this project are:

1.5.1 – What is the main purpose of SMART ID?

1.5.2 – How SMART ID works?

## **1.6 SCOPE OF PROJECT**

This project will be carried out at PSA for students with matric cards. The project will begin by conducting questionnaires regarding appropriate information required to add and display on the QR code through Google Forms. The data will then be added in a unique QR code that will then be printed out as a sticker for the student to stick on their matric card.

The result of this project will be the convenience of a one-stop center for students' information and a quick attendance process. Furthermore, as researcher delve deeper into this project, researcher will be able to use the matrix card as an attendance system through the QR code for effective and efficient use among students and lecturers.

## **1.7 IMPORTANCE OF THE PROJECT**

### **1.7.1 – Speed and accuracy**

This system is faster than the manual attendance system as there are few procedures for taking the student's attendance. It also helps to prevent incorrect data entry, proving that this system is more accurate than manual attendance.

### **1.7.2 – Identification purpose**

This system helps people quickly identify students' records or identification by scanning the QR code placed on the student's matrix card.

### **1.7.3 – Enhances punctuality**

This system will record each student's arrival time to class and display their delinquent behaviour, which will teach the students the importance of punctuality.

### **1.7.4 – Reduced lecturer effort**

Automating this attendance system will reduce the mundane of manual paperwork that every faculty has to do every class hour.

### **1.7.5 – Reduced time**

The automation system eliminates repetitive work and will reduce the time taken for attendance in every class hour.

### **1.7.6 – Environment friendly**

Every piece of information is stored in drives and clouds, proving that with this automation system, the use of paper will be reduced and, even better, eliminated.

## **1.8 DEFINITION OF TERM**

### **1.8.1 – Matrix card**

Also known as a student identity card, it is an indispensable means of identification for every student (Kadri, 2017). This matric card must be brought with students wherever they go as long it is inside the learning institution.

### **1.8.2 – QR code**

A two-dimensional bar code called a Quick Response code (QR- code) was created by Denso Wave in Japan in 1994. A QR code is structured in black and white rows and columns and was created to be read by smartphones.

Numerous pieces of alphabetic and numeric data can be concealed by a QR code. As a result, they have gained popularity on a global scale. Due to the growing use of smartphones, which often come with software that can read QR-code images, QR codes are also commonly utilised in communications. (Rahmawati, D., Putro, F. W., Wicaksono, A. Y., & Nurdin, A. 2020)

### **1.8.3 – Multipurpose**

Designed or used for several purposes (American Heritage, 2018). This means anything that has multiple uses. For example, a sofa bed could be used as a bed for people to sleep on at night and as a sofa for people to relax and sit during the day.

### **1.8.4 – Student**

One who is enrolled or attends classes at a school, college, or university (American Heritage, 2018). In this sense, though, the term student is used for students at higher learning institutions which is the student of Polytechnic Sultan Salahuddin Abdul Aziz Shah.



## **1.9 SUMMARY**

The invention of SMART ID used by PSA students is outlined in this chapter. The problem statement, objective, scope, and definition of the terms are all covered in this chapter.

In this project, the researcher presented an advanced QR code-based student identification card that can be used in PSA's current student matrix card. This new approach offers a unique means of classifying a person as a student. In contrast to the current ID card, which can only be used for identification, the suggested multipurpose card can be used for other things. The SMART ID can be used as a medium to take students' attendance with a simple scan of the QR code on the matrix card using a QR scanner that can help the lecturers and other relevant parties.

The next chapter will give a clear explanation behind the idea of this project and the innovation of the SMART ID.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

The words, definitions, and characteristics of the project topic were tracked throughout the literature review. It needs to offer appropriate ideas for the project and contribute to defining its nature. The multi-tasking card, student identification cards, matrix cards, and technological advancements in using QR Codes and information will all be further examined through a literature review. The following literature study will discuss the definitions of dependent and independent variables.

#### **2.2 LITERATURE REVIEW**

A literature review summarises the earlier written works on a specific subject. The phrase can describe an entire academic paper or a particular academic work, like a book or an essay. In this case, the literature review goal is to give the researcher/author and the audience a broad overview of the body of information on the subject at hand. A literature review helps place the current study within the body of the pertinent literature and to give the reader context. The assessment typically comes before the work's methodology and outcomes sections in such a situation.

Subhieh M. El-Salhi, Safa'a N. Al-Haj Saleh, and Ibrahim I. Al-Amro (2019) stated that automated system needed for managing attendance that uses a barcode scanner. In higher educational institutions such as colleges and universities, student attendance significantly impacts academic outcomes and, thus, the overall educational process. Therefore, an automatic attendance registration system is one of the most critical requirements in the educational process, especially with the tremendous growth in technology sectors.

### 2.2.1 – Multipurpose card

Yadav, R., Kadam, R., & Kolekar, V (2019) showed that a multipurpose card is a single digital card or smart card that combines all the various cards. This card can be used for multiple purposes—for example, identification and payment.

According to Thombare, S. (2021), multipurpose smart cards offer campuses several simple and cost-effective ways to increase the level of protection and the quality of education. Today's intelligent access card technologies provide superior read range and performance so that educational institutions can improve efficiency and security at multiple levels.

Thani, F. A., & Anshari, M. (2020) mentioned the development of smart cards has allowed for the integration of numerous applications into the technology. This research intends to provide a multipurpose smart card to address the same smart card system. The findings showed that the public is open to a multifunctional smart card system and believes the current intelligent card system serves only a limited purpose.

Kumar, P., Kumar, N., & Kumar, B. (2018) mentioned it had been noted that users and administrators alike prefer Smart Card solutions in most circumstances. Smart cards are now so widely used that, regardless of a person's occupation, their identification is barely complete without using them.

In conclusion, based on the journals, a card with multiple purposes is essential in institutions as the advantages of card technology, and in particular, smart cards or multipurpose cards, are becoming more widely recognized as their application area and number of supported applications expand. These advantages are particularly applicable to university settings where smart cards are used in various ways. Numerous "smart" student cards, now being developed to serve several tasks on a single card, are being used at an increasing number of universities worldwide.

### 2.2.2 – Matrix card

According to Jeong, J. P., Kim, M., Lee, Y., & Lingga, P. (2020), the current system for verifying attendance uses student identification (ID) cards or mobile applications. Confirming attendance may be easier for students and lecturers if it is handled automatically by an attendance-checking system.

Kulp, A. M., Pascale, A. B., & Grandstaff, M. (2021) observed the connections between first-year college students' participation in campus-sponsored extracurricular activities, their grade point average, persistence from the fall to the spring, and retention to the second year. Throughout the academic year, attendance at several campus life events was monitored by scanning student ID cards.

Prince Ana, Ukoette Jeremiah Ekah, & Emmanuel Oyo-Ita. (2022) mentioned that this research implies that it is essential to find a method of identifying everyone within the institution, and Cross River University of Technology (CRUTECH), Calabar, Nigeria, is not an exception. This is especially true given the recent insecurity and impersonation in the country.

Mariveles, E. M. H. (2020) stated that one of the issues Pamantasan ng Cabuyao has been dealing with because of a large influx of students into the institution is wearing an inappropriate uniform. The security personnel cannot always observe the student's dress. Some students do not wear identity cards (IDs) when they enter the school building, which is also crucial for staff and student identification as well as the safety and integrity of the institution.

In conclusion, it can be said that the matrix card is significant in the institution based on the journals that have studied it. This is because a student's matrix card may contain much information. The lecturer can quickly check the attendance and an organization's record tracking system for attendance. It is used in the educational sector to monitor staff attendance and students who attend classes.

### 2.2.3 – QR code

Study done by Pei Yu Lin, Wen Shao Lan, and Wen Chuan Wu Entropy (2022), the data contained in QR codes can currently be extracted using barcode decoders on mobile devices. Security concerns are raised despite this ease when transmitting private data, such as e-tickets, coupons, and other sensitive information. This article suggests hiding sensitive data by altering the QR Code's modules. Additionally, by changing just one module, this method can hide two secret bits, double the amount of private information that was initially hidden. As a result, any barcode decoder may correctly extract the shared data content (such as a URL) from the created QR code, which does not affect how easily it can be read. Furthermore, the disguised confidential information can only be further extracted by authorized users with secret keys. This proposed scheme can provide applications for the QR system that are safe and dependable.

Based on Klaver, P. and Rohlfing, K.J. (2022), Quick response (QR) codes that can be scanned with smartphones are becoming increasingly popular among customers who want to avoid paying with cash or with credit cards at physical businesses. According to a comprehensive survey by China UnionPay, 85% of all mobile payments will be made via QR codes in 2020. (CUP, 2021). The growing use of QR codes for payment in physical stores predicts a future without cash.

### 2.2.4 – Attendance using QR code

Sri Widiyanti Sri WidiyantiIna Sholihah Widiati (2021) mentioned that method uses a QR code to read student data because it takes each card roughly 15 seconds to attend. When taking attendance, students' cards with QR codes are scanned using the android app on the scan provider. As a result of this method, it may be simpler for instructors to handle student data and create reports in the administration portion.

According to Akhmad Qashlim Hasruddin (2017), the demand for knowledge necessitates a location, and efficacy and efficiency will undoubtedly be prioritized by many. A passport, visa, or identification card can all fit a QR-Code because it can fit many data in a tiny area. This study suggests a technological QR-Code implementation strategy utilizing Microsoft Excel 2013 to verify the reliability of a Denso Wave-

recommended online-generated QR-Code. The findings demonstrated the use of QR-Code technology, enabling students to update accurate data about their identities, track history lectures, and learn history. Identification is possible using electronic equipment to read the QR-Code printed on the identity card. The contribution of this study is to explore a novel idea in student information services by using a student card that saves a lot of data on a little QR-Code.

### **2.3 SUMMARY**

This chapter has provided in-depth information on the multipurpose card, matrix card, and QR code literature review. A QR code on the matrix card is required to make this project successful as a complete student identity card and to help lecturers in taking the student's attendance.

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

The way by which researchers must direct their research is known as the research methodology. This chapter demonstrates how researchers prepare their goals and challenges before presenting the findings from the information gathered during the research and study time (Sileyew, 2019). Researchers were able to identify the data that students in PSA needed in the matrix card through the quantitative research methods used in this study

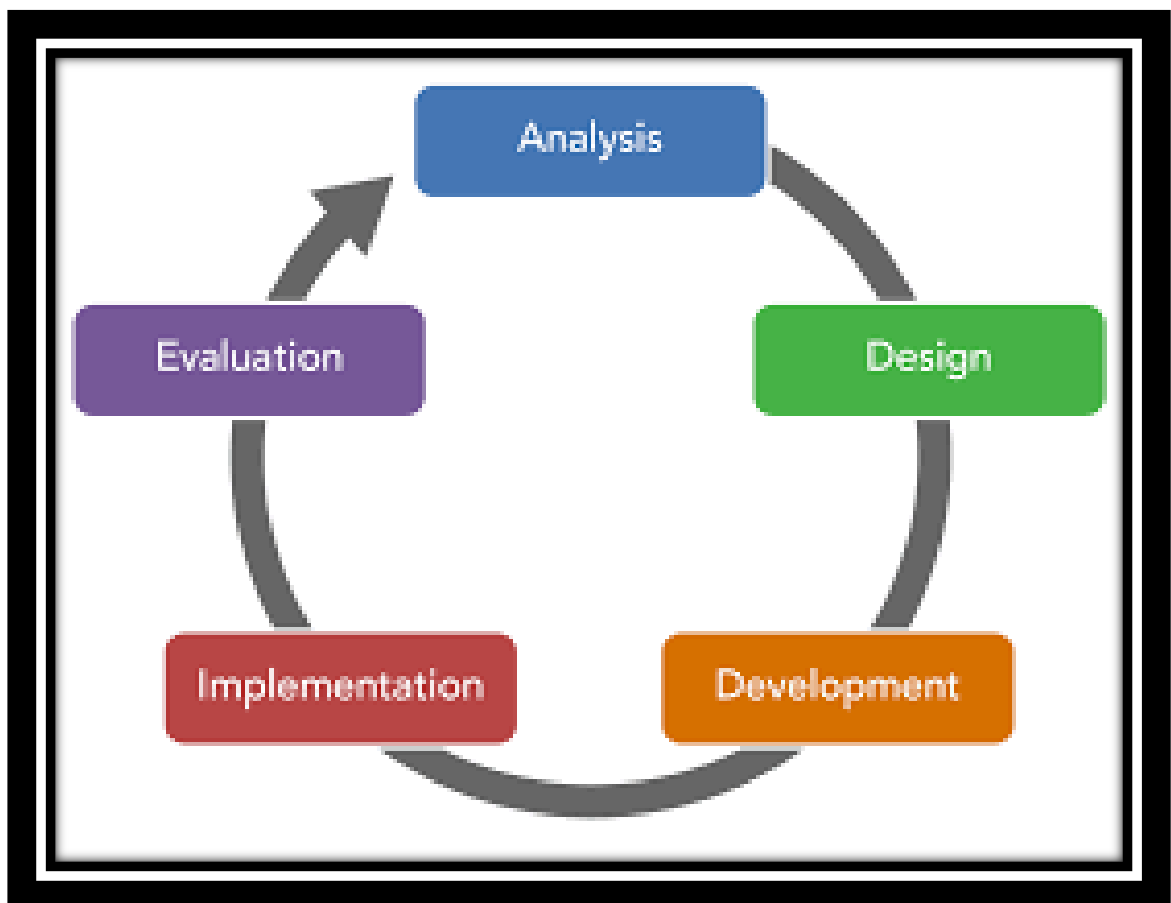
Furthermore, this chapter's contents will include the methodological research procedures used to develop Addie design, develop product, create questionnaire and analysis before and after the use of SMART ID PSA.

#### **3.2 ADDIE**

Researchers are utilizing the ADDIE Instructional Design Model for this project to improve and organize workflow. The ADDIE model is a reasonably generic method training developers, and instructional designers frequently use to create learning initiatives. Many tools that have made their way into the commercial world were created in the 1970s for the US army. One of the earliest and most well-known instructional design models is this one. Its popularity might be attributed partly to the fact that it offers a straightforward process that anybody can use to create educational materials.

In the original form, there were five stages and 19 substages. The stage has been improved with fast prototyping, which refers to quick input during design. However, it is not the main subject of this article. Analyze, Design, Develop, Implement, and Evaluate are the five ADDIE stages. Here, researchers talked about each of those stages in turn.

Cahyadi, R. A. H. (2019) stated that instructional material is an important part in determining the quality of learning. The design of the development of instructional material needs to pay attention to the development model to ensure the quality of instructional material in supporting learning effectiveness, because the development of instructional material is basically a linear process with the learning process. One of the designs for the development of instructional material that is often used is the ADDIE Model through 5 stages: Analysis, Design, Development, Implementation and Evaluation. The ADDIE model is a learning system design model that shows the basic stages of a learning system that is easy to do.



*Figure 3.1 - The ADDIE Instructional Design Model (Molenda, M. 2015)*



### 3.3 DEVELOPMENT OF SMART ID

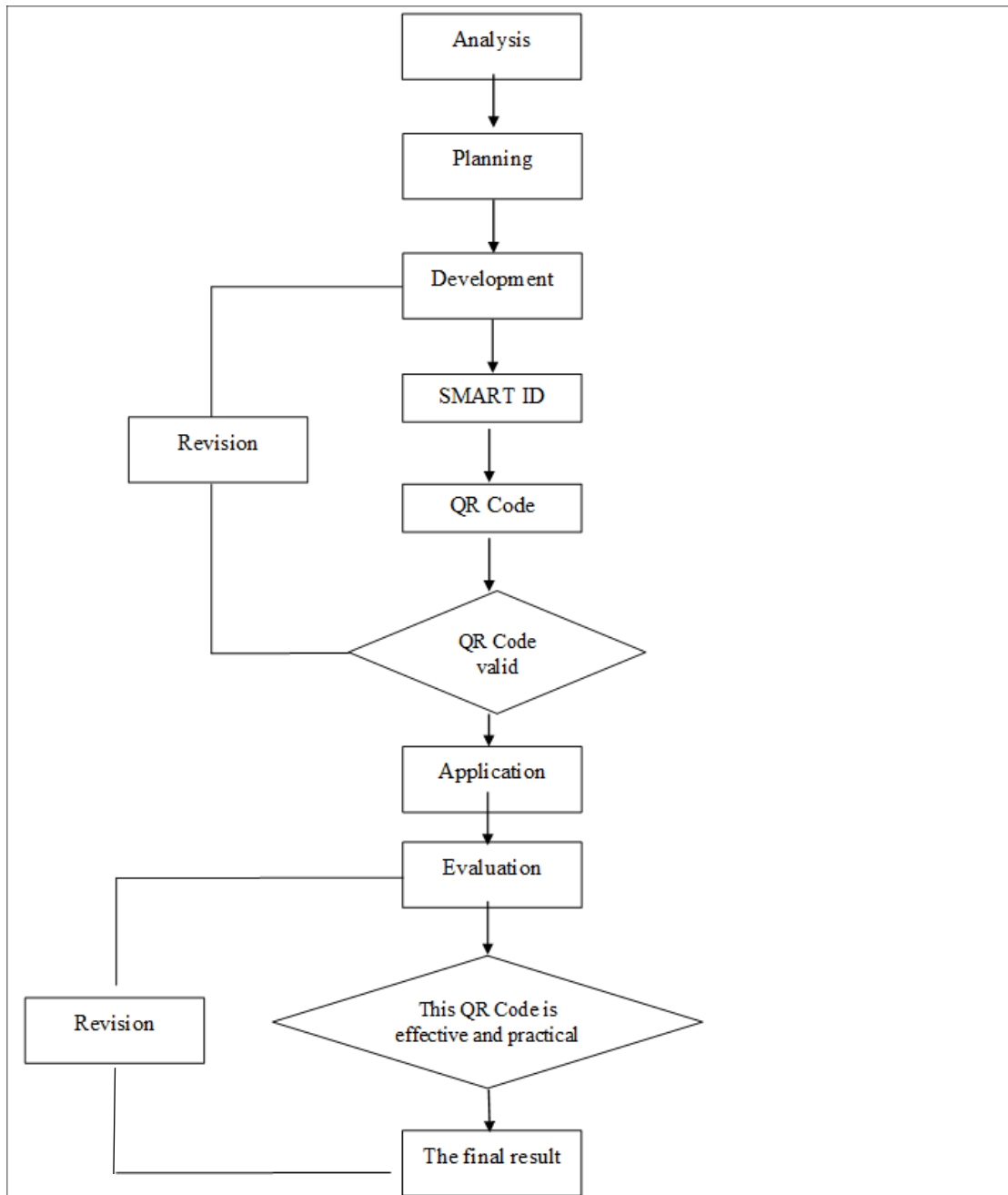


Figure 3.2 – ADDIE Development for smart ID

Based on the original Addie framework, a new Addie was developed for SMART ID PSA. This study uses the ADDIE paradigm, development research with five stages: analysis, design, development, implementation, and evaluation. Visually, the steps of the ADDIE model can be seen in Figure 3.2.

### 3.3.1 – Analysis stage

In this project, the researcher used a questionnaire method to collect data. The collected data from the questionnaire will be processed and analyzed to know if implementing the QR code on the matrix card is useful and what kind of information is needed in the QR code. The data was taken and analyzed from a questionnaire released a month ago. The data was collected from 12<sup>th</sup> September to 18<sup>th</sup> September 2022.

Table 3.1 – Questionnaire questions

Section A: Demographic profile		
1	Email	(Answer)
2	Name	(Answer)
3	Gender	Male <input type="checkbox"/> Female <input type="checkbox"/>
4	Course	DPM <input type="checkbox"/> DPR <input type="checkbox"/> DPI <input type="checkbox"/> DIN <input type="checkbox"/>
5	Semester	Sem 1 <input type="checkbox"/> Sem 2 <input type="checkbox"/> Sem 3 <input type="checkbox"/> Sem 4 <input type="checkbox"/> Sem 5 <input type="checkbox"/> Sem 6 <input type="checkbox"/>
6	Age	Below 18 years old <input type="checkbox"/> 18 – 25 years old <input type="checkbox"/> 26 – 30 years old <input type="checkbox"/>
7	Have you received your student matrix card?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Section B: Matrix card		
1	Do you think you can attend class without bringing your matrix card?	Yes <input type="checkbox"/> No <input type="checkbox"/>
2	In your opinion, what is the purpose of matrix card for you?	(Answer)
3	Have you ever misplaced your matrix card?	Yes <input type="checkbox"/> No <input type="checkbox"/>
4	Are you having trouble finding your misplaced matrix card?	Very hard <input type="checkbox"/> Hard <input type="checkbox"/> Easy <input type="checkbox"/>
Section C: Purpose of the matrix card		
1	Currently in PSA, matrix card is used for student's identification only. Other than that, what would you like matrix card to be used for?	Attendance purpose <input type="checkbox"/> Contact number <input type="checkbox"/> Details of accommodation <input type="checkbox"/> Name of academic advisor (PA) <input type="checkbox"/> Others <input type="checkbox"/>

### 3.3.2 – Planning stage

Tasks	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14
Form a group, choose title, Determine supervisor														
Discuss about the issue, Discuss proposal, Introduction														
Checking chapter 1 with supervisor														
Discuss about research objectives, Discuss about chapter 2														
Discuss about chapter 1 until chapter 3														
Identification discussion of potential target respondent, Discuss about questionnaire														
Start writing first proposal draft														
Started to collect journals in attempt to develop a questionnaire														

Checked proposal in chapter 1 until 3 and do some corrections														
Present the proposal to supervisor, Checked proposal with supervisor														
Meeting with supervisor (Pn. Hasni)														
Prepared report														
Final report														
Checked final report with supervisor														
Present FYP														

*Table 3.2 : Project Gantt Chart*

Based on table 3.2, the gantt chart shows the process of our project workflow from week 1 to week 13.

### 3.3.3 – Development stage

In this stage, student information is essential to convert them into a QR code using the QR code generator. Afterward, the QR code will be printed on sticker paper to stick on the matrix card.

#### Information of students

No.	Name	Matrix Number	Class	Contact Number	Accommodation	Academic Advisor
1	MOHAMMAD AMIR SYAKIR BIN MOHD NORAZMI	08DPM19F1153	DPM5A	+60 14-309 0387	OUTSIDE KAMSIS	HARYANTI BINTI ABDULLAH
2	NURALEEFAH HUSNA BINTI MUHAMAD RAMLEE	08DPM20F1003	DPM5A	+60 13-783 6265	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
3	NUR SYAQILAH BINTI FAIZIRAN	08DPM20F1005	DPM5A	+60 11-6559 4991	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
4	NUR HAFINAZHUDA BINTI MOHAMAD HASYAFI	08DPM20F1006	DPM5A	+60 12-629 7891	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
5	AIMAN AIDID BIN MUHAMAD RAFIE	08DPM20F1007	DPM5A	+60 11-1981 1923	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
6	MUHAMMAD IMAN BIN SALEHUDDIN	08DPM20F1008	DPM5A	+60 11-3740 0952	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
7	NURAINAFIQAH BINTI KHAIRUL ANWAR	08DPM20F1009	DPM5A	+60 18-781 4776	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
8	NUREEN FARAHANIS BINTI MOHD NIZAM	08DPM20F1010	DPM5A	+60 11-2835 4378	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
9	NUREEN FARAHANIE BINTI MOHD NIZAM	08DPM20F1011	DPM5A	+60 11-2853 0514	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
10	NURSYAZA ALIAH BINTI RADZI	08DPM20F1012	DPM5A	+60 17-318 5852	IN KAMSIS	NORSYILA BINTI RASHID
11	MUHAMMAD AIMAN BIN ABDULLAH	08DPM20F1013	DPM5A	+60 17-361 5899	IN KAMSIS	NORSYILA BINTI RASHID
12	NABIL BIN NORAZAM	08DPM20F1014	DPM5A	+60 19-541 5719	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
13	MUHAMMAD LUQMAN HAKIM BIN ANUAR	08DPM20F1015	DPM5A	+60 13-536 2018	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
14	MUHAMMAD ASYRAF MARZUQI BIN MOHD AZMAN	08DPM20F1017	DPM5A	+60 18-663 0062	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
15	KAISAH AQILAH BINTI HAIRUDDIN	08DPM20F1018	DPM5A	+60 11-6068 4936	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
16	NUR AIN ZULAIKA BINTI SHAMSUL BAHARI	08DPM20F1023	DPM5A	+60 13-824 1660	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
17	LIA MAYUNI BINTI SUKRI	08DPM20F1025	DPM5A	+60 11-3588 9562	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
18	MUHAMMAD NUR KHALISH BIN ABDUL GHANI	08DPM20F1027	DPM5A	+60 18-328 9095	OUTSIDE KAMSIS	NORSYILA BINTI RASHID

19	AHMAD AQIL NURUDDIN BIN AHMAD NAZRI	08DPM20F1028	DPM5A	+60 16-339 0267	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
20	NUR RAIMISYA BINTI ROSLAN	08DPM20F1030	DPM5A	+60 17-311 0643	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
21	AMIRAH BALQIS BINTI MOHD AMIR AL-KARIM NG	08DPM20F1034	DPM5A	+60 19-828 6098	OUTSIDE KAMSIS	NORSYILA BINTI RASHID
22	SIKRINSA A/P EH THOM	08DPM20F1001	DPM5B	+60 11-2542 8438	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
23	ATHITYAAN A/L LOGANATHAN	08DPM20F1002	DPM5B	+60 11-2621 2797	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
24	CHIA YUEH JIUN	08DPM20F1004	DPM5B	+60 11-1062 8993	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
25	LISHALINI A/P JAYA KUMAR	08DPM20F1016	DPM5B	+60 12-521 5356	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
26	NG LYN YUE	08DPM20F1019	DPM5B	+60 17-363 3289	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
27	MOH JING YAN	08DPM20F1021	DPM5B	+60 16-630 5438	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
28	NITYASREE A/P MANI MARAN	08DPM20F1022	DPM5B	+60 18-784 6568	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
29	PREETHISHA A/P KUNARAJAH	08DPM20F1024	DPM5B	+60 11-1183 2630	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
30	NARMADAA A/P POOBALAN	08DPM20F1026	DPM5B	+60 11-1446 1392	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
31	HII WEN XIANG	08DPM20F1029	DPM5B	+60 18-219 9737	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
32	NUR NAFIZAH BINTI KAMARUDDIN	08DPM20F1031	DPM5B	+60 18-323 1701	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
33	NORFARHANA BINTI AKMAL	08DPM20F1033	DPM5B	+60 19-350 6749	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
34	NURASYIQIN BINTI IBRAHIM	08DPM20F1035	DPM5B	+60 11-3790 6809	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
35	NOR SAHARA BINTI ABD HANIFF	08DPM20F1036	DPM5B	+60 10-931 1281	IN KAMSIS	DIANA BINTI NASARUDDIN
36	MIKAEL BIN ROSLI	08DPM20F1037	DPM5B	+60 17-653 3988	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
37	NURUL SAFIQA BINTI ROSLIM	08DPM20F1038	DPM5B	+60 11-2750 4062	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
38	MUHAMAD SHAWAL BIN HAMZAH	08DPM20F1039	DPM5B	+60 11-5859 4171	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
39	DHINESHRAJ A/L P. RAMAN	08DPM20F1040	DPM5B	+60 18-871 3059	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN
40	ALISHA NABILA BINTI AZIRAM	08DPM20F1041	DPM5B	+60 13-314 3590	OUTSIDE KAMSIS	DIANA BINTI NASARUDDIN

*Table 3.3 : Students' informations*

3.3.3.1 – Matrix card



Figure 3.3 – Matrix card



### 3.3.3.2 – QR code

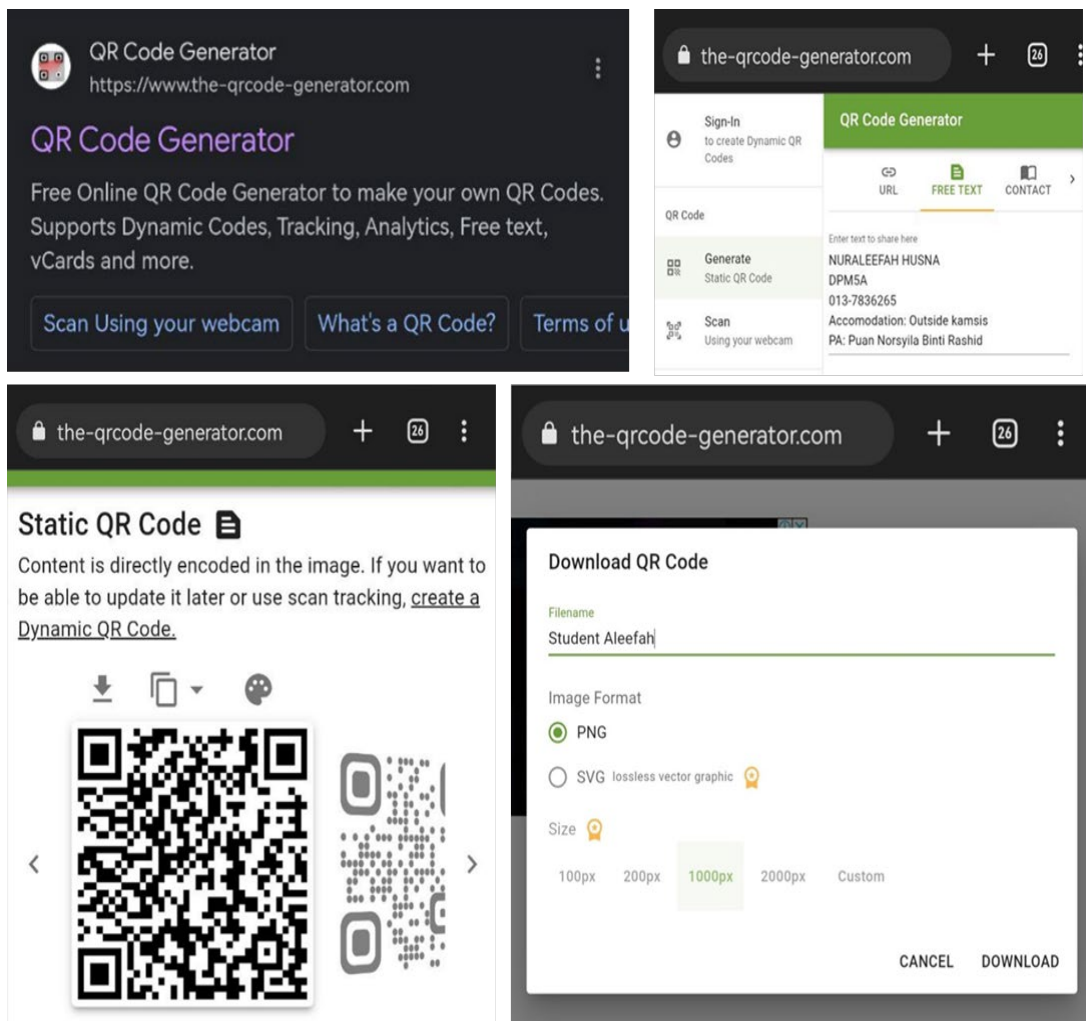


Figure 3.4 – QR code generator

No.	Name	Matrix Number	Class	Contact Number	QR code
1	MOHAMMAD AMIR SYAKIR BIN MOHD NORAZMI	08DPM19F1153	DPM5A	+60 14-309 0387	
2	NURALEEFAH HUSNA BINTI MUHAMAD RAMLEE	08DPM20F1003	DPM5A	+60 13-783 6265	
3	NUR SYAQILAH BINTI FAIZIRAN	08DPM20F1005	DPM5A	+60 11-6559 4991	
4	NUR HAFINAZHUDA BINTI MOHAMAD HASYAFI	08DPM20F1006	DPM5A	+60 12-629 7891	
5	AIMAN AIDID BIN MUHAMAD RAFIE	08DPM20F1007	DPM5A	+60 11-1981 1923	
6	MUHAMMAD IMAN BIN SALEHUDDIN	08DPM20F1008	DPM5A	+60 11-3740 0952	
7	NURAINAFIQAH BINTI KHAIRUL ANWAR	08DPM20F1009	DPM5A	+60 18-781 4776	
8	NUREEN FARAHANIS BINTI MOHD NIZAM	08DPM20F1010	DPM5A	+60 11-2835 4378	
9	NUREEN FARAHANIE BINTI MOHD NIZAM	08DPM20F1011	DPM5A	+60 11-2853 0514	
10	NURSYAZA ALIAH BINTI RADZI	08DPM20F1012	DPM5A	+60 17-318 5852	
11	MUHAMMAD AIMAN BIN ABDULLAH	08DPM20F1013	DPM5A	+60 17-361 5899	

12	NABIL BIN NORAZAM	08DPM20F1014	DPM5A	+60 19-541 5719	
13	MUHAMMAD LUQMAN HAKIM BIN ANUAR	08DPM20F1015	DPM5A	+60 13-536 2018	
14	MUHAMMAD ASYRAF MARZUQI BIN MOHD AZMAN	08DPM20F1017	DPM5A	+60 18-663 0062	
15	KAISAH AQILAH BINTI HAIRUDDIN	08DPM20F1018	DPM5A	+60 11-6068 4936	
16	NUR AIN ZULAIKA BINTI SHAMSUL BAHARI	08DPM20F1023	DPM5A	+60 13-824 1660	
17	LIA MAYUNI BINTI SUKRI	08DPM20F1025	DPM5A	+60 11-3588 9562	
18	MUHAMMAD NUR KHALISH BIN ABDUL GHANI	08DPM20F1027	DPM5A	+60 18-328 9095	
19	AHMAD AQIL NURUDDIN BIN AHMAD NAZRI	08DPM20F1028	DPM5A	+60 16-339 0267	
20	NUR RAIMISYA BINTI ROSLAN	08DPM20F1030	DPM5A	+60 17-311 0643	
21	AMIRAH BALQIS BINTI MOHD AMIR AL-KARIM NG	08DPM20F1034	DPM5A	+60 19-828 6098	
22	SIKRINSA A/P EH THOM	08DPM20F1001	DPM5B	+60 11-2542 8438	

23	ATHITYAAN A/L LOGANATHAN	08DPM20F1002	DPM5B	+60 11-2621 2797	
24	CHIA YUEH JIUN	08DPM20F1004	DPM5B	+60 11-1062 8993	
25	LISHALINI A/P JAYA KUMAR	08DPM20F1016	DPM5B	+60 12-521 5356	
26	NG LYN YUE	08DPM20F1019	DPM5B	+60 17-363 3289	
27	MOH JING YAN	08DPM20F1021	DPM5B	+60 16-630 5438	
28	NITYASREE A/P MANI MARAN	08DPM20F1022	DPM5B	+60 18-784 6568	
29	PREETHISHA A/P KUNARAJAH	08DPM20F1024	DPM5B	+60 11-1183 2630	
30	NARMADAA A/P POOBALAN	08DPM20F1026	DPM5B	+60 11-1446 1392	
31	HII WEN XIANG	08DPM20F1029	DPM5B	+60 18-219 9737	
32	NUR NAFIZAH BINTI KAMARUDDIN	08DPM20F1031	DPM5B	+60 18-323 1701	
33	NORFARHANA BINTI AKMAL	08DPM20F1033	DPM5B	+60 19-350 6749	
34	NURASYIQIN BINTI IBRAHIM	08DPM20F1035	DPM5B	+60 11-3790 6809	

35	NOR SAHARA BINTI ABD HANIFF	08DPM20F1036	DPM5B	+60 10-931 1281	
36	MIKAEL BIN ROSLI	08DPM20F1037	DPM5B	+60 17-653 3988	
37	NURUL SAFIQA BINTI ROSLIM	08DPM20F1038	DPM5B	+60 11-2750 4062	
38	MUHAMAD SHAWAL BIN HAMZAH	08DPM20F1039	DPM5B	+60 11-5859 4171	
39	DHINESHRAJ A/L P. RAMAN	08DPM20F1040	DPM5B	+60 18-871 3059	
40	ALISHA NABILA BINTI AZIRAM	08DPM20F1041	DPM5B	+60 13-314 3590	

*Table 3.4: Students information with generated QR code*

### 3.3.4– Printed QR code

After generating the information details into a QR code, sticker paper is needed to print the QR code. The printed QR code will be placed on the student's matrix card. In addition, the printed QR code will be waterproof because the matrix card has already been placed inside a cardholder.



*Figure 3.5 – QR code on matrix card*

### 3.3.5 – Application stage

To apply this Smart-ID, researchers begin with researching information on the students. The data will be transferred into an excel document to rearrange and organize that information before converting it into QR codes.



*Figure 3.5 – Scanning the Smart ID PSA using mobile phone*

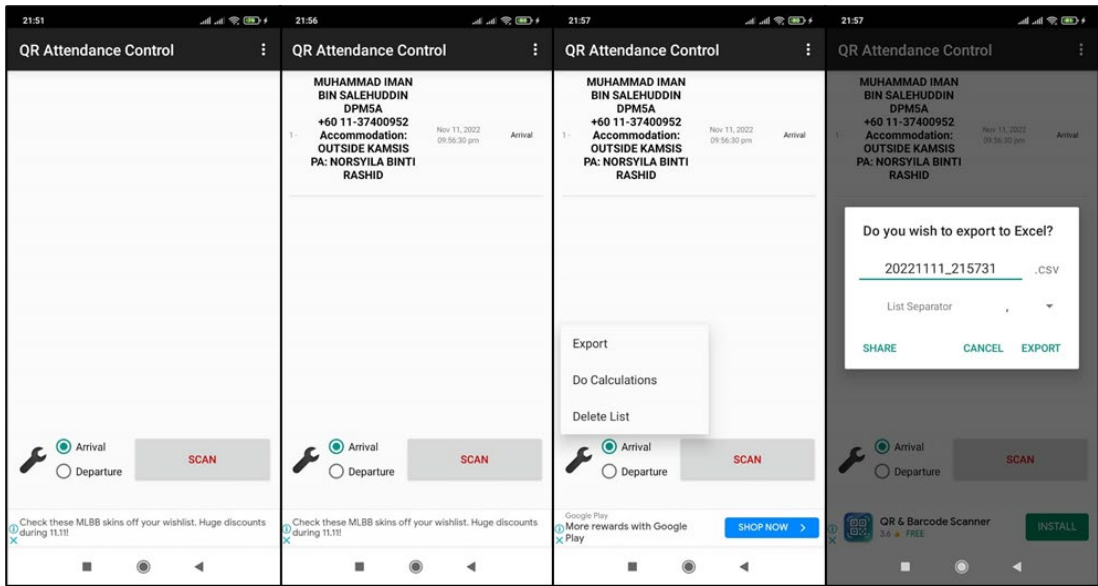


Figure 3.6 – QR code for student attendance



### 3.3.6 – Result

The creation of Smart ID is successful and works well when scanning the QR code. When scanned, it shows the details of the students on the phone. This way will make it easier for people who find the lost matrix card to return it to the owner, the students. Besides that, it can also scanned the QR code to track the students attendance. This is useful for lecturers that needed the students attendance record to save it as a report. The result will be discussed in chapter 4 based on the evaluation after using the smart id.



Figure 3.7 – QR code content when scanned

### 3.3.7 – Evaluation stage

Evaluation is made in this stage to further analyze the effect of the Smart ID that was created. A Google Form is created to get feedback on the effectiveness of the QR code. This form is distributed to students from classes DPM5A and DPM5B.

Table 3.5 – Feedback questionnaire

Section A: Demographic profile						
1	Name	(Answer)				
2	Gender	Male	<input type="checkbox"/>			
		Female	<input type="checkbox"/>			
3	Class	DPM5A	<input type="checkbox"/>			
		DPM5B	<input type="checkbox"/>			
4	Have you received your SMART ID PSA (QR code)	Yes	<input type="checkbox"/>			
		No	<input type="checkbox"/>			
Section B: Visual design aspect						
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	The SMART ID PSA (QR Code) design are appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	The SMART ID PSA (QR Code) information/contents are well organized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	The SMART ID PSA (QR Code) is iPhone/Android-friendly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	The size of the SMART ID PSA (QR Code) appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Section C: User's satisfaction						
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	I am very satisfied using SMART ID PSA (QR Code).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	I would like to recommend this SMART ID PSA (QR Code) to my college friend.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	This SMART ID PSA (QR Code) is very valuable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4	This SMART ID PSA (QR Code) usage is very useful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	The QR code on the SMART ID PSA can easily be scanned.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Would you like to recommend SMART ID PSA (QR Code) to be used at PSA?	Yes				<input type="checkbox"/>
		No				<input type="checkbox"/>
7	Do you have any suggestions or recommendations to improve SMART ID PSA?	(Answer)				

Section A of the questionnaire gathered information on student's demographic profile. Next, Section B researchers had collected data on visual design aspect of the smart ID PSA. Lastly, Section C collected feedbacks based on user's satisfaction towards the smart ID PSA.

### 3.4 SUMMARY

This chapter summarises all the detail information in making the Smart ID. Starting from collecting students data, converting data into QR code, print the QR code in a sticker paper, distribute the QR code to the students, and the ways of using the QR code for taking attendance. The in-depth clarification based on the result of this project will be explained in the next chapter.

## **CHAPTER 4**

### **FINDINGS AND DISCUSSION**

#### **4.1 INTRODUCTION**

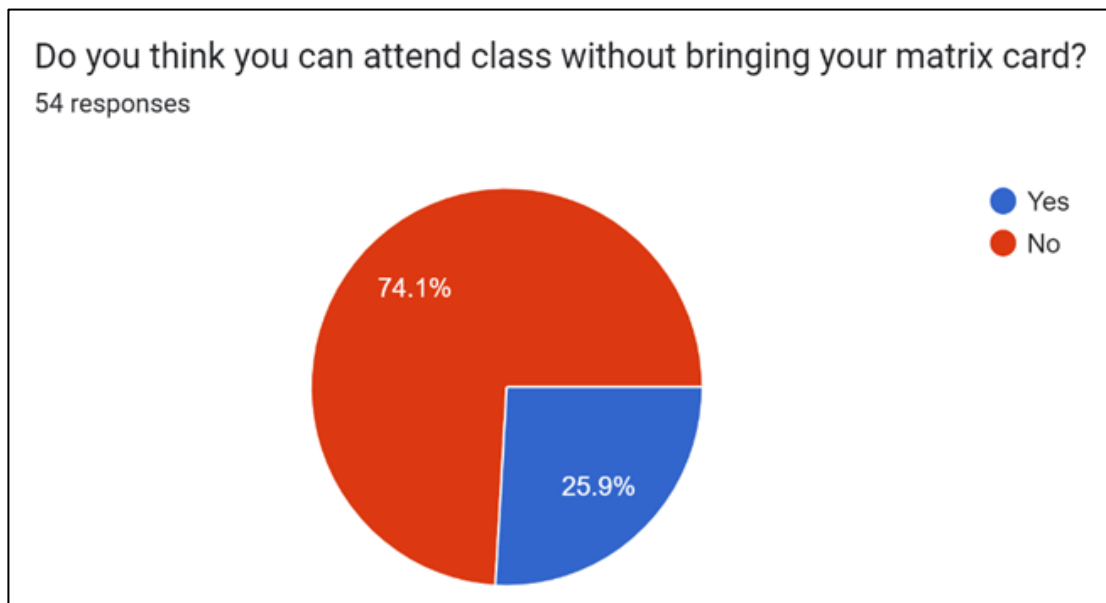
This chapter summarises the findings of the project based on the data from the product questionnaire and the feedback questionnaire. The first section of this chapter will focus on the analyzed results gathered through an online questionnaire among the PSA students. The second section will be the analyzed feedback questionnaire of the product that was given to DPM5A and DPM5B students. Lastly, the researcher will discuss the overall comparison between the product before and after it was made and given to the students.

#### **4.2 FINDING ON ANALYSIS BEFORE THE USE OF SMART ID**

Questionnaires that have been distributed to respondents, which is students of DPM5A and DPM5B, using Google Form via link: <https://forms.gle/CDjF4wZPtjLieFXNA>

The result showed as below:

#### 4.2.1 – The awareness of carrying the matrix card



*Figure 4.1 – Chart on bringing the matrix card to class*

Based on the chart above, 74.1% of the students say that they cannot enter or attend a class without bringing their matrix card, while 25.9% of the students say that it is unnecessary to bring their matrix card when attending a class.

Based on this result, the researcher can conclude that bringing the matrix card to attend class is insignificant among the students. Carrying the matrix card may be a trivial matter. However, the matrix card has the student's information as a student of PSA that is needed for the lecturers and the PSA's internal staff. This information is vital to confirm and verify the identity of PSA students.

#### 4.2.2 – Misplace and retrieve lost matrix card

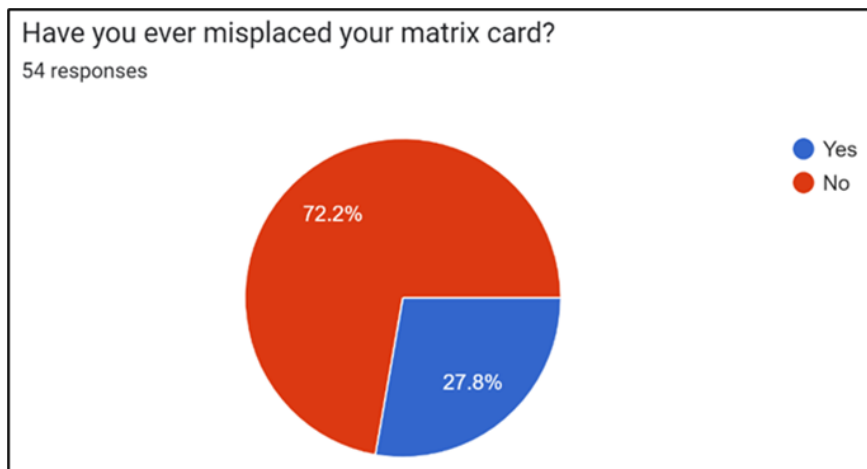


Figure 4.2 – Chart on misplaced matrix card

The chart above is about knowing whether the students have misplaced their matrix card before. Based on the first chart, 72.2% of students claimed they had never misplaced their matrix card, whereas 27.8% said they had misplaced it.

The chart is to know if the students had trouble finding their misplaced or lost matrix card. Based on the second chart, 46.3% of students find it easy for them to retrieve their lost matrix card. However, 42.6% of students said that it is hard to find their misplaced matrix card and the other 11.1% find it extremely hard to retrieve them.

#### 4.2.3 – Trouble in finding misplaced matrix card

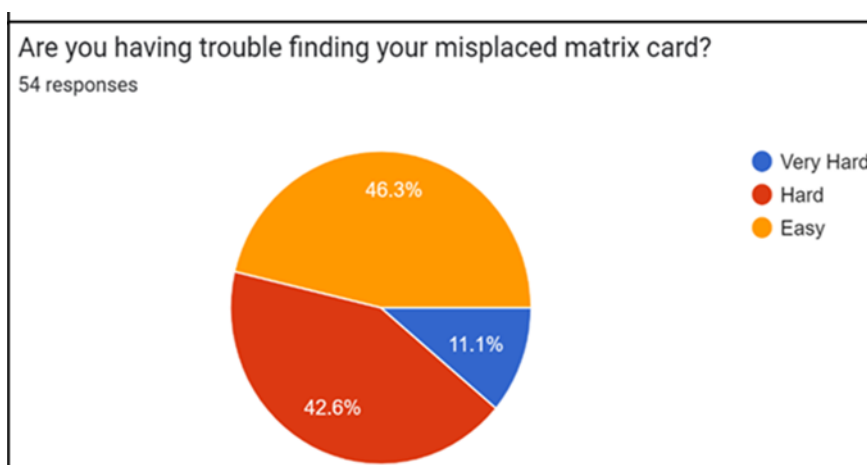
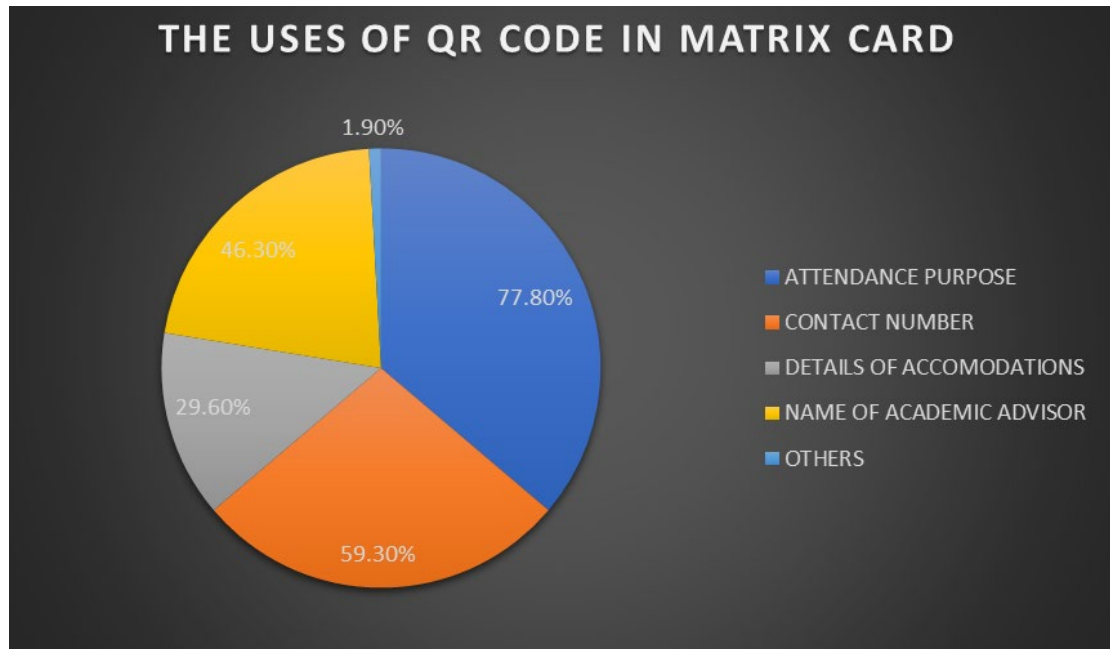


Figure 4.3 – Chart on trouble finding misplaced matrix card

The chart above shows the students trouble in finding their misplaced or lost matrix card. Based on the chart, 46.3% of students find it easy for them to retrieve their lost matrix card. However, 42.6% of students said that it is hard to find their misplaced matrix card and the other 11.1% find it extremely hard to retrieve them.

#### 4.2.4 – Functions of the matrix card



*Figure 4.4 – Chart on the function and content inside the matrix card QR code*

The chart above shows the relevant function and information needed when applying the QR code on the matrix card. Based on the chart, 77.80% of students preferred using the QR code as a medium of taking attendance during class. 59.30% of students chose to include a contact number inside the QR code, 46.30% recommended putting the name of their academic advisor, and 29.60% opted for having the detail of accommodation. Of the balance, 1.90% of students chose others when using the QR code on the matrix card. The contact number, academic advisor's name, and detail of accommodation are mainly to facilitate retrieving a misplaced or lost matrix card.



### 4.3 FINDING ON ANALYSIS AFTER THE USE OF SMART ID

The SMART ID QR code is given to students from classes DPM5A and DPM5B to try out the function in the QR code. Statistical measures are used to analyze the data collected from the SMART ID feedback questionnaire given to students from classes DPM5A and DPM5B.

Statistical measures or central tendencies are used to provide an accurate representation of the acquired data by identifying values that are reflective of the full distribution. Mean or average is the sum of a collection of numbers divided by the count of numbers in the collection. Meanwhile, the standard deviation is a descriptive statistic that approximates the variation of data around the sample mean.

Mean Score	Interpretation
1 – 2.6	Low/Negative
2.61 – 3.2	Medium/Neutral
3.21 – 5	High/Positive

*Table 4.1 – Mean score interpretation*

Source: Moidunny, 2009

Feedback survey that has been distributed to respondents, which is students of DPM5A and DPM5B, using Google Form via link: <https://forms.gle/pS3qeRAT4m1MEGFK9>

The result showed as below:

#### 4.3.1 – SMART ID visual design

<b>Visual Design Aspect</b>			
	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
The SMART ID PSA (QR Code) design are appropriate.	31	4.77	.617
The SMART ID PSA (QR Code) information/contents are well organized.	31	4.87	.428
The SMART ID PSA (QR Code) is iPhone/Android-friendly.	31	4.97	.180
The size of the SMART ID PSA (QR Code) appropriate.	31	4.71	.693

*Table 4.2 – Visual design aspect mean & standard deviation*

Based on table 1 4.3.1, the SMART ID PSA is user-friendly has the mean of 4.97, which is the highest mean score. Meanwhile, the size of the SMART ID PSA (QR code) has the mean of 4.71, which is the lowest mean score. Based on these scores, the researcher can conclude that the SMART ID PSA is user-friendly and can easily use by the students. However, some students find the size of the QR code of the SMART ID PSA is unsuitable for the matrix card because it is too small. The size of the QR code is unavoidable due to the content in the matrix card is almost full and cannot fit a big sized QR code. Based on the mean score interpretation, the overall visual design aspect is positive because it has the mean score above 3.21.

#### 4.3.2 – SMART ID user’s satisfaction

### User's Satisfaction

	N	Mean	Std. Deviation
I am very satisfied using SMART ID PSA (QR Code).	31	4.81	.402
I would like to recommend this SMART ID PSA (QR Code) to my college friend.	31	4.74	.514
This SMART ID PSA (QR Code) is very valuable.	31	4.77	.497
This SMART ID PSA (QR Code) usage is very useful.	31	4.77	.560
The QR code on the SMART ID PSA can easily be scanned.	31	4.90	.396

*Table 4.3 – User’s satisfaction mean & standard deviation*

Based on table 1 4.3.2, the QR code on the SMART ID PSA can be scanned easily has the mean score of 4.90, which is the highest mean score. Meanwhile, to recommend the SMART ID PSA to other students has the lowest mean score. Based on these scores, the researcher can conclude that the QR code of the SMART ID PSA works perfectly. The student is satisfied with the QR code because it can be scanned easily and quickly. However, a small number of students are reluctant to recommend the SMART ID PSA (QR code) to other students. This may be because of the unsuitable size of the QR code on the matrix card, which cannot be changed due to the general size of the matrix card.

#### 4.4 DISCUSSION AND COMPARISON

Before the creation of SMART ID PSA with the matrix card, the students felt that bringing the matrix card to attend class is insignificant and unimportant. Carrying the matrix card may be a trivial matter. However, the matrix card has the student's information as a student of PSA that is needed for the lecturers and the PSA's internal staff. This information is vital to confirm and verify the identity of PSA students.

Besides that, some students face the problem of misplace and lost matrix card. This problem led to added up problem, which is the challenge of retrieving the misplaced or lost matrix card. Retrieving a lost matrix card can sometimes be possible and easy to retrieve it. However, most of the time, a lost matrix card can take a long time to retrieve it and can even be impossible.

After the creation of SMART ID PSA and the distribution of QR code to the DPM5A and DPM5B students, majority of the students gave a positive response. This user-friendly SMART ID PSA has been the reason students felt impressed. Followed by the well-organized information in the QR code, and the minimal and slick design of the QR code. However, some students find the size of the QR code of the SMART ID PSA is unsuitable for the matrix card because it is too small. The size of the QR code is unavoidable due to the content in the matrix card is almost full and cannot fit a big sized QR code.

Nevertheless, the QR code of the SMART ID PSA works perfectly. The student is satisfied with the QR code because it can be scanned easily and quickly. Furthermore, the students find it that the SMART ID PSA is valuable and useful to them. However, a small number of students are reluctant to recommend the SMART ID PSA (QR code) to other students. This may be because of the unsuitable size of the QR code on the matrix card, which cannot be changed due to the general size of the matrix card.

## **4.5 CONCLUSION**

The QR code in the matrix card are necessary and can help the polytechnic lecturers get accurate attendance and help the students find their lost matric card. Only relevant information will be displayed in the QR codes to prevent serious crimes for the students. The QR codes contain the student's name, class, phone number, current accommodation, and the student's academic advisor's name. These are the only pieces of information needed that are concluded based on the product research for the use of student attendance and the finding of matrix card.

## **CHAPTER 5**

### **CONCLUSION AND RECOMMENDATIONS**

#### **5.1 INTRODUCTION**

In the previous chapter, the researchers have obtained results from the data collected. The statistical findings from Chapter 4 are summarised in this chapter. It recapitulated the study and discussed the key findings by stating an explanation of the study. The research's recommendations will be emphasised for usage in the future.

#### **5.2 CONCLUSION**

Throughout the course of completing this project, the prototype on development of multipurpose student matrix card started off with an idea as to what must be done. To have a clear idea and more knowledge on this topic, several journals were read and reviewed. Through these journals, got to know about the various ways to carry out the project and learned about new technology. Once the literature review was done, the next part of product design and development was concept generation.

By looking at all the analyses and outcomes in each chapter, it can be said that the PSA SMART ID product is an additional information through QR code that must be developed at PSA to create a system with high efficiency. After the project is finished, we can build a guarantee to fix system flaws. QR code generation in the student's matrix card needs to be done and enlarged to improve efficiency and eliminate errors people. All information is kept in an express database, so it is simple to delete and retrieve any data. Editing is made also flexible because the authorities only must give essential information and then print the matrix card with student image and inserted QR code.

A code is introduced that comprises the student's detailed information which can be scanned in one second using a smartphone. Not only that, but an effective attendance system may also be developed with PSA SMART ID itself. The creation of QR codes for the student's matrix card will both lessen and increase human strain while also utilising modern, sophisticated technology that offer everything for free. A free modern

technology is a great benefit for developing nations because they can implement it in a variety of educational institutions.

### 5.3 SUGGESTIONS

The use of technology in PSA is expanding rapidly. With the rapid growth of technologies, PSA must also improve its system to be on par with technology in other educational institutions. This could be seen where some institutions still relied on manual handwritten attendance sheets for student identification in class, including PSA. If a proper ID card or matrix card is introduced, it would significantly change the whole organization. It would be much easier to identify a student and saves time, efficiency, and reliability. Thus, the matric card will play an essential role as it is the primary tool for student identification throughout their polytechnic years.

Some students face the problem of misplace and lost matrix card. This problem led to added up problem, which is the challenge of retrieving the misplaced or lost matrix card. Retrieving a lost matrix card can sometimes be possible and easy to retrieve it. However, most of the time, a lost matrix card can take a long time to retrieve it and can even be impossible.

The solution for these problems has been the primary purpose of the SMART ID PSA creation. The SMART ID PSA was proposed to the students before its creation through questionnaire. The students agreed to have a QR code on the matrix card with their personal information to help them retrieve their misplaced or lost matrix card through contacting them directly. The SMART ID PSA has an added-up feature, which is taking students attendance, to help the lecturers take a valid student attendance and prevent from fraud attendance by the students.



## **5.4 LIMITATION OF PROJECTION**

### **5.4.1 Limit the reception audience**

Smartphones or other devices with built-in QR scanners are needed to read QR codes at SMART ID PSA. Because so few individuals have access to or know how to use this expensive equipment, it merely restricts the reception audience. Innovation is delayed by it, and the lecturer may experience a minor difficulty in distributing information quickly. Lecturers and students are unable to obtain the information since not everyone owns a smartphone or has access to an image scanner.

### **5.4.2 Not so-user friendly at times**

The QR code technology might not always be user-friendly. The connectivity and numerous other maintenance issues are some of its flaws. Those who dislike technological complexity don't appear to find it appealing. As a result, they tend to avoid them or are unwilling to try.

### **5.4.3 QR Code may become distorted**

In some circumstances, QR codes might get distorted, which could prevent a device from properly reading them. Other times, interface difficulties can make it difficult to scan QR codes. Users have occasionally been redirected to versions of websites that are not responsive to mobile devices via QR code readers.

### **5.4.4 Demands a high maintenance**

We must link the gadgets to the internet, which requires little maintenance, to access the information via QR codes. Not everyone has constant access to free Wi-Fi or an internet connection to obtain the information. Therefore, embracing technology might be expensive for the common population.

## **5.5 SUMMARY**

From all the findings and discussion of the study, the objectives have been achieved. The researchers found that application of QR code onto student's matrix card is beneficial and necessary for both students and lecturers. Majority of the respondents are satisfied with the functions of SMART ID PSA because of how easy and quick the method is. Time consuming could be reduced when taking the student's attendance as well as getting the attendance accurately. Finally, the researcher hopes that this subject will continue to be researched. For instance, it is intended that this survey may provide some early value and insight into the use of the matrix card in PSA.

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## APPENDIX A: GANTT CHART

Tasks	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14
Form a group, Choose title, Determine supervisor														
Discuss about the issue, Discuss proposal, Introduction														
Checking chapter 1 with supervisor														
Discuss about research objectives, Discuss about chapter 2														
Discuss about chapter 1 until chapter 3														
Identification discussion of potential target respondent, Discuss about questionnaire														
Start writing first proposal draft														
Started to collect journals in attempt to develop a questionnaire														

Checked proposal in chapter 1 until 3 and do some corrections														
Present the proposal to supervisor, Checked proposal with supervisor														
Meeting with supervisor (Pn. Hasni)														
Prepared report														
Final report														
Checked final report with supervisor														
Present FYP														



## APPENDIX B: QUESTIONNAIRE

Section A: Demographic profile		
<b>1</b>	Email	(Answer)
<b>2</b>	Name	(Answer)
<b>3</b>	Gender	Male <input type="checkbox"/> Female <input type="checkbox"/>
<b>4</b>	Course	DPM <input type="checkbox"/> DPR <input type="checkbox"/> DPI <input type="checkbox"/> DIN <input type="checkbox"/>
<b>5</b>	Semester	Sem 1 <input type="checkbox"/> Sem 2 <input type="checkbox"/> Sem 3 <input type="checkbox"/> Sem 4 <input type="checkbox"/> Sem 5 <input type="checkbox"/> Sem 6 <input type="checkbox"/>
<b>6</b>	Age	Below 18 years old <input type="checkbox"/> 18 – 25 years old <input type="checkbox"/> 26 – 30 years old <input type="checkbox"/>
<b>7</b>	Have you received your student matrix card?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Section B: Matrix card		
<b>1</b>	Do you think you can attend class without bringing your matrix card?	Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>2</b>	In your opinion, what is the purpose of matrix card for you?	(Answer)
<b>3</b>	Have you ever misplaced your matrix card?	Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>4</b>	Are you having trouble finding your misplaced matrix card?	Very hard <input type="checkbox"/> Hard <input type="checkbox"/> Easy <input type="checkbox"/>
Section C: Purpose of the matrix card		
<b>1</b>	Currently in PSA, matrix card is used for student’s identification only. Other than that, what would you like matrix card to be used for?	Attendance purpose <input type="checkbox"/> Contact number <input type="checkbox"/> Details of accommodation <input type="checkbox"/> Name of academic advisor (PA) <input type="checkbox"/> Others <input type="checkbox"/>

## APPENDIX C: FEEDBACK

Section A: Demographic profile						
1	Name	(Answer)				
2	Gender	Male	<input type="checkbox"/>			
		Female	<input type="checkbox"/>			
3	Class	DPM5A	<input type="checkbox"/>			
		DPM5B	<input type="checkbox"/>			
4	Have you received your SMART ID PSA (QR code)	Yes	<input type="checkbox"/>			
		No	<input type="checkbox"/>			
Section B: Visual design aspect						
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	The SMART ID PSA (QR Code) design are appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	The SMART ID PSA (QR Code) information/contents are well organized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	The SMART ID PSA (QR Code) is iPhone/Android-friendly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	The size of the SMART ID PSA (QR Code) appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Section C: User's satisfaction						
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	I am very satisfied using SMART ID PSA (QR Code).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	I would like to recommend this SMART ID PSA (QR Code) to my college friend.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	This SMART ID PSA (QR Code) is very valuable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4	This SMART ID PSA (QR Code) usage is very useful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	The QR code on the SMART ID PSA can easily be scanned.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Would you like to recommend SMART ID PSA (QR Code) to be used at PSA?	Yes				<input type="checkbox"/>
		No				<input type="checkbox"/>
7	Do you have any suggestions or recommendations to improve SMART ID PSA?	(Answer)				