FINAL YEAR PROJECT DISSERTATION REPORT

Implementation of QR Code in UTP Educational System

by

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ABSTRACT

This thesis is about implementing the Quick Respond (QR) Code in Universiti Teknologi Petronas (UTP) educational system. In order to increase the productivity of educational system in UTP, QR Code which is technically a good way aligning with the current modern world can be use. By contrast, a website was designed in order to implement this method and the website's address is www.utpqrcode.com. The main objective of this project is to increase the productivity of UTP educational system and eliminate the wastes such as money, time and effort. This output at the same time will profit the university itself while the lecturers and students also will get the benefits from that in term of convenience. In addition, with the advance of the technology, mobile phone evolves to a device with more functionality like internet browsing, gaming device and also education platform.

As we can see, QR Code is everywhere nowadays and it is made to seen as an image. Technically the scanner will takes a picture of QR Code, then align it with the specific identifiable patterns and finally uses the rest of pattern as binary code. Thus, it will link the users to the specific digital destination. In addition, if before mobile phone usage just limited to text messaging and phone call but now it likes a small computer with the intelligent inside which user can carry anywhere they go. As for this website, it will basically act as a server and storage of the learning materials uploaded by lecturers and at the same time will convert those files into the QR Code that will be used by students in order to download the files into their Smartphone or Gadget. Prototyping model was used in order to complete the project and result consists of findings from literature review section, storyboard of the website and user interface of the website. Last but not least, recommendation and conclusion conclude the whole chapter of the project and it includes a few recommendations for the future implementation in order to improve the project.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

1. INTRODUCTION

1.1 Background of Study

As we all know, nowadays the technology of mobile phone and tablet has increase rapidly. The focus of this technology development is more towards smart phone and tablets. According to Andrew Nusca (2009), a smart phone is a mobile phone built on a mobile computing platform with more advanced computing ability and connectivity than a feature phone. Along the way, as mobile devices is enhanced, mobile applications is introduced. Besides, these smart phones and tablets are embedded with operating systems such as iOs, Android, BlackBerry and few more. In order to use this QR Code some applications need to be install first in the smart phone or tablet.

QR Code which is stand for Quick Response basically a quick, scan able barcode-like image that will takes us to specific destination. It can contain such a large ton of information in just one code. This method will become more beneficial if it is use in the educational system and it is what exactly this project is about. With the smart phone and tablet penetration nowadays, QR Code readers are everywhere. ScanLife's mobile bar-code trend report 2012 says: "there are 45 million people in the US using QR codes today, a 300% increase in QR code generation compared to last year".

This project aims to implement the QR Code method in the UTP educational system. Basically this project is focusing on the education materials such as lecture note, assignment or report, extra information in the presentation and few more. The purpose is to eliminate the wastes such as time, money and effort and at the same time increase the productivity of work in order to make profit for the university itself. Technically, a server

or a website also will be implementing in order to achieve the objective. This server will function as the storage for the educational materials that will be generating to QR Code. The lecturer will have the authority to log in, upload those materials and at the same time convert it to QR Code.

Basically, this project need a device that has a camera so we can scan or take a picture of the code, a program to do the decoding and web access to see where the code takes us. However we also could use a computer and a scanner but we are going for mobility in this project. Figure 1 below show the process example of this QR Code in the educational system.
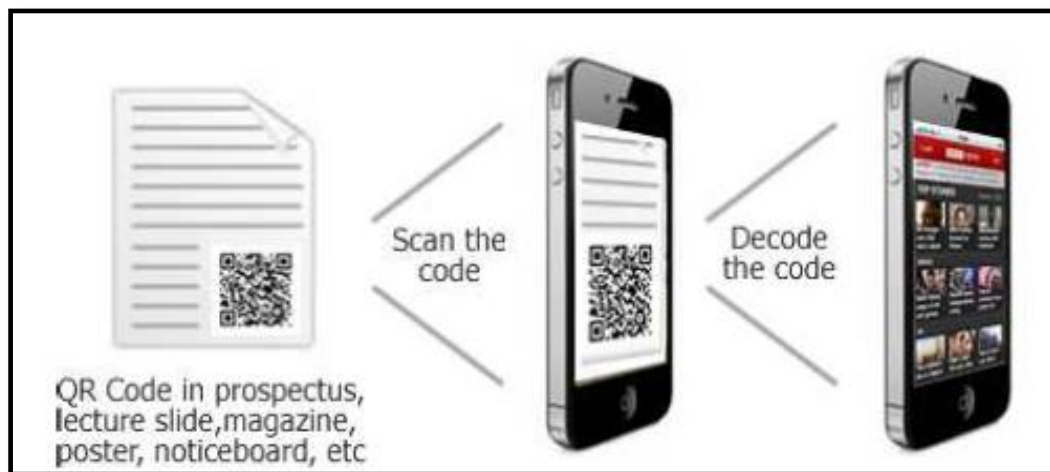
Figure 1: Process of using QR Code in the educational system

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1.1.2 Techniques of Using QR Code in Educational System

1. Share Lecture Slide / Notes / Learning Materials with QR Code

Usually lecturers will upload the slide to the UTP e-Learning or save it in the computer used during the class. By using the QR Code, lectures can share the slide at the end of the class. This will help to save time, money and effort. The slides will directly download to the student's phone and it will become very convenience for them practically. Technically proven, e-Learning always down and it become a problem for the lectures to upload the slide. By doing this method it can somehow overcome the problem.

Figure 2: Example of QR Code for the slide (on the projector)

2. Extra information in presentations and course content (e.g.: Video)

If lecturers have online courses, classes, tutorials, tests or other resources relevant to the syllabus, that they want students to access, they can create a QR code for each resource. They can simply embed QR codes into PowerPoint slides, course material, handouts, syllabus documents, webinars, class downloads, and onto whiteboards. Students will easily be able to access the resource by scanning the QR code.
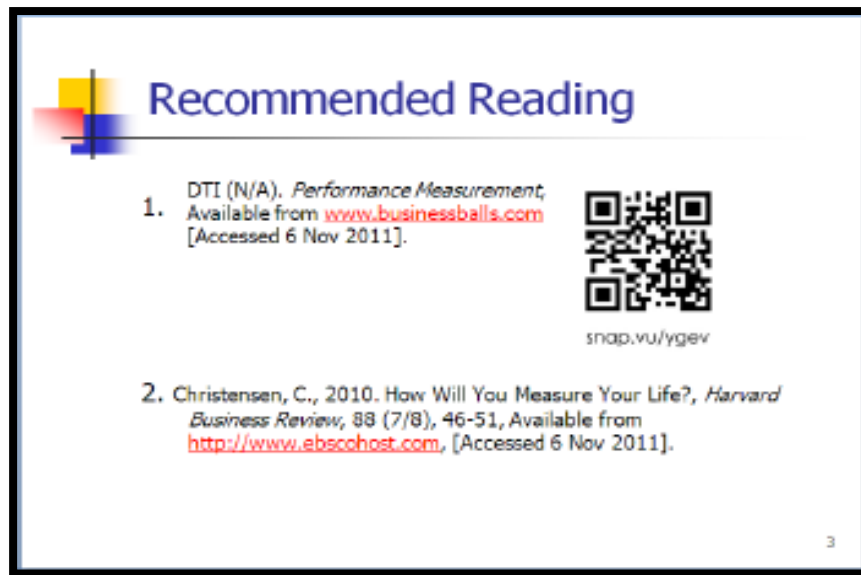
Figure 3: Example of QR Code of Extra Information in Slide

3. Reports & Projects

With any assigned book or reading, include QR codes linking to book reviews. Include codes to the online versions of the assignments, classroom's calendar of events with upcoming due dates, or related videos, articles and etc.

4. Check Test / Assignment Answers and Reflect (Programming etc)

Have students check their answers by scanning the QR code after completing a test or assignment. As a teacher, they can visually confirm when students are checking their work and can also check in to see how they are doing. This will help track individual learning and can provide an opportunity to facilitate student reflection.

5. Voting Tools

QR codes can be a great voting tool allowing students to vote by simply scanning the code as they enter or exit the classroom. This can save time and it gets your students up and moving.

Figure 4: Example of QR Code for Voting Tools

1.2 Problem Statement

1.2.1 Problem Identification

The focus of this project report is to implement the QR Code in UTP Educational System. Based on researches done, this method still not yet implement in UTP while it is widely use in other area such as business, marketing and so on. Other than that, students usually do not aware of the materials given by the lecturer as they are some problems involved such as the problems of UTP e-Learning itself which always down and the long required processes to get the materials. Besides, the current method also wastes time. For example, student needs to download the materials from e-Learning to computer which consume more time compare to just one click by QR method. Students also wasting their time by go "Googling" for the extra information or references about the topics while by a few steps using QR Code and it is done. Furthermore, by using the manual ways such as paper, it will just wasting money, effort and times to prepare the materials while it is also not so environmental-friendly.

1.2.2 Problem Significance

This particular project will bring significance to UTP's people in order to increase the productivity of both parties which are students and lecturers while eliminating the wastes such as time, money and effort. Besides, by implementing this project, it will increase the profit of UTP itself from the benefits of this QR Code in the educational system as mentioned before. The main idea of this project is to implement QR Code in UTP Educational System in order to cater those problems which mentioned before.

1.3 Objective and Scope of Study

1.3.1 Objective

There are some objectives – (primary and secondary) for this project as shown as below:

Primary Objectives

- To ease the processes of getting and giving the educational materials which involve the both parties - lecturers and students
- To eliminate those time, effort and money wastes when by using the manual ways
- To provide a more convenient life for students
- To ease the process of learning in UTP

Secondary Objectives

- To develop a system which is more environmental-friendly
- To design and develop the website for the system
- To develop a prototype for the project
- To successfully test-run the prototype for the system implementation

In order to achieve these objectives, the website will be fully equipped with all the list of subjects in UTP to ease the process of the system. Besides, the website will also equip itself with all lecture's database, related information regarding subject's offered, frequently asked question and function of report's mail to admin for the improvement and maintenance processes.

1.3.2 Scope of Study

The scope of this particular project is to UTP organization which is focusing more towards students and lecturers. With this implementation of QR Code in the UTP educational system, it will increase the productivity of work for both students and lecturers by ease their own works with this QR Code method. The web also will ease the lecturers to upload the material as it is focus only on that and it will be in good arrangement base on each subject offered by UTP.

1.3.3 The Relevancy of the Project

In order to complete this project, a website or server which acts as the storage to hold the educational materials will be build. Lecturers will have the authority to log in to the web, upload the materials and lastly convert it to the QR Code. Thus for the last part is lecturer will attached the QR Code during the class to be use by the students. This method will save more time, money and effort.

1.3.4 Time Frame and Feasibility

Within 2 semesters which is about 8 months, this project expected to be complete at least to the minimum requirements. It also depends on the amount of scope creep that would be encountered which is inevitable. As for this project, I need to do a web in order to hold those materials before converting it to QR Code. Then, some trials will be done in order to get feedbacks and comments regarding this project which can help me to improve it. Other than that, a Gantt Chart also was build in order to guide me to do the progress works within the timeline. Last but not least, Final Year Project 1 subject will focusing more on the documentation or report while Final Year Project 2 will focusing more development and the implementation of the project.

Besides, this project will become beneficial for the students by saving their time, money and effort and at the same time ease their life for the learning process. Lecturer also will enjoy the same benefit as student. Other than that, this project basically will increase the productivity of UTP's educational system. By having this benefit, it will increase the learning's result of student itself, thus become beneficial for the UTP organization itself.

CHAPTER 2

2. LITERATURE REVIEW

2.1 Learning Process

According to Kerrisha Gayle (2002), learning is a process of Mental, Physical and Spiritual development. Development is advancing and growth. Development is proof that learning has taken place. One has to apply him or herself to a given situation and or context in order for learning to occur. Basically learning is what people practice in implementing their skills and knowledge which derived from the education. Thus, the process of learning actually will occur just when people apply the information of knowledge learn and practice it in their own daily life. In addition, based on Birkenholz (1999), learning defined as change in behavior which is demonstrated by people implementing knowledge, skills, or practices derived from education. Besides, from the educator's perspective, learning involves helping people along the learning process and includes everything that people do to make a thing happen.

In order to get the better result of learning, it needs to be done in an 1effective way. Basically there are many ways for this and one of the ways is to use the technology in order to take the learning process to the higher level of understanding. By relating it to this project which will use the technology of QR Code, the learning process is expected to be better than before. Moreover, in order for people to get used to the new technique or method of learning, it is also usually will take some times. In addition, technology is proven very effective and efficient in the learning or education area. Based on Richard Down (2011), technology used in education is a very smart way to get captivates those students to learn more. Thus, by using technology, it can attract the attention of the students and for sure the learning process also will run efficiently.

2.2 Background of QR Code

QR Code originated in 1994 when The Denso Wave Company established a two dimensional bar code during the rapid technology era in Japan. Basically this type of method has only recently begun to become popular in other region of countries such as Middle East and Europe. QR Code basically become more popular because this method due to their ability to store or keep data or information up to 4000 in just one code compare to the traditional or regular bar code. Nowadays, this QR Code method has widely been used and it is proved to be very useful in the business market. Other than that, this QR Code not just can hold or store more data than traditional one, but it is also taking up less space and at the same time it is proven are resistant to dirt and damage.

In the old days, QR Codes were used to track automobile parts during the manufacturing process and Toyota was actually the part of the beginning of this method. Basically this method had started in the automobile area but in nowadays, this QR Code method has recently become more famous in the area of mobile marketing. Based on the book QR Code Features by Denso Wave (2011), the Japanese standard for QR-Codes, devised by Denso Wave, is JIS X 0510, which was released in January of 1999. The corresponding ISO International Standard, ISO/IEC 18004, was then approved in June of 2000. The standard was then updated back in 2006.

In addition, QR Code has proven can and capable of handling many data such as number, alphabetic, Kanji, Hana, symbol, binary and control codes. Technically, a total of 7,089 characters can be encoded in just one code. The QR Code data capacities are shown as below:

QR-Code Data Capacities	
Numeric only	Max 7,089 characters
Alphanumeric	Max 4,296 characters
Binary (8 bits)	Max 2,953 bytes
Kanji, full-width Kana	Max 1,817 characters

Figure 5: QR Code Capacities

2.3 QR Code in Education

QR Codes are becoming the new trend used by business in all over the world. Through the use of mobile phone, this method became a very effective to reach the customers and at the same time provide a user-friendly way for the access of the content online. According to David Hopkins (2012), educational institutions are on the uptake in making use of these 21st century tools as a way to engage their main stakeholders, i.e. students. In addition, Korhan (2011), said, "QR codes can serve a specific use for you, mostly as a lead generation tool. How are you doing your lead generation now? If you can use what is working for you now and make it better, more attractive or easier with QR codes, you are probably on the right track." This actually proves that if this type of method is using in the education it can surely deliver the value and a favorable user experience especially to the student during the learning processes.

Andrew Miller (2011), also said that one of the way to use this in education is to have the students to check their answers by scanning the QR Code after completing the test or assignment. As a teacher, you can visually confirm when students are checking their work and can also check in to see how they are doing. This will help track individual learning and can provide an opportunity for you to facilitate student reflection. Based on Andy Ramsden (2011), the only hitch in the QR codes use is that they can also be used to distribute malware. Teachers who share QR codes from foreign sources (codes they didn't create) should:

- Check the embedded link before displaying the code to students, to make sure the link points where it should
- Include a warning that this code was not generated by the instructor

QR Code is a great tool for the teacher to be implemented in the learning process. Based on Andrew Miller (2011), technology is a tool and needs to fit a purpose. It can help create engagement in a lesson, manage your classroom, be part of student work or facilitate inquiry in a project. So it shows that, QR Codes are such an invaluable resource to be use in the classroom during the time when the learning processes take places.

2.4 Technology and Multimedia in Education

According to Locatis (2011), multimedia programs employ two or more of the following types of information which are text, graphics, pictures, animation, audio and video. The combining of video, audio and graphic will result in an interesting presentation which will attract the interest of human. Based on Ryan T (2011), the ability to manipulate the text through an electronic device holds the potential for students to work with the media thereby allowing a more exciting method compared to standard note taking. Basically multimedia will make things more interesting in order to attract people to read or look at it. According to Shavinina and Loarer (1999), a common multimedia application consists of at least 3 of these 7 components:

1. Text (including notes, captions, subtitles, and other resources such as tables of contents, indices, dictionaries, and help facilities)

2. Data (such as tables, charts, graphs, spreadsheets, statistics, and raw data of various kinds)

3. Audio (including speech, music, atmospheric background noise, and sound effects)

4. Graphics (often ranging from traditional media such as drawings, prints, maps, and posters to images processed or created entirely within a computer)

5. Photographic images, from negatives, slides, prints, or even digital cameras (which record photographic images directly as computer graphics)

6. Animation (whether recorded on film or video, or created with a computer)

Other than that, students who learn from the multimedia (graphics) are proven got better understanding and learn more to perform better compared to students who learn from books or paper (non-graphics). Last but not least, Ryan T (2011) examined that multimedia has the potential and functionality to hold the enjoyment of the users compared to the standard textbook. This is clearly proved that graphic or multimedia is much better in learning in order to get better result from the user in term of education or knowledge that they will get.

2.5 Educational Website Development

According to Gibson and Herrera (1999), the development and implementation of web-based distance courses is a time consuming process, typically requiring more resources than the development of a print-based course. As the technology growing, the distance of education also became more diverse. Thus, it result in increasingly sophisticated support organizations that will be needed to manage distance educational network in order to help the faculty itself in term of profit by deliver the courses. In addition, Meyen, Lian et al. (1998) summarize several important issues that should be addressed during web course development:

- ✦ Will standard formats for course design be established so that students do not have to learn a new format with each course they take?
- ✦ Will there be common features across courses that students can anticipate, for example, assessment strategies, chat groups, bulletin boards, syllabi or communications with instructors?
- ✦ Will there be common features across courses that students can anticipate, for example, assessment strategies, chat groups, bulletin boards, syllabi or communications with instructors?

The most advantage of this web method is it will increase the instructor's opportunities to assist students in the learning process. Because of this, it will result in better and efficient productivity in term of educational system. Other than that, selecting the web setting is very an important part in the web development. Firdyiwek (1999) suggests a basic profile to access courseware systems. Basically the profile needs to contain several things such as administrative features, instructional features and the features used by students. By having these settings, the probability of the web to success effectively and efficiently is higher. On the other hand, the owner of the website need to be alert on the origin and the copy right of material as it will become serious issues in term of intellectual property rights and also the security. Meyen, et al. (1998) comment, "All of the knowledge and skills the faculty teaches online become open to review. Although it may be restricted to students, it is still public. This is in contrast to traditional courses, where lectures are presented but not recorded."

CHAPTER 3

3. METHODOLOGY

3.1 Research Methodology

Research of this project was done with supervisor - A.P. DR. P.D.D.Dominic and also self-study with the help of internet and books. Basically the methodology used in this project is a combination of prototype model and rapid development. For this project, analysis and planning was done before coding is initiated. Besides, coding, testing and debugging will take place in a whole activity. In addition, requirements change and testing result pushed for the re-coding.
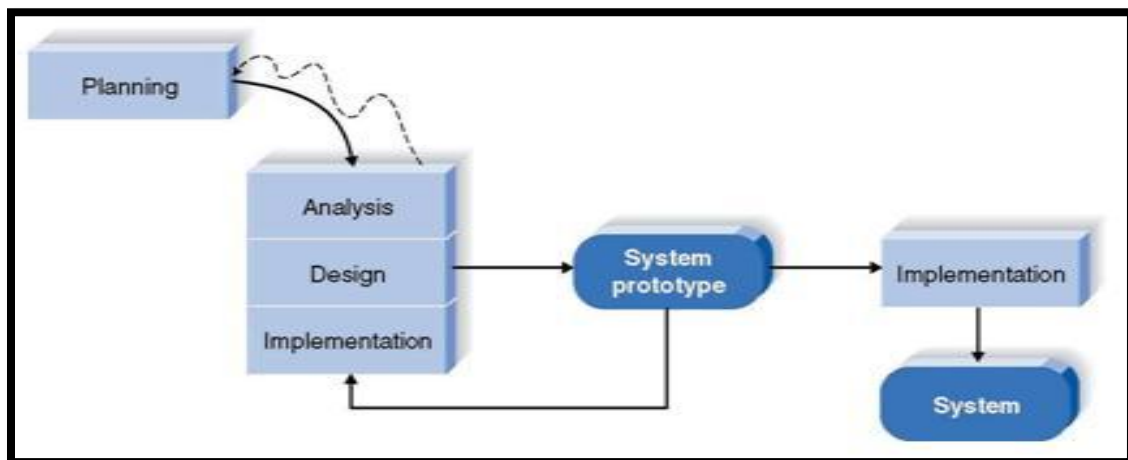
Figure 6: The Prototyping Model

Basically prototyping methodology usually is used when there will be changes during the process or progress of the project because of some new added ideas on the system. Analysis, Design and Implementation phase will perform at the same time in order to producing a system prototype. This cycle will repeated based on comments and feedbacks until the requirement of the prototype finally meet. The final and last prototype

which is after all the changes have been done will be called the system. Last but not least, this methodology like mentioned before is divided into 4 phase which are Planning, Analysis, Design and Implementation and the main advantage of this methodology is it can still deliver the system quickly to user although the requirement not fully meet.

3.2 Project Activities

Upon completing this project, I had come out with the project planning. As we all know in order to get an effective result we need to spend 50% of our period of timeline for planning. I need to always follow this timeline in order to finish this project during the time provided. The activities are shown as below:
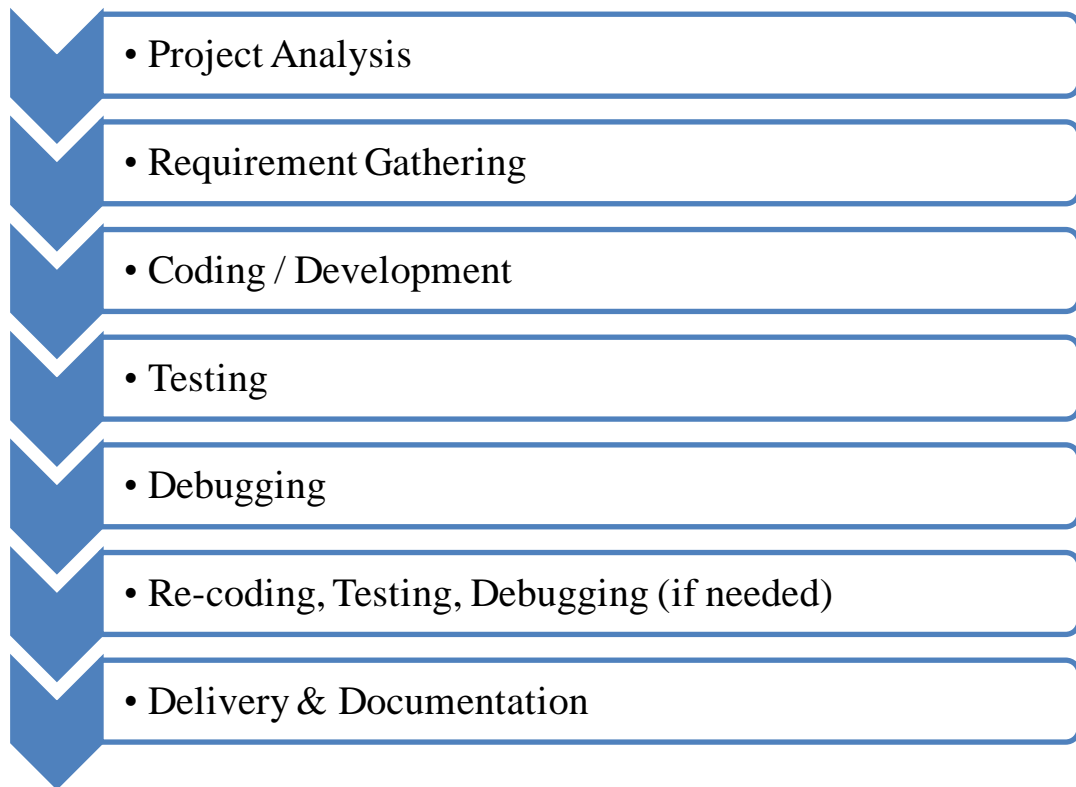
- Project Analysis

- Requirement Gathering

- Coding / Development

- Testing

- Debugging

- Re-coding, Testing, Debugging (if needed)

- Delivery & Documentation

Figure 7: System Development Life Cycle

In order to narrow down the project activities, the activities schedule was made for completing this project following the timeline given and it is shown as below:

Phase 1: Duration – 3 weeks

- ✓ Do some researches regarding the QR Code and its implementation
- ✓ Consult with supervisor - A.P. DR. P.D.D.Dominic for confirmation of topic
- ✓ Learn and try to understand the concept of QR Code
- ✓ Do practices on programming skills learnt in Internet Programming before

Phase 2: Duration 4 weeks

- ✓ Start to do the research regarding the implementation of QR Code in education
- ✓ Do some online survey to get the feedbacks and comments from user
- ✓ Plann the functions of the website system
- ✓ Start to do the documentation of the project

Phase 3: Duration 3 weeks

- ✓ Get feedbacks from survey regarding the system
- ✓ Obtain details from the UTP education unit
- ✓ Start to design and plan for the interface, database and function of the system

Phase 4: Duration 6 weeks

- ✓ Start doing the programming coding for the system
- ✓ Create and implement all the content features to the system
- ✓ Add interactive functions to the system
- ✓ Finding solutions to the errors
- ✓ Keep on researching for the improvement process

Phase 5: Duration 5 weeks

- ✓ Do some review with SV and users
- ✓ Do the real simulation of the system in the class as final review
- ✓ Do some minor modifications after review sessions
- ✓ Present the system during Viva in front of SV and also external examiner

3.2.1 Planning Phase – Data Gathering

Basically for this project, the planning phase was done by 3 approaches in order to get the better understanding about the requirements and improvements need to be made. These approaches are shown as below:

- Primary Data

  The example of this primary data is the survey and questionnaire. This method will be design for the students and also the lecturers in order to get their comments and feedbacks for this system. It is a common way to collecting data which will result in quantitative analysis. This survey will be conducted through a number of people in order to get the percentage of the result.

- Secondary Data

  For this approach, interview method will be use. As we all know interview is the easiest way to get extra information and the frank answer or feedbacks from the users. Besides, it also will help and guide us to develop the questionnaire for the users. Magazine, journals and research article also falls under the secondary data that will use in this project.

- Thinking-Aloud

  According to Arunkumar Khannur (2012) Think aloud protocol technique can take up a lot of time and provide limited results which focus on trying to understand the problem and come up with solution later with your design team. The results of this data will become very beneficial for the development of this system.

3.2.2 Analysis Phase – Data Analysis

This Analysis phase is actually where the data and information are being organized and analyze. The function and interface (prototype) of this project can be identified after this Analysis Phase. Thus, it will help and guide the author throughout the completion in the development of this project or system.

3.2.3 Design Phase – System Development

The design phase basically focusing more on interface of this system. Through the Analysis phase the author should have ideas on how the system looks like and what is the functions of it. This phase also will help author to design an appropriate interface for the UTP organization consists of both parties which are the students and the lecturers as the users of this project or system.

3.2.4 Implementation

This is the phase where the system will be tested based on the comments for the changes and improvement from the feedbacks of users. During this phase minimal changes usually occur and the final product will be ready to use once the project meets the requirements and meets the user satisfaction.

3.3 Key Milestone

For FYP1 the submission of Viva: Proposal Defense and Progress Evaluation at the end of this semester is the main key milestone for the faster completion of this project while Pre-SEDEX is the main key milestone for FYP2. Besides, the guidance from A.P. DR. P.D.D.Dominic also contributes in this case. Last but not least, the support of CIS department also contributes as a key milestone for this project internally and also externally. In addition, other keys milestone of the project are shown as below:

Activities	Week
Selection of Project Title	2
Submission of Proposal for Research	3
Submission of Extended Proposal	6
Proposal Defense and Progress Evaluation	10
Submission of Interim Report	12

Table 1: Keys Milestone of FYP1

Activities	Week
Submission of Progress Report	4
Pre-SEDEX	10
Submission of Dissertation Report	13
Oral Presentation Viva	14
Submission of Technical Report	15
Submission of Final Dissertation Report	16

Table 2: Keys Milestone of FYP2

3.4 Gantt Chart

Gantt charts for Final Year Project Part 1 and 2 were created in the beginning of the project based on project activities and number of weeks to implement this project. The objective of this Gantt chart is to ensure the development of the project will be right on schedule and can finish by the timeline given. The Gantt charts are shown as below:

No.	Project Activities	Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	**Selection of Project Title**	Y	R												
	Search for Project Title	Y	Y												
	Project Title Approval		Y												
2	**Submission of Proposal for Research**			R											
	Writing Project Proposal		Y	Y											
	Submit Proposal and Approval			Y											
3	**Submission of Extended Proposal**			Y	Y	Y	R								
	Perform Literature Review Research			Y	Y										
	Identify Project Methodology				Y	Y									
	Design Project Flow and Gantt Chart					Y	Y								
	Submit Extended Proposal						Y								
4	**Proposal Defense/Progress Evaluation**						Y	Y	Y	Y	R				
	Prepare Presentation Slide						Y	Y	Y	Y					
	Present Proposal Defense										Y				
5	**Submission of Interim Report**										Y	Y	R		
	Project Works Continue										Y	Y			
	Submission of Interim Draft Report											Y			
	Interim Report Approval												Y		

Table 3: Project Development Gantt Chart of FYP1

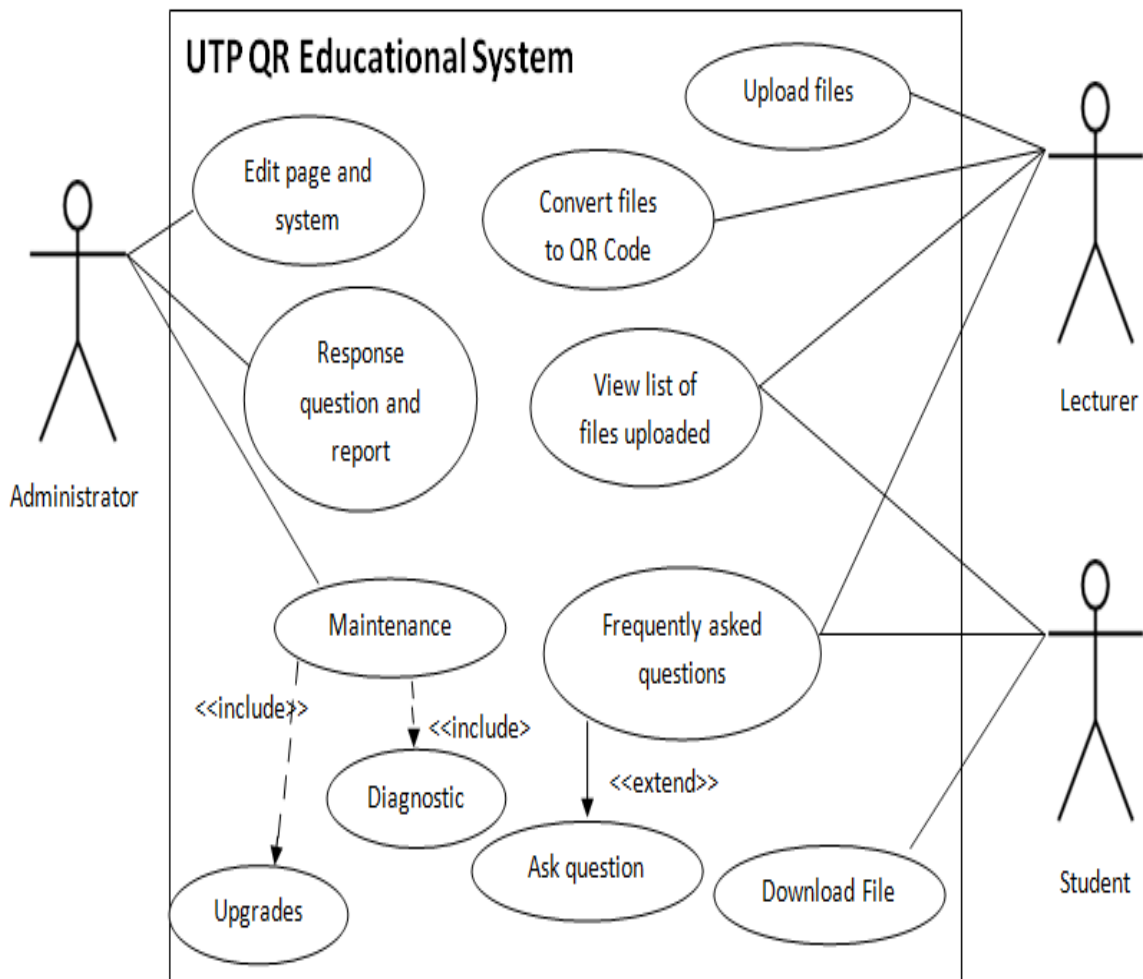| No.	Project Activities	Week															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	**Submission of Progress Report**	Y	Y	Y	R												
	Design System Implication Diagrams	Y	Y														
	Project Works Continue		Y	Y	Y												
	Submit Progress Report				Y												
2	**Pre-SEDEX**					Y	Y	Y	Y	Y	R						
	Prepare Presentation Poster						Y	Y	Y	Y							
	Present And Demonstrate Prototype										Y						
3	**Submission of Dissertation Report**										Y	Y	Y	R			
	Project Works Continue										Y	Y	Y				
	Submission of Dissertation Draft Report											Y	Y				
	Dissertation Report Approval													Y			
4	**Oral Presentation Viva**													Y	R		
	Prepare Presentation Slide													Y			
	Present Viva														Y		
5	**Submission of Technical Report**														Y	R	
	Submission of Technical Report (Draft)													Y	Y		
	Submission of Technical Report (Final)															Y	
6	**Submission of Final Dissertation Report**																R
	Submission of Dissertation Draft Report																Y
	Final Dissertation Report Approval																Y

Table 4: Project Development Gantt Chart of FYP2
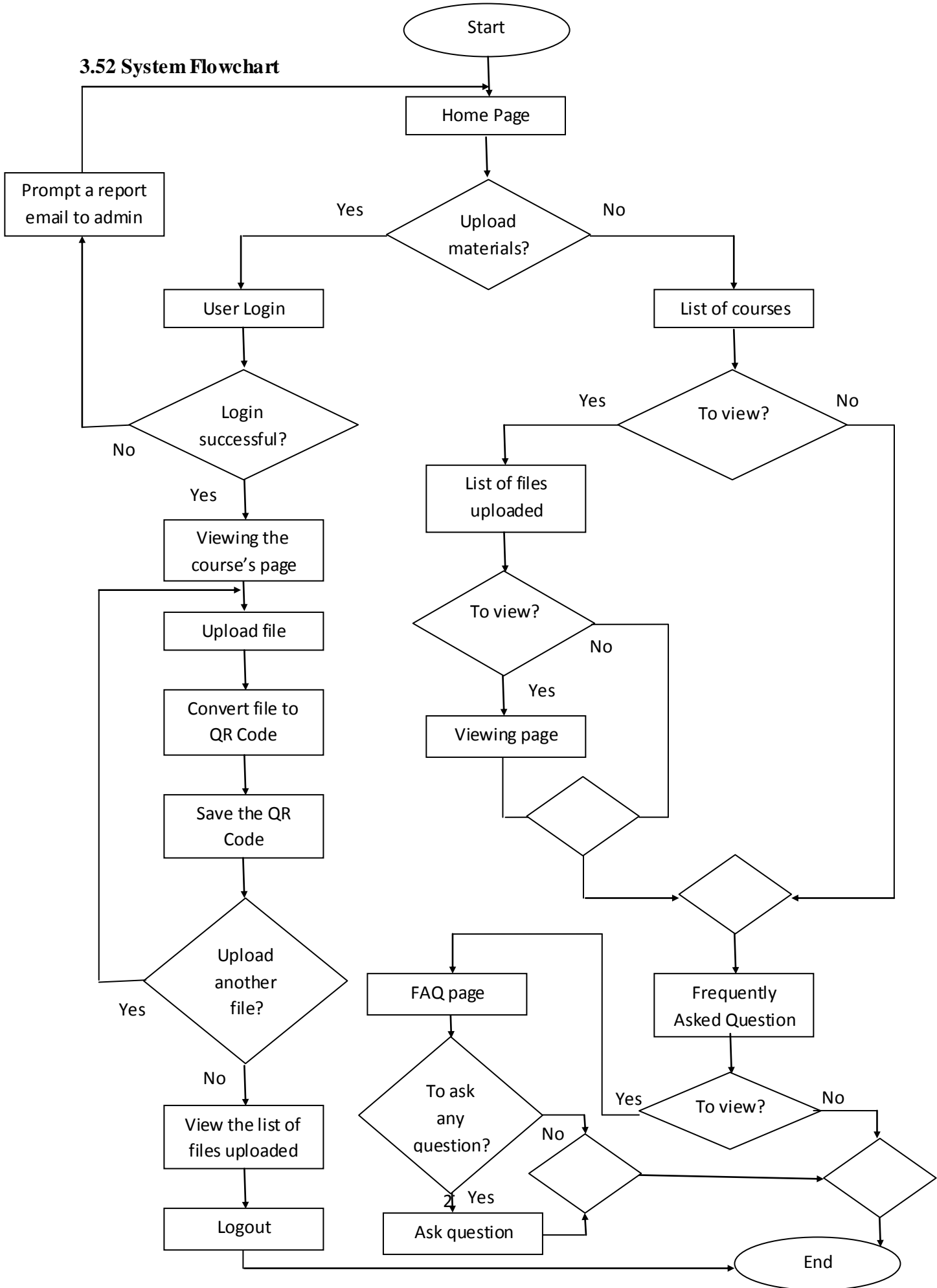
3.5 System Implementation Diagrams

For the design and planning phase, some diagrams were made in order to ease the process of the implementation. Upon completing the project effectively, Use Case diagram System Flowchart diagram, ER diagram and also Context diagram were implemented during the FYP 1. The details of the diagrams are shown as follow:

3.5.1 Use Case Diagram

Use case diagram basically use to show the relationship between the user and the system itself. Technically, use case diagram are helpful to determining the features, communicating with clients and also generating test cases. Use Case diagram for this system is shown as below:

3.52 System Flowchart

```
                                    ( Start )
                                        |
                                        v
                                ┌──────────────┐
                                │  Home Page   │
                                └──────────────┘
                                        |
                                        v
            Yes                   ◇ Upload        No
       ┌─────────────────────────  materials? ──────────────────┐
       |                          ◇                              |
       v                                                         v
┌──────────────┐                                        ┌──────────────┐
│  User Login  │                                        │List of courses│
└──────────────┘                                        └──────────────┘
       |                                                         |
       v                                          Yes            v           No
   ◇ Login                                   ┌────────────── ◇ To view? ──────────┐
     successful?  ◇                          |               ◇                    |
   ◇                                         v                                    |
No ─┐    Yes                         ┌──────────────┐                             |
    |    |                           │List of files │                             |
    |    v                           │  uploaded    │                             |
    |  ┌──────────────┐              └──────────────┘                             |
    |  │Viewing the   │                     |                                     |
    |  │course's page │                     v                                     |
    |  └──────────────┘                 ◇ To view?            No                  |
    |        |  <───────┐              ◇          ◇ ──────────┐                    |
    |        v          |                   |                 |                    |
    |  ┌──────────────┐ |                  Yes                |                    |
    |  │ Upload file  │ |                   v                 |                    |
    |  └──────────────┘ |           ┌──────────────┐          |                    |
    |        |          |           │Viewing page  │          |                    |
    |        v          |           └──────────────┘          |                    |
    |  ┌──────────────┐ |                   |                 |                    |
    |  │Convert file to│ |                  ◇                 |                    |
    |  │   QR Code    │ |                   └──────┐          |                    |
    |  └──────────────┘ |                          v          v                    |
    |        |          |                          ◇ ─────────────────────────────┘
    |        v          |                          |
    |  ┌──────────────┐ |                          v
    |  │ Save the QR  │ |                   ┌──────────────┐
    |  │    Code      │ |                   │  Frequently  │
    |  └──────────────┘ |                   │Asked Question│
    |        |          |                   └──────────────┘
    |        v          |                          |
    |    ◇ Upload       |          Yes             v            No
    |      another  ────┘     ┌────────────── ◇ To view? ────────┐
    |  Yes file?  ◇           |               ◇                  |
    |    ◇                    |                                  |
    |        |                v                                  |
    |       No         ┌──────────────┐                          |
    |        v         │  FAQ page    │                          |
    |  ┌──────────────┐└──────────────┘                          |
    |  │View the list │       |                                  |
    |  │of files      │       v                                  |
    |  │uploaded      │   ◇ To ask                               |
    |  └──────────────┘     any          No                      |
    |        |            question?  ◇ ──────┐                   |
    |        v              ◇                 ◇ ─────────────────┐|
    |  ┌──────────────┐      |  Yes           |                 ||
    |  │   Logout     │      v                |                 ||
    |  └──────────────┘ ┌──────────────┐      |                 ||
    |        |          │ Ask question │──────┘                 ||
    |        v          └──────────────┘                        vv
    └─>┌──────────────┐                                      ( End )
       │Prompt a report│
       │email to admin │
       └──────────────┘
```

Prompt a report email to admin

Start → Home Page

Upload materials? Yes → User Login / No → List of courses

User Login → Login successful? No → Prompt a report email to admin / Yes → Viewing the course's page

Viewing the course's page → Upload file → Convert file to QR Code → Save the QR Code → Upload another file? Yes → Upload file / No → View the list of files uploaded → Logout → End

List of courses → To view? Yes → List of files uploaded / No →

List of files uploaded → To view? Yes → Viewing page / No →

Viewing page → Frequently Asked Question → To view? Yes → FAQ page / No →

FAQ page → To ask any question? Yes → Ask question / No →

Ask question → End

3.5.3 Entity Relationship (ER) Diagram

ER diagram basically use to show the relationships between entities in a database of the system. Basically there are 3 basic elements which are entities, attributes and relationship. The ER diagram for this system is shown as below:
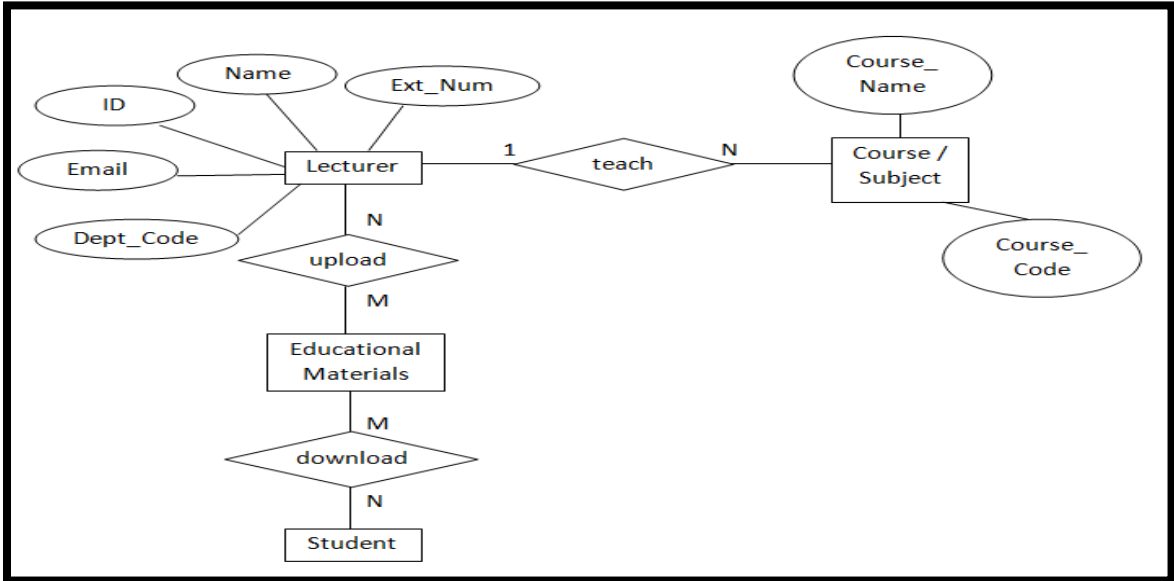
3.5.4 Context Diagram

Basically context diagram is use to show the flow of data of the system. System used, interaction element, and note regarding the data flow is needed in order to make this diagram. The Context diagram of this system is shown as below:
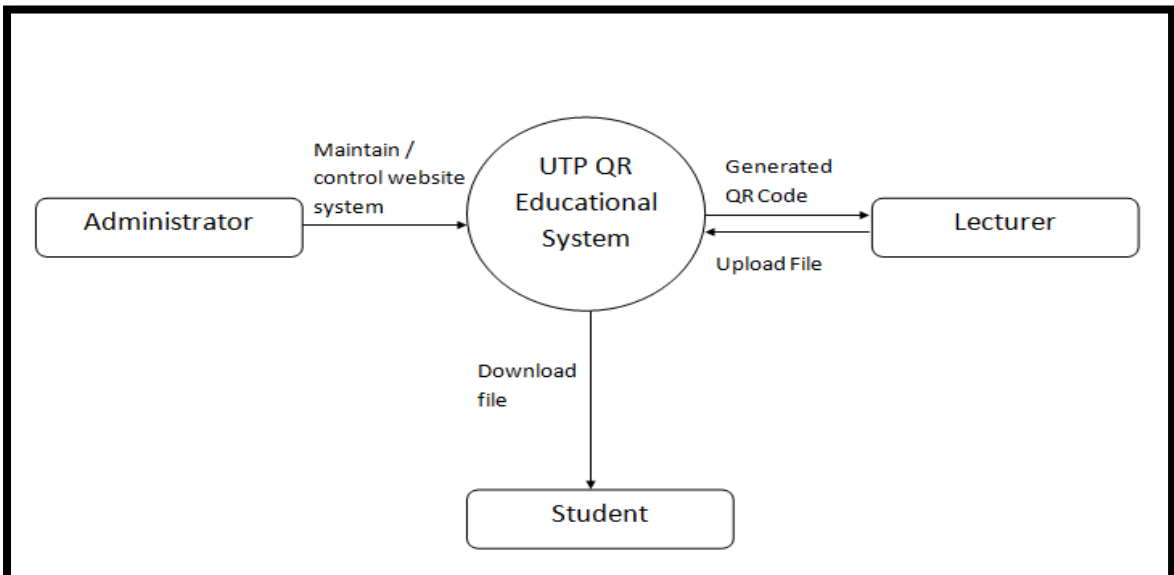
3.6 Tools

For the completion of this project, some tools will be used which consists of hardware and also software. The descriptions of these tools are shown as follow:

3.5.1 Hardware

For this project, in order to scan QR Code you will need a device (smart phone or tablet) that has a camera as well as the ability to install application. This kind of hardware will be used to demonstrate the completed system after completing this project. In the development phase, a personal computer will be used as a workstation before demonstrate through mobile devices.

Figure 8: Examples of Hardware Used (Smartphone and Tablet)

3.5.2 Software

In order to complete this project, a web acts as material storage will be build. During the web development process, web language such as html, php and few more will be used in this project. Wordpress and Xampp application also will be use for the database and connection. Other than that, in order to scan the QR Code, some application needs to be installed in the smart phone or tablet. There are some applications that are recommended which are free and available from the phone app market or store. The recommended Apps for the QR Scan Code are shown as follow:
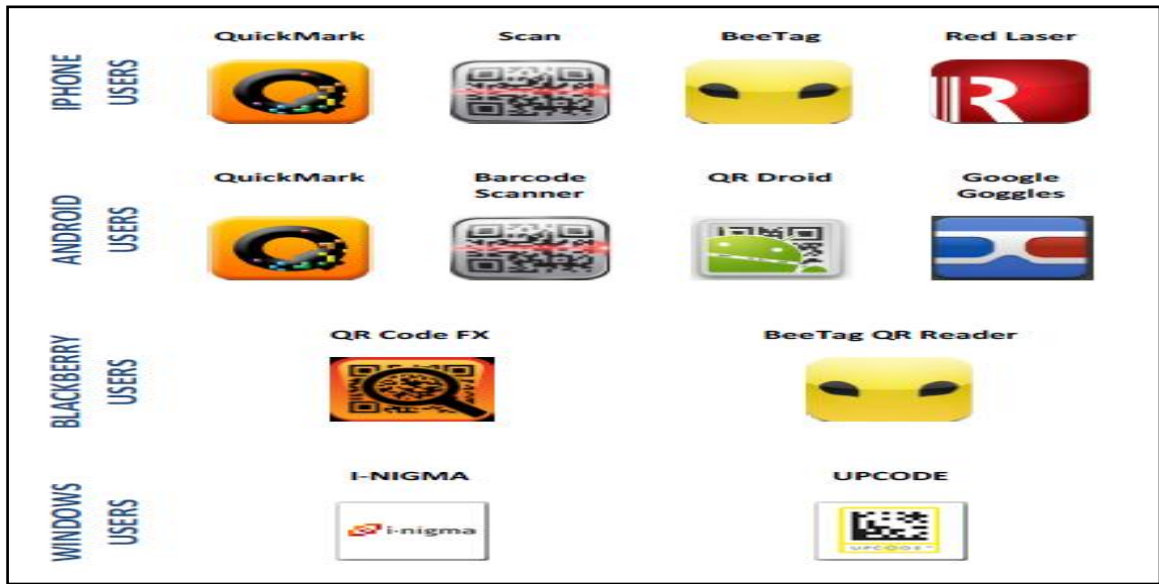
Figure 9: Recommended Applications for the QR Code Scanner

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CHAPTER 4

4. Result and Discussions

4.1 Survey Findings

An online survey had been conducted among UTP students in order for me to get the feedbacks, views and comments regarding this project. A sample of 50 respondents had been captured and the results are shown as below:

Do you use Smartphone /Tablet in your daily life?

■ Yes ■ No

26%

74%

Do you transfer the educational materials to your Smartphone / Tablet for study purposes?

■ Yes ■ No

6%

94%

For students using Smartphone / Tablet only (37/50)
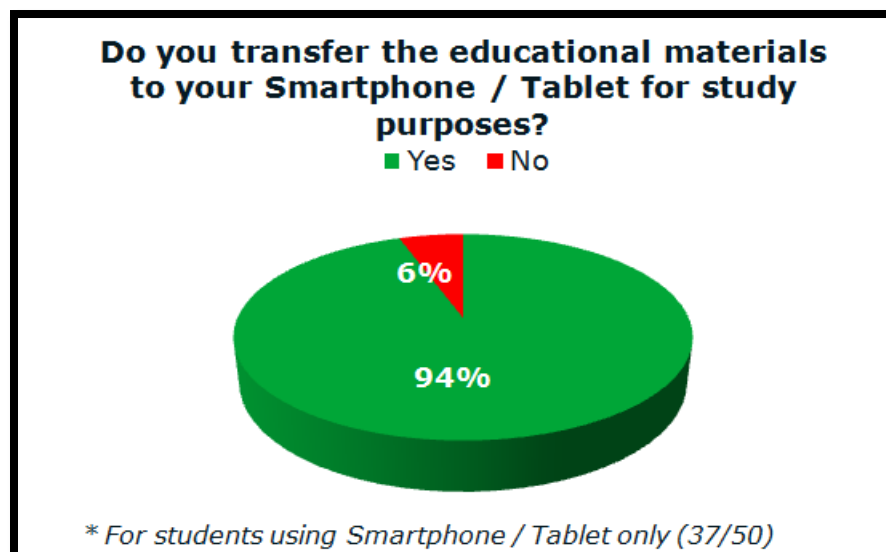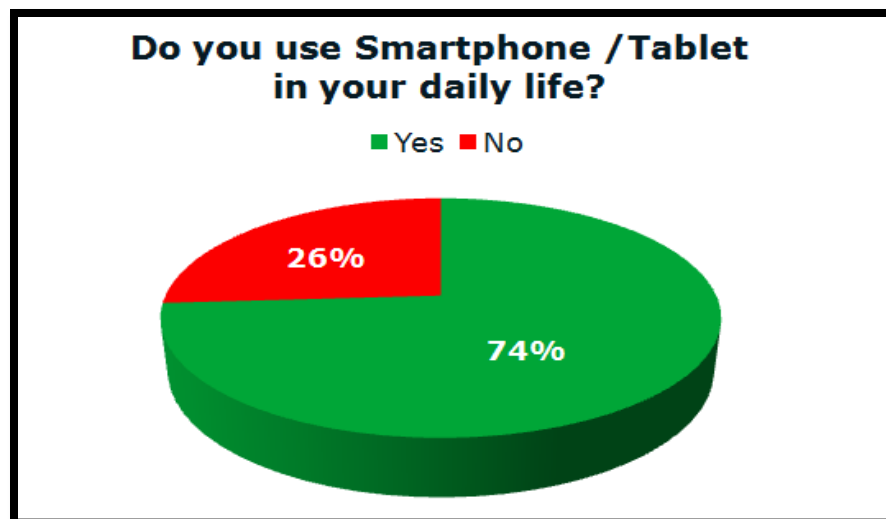
How do you find the internet connection in UTP Residential Village?

■ Excellent ■ Average ■ Poor

8%

10%

72%
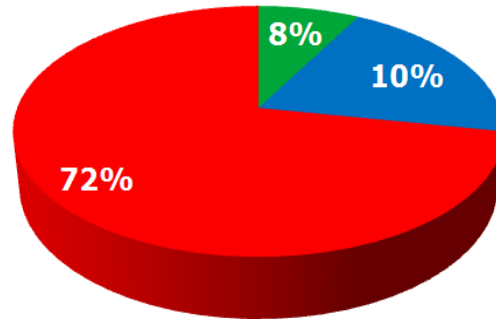
Do you know what is QR Code and it's function?

■ No ■ Yes

4%

96%
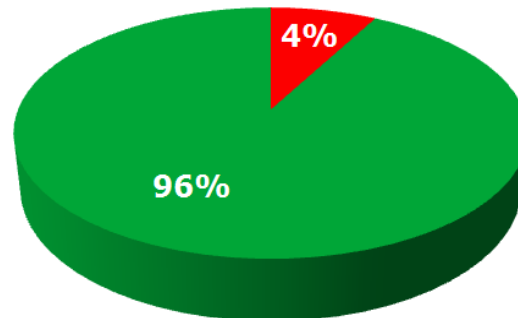
Do you agree if UTP use this QR method in the educational system?

■ Yes ■ No ■ Not Sure

4% 4%

92%
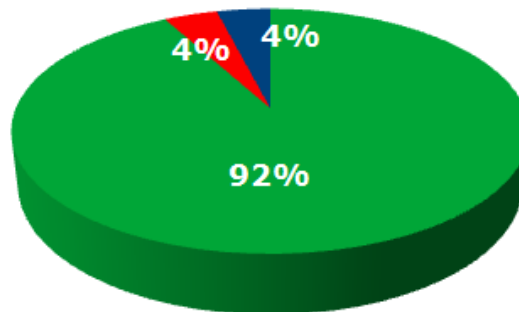
4.1.2 Data Gathering and Analysis

Based on the survey conducted to the UTP students, some data had been identified and analyzed. Basically there were 5 basic questions being asked to the respondents in the survey.

For question number 1 which was asking them whether they use Smartphone or Tablet, 74% said yes and another 26% said no. This shows that student nowadays tend to have these kind of gadget as the technology is growing. Besides, this clearly means that majority of UTP student use the Smartphone or Tablet in their daily life which becomes an opportunity for this project to be implemented in the educational system.

For question number 2 which was asking the respondent whether they transfer the educational materials such as lecture slide to their Smartphone or Tablet. The results were 94% said yes and another 6% said no. This shows that student nowadays tend to transfer the educational materials to their Smartphone or Tablet compare to bring the small books everywhere just like the old way.

For question no 3 which was asking how they find the internet connection in UTP Residential Village, 8% said excellent, 10% said average and another 72% said it is poor. This actually showed that most of the students do not satisfied with the connection. Regarding this matter it will also become a problem for student to download the learning materials for the study purposes.

For question no 4 which was asking the respondents whether they know what is QR Code and the function of it, 96% said yes and 4% said no. This statistic shows that most students are aware of this QR Code and it will be an opportunity to use or implement the method in the UTP educational system itself.

For question no 5 which was asking the respondent whether they agree to implement the QR method in the educational system. The results were 92% said yes, 4% said no and another 4% not sure. This concludes that they really want this QR method in the educational system which is more interesting compare to the current system.

4.2 Literature Review Findings

Based on the literature review research, some findings were identified and are shown as below:

+ QR Code is widely use and become one of the most popular marketing's method nowadays.
+ Technology can increase the passion and interest of student to learn
+ There are many ways in order to implement QR Code in educational system
+ Website can act as helping tool in order to increase the learning productivity of student
+ Implementation of QR Code in education is really relevant and beneficial

4.3 Storyboard Modeling

The system is expected to be a user-friendly system in with some functions that basically will ease the work of student and lecturer. Technically the system will have the login function. This is because only the lecturer will have the authority to upload and convert the file into the QR Code while the student can just view the contents of the web.

The homepage based on Figure 10 below basically will show the list of the subject on the menu and the files uploaded by lecturer for each of the subject. This part is expected to be in nice arrangement in order to increase the effectiveness of the system itself. This part technically will fall under menu part which will be on top of the website. As for the sub menu, it will keep on changing according to the main menu chosen by the user.

As for the lecturer, based on the Figure 11 below, there will be an upload button and also the convert button after the login. It will be in the simplest form in order to ease the process of the converting. After done with the converting process, lecturer can click on the list of course in the menu part to view the files that have been uploaded. Logout button also will be on the right corner.

If the user needs assistance or inquiry while browsing the website, a FAQ page will be provided in the menu. Admin will have the responsibility to answer and respond to the question ask by the user in order to solve any confusions when using this system.
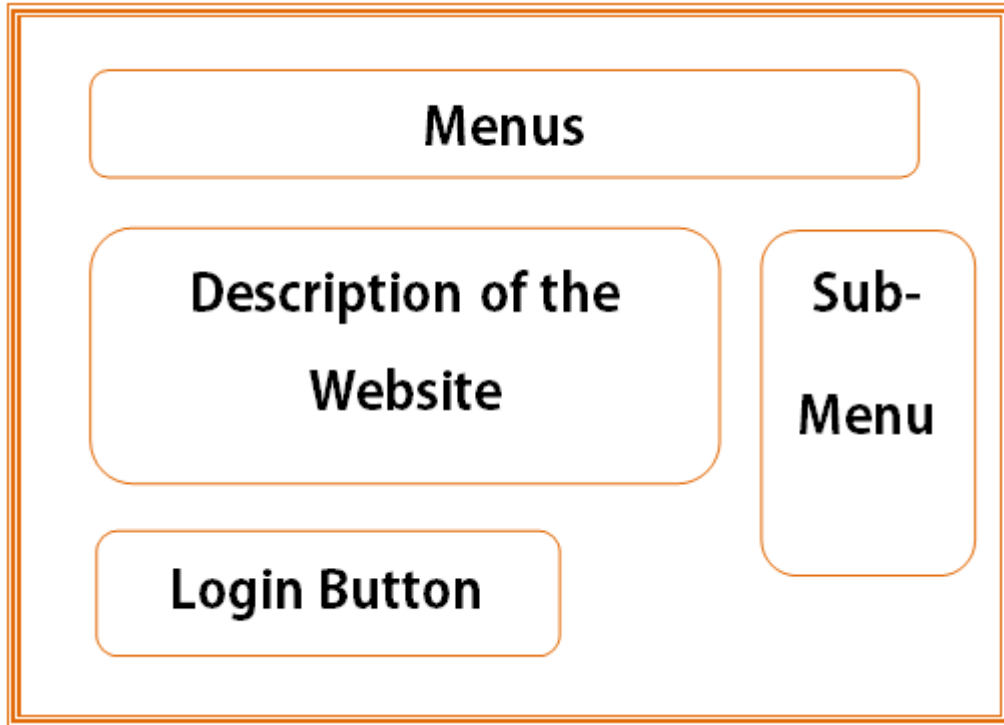
Figure 10: Storyboard of the website's homepage
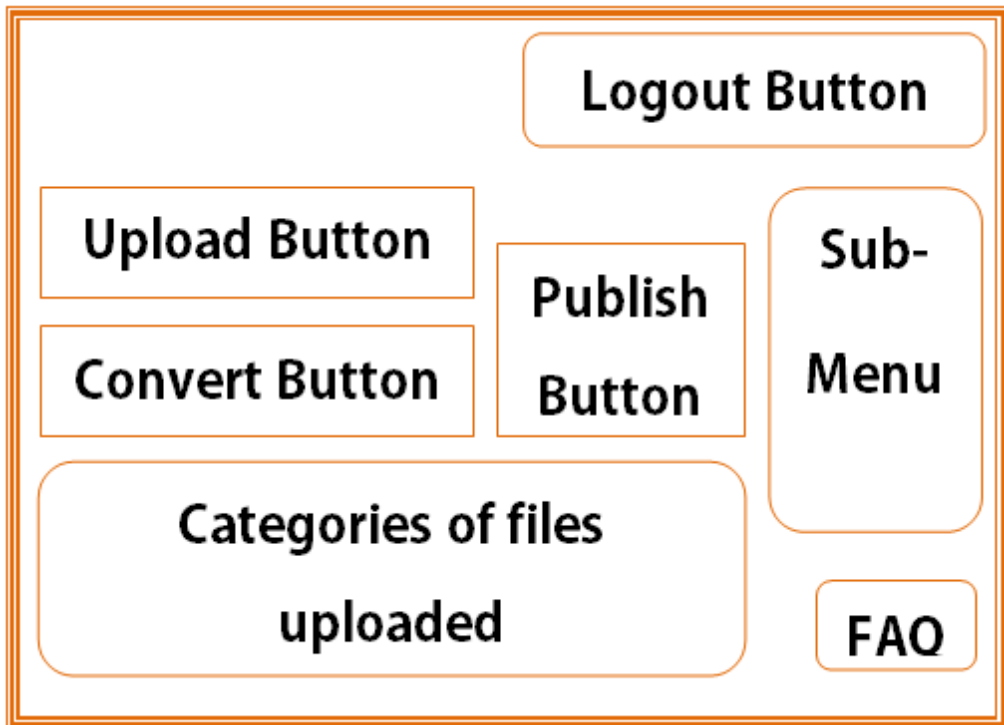
Figure 11: Storyboard of the website's functions

4.4 Prototype and Project Deliverables (www.utpqrcode.com)

After few weeks of designing and developing the website, a complete version of the system finally takes place. This complete prototype version is based on the feedbacks and reviews from my supervisor- A.P. DR. P. D. D. Dominic, UTP students and also lecturers. Below is the prototype modeling of the complete system. Basically all the processes of the website are user friendly and interactive. Besides, a domain was purchased in order to increase the productivity of the system itself and the domain for the website is www.utprqcode.com. Technically, this website needs to be online in order to make the files downloadable by the users. There will be 3 types of users which are students or viewers, lecturers and admin. The website's homepage is shown as below:
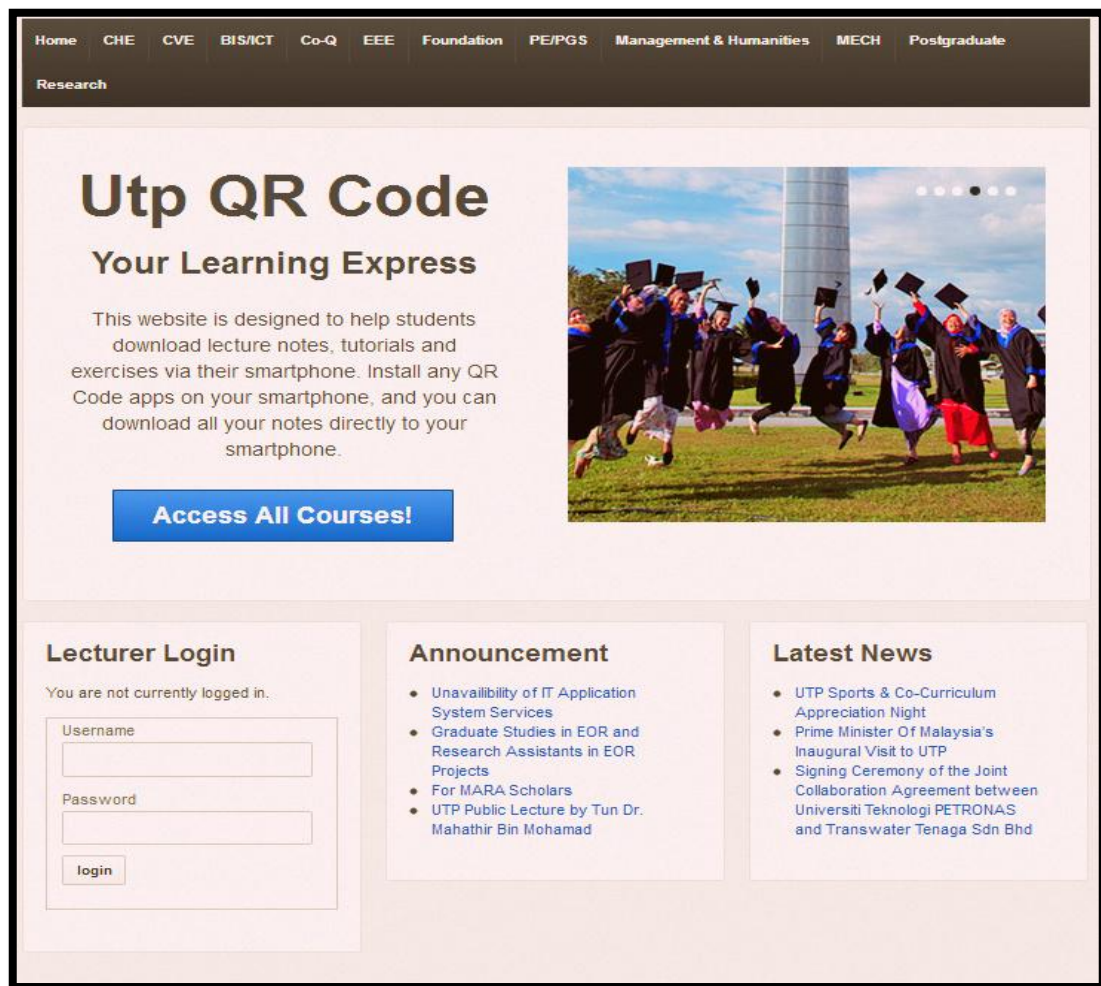
Figure 12: Homepage of the website - www.utprqcode.com

Based on the Figure 12, a menu list was created at the head of the page which consists of the courses offered in UTP. This list basically following the naming method in the UTP eLearning website in order to avoid confusion from the students and lecturers. This menu element is purposely set to public so that all students can just go into the website and view the files. Besides, at the middle of the homepage, a simple and clear yet brief description of the website was stated with the slides show of pictures in order to increase the attraction of the website in a cosmetic way. Other than that, there will be a login function which only work for the lecturers. The username and password can be setup by the admin in the database. In addition, an announcement and news columns also was included in order to make the website more useful and efficient for the users and viewers.

Basically, lecturers can just upload the files according to the categories such as courses, subjects, and codes which actually depend on the lecturers themselves. They also can modify the QR Code in term of size and color. This function was made to increase the attractiveness of QR Code method itself. Lecturers can customized their own QR Code before publish it as a post. Moreover, a comment's function also was added which open to public in order to get feedbacks and comments from users especially student. Furthermore, another function which is download link at the post was added for the students who happen do not have the gadgets – Smartphone or Tablet. They also can download the materials uploaded by just click at the download link at the top of each QR Code in the post.

In addition, a share's function also was added in order to increase the efficiency of the system. Users can easily share the QR Codes or the lecturer's post on many sharing medium such as Facebook, Twitter, Google Plus and also Email. Users can just click the share button and it will automatically be share at the chosen medium. The security level of this function is surely in a good level where the users actually need to allow the application first in order to continue with the sharing. This function also basically was created in order to increase the publicity of this website and the system implementation itself. It will at the same time increase the number of viewers and attract more users in order to implement this method in the UTP educational system.
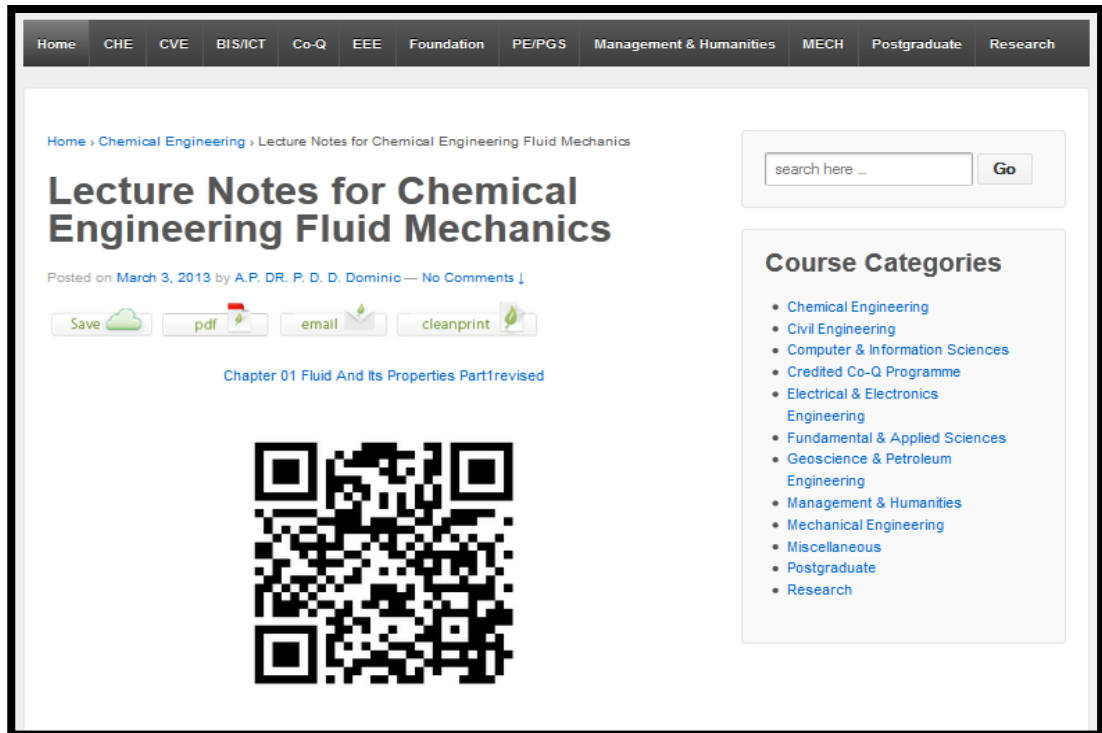
Figure 13: Example of website's post
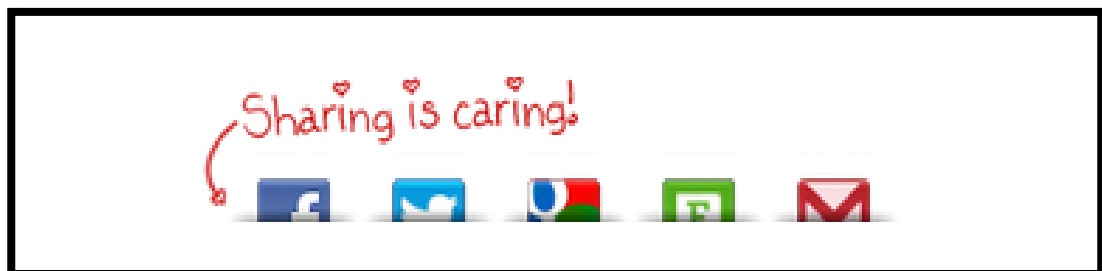
Figure 14: Example of share's function

4.4.1 Steps of Uploading and Converting Files into QR Code

In order to implement this method, the files or the learning materials need to be convert into QR Code first by using the website. Basically the lecturers need to upload the files online in order to continue with the converting process. The steps of uploading and converting process are shown as below:

1) **Login to the website**

   As for the first step, lecturers need to login first in order to have the authorization to upload the files to the website. The username and password of the lecturers can be setup in the database and will be given to them by email.
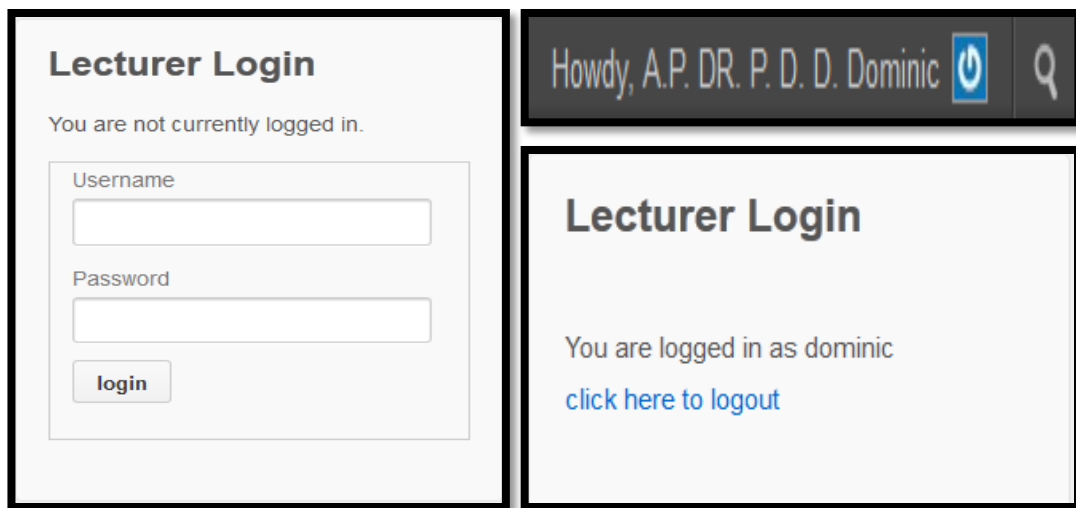
Figure 15: Login to the website

2) **Upload files to the website**

   After successful with the login, lecturers now can upload the files to the website. As for now, the maximum size of the files is 2.0 Mib. This is because of the database capacity that has been purchased before. In other word, to increase the size, higher cost is needed. Technically, lecturers can upload anything such as lecture notes, assignments, videos, and other learning materials as long as not exceeding the size limit. In addition, the capacity of the size will be increase as one of the recommendation for this project in order to improve the system.
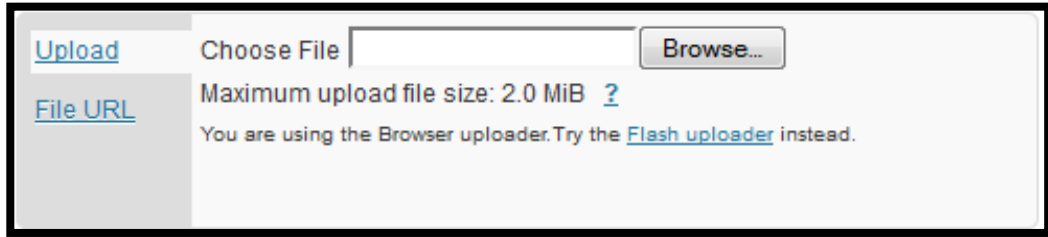
Figure 16: Uploading process

3) Convert files into QR Code

After done with the uploading process, the website will take lecturers to the converting process. There will be a tools menu as shown as Figure 15 below and lecturers need to select the QR Code icon in order to continue with the converting process. Lecturers can also customize their own QR Code here by selecting colors and adjusting the sizes of the codes. After done with all the adjusting, lecturers need to select some categories such as subject and course in order to manage the post efficiency. Lastly they can publish the post and it will be viewable to the students and other viewers as the post will be set to the public's view.
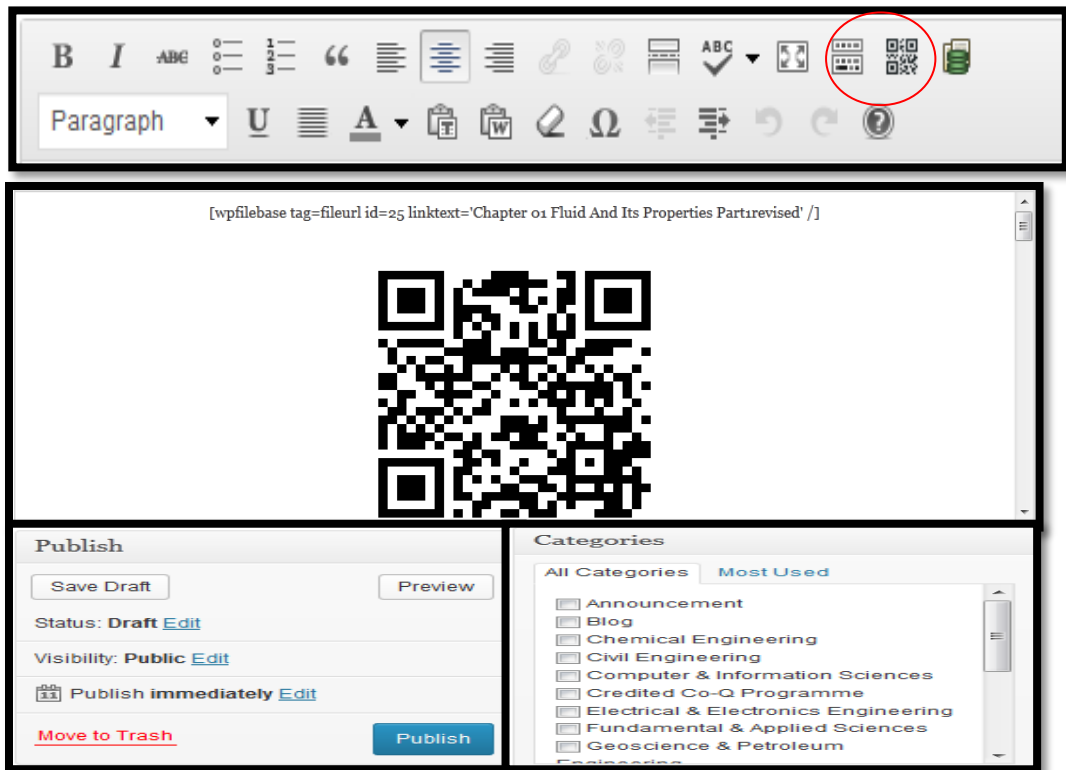
Figure 17: Converting Process

4) Publish the post

Once the QR Code is created, lecturer can publish the post to make it viewable for those users who do not have the gadgets to scan the code. However they can still download the files just by clicking the link title above the QR Code as shown as Figure 18 below. Other than that, lecturers also can update the post anytime they want and can just post all the QR Codes of each subject in just one post. A comment box also is provided as shown as Figure 19 below.
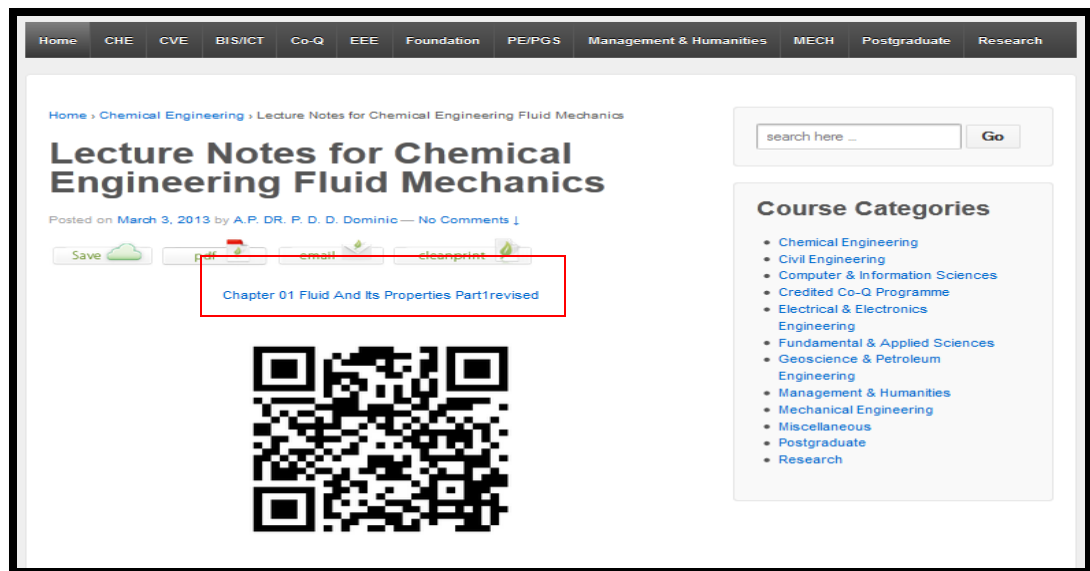
Figure 18: Alternative download link for users

Figure 19: Edit button and comment box

4.5 System Testing

A system testing had been conducted during International Financial Management (IFM) class – GCB 3073 on April 19, 2013. This testing was helped by Mr. Md. Akhir Syarif as the lecturer of the IFM subject. During the testing, total number of students in that class is 23 students and the number of student who is using the Smartphone or Tablet is 17 students or 74%. The result from this system testing consists of 3 parts which are Graphical User Interface (GUI) survey, student survey and last but not least lecturer survey. The results are shown as below:

1) Graphical User Interface (GUI)
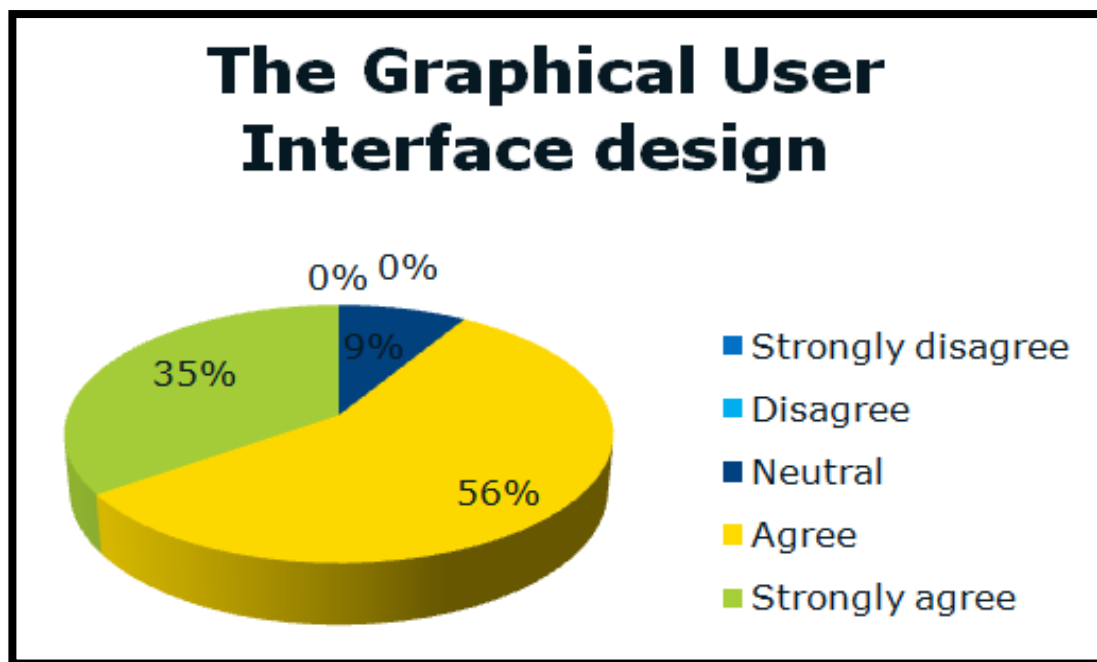
The survey above is about a question on how friendly the GUI of the website from student's view. 35% is strongly agreed, 56% is agreed while another 9% is neutral. This show that majority of students agreed that the website is user friendly in term of the simple graphic and formal GUI design as consulted with Dr. Dominic.

Navigation

- Strongly disagree — 0%
- Disagree — 0%
- Neutral — 4%
- Agree — 18%
- Strongly agree — 78%
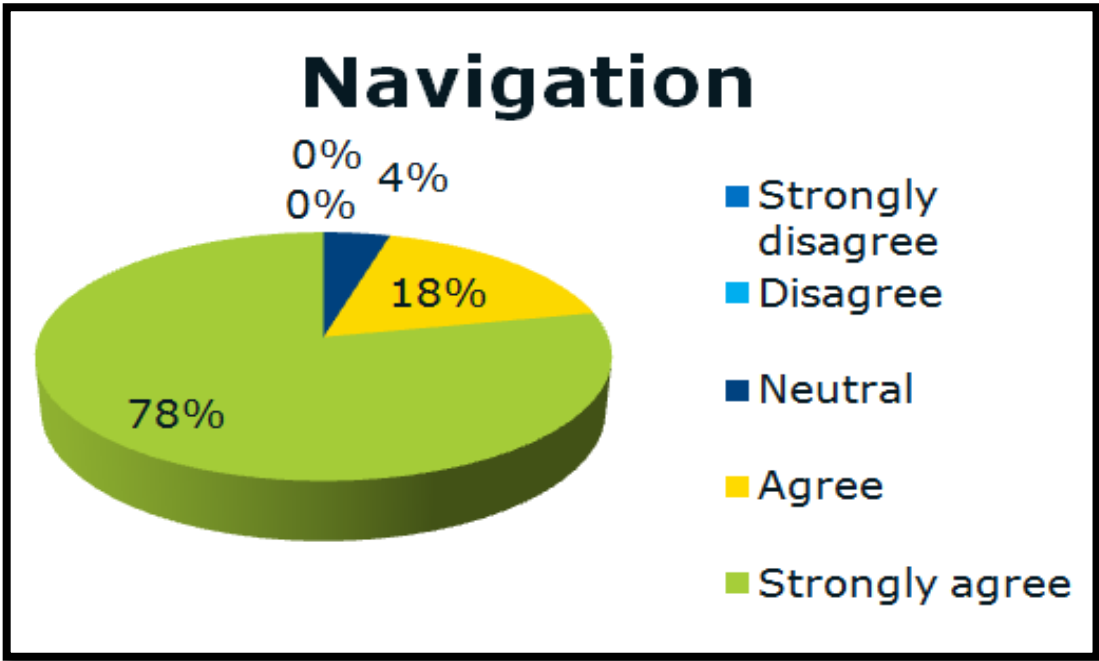
The survey above is about a question on how easy the users can navigate from one page to another in the website. 78% of students are strongly agreed, 18% agree and another 4% is neutral. This show that majority of students find it very easy to navigate from page to another even for first timer. Because of the simple GUI it is become very easy for users to understand the flow and arrangement of the website.

2) Student's Result

Beneficial to learning process

- Strongly disagree — 0%
- Disagree — 0%
- Neutral — 22%
- Agree — 43%
- Strongly agree — 35%
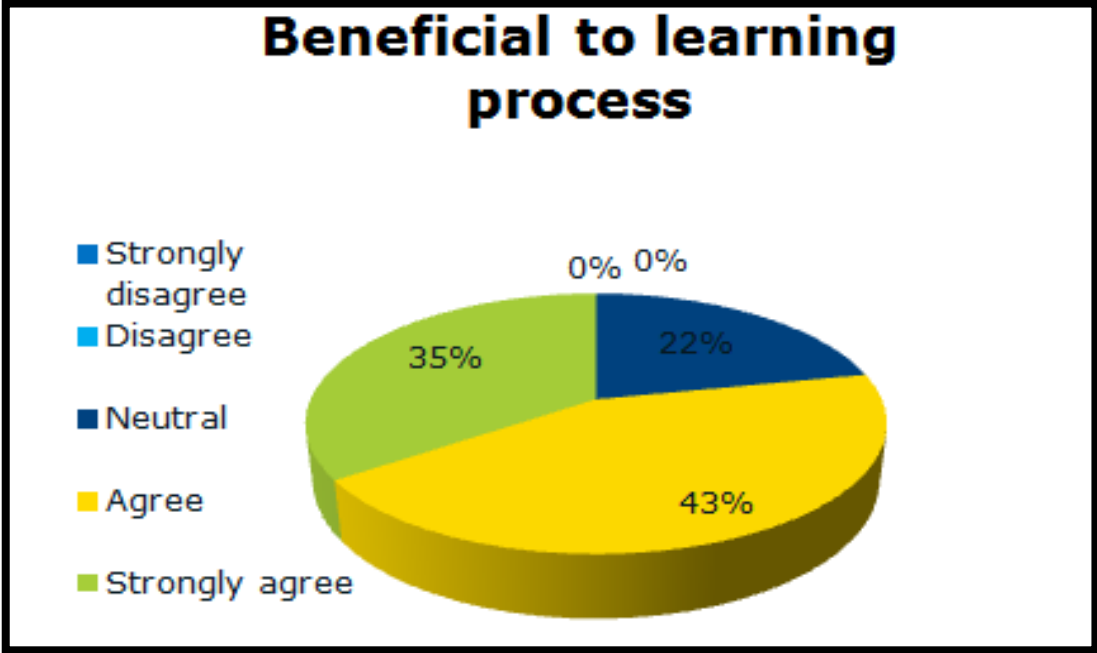
The survey above is about whether this project is beneficial to learning process or not. 35% strongly agreed, 43% agreed while another 22% neutral. This proves that most students agreed that this project will be beneficial to the learning process in UTP.
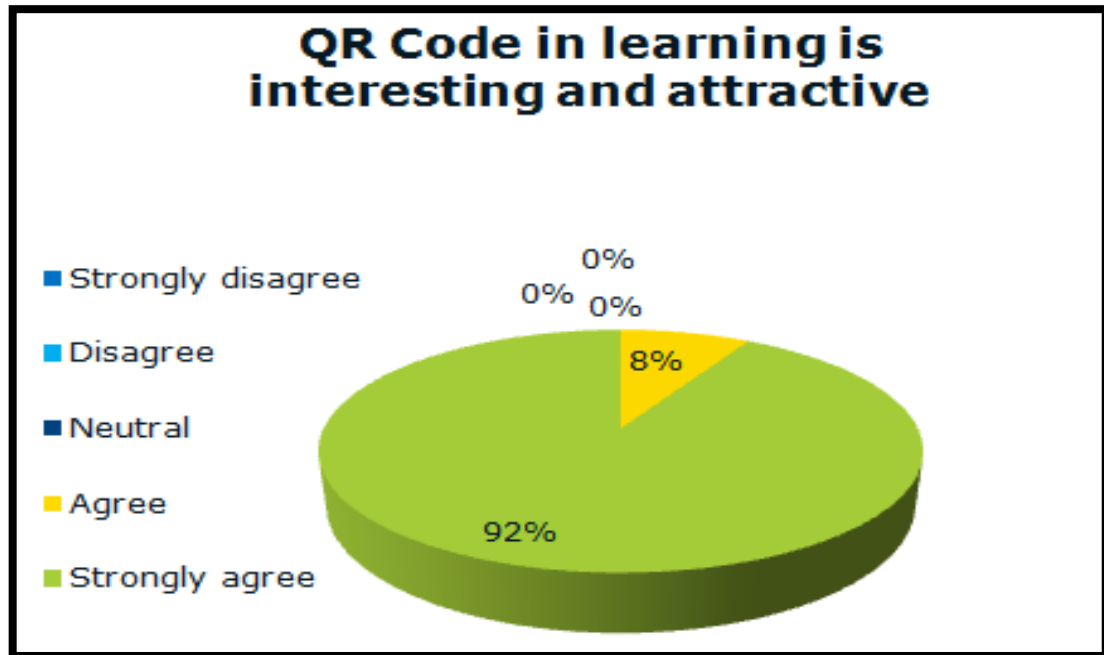
The question above is about whether this QR Code in learning is interesting and attractive and the result shows that 92% strongly agreed and another 8% agreed. This surely prove that majority of the students are agree that QR Code method is interesting and attractive to be use in UTP educational system.

3) Lecturer's Result

Three lecturers were quoted during the system testing and the results are shown as below:

- "It could be more beneficial and effective if it can link with UTP e-Learning". **(Dr.P.D.D.Dominic, 2013)**
- "The idea is good and practical. I believe that the implementation can be done here in UTP successfully". **(Dr. Alan Oxley, 2013)**
- "I received many positive feedbacks from students saying that this method is really easy, fast and above all it is interesting". **(Md. Akhir Sharif, 2013)**

CHAPTER 5

5. Conclusion and Recommendation

As a conclusion, this report is focus to propose an implementation of QR Code method in UTP educational system by using the designed website - www.utprqcode.com. This project will focus on two parties which are students and lecturers. The main objective of this project is to increase the UTP educational productivity while eliminating the wastes such as money, time and effort in order to align with UTP vision itself which is to produce the well rounded students. Besides, method uses for data gathering also were discussed in this report. Other than that, this report also discussed on the development of this project itself and how it can be a solution towards the problem statement. The further research and data gathering will be done after this in order to improve this project with the requirement as demanded from feedbacks and comments. In addition, instead of conduction survey and questionnaire, real simulations of the system need to be done in order to understand more about the needs and weaknesses for the improvement process in the future.

For future recommendation and plan, this system could be link with UTP e-Learning website which basically will increase the efficiency and effectiveness of this project. By doing this it will ease more the work for lecturers during the learning process. Besides, the capacities of the database also can be increase in order to make the system more useful. For example, lecturers can upload bigger size file such as video. This actually will make the system more attractive for the students. In addition, the website can add another login function for the students. Students also can make their own QR Codes and use it in the education field such as assignment. This will make the education system become more interesting for students and also lecturers. Last but not least, this website should work effectively by achieving the objectives while eliminating the wastes in order to give benefits and good result for all students in UTP.

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APPENDICES

Final Year Project Poster Presentation

- Courses
  - Miscellaneous
  - General
  - Credited Co-Q Programme
  - Management & Humanities
  - Post Graduates Studies Information Technology
  - Master of Science (MSc) in Petroleum Engineering
  - Computer & Information Sciences
  - Geoscience & Petroleum Engineering
  - Fundamental & Applied Sciences
  - Electrical and Electronics Engineering
  - Civil Engineering
  - Mechanical Engineering
  - Chemical Engineering
  - Research
  - Master of Science (MSc) in Electrical Engineering

List of courses in UTP e-Learning