Mobile Game Based Learning on Online Banking Fraud Security among Young Adults (BFG)

by

Roisah Fadhilah binti Saifullah
13363

Dissertation report submitted in partial fulfilment of
the requirements for the
Bachelor of Technology (Hons)
Information and Communication Technology

JANUARY 2013

Universiti Teknologi PETRONAS
Bandar Seri Iskandar
31750 Tronoh
Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

Mobile Game Based Learning on Online Banking Fraud Security among Young Adults (BFG)

by

Roisah Fadhilah binti Saifullah
13363

A Project dissertation submitted to the
Information & Communication Technology Programme
Universiti Teknologi PETRONAS
In partial fulfilment of the requirement for the
Bachelor of Technology (Hons)
(Information and Communication Technology)

Approved by,

_____

(Ms Nazleeni Samiha bt Haron)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK

JANUARY 2013

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

_____

(Roisah Fadhilah binti Saifullah)

ABSTRACT

Online banking has brought a huge transformation in many banking and financial services. The percentage of online banking users has increase rapidly across the age including young adults nowadays. In 2011, fraud marks the highest percentage of cyber-crime cases in Malaysia. High concern rises among global expertise on fraud attacks especially in economic and banking sectors. However, the knowledge on this issue among Malaysian young adults is still low. Through the survey conducted, about 63% of young adults do not know about online banking system security. Therefore, this paper presents an alternative approach to educate young adults in Malaysia about online banking fraud. The main deliverables of this study are to identify the online banking fraud security issues that related to young adults, their behavior towards online system security and the development stages. Bypass Fraud Game (BFG) has been proposed based on mobile game-based learning model by mapping with learning theories and approach using Android Eclipse and SDK Development software as the platform. In addition, Technology Acceptance Model (TAM) is used to evaluate the effectiveness on adaption of learning theories in mobile game-based learning. The results show that the game is well received by the users with average response more than 4.00 for TAM elements which are Perceived Usefulness (PU), Perceived Ease of Use (PEOU) and Attitude towards Using (ATU). Through this interactive and fun approach, BFG is expected to help young adults in identifying the methods deployed by cyber criminals as well as precaution action to prevent from being attack.

TABLE OF CONTENTS

LIST OF FIGURE

LIST OF TABLES

CHAPTER 1

PROJECT BACKGROUND

1.1 BACKGROUND OF STUDY

Internet or cyberspace is a virtual space that has become the central activities for social, economic and political. Because of its flexibility, the grown of cyberspace usage has become tremendously since it was introduced. In just 2012, internet usage and broadband penetration had grown to 62.3% in Malaysia (NewStraitsTimes, 2012). Meanwhile, the dependency on cyberspace are constantly increases in many of the nation all over the world without realising that they are in risky position due to the borderless of cyberspace and very vulnerable to cyber threats.

Chief Executive Officer, Cyber Security Malaysia, Lt Col (R) Husin Jazri claimed that in the year 2011, 15,218 cybercrime cases were reported in the country which had increases to 88% compared to 2010 with 8,090. While, about 11,930 cases are from online fraud which had increases to 30% compared to 5181 in 2010 (TheStar, Cyber Security Malaysia, 2011).

Age category	2008	2009
Under 15	6.8	8.1
15-19	17.9	19.2
20-24	15.7	14.2
25-29	11.9	12.9
30-34	11.7	11.4
35-39	11.2	9.5
40-44	9.3	9.4
45-49	6.1	5.1
50 and above	9.4	10.2

Figure 1: Percentage Shares of Internet Users by Age **(Eng, 2011)**

Figure 1 above shows the percentage share of internet users by age in Malaysia. According to the figure, it can be observed that the young adults of age 15 to 24 spend most of the time on internet. Therefore, the potential for them to become a victim of online fraud is greater.

Internet banking was launched in June 2000 and has grown steadily in Malaysia. Now, it has been offered to 29 banks and the number of registered users has grown over the years, rising from 3.2 million in 2006 to 12.8 million in September 2012 (ABM, 2013). The number of online banking customers was not surprising considering the growth number of internet subscription. The Nielsen Company (2012) exposed that in December 2011, there were over 17 million (61.7%) Malaysian uses the internet on daily basis and almost six in ten (57%) recorded as the highest usage among group age 20-24, with an average of 22.3 hours online per week. Therefore, in this challenging world, internet has become a part of young adults' everyday lives and activities and is truly ingrained. Meanwhile, the dependency to get online especially in financial activities had increased with the availability of internet-connected mobile devices (Ariffin, 2011)

Even though the internet has brought impressive functions and variety of services and learning opportunities, it also brought high concern about the safety and security among the users as the chances to become victims and experiencing negative incidents to online crime are greater. There are several reported incidents highlighted as online crime among young adults such as vulnerabilities report, spam, malicious codes, intrusion attempt, intrusion, denial of service, cyber harassment, and content related as well as fraud crime (Masrom, Mahmood, Zainon, Wan, & Jamal, 2012).

Mobile Game Based Learning is defined as learning through gaming by utilizing mobile technologies as the playing platform. In this digital age, mobile technologies can be effective tools to cater the necessity of young adults and have big potential to motivate them in learning through games played on mobile devices (Ha, 2007). Due to the rapid development of mobile communication, mobile gaming is increasingly playing an important role in entertainment industry.

As conclusion, game and learning can be successfully developed and implemented in learning environment by combining both game design and instructional design approaches as well as considering various issues such as learning theories and mobile platform and technologies (for mobile games).

1.2 PROBLEM STATEMENT

Cyber Security Malaysia exposed in the news that e-banking fraud has been increased drastically in Malaysia, with a total of 1426 reports were made in 2010 compared to 643 in 2009 (TheStar, 2011). In 2012, the global world faced the same crisis.

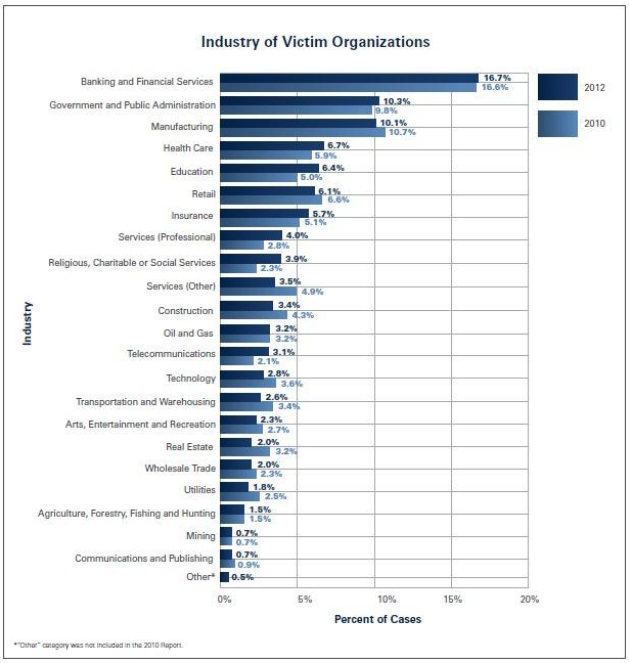


Figure 2: Industry of Fraud Victim Organization

Figure 2 above shows the industry of the victim organizations by reported cases of fraud made by Association of Certified Fraud Examiners (2012). Based on the figure, banking and financial services marks the highest cases of fraud in the organizations with 16. 7% cases in 2012. Higher concern rises among global expertise on fraud attacks especially in economic and banking sectors as well as the prime users.

The Association of Banks in Malaysia (2013) claimed that the most popular e-banking fraud in Malaysia was email scam, followed by SMS scam and phone scam. Being a victim of online fraud had to endure all the consequences such as economic decline due to losses amount of money, physical injury or death to

innocent victims caught in the middle of scams situation and emotional and psychological burdens.

Therefore there is a need to protect ourselves against internet banking fraud. Bypass Fraudster Game (BFG) is proposed to educate them in identifying the available fraud as well as assist them on how to respond when it attack. The development is primarily based on the concept of game-based learning and mobile game based learning approach which focuses on intertwining learning and gaming.

1.3 OBJECTIVES

1. To identify online banking fraud security issues that related to young adults.
2. To study the behaviour of young adults towards online system security
3. To adapt learning theories in mobile game based learning that educates young adults on the internet banking fraud security.

1.4 SCOPE OF STUDY

This project aimed to get the understanding on internet banking fraud and security threats elements. Therefore, one game based learning application has been proposed by using android mobile as a platform to educate young adults on safer cyber environment. The main target audiences are the young adults aged 15 to 24.

The scope of study is focusing on the adaption of learning theories towards the development of mobile game that can provide user with the real life situation of internet banking fraud and security threats. BFG is expected to give broad overview on fraud and security threats to the prime users.

Game based learning has been discovered many years before and this medium is believed to provide fun and attractive learning process. Since the project is game and technology based, the author need to do extensive research about the latest trend and behaviour of users towards game and technology in different environment with regards to what technology can offer.

1.5 THE RELEVANCY OF THE PROJECT

The research project is in line with today's issues which is the emerging of internet fraud and security issues. According to findings, almost 9 out of 10 investment fraud victims are men and hold a college degree than a non-victim (Pak & Shadel, 2011) Therefore, BFG is expected to educate young adults about this issue and give an overview on the precaution measures that should be practice in the future.

CHAPTER 2

LITERATURE REVIEW

2.1 FRAUD RISK OF ONLINE BANKS

Tan and Thompson (2000) give definition of internet banking as a channel for consumers to perform financial and non-financial services through a bank's website. Nowadays, internet banking has become one of the most popular services utilised by Malaysian surfers. The increasing growth number for internet subscription has resulted to the higher demand in adoption of online banking in Malaysia (Ng., 2011). While, the prime users of online banking are mostly comes from the young generation due to higher computer literacy (M. Sadiq Sohail, 2003).

According to Wells (2011), fraud is defined as any crime that intentionally uses deception as its principal approach. All the form of fraud action includes deception but, not all deception is necessarily fraud. Under common law, fraud crime is considered to be occurred when all the following elements exist:

1) Intentionally false statement makes by individual or organization
2) Knowledge behind that prove the statement was false
3) Depending on the false statement by the victim
4) Damages as a result

Zhang (2009) defined internet fraud as the use of internet service to give out fraud information to potential victims for execution of certain kind of fraudulent transaction or fraud action intended at the financial and related institutions. Meanwhile, online bank fraud is an illegal action using internet technique aiming at stealing money from different bank accounts. Among two most popular fraudulent methods are phishing and identity theft.

Australia and New Zealand Banking Group (2012) disclosed that fraudulent activities may exist either on online activities or offline. Online attacks involve internet fraud and security threats such as Phishing, Spyware and Adware, Viruses and Worms, and Trojans. The other fraudulent activities are identity theft, credit or debit card fraud, cheque fraud, advertising network, and online auction.

Phishing or email fraud is defined as an attack done by intruders that defrauds individual and 'fishing' for his/her personal and financial information (Sakharova, 2012). Alnajim &Munro (2009) point out that phishing or email scam has become the most popular threat for online banking and e-commerce users.

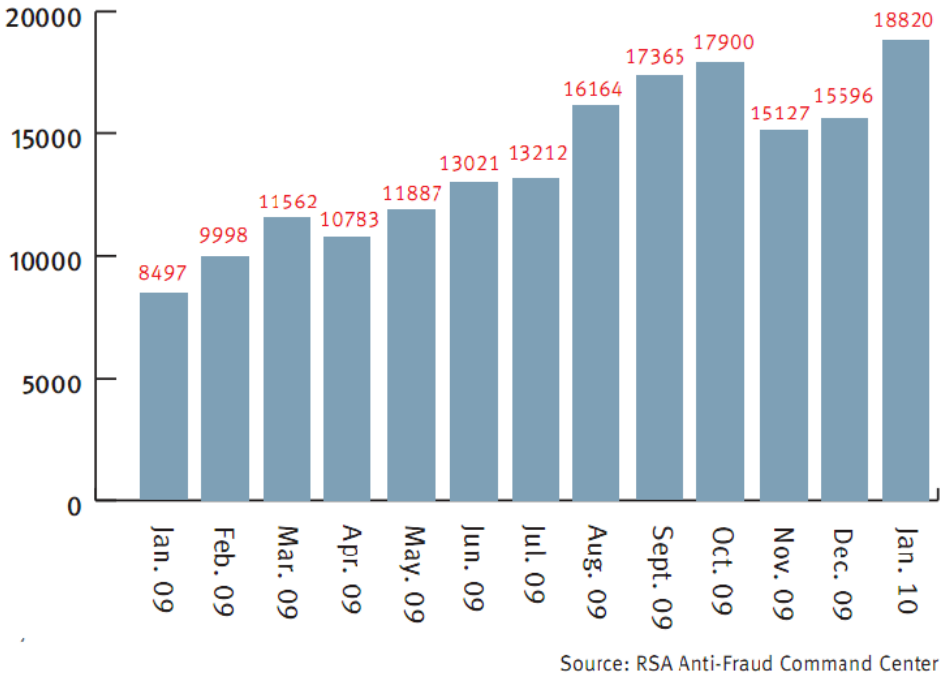


Figure 3: Phishing Worldwide Trend Analysis January 2009-January 2010

The graph above shows the analysis for worldwide phishing attacks between early 2009 and 2010. From the graph, phishing attacks are increasing more than doubled within just a single year's time and still increasing rapidly (RSA_Anti-FraudCommandCenter, 2010).

2.2 MOBILE GAME

Quan-Yin et.al (2011) stated that mobile game is a game on personal and portable mobile technologies such as mobile phone, portable mobile technologies, personal digital assistant (PDA), or portable media player. The game is played according to the technology that exists in the device.

There are five main categories of mobile game types which are embedded game (EG), messaging game (MG), browser game (BG), interpreted language game (ILG) running on virtual machine (VM) and compiled language game (CLG) which running on operating system (OS) (Xin, 2009). Table 1 shows the type of mobile game and the corresponding description.

Table 1: Mobile Game Types

Mobile Game Types	**Description**
Embedded game (EG)	Game that programmed in simple graphic and single colour which cannot be installed by consumer. Example: 'Snake' game in NOKIA
Messaging game (MG)	Game that focus on messaging services, SMS/MMS. It is not a good platform for game development as it is based on text entry by users, expensive and high latency.
Browser game (BG)	Games that offer friendlier user interface than MG and can be played on most mobile phones as most mobile phones have browser. However, the game medium is a static browser and can only be played over the network.
Interpreted Language game (ILG)	Games that attempts powerful capabilities and support many functions such as multimedia and network. Develop by advance language such as C/C++ and Java. It can only be run on VM.

Compiled Language game (CLG)	Games that allow better control over user interface (UI), greater speed and enable high performance games. Develop by C/C++ and directly run on mobile phone OS.

Based on the types of mobile game described in Table 1, BFG can be classified as compiled language game because it is designed on Android OS platform.

2.3 YOUNG ADULTS' BEHAVIOUR TOWARDS MOBILE TECHNOLOGY

In today's world, mobile technologies can be considered as the most widely used in information and communication technologies. More and more people tend to own at least one mobile device. The World in 2010 Report disclosed that 90% of world population (International Telecommunication Union , 2010) and about 93% of young adults ages 18 to 29 (Lenhart, Purcell, Smith, & Zickuhr, 2010) has available access to mobile networks.

According to Quan-Yin, et.al (2011), Android is a broadly anticipated open source operating system for mobile devices. It delivers a basic operating system, a Java development kit (SDK), middleware layer application, and a group of system applications. According to Smartphone Usage Statistics (2012), there are many users are using Android Smartphone (46.9%) because of its features and platforms.

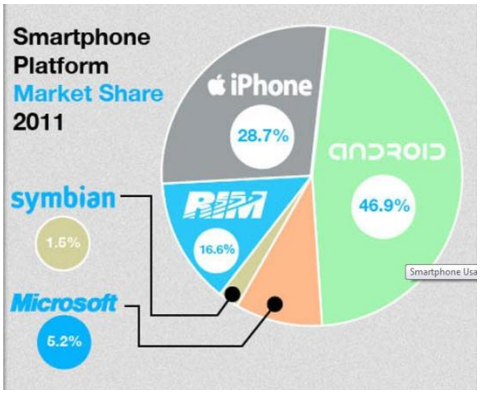


Figure 4: Smartphone Usage Statistics 2012: Smartphone Platform Market Share 2011

2.4 MOBILE GAME-BASED LEARNING THEORY

Games-based learning in mobile phone has gained great interest among young generation throughout the world in recent years and there is a signal that the trend will continue. Based on a research, game has possibilities to inspire learning in young generation (Mininel, Vatta, Gaion, & W.Ukovich, 2009). While, the strategic plan in learning program which is a key of successful learning process gives a 'flow' learning experience to the target users. Hwang, Wu and Chen (2012) defined 'flow' as pleasant experience achieved by users when involve in an activity with full participation, concentration and pleasure.

There are five main categories of game styles found in mobile game-based learning theory which are Quiz game, Exploration, Arcade, Simulation, and Adventure (Mininel, Vatta, Gaion, & W.Ukovich, 2009). Table 2 describe the game style in mobile game based learning project.

Table 2: Game Styles in Mobile Game-Based Learning

Game Style	Description
Quiz	Game that focus on permanent event-sprites, A long list of random quizzes is interconnected each other regarding various topics.
Exploration	Games that emphasize the fog of war and visible or hidden obstacle can allow creation of labyrinth games of exploration
Arcade	Game that focus on event-sprites with programmed or semi-random movement on a map. The game target to avoid annoyed-event sprites while searching collision with positive event sprites.
Simulation	Game that attempts to replicate particular situation in real life in the form of game for various purposes such as training, analysis and prediction

Adventure	Game that focus on plot creation with several stages. The game can memorize the players' decision using the set of internal variables value event and have the adventure world react accordingly.

Based on the style characteristics of mobile game described in Table 2, BFG can be classified as a simulation game. Simulation game is able to stimulate the participants' problem solving ability as it allows them to experience the scientific discovery process such as hypothesis generation, experiment designs and data interpretation (Liu, Cheng, & Huang, 2011).

Four orientations of learning theories and representatives' principles have been proposed by Smith (1999) which are behaviourism, cognitivism, humanism and constructivism. According to Zaibon and Shiratuddin (2010), mobile game-based learning should have the following characteristics of learning theories as shown in Table 3 and the advantages of implementation in Table 4.

Table 3: Characteristic of Mobile Game-Based Learning Theory

Behaviourism
• State objectives and break them down into steps. • Provide hints or cues that guide players to desired behaviour. • Use consequences to reinforce the desired behaviour. • Provide good feedback and response to the players.
Cognitivism
• Organize new game information. • Link new game information to existing knowledge. • Use techniques to guide and support learners' Attention, Encoding, and Retrieval process. • Provide good screen design, interface and navigation. • Supply variety of game resources for choices and game options. • Provide adventures storyline and game play.
Constructivism
• Pose good problems -realistically complex and personally meaningful. • Create group learning activities. • Model and guide the knowledge construction process. • Offer different types of game levels, game play, and challenges.

Table 4: Advantages of Learning Theory in Mobile Game-Based Learning

Behaviourism
• Behaviourism provides the concept of repetition & reward. • The player practices in a game through repetition while receiving rewards after each proper response.
Cognitivism
• Cognitivism attempts to build intrinsic motivation by integrating learning and game experience. • Player engages in a discovery process through a game experience that integrates learning and play akin to the limitations and potentials of the human mind.
Constructivism
• Constructivism provides game challenges that offer player to solve problem in the game environment. • Challenges can be solved through player's experiences in previous game level.

Behaviourism is known as a paradigm that considers learning to be produced by stimulation and reinforcement (Wu, Chiou, Kao, Hu, & Huang, 2012). Cognitivism in other hand, reflect learning to be simpler than stimulation and reinforcement but involve thinking (Moore & Fitz, 1993). Finally, in constructivism, learning is considered to be an active process of constructing knowledge instead of acquiring it (Kettanurak, Haseman, & Ramamurthy, 2001).

2.5 RELATED WORKS

The proposed game objective is to educate young adults aged 15 to 24 about online banking fraud and security threats issues. By default, there are few existing games that are quite similar to the proposed project. In this stage, research element is crucial to compare the differences among available resources with the proposed BFG. Table 5 below summarizes the key points of games comparison.

Table 5: Comparison between Existing Fraud and Security Threat Games

Games	Fraud Bingo Game	Phishing Scams Game
Scope	Definition of fraudulent activities	Phishing scams on financial literacy
Instructions	Pass out game cards, which contain answer to the fraud questions that the trainer will draw at random and call out corresponding to the five letters in the word F-R-A-U-D.	Simply read the questions and answer each of the questions by click on corresponding answers given.
Level of Exposure on fraud and security threats	Low -Absent of visual elements. -Absent of behaviourism, cognitivism and constructivism theories.	Medium -No emphasize on learning by doing action and see the cause and effect of the action. -Absent of behaviourism and constructivism theories.

F	R	A	U	D
Dumpster Diving	Credit Report	Shred	Medicare	Truth In Lending Act
Securities & Exchange Commission	Guide Star	Scam	3 Payments	Pyramid Scheme
Financial Exploitation	Identity Theft	FREE	Sucker List	Deed Forgery
Credit Card Statement	Cosigner	Annually	Living Trust	Call the Police
Skimming	Phishing	Home Equity Loan	Better Business Bureau	Tele-marketer

Figure 5: Fraud Bingo Game

Figure 6: Phishing Scams Game

Based on the previous comparison, proposed BFG has been developed according to the certain criteria as described in Table 6 below.

Table 6: Proposed BFG Criteria

Criteria	**Description**
Scope	Online banking fraud (email scam, phone scam and SMS scam)
Instructions	There are 3 situations that will be explore by the player which are email scam, phone scam and SMS scam. Each situation will undergo 2 levels. Level 1: Player need to identify the characteristic of the received email, phone or SMS before classifying them to the security threats accordingly. Level 2: Players need to identify the email, phone or SMS type first then react to the corresponding fraud received by selecting the right action to avoid fraud attacks. Implication for each action will be shown during the game.
Level of exposure on fraud and security threats.	To develop an effective educational materials, some of the learning theories principles that been used are: 1) Behaviourism: BFG provide real time feedback through interventions when the player clicks to corresponding button. 2) Cognitivism: BFG provide adventure storyline and gameplay as well as good screen design, interface and navigation 3) Constructivism: BFG pose good problems realistically complex and personally meaningful as well as offer different types of game levels, gameplay, and challenges.

CHAPTER 3

METHODOLOGY

3.1 RESEARCH METHODOLOGY

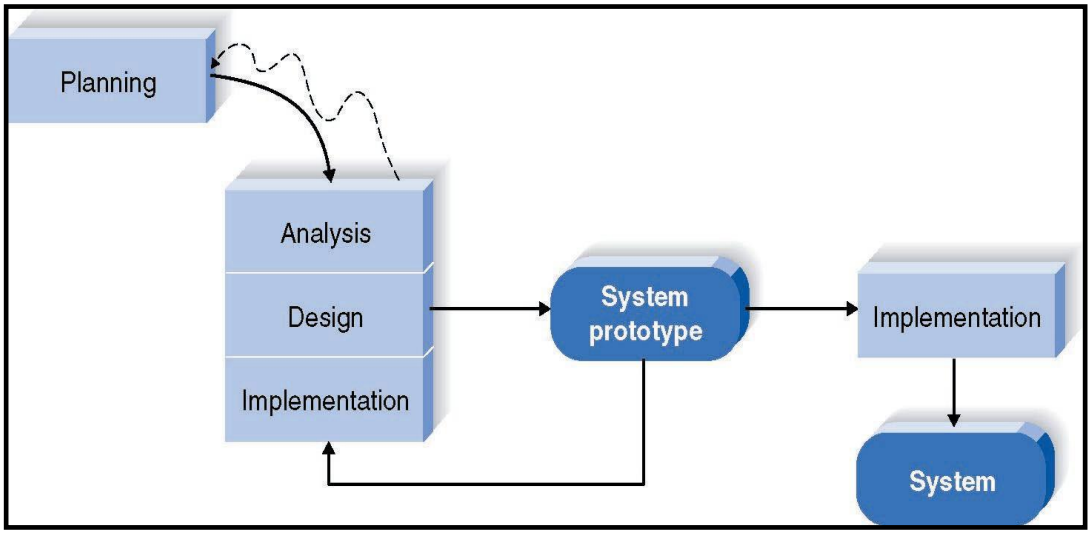


Figure 7: The Prototyping Model

The research methodology for this project will focuses on reviews of books, journals, internet resources, newspaper, t-test, questionnaire and other resources that is useful in developing this project. The chosen model to be implemented is prototype model which the analysis, design, and implementation which will be conducted concurrently until the completion. According to Bowman (2009), this model is useful as it lets the author to ponder a new solution to fix any problems and difficulties to make a few refinements before developing the final result. The process is comprises of five stages which are planning, analysis, design, system prototype (build and test), and implementation.

3.1.1 Planning

In this phase, the author is putting a few problem statements on developing this project and thinks a few reasons why this project should be developed. Then, the author does data gathering and research, looking for information in regards to the project title. The planning activities from this stage used as the baseline to monitor the project progress by stages. A Gantt chart is developed to ensure enough time is allocated for specific task and completed the project according to the time projected.

3.1.2 Analysis

Analysis has been taken based on the objectives of the project which to study the available online fraud related to young adult and their behaviour towards security. Research is the most crucial in this stage in order to analyse the game requirements for end user. Journals, web-site articles, newspapers and books are widely used to find out the solution and strengthen the knowledge about the subject of research. All the related works has been gathered and reviewed in literature review part which aimed to get the importance and benefits of this project.

3.1.3 Design

The BFG flowchart and BFG flowchart has been prepared before proceed to build system prototype stage. Considering the learning theories used in mobile game based learning theory as discussed in Chapter 2, BFG has been design to instil learning elements of online banking fraud to target users.

3.1.3.1 BFG Game Architecture

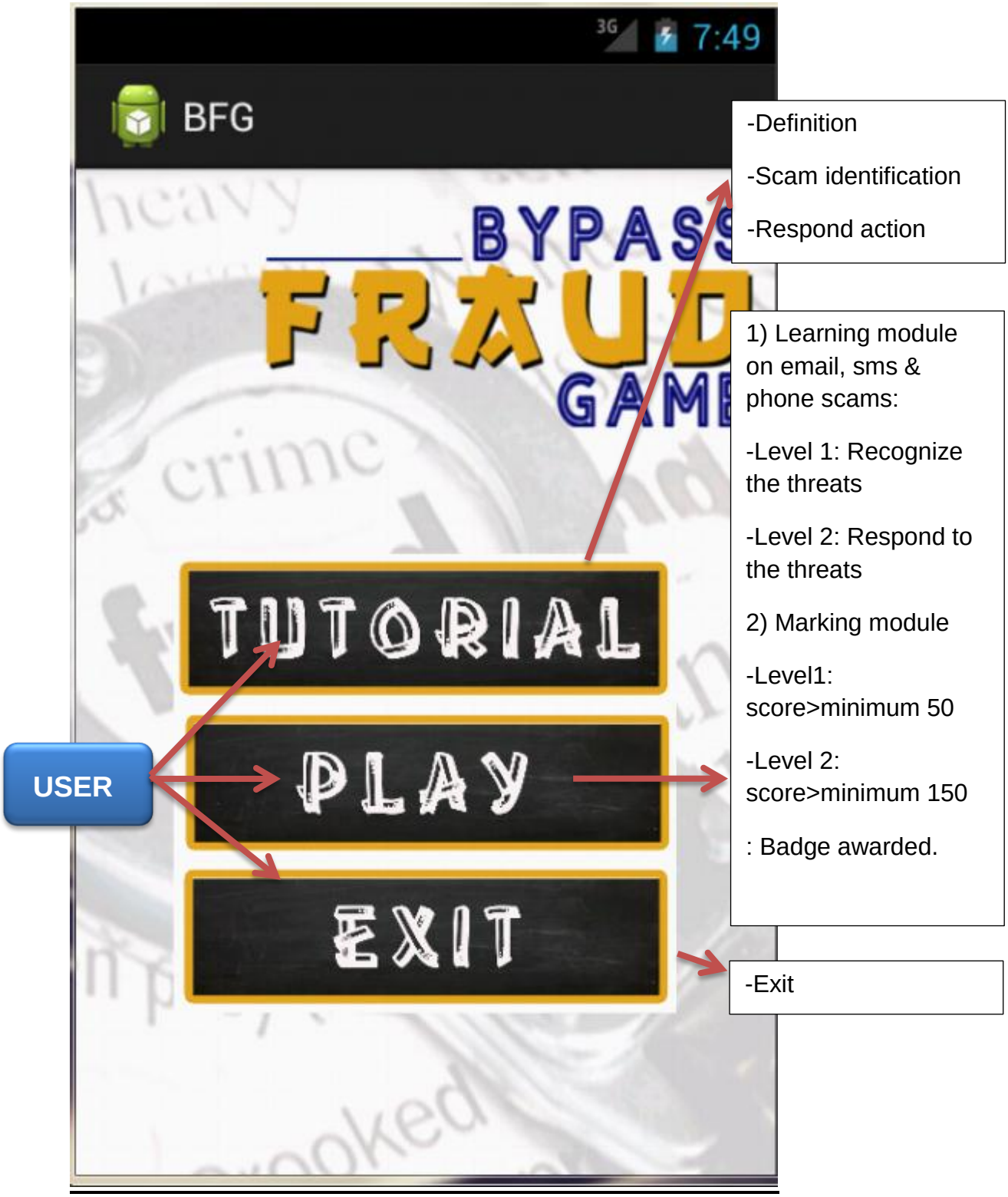


Figure 8 : BFG Game Architecture

3.1.3.2 BFG Flowchart

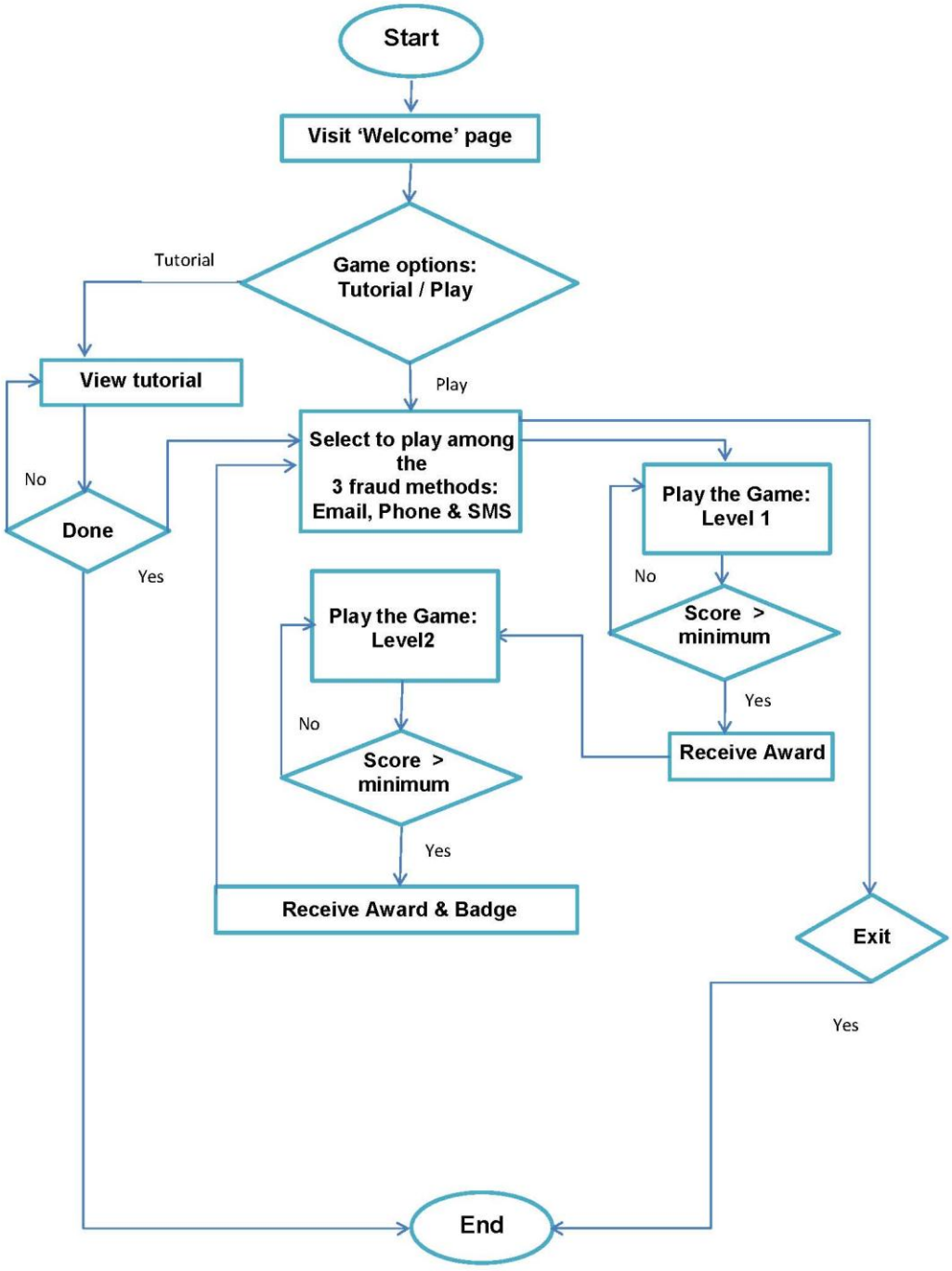


Figure 9: BFG Flowchart

3.1.3.3 BFG Storyboard

A storyboard of BFG was designed to provide a better visual interpretation of the game to be developed. Below are overviews on how the game should be look alike:

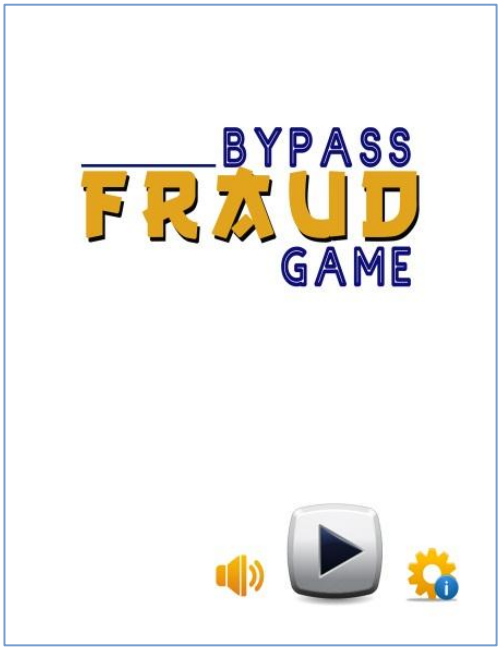


Figure 10: Welcome Page Screen

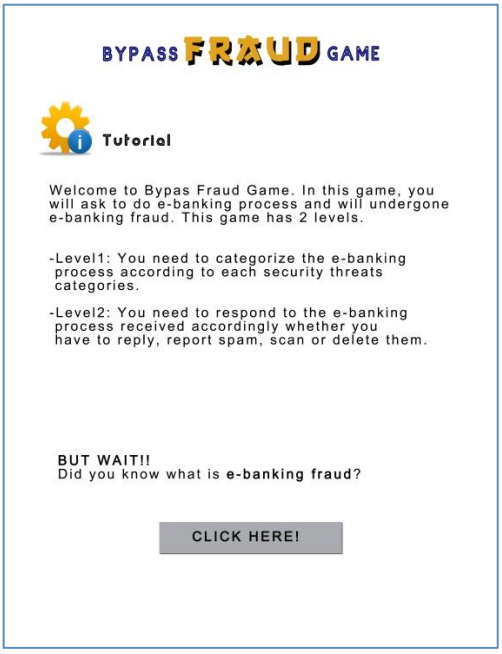


Figure 11: Tutorial Screen

Figure 12: Did You Know Screen

Figure 13: SPAM Tutorial Screen

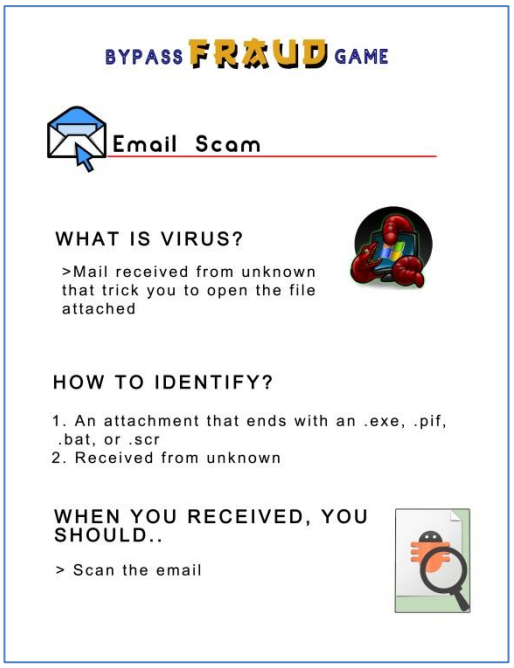


Figure 14: Virus Tutorial Screen

Figure 15: Phishing Tutorial Screen

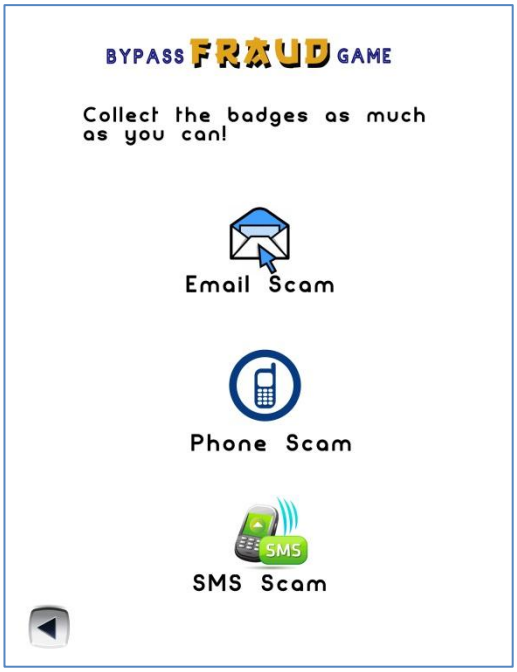


Figure 16: Start Page

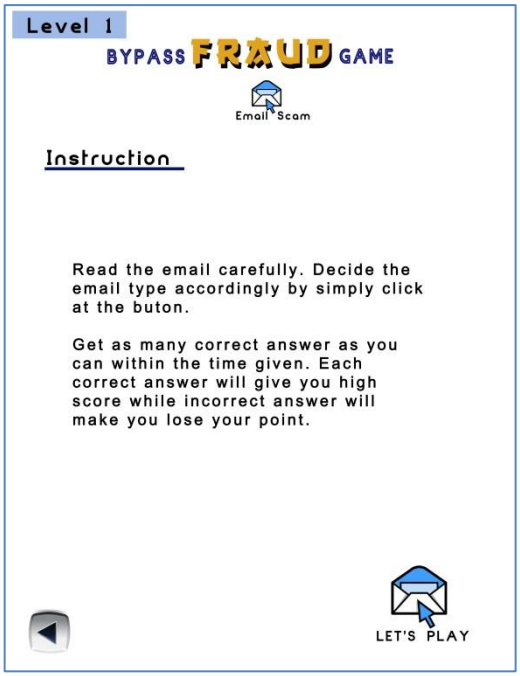


Figure 17: Level 1 Instruction Screen

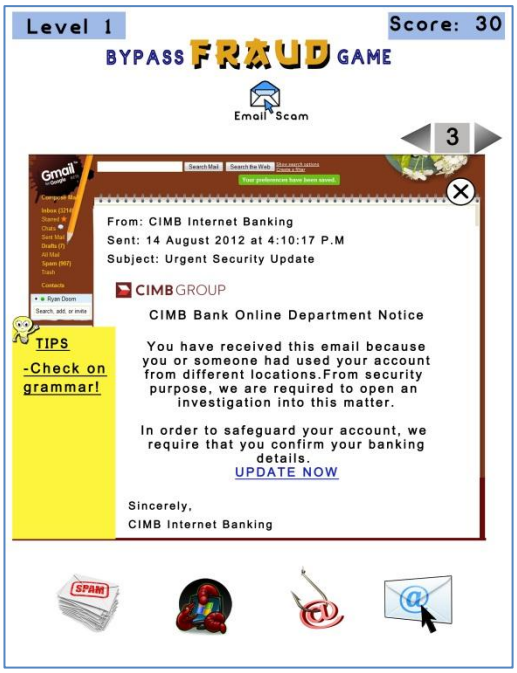


Figure 18: Level 1 Question

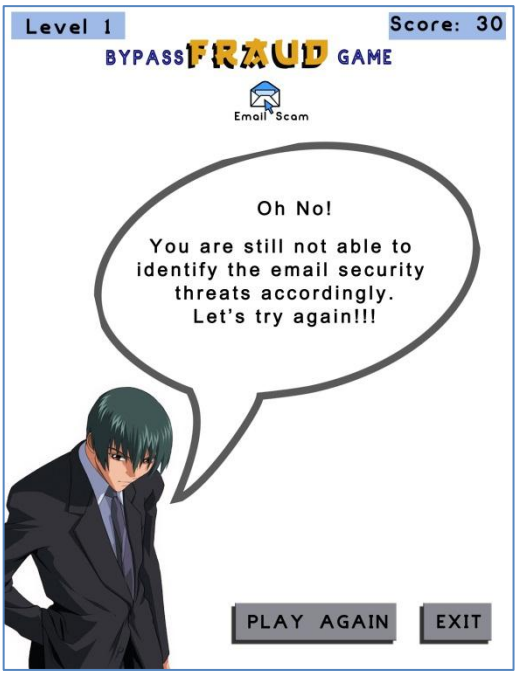


Figure 19: Level 1 Let's Try Again Screen

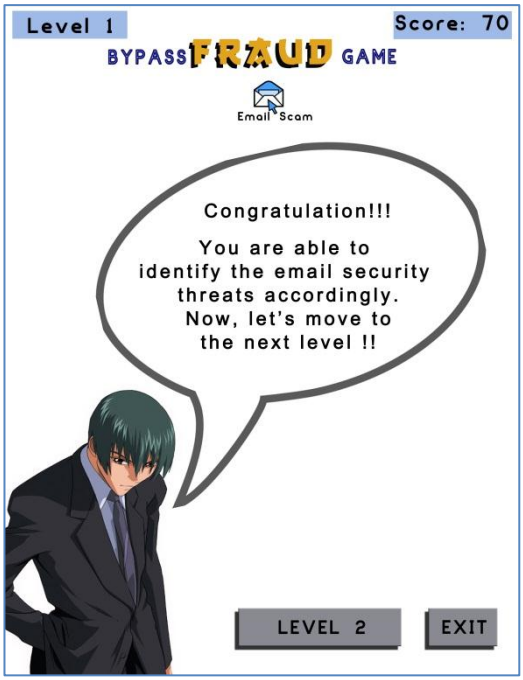


Figure 20: Level 1 Congratulation Screen

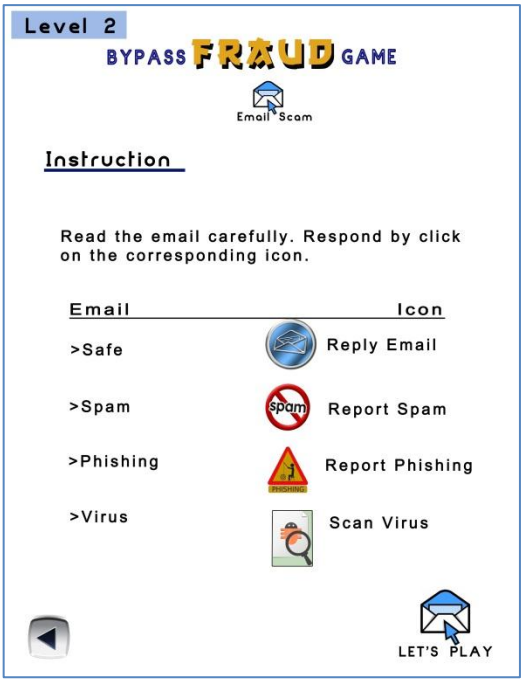


Figure 21: Level 2 Instruction Screen

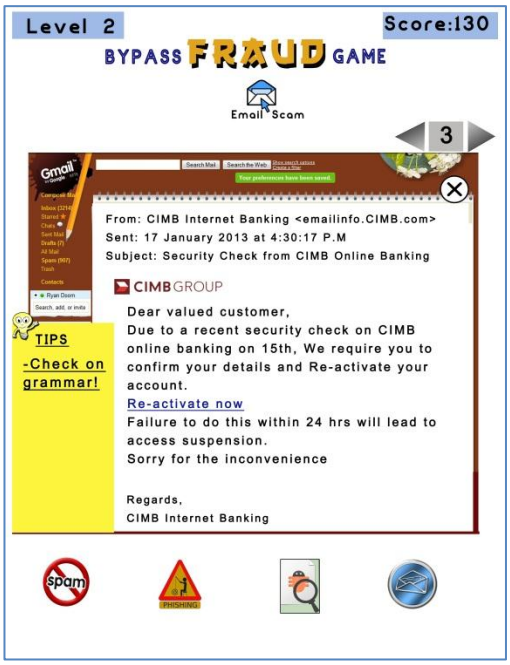


Figure 22: Level 2 Question Screen

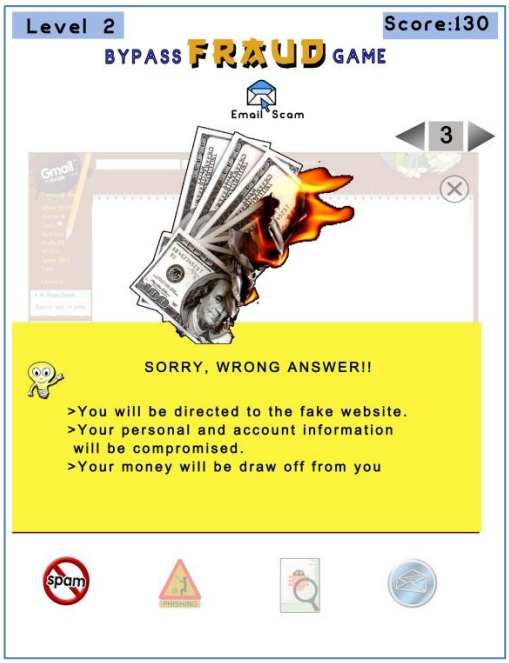


Figure 23: Level 2 Wrong Answer Screen

Figure 24: Level 2 Right Answer Screen

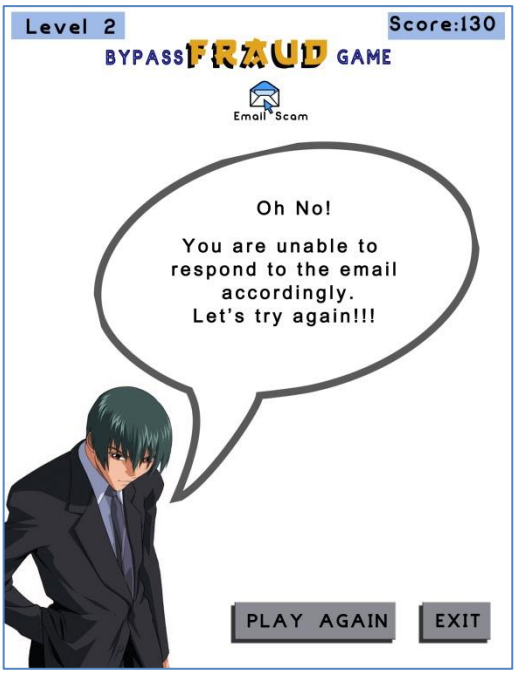


Figure 25: Level 2 Let's Try Again Screen

Figure 26: Level 2 Congratulation Screen

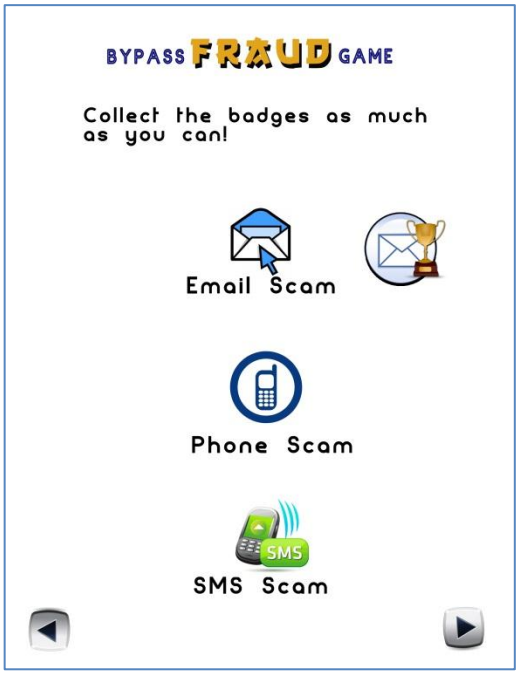


Figure 27: Start Page Screen

3.1.4 System Prototype

This is the stage where the real system or software will be developed. Thus, the author needs to do research on mobile and game development. Android OS smartphone will be used to test the system. The tools such as Eclipse and Android SDK are important to write the java code to develop the project. Realising the importance of graphical user interface, GUI towards the application, the author make another focuses on interesting user interface for the game to develop. This is to capture the end user interest to use it.

3.1.5 Implementation (Testing)

Technology Acceptance Model (TAM) has been developed to investigate and understand the factors affecting the acceptance of the game (BFG). This theory model employed to study the relationship between perceptions such as perceived usefulness (PU) and perceived ease of use (PEOU) of the game and attitude towards usage (ATU) of the game.

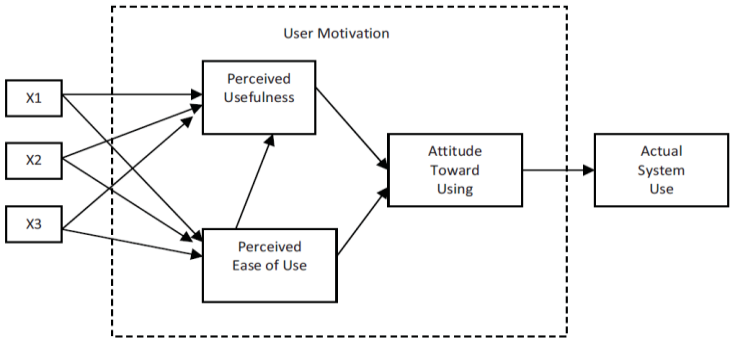


Figure 28: Original TAM proposed by Fred Davis

Figure 28 above shows the original TAM model theory proposed by Fred Davis (1985). In his proposal, he mentioned that there are three factors to explained user's motivation which are PU, PEOU and ATU. ATU is the major determinant of whether the game will be accepted or rejected by the user. While ATU is influenced by two major factors which are PU and PEOU and PEOU have a direct influence on PU. Finally, both these factors were assumed to be directly influenced by the game design characteristics which represented by X1, X2, and X3 in the figure above.

TAM model may help to analyse the reasons for opposition toward the game and would further enable author to take efficient measures to improve user acceptance of the game. Davis (1989) mentioned that there are two purposes in evaluating system which are:

1) To predict acceptability
2) To diagnose the reasons resulting in lack of acceptance and to take proper measure to improve user acceptance

PU is defined as the degree to which an individual believes that using a BFG game could enhance his or her understanding in the course, whereas PEOU refers to the degree to which an individual believes that using the game would be free physical and mental effort. Bandura (1982) then support the use of TAM model as it shows the importance of considering both PU and PEOU in predicting behaviour.

3.2 PROJECT ACTIVITIES

The first start to develop this project is by doing a few researches, theoretical reading and collecting data that is relevant to strengthen the knowledge and understanding about the project. In order to build the application, Mobile application inventor which is known as Eclipse will be taken as the platform. Thus, the author put some effort to familiarize with Android application development. There are also several activities done to ensure relevancy of the game built to the user.

a) T-Test Survey

Survey is the most common and direct method to gather information and get respondent feedbacks on the project. The survey had been taken to young adults in the group age 15-24 to get the important information for the development of the game.

b) Information Gathering

The information mostly comes from literature review to understand the fraud action and security threats at first place. Then, the author maximise the usage of internet to gather information for survey as well as research study. Author also had watched a lot of YouTube videos regarding the game development.

c) Discussions

Throughout the project, discussion has been made to some parties mainly with supervisor, young adults and fellow Android developer.

d) Development of the Game

This is the biggest challenge for author to develop the game that match with the young adult's interest. A lot of research needs to be done to study the behaviour of young adults towards game design. Furthermore, the sources from internet and tutorial from YouTube will be needed to build the application.

3.3 KEY MILESTONE

Below are the key milestones that need to be achieved throughout both of the semester of final year project 1 (FYP I) and final year project 2 (FYP II).

Semester 1

Table 7: FYP 1 Milestone

Milestone	Week
Project Proposal	Week 3
Extended Proposal (10%)	Week 6
Proposal Defence (40%)	Week 13
Interim Report (50%)	Week 14

Semester 2

Table: FYP 2 Milestone

Milestone	Week
Progress Report (10%)	Week 4
Pre-Sedex (10%)	Week 10
Dissertation (40%)	Week 13
VIVA (30%)	Week 14
Technical Report (10%)	Week 14

3.4 GANTT CHART

Gantt chart is attached in Appendix1.

3.5 TOOLS

3.5.1 Hardware

During this project, Android device such as Sony Xperia SL that run on Android OS v4.03 will be used to test the game that being developed. The device support application that run on Java and can be used to flash any custom Android application that is being used for testing. Before that, personal computer will be used as a platform to develop the system before implement it to the Smartphone.

3.5.2 Software

1) Eclipse
2) Adobe Photoshop CS4
3) Android Software Development Kit (SDK)
4) Google Mail (Gmail) - for survey purpose
5) Windows 7 Home Basic Operating System.
6) Adobe Flash CS4

CHAPTER 4

RESULTS AND DISCUSSION

4.1 ONLINE QUESTIONNAIRE SURVEY

4.1.1 Method

Questionnaire survey is the most common and direct method to gather information. According to Kothari (2009), this technique involves a number of questions printed or typed in a definite order on a form. Nowadays, with the internet penetration on market research makes the online questionnaire survey as one of the most viable options. This is because of greater reach participants, offer confidentiality and the participants can do survey at their own convenience.

The objective of having out a survey is to find out particular information from research questions set in a questionnaire. Besides that, it is one of the cheapest and most feasible ways of gathering data. It is important to design the questions to be cleared, pleasant to eye and easy to understand as there is no one to explain the meaning of questions to the respondents (Kumar, 2010)

The approach used to deliver the online questionnaire survey is by sent it to the targeted participants through email and social network.

4.1.2 Questionnaire Result

In order to meet one of the objectives of this project, online survey had been done to evaluate the behaviour of young adults towards online system security. This survey is given out through email and social network to 40 respondents. Below are the demographic analysis and key findings from the survey.

4.1.2.1 Demographic Analysis

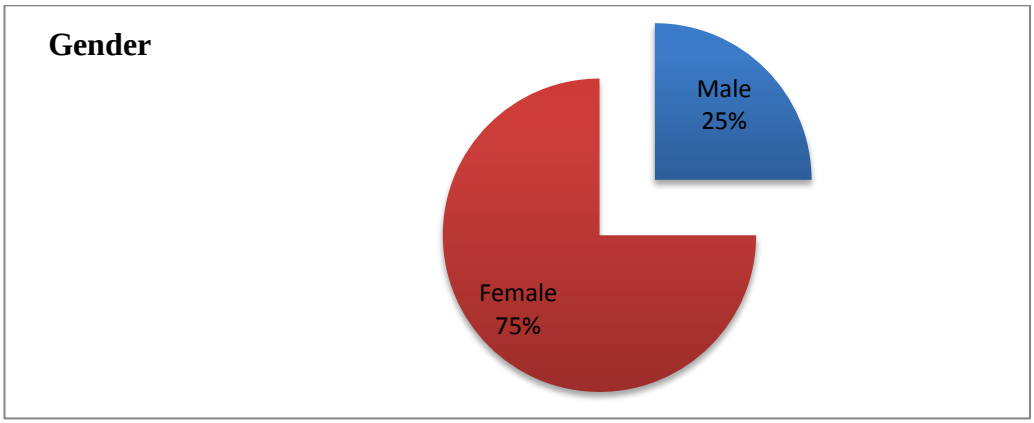


Figure 29: Gender

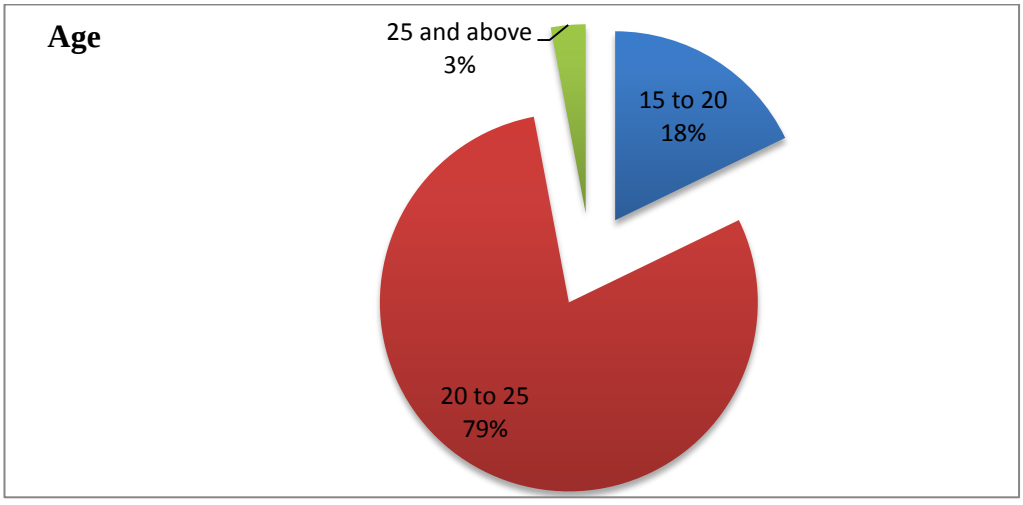


Figure 30: Age

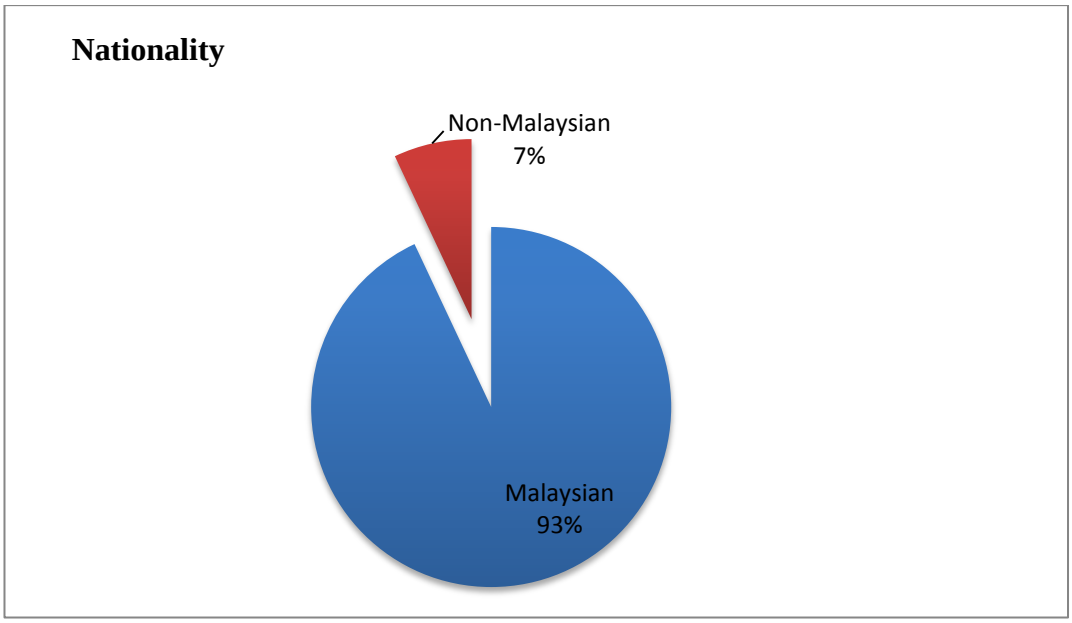


Figure 31: Nationality

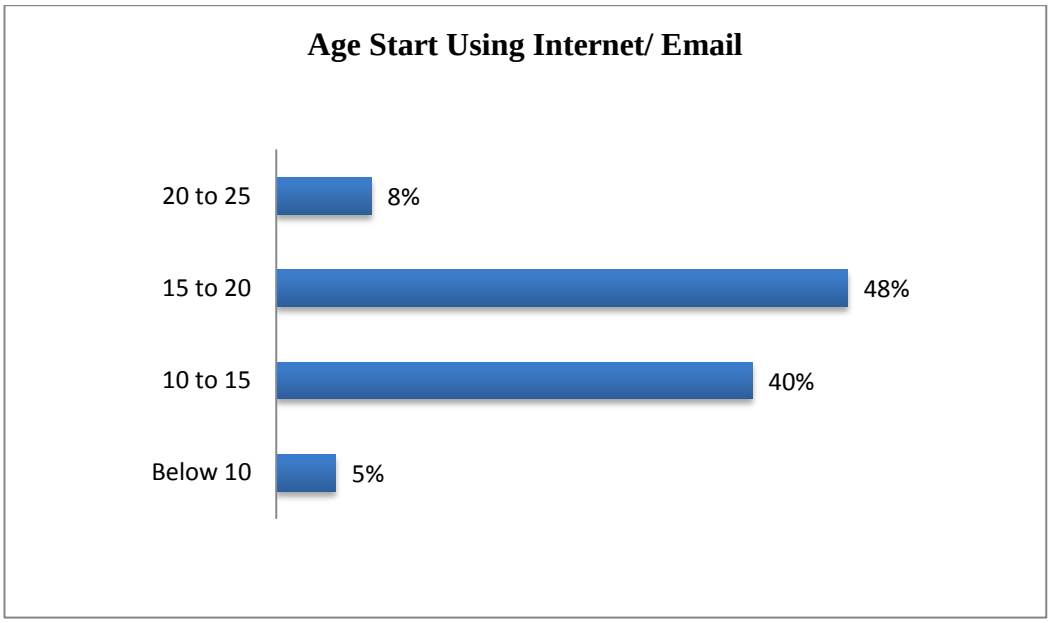


Figure 32: Age Starts Using Internet/Email

4.1.2.2 Key Findings

First Question:

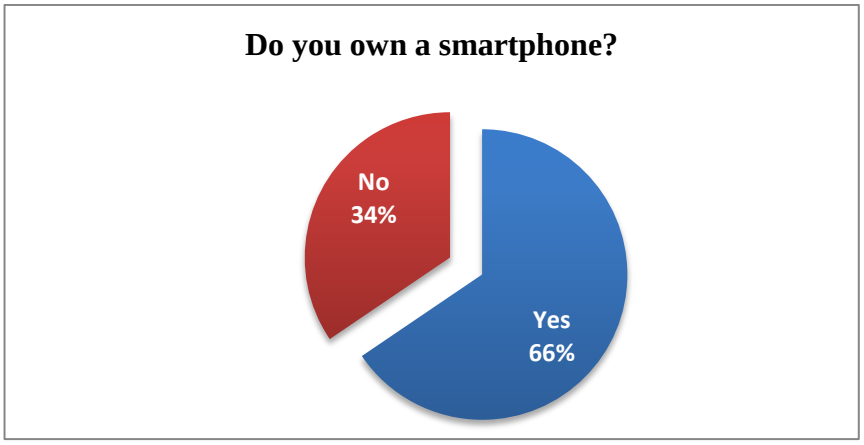


Figure 33: Survey Question1

This question is basically to know the percentage of users that use smartphone and the relevancy of developing the game through mobile. From the graph, most of the respondents use smartphone and it is a good sign for the author to develop the game through mobile.

Second Question:

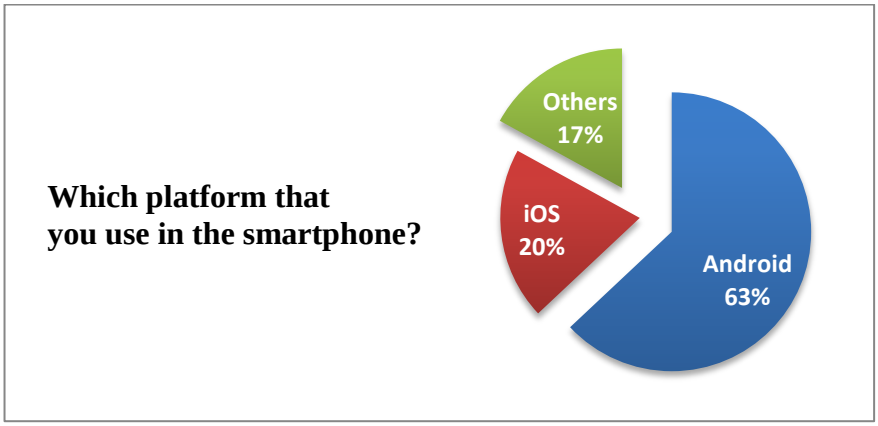


Figure 34: Survey Question 2

The second question is basically to know the smartphone usage statistics for the most popular smartphone platform (OS) that being used. Most of the respondents are using Android Smartphone because of its features and platforms.

Third Question:

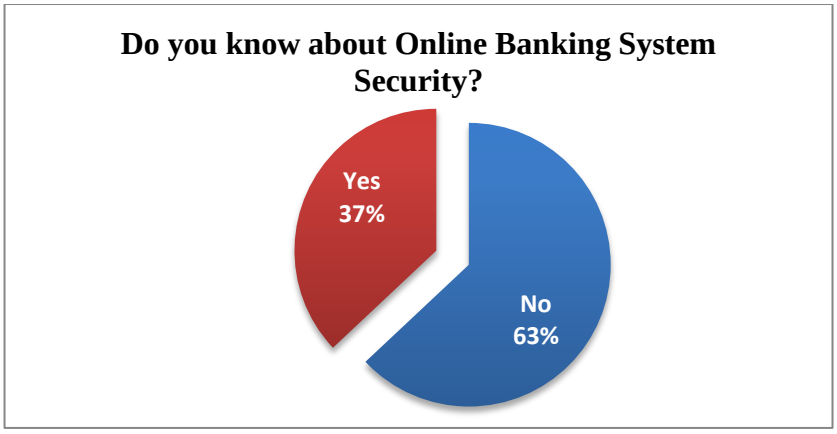


Figure 35: Survey Question 3

The figure above shows the awareness of respondents about online banking system security. Most of the respondents are less aware about the existence of system security in online banking. Thus, there is a necessity to educate them on the system security of online banking to avoid them from being attacks by fraudulent activities.

Fourth Question:

Figure 36: Survey Question 4

Based on figure 36, 35% of the respondents have been the victims of online banking fraud at least once in lifetime. This shows that there are possibilities of 2/3 of people for at least once in life exposes to become a victim of online fraud.

Fifth Question:

Figure 37: Survey Question 5

The purpose of this question is to know how concerned are them to become a victim of online fraud. As noted in figure above, majority of them are very concerned and eagerly to avoid themselves from becoming a victim of online fraud.

Sixth Question:

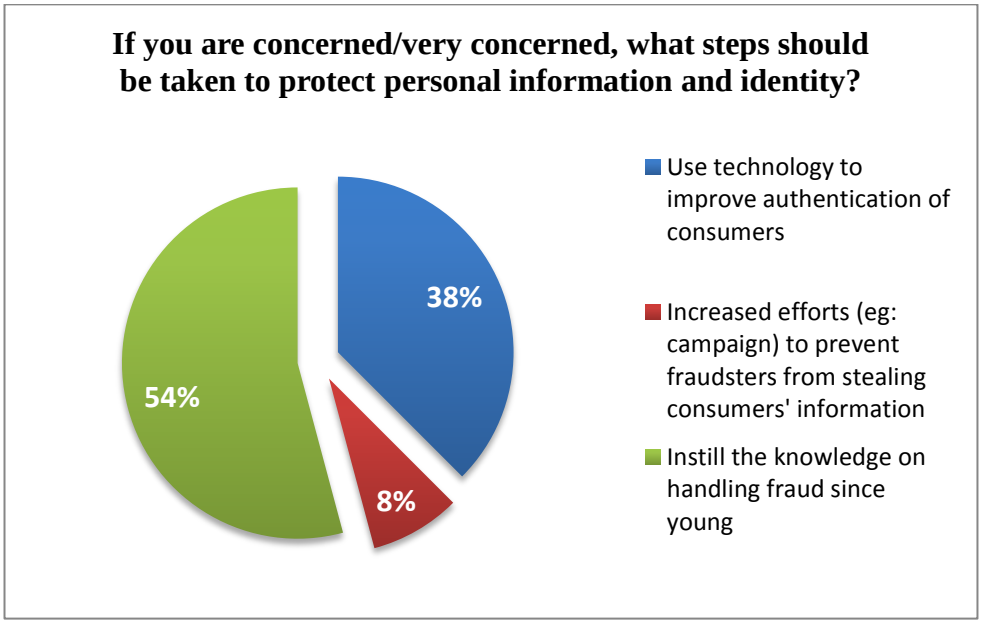


Figure 38: Survey Question 6

As noted in figure 38, majority of the respondents believe that the best precaution methods to decrease the number of internet fraud victims is by instil the knowledge on handling fraud since young. This had support the game's objective which to educate young adults on internet fraud and security issues.

Seventh Question:

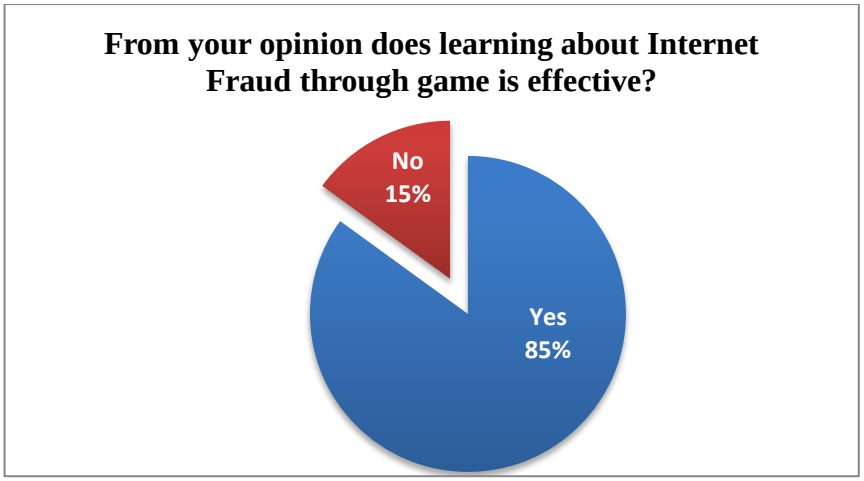


Figure 39: Survey Question 7

The last question is basically to know their respond regarding the main idea of the project which to develop mobile game that educates young adults on the internet fraud security. Majority of them agree that this project is relevant and should be developed.

4.2 IMPLEMENTATION OF GAME STYLE IN MOBILE GAME-BASED LEARNING

The game style used by author is simulation style which is widely used in edu-gaming and game-based learning that focuses on intertwining learning and gaming.

Theory 1: Simulation Game Style

Principle: Game that attempts to replicate particular situation in real life in the form of game for various purposes such as training, analysis, and prediction.

Design:

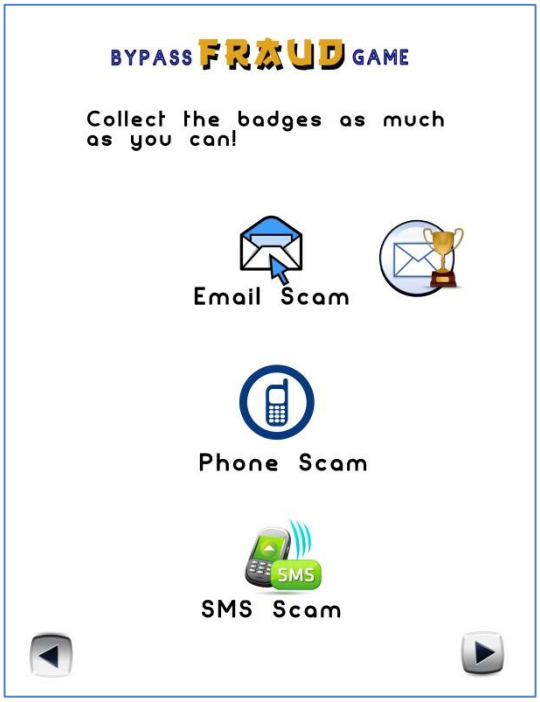


Figure 40: Simulation Game Style design theory: Types of Fraud

This theory is chosen because it able to trigger the participants' problem solving ability as it allows them to experience the scientific discovery process which are hypothesis generation, experiment design and data interpretation. Therefore, this game simulates the online banking environment. Based on figure 40, the users will face 3 types of frauds that exist in online banking which are email scam, phone scam, and SMS scam.

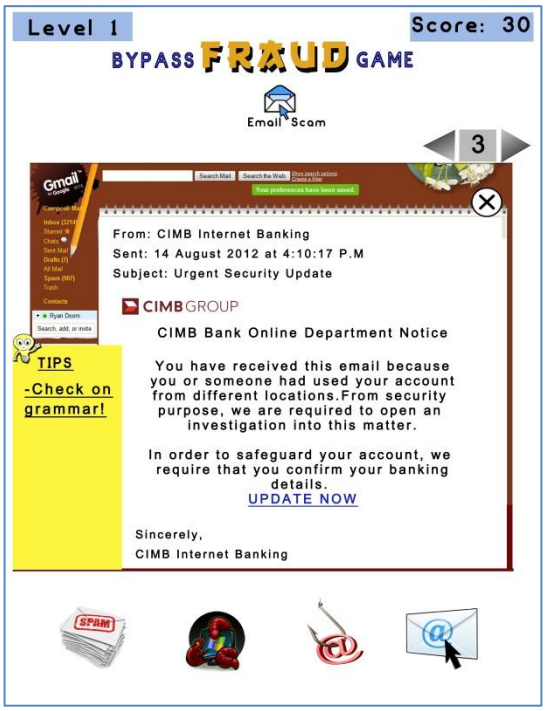


Figure 41: Simulation Game Style design theory: Level 1 Question

Figure 41 above illustrates the sample question for email scam in level 1 which simulates the real email scam received by user. Then, the user need to categorize the email with its respected threats provided. While experiencing the game world, this theory is believed could make the users become active participants in learning process by exploring and manipulating objects in order to test their hypothesis (Kiili, 2005).

4.3 IMPLEMENTATION OF LEARNING THEORIES IN MOBILE GAME-BASED LEARNING DEVELOPMENT

Bypass Fraud Game is aimed at educating the available online banking fraud and challenging knowledge capabilities of the players on how to respond towards the fraud attacks. In order to develop an effective educational material, some of famous learning theories principles have been adapted in BFG development process which is behaviourism, cognitivism and constructivism.

Theory 1: Behaviourism

Principle:

1. Provide hints that guide players for playing

2. Use desired consequences to reinforce the behaviour

Design:

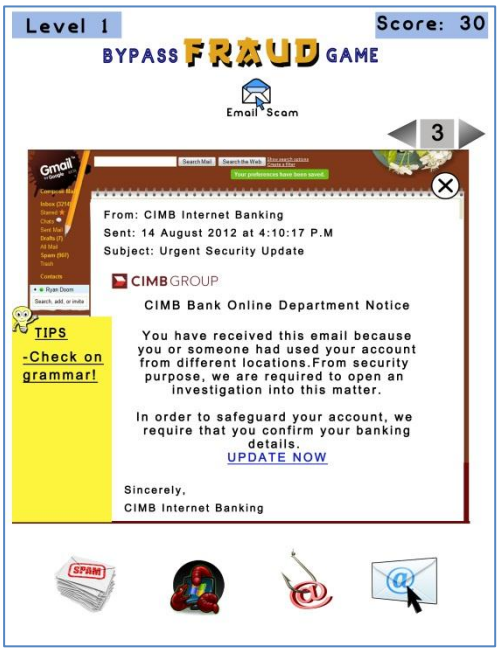


Figure 42: Behaviourism Theory (a)

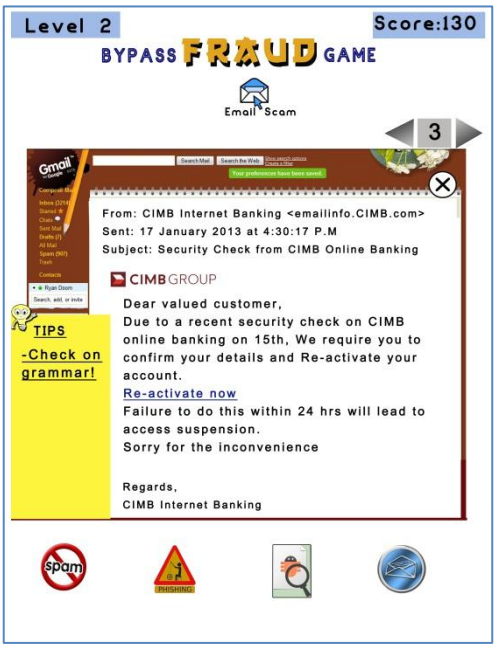


Figure 43: Behaviourism Theory (b)

Hints, tips and manuals are examples of guidance strategies which should be provided in a game. For example in figure 42 and 43 above, tips are given to guide the player throughout the game. Besides that, this theory provides the concept of repetition and rewards. Figures above demonstrate the concept of repetition where the players will start from nothing and then his behaviour is shaped through reinforcements. As example of email scam in figures above, player is asks to identify the characteristic of the received emails before classifying them to the email security threats accordingly in level 1. After certain score point, player will continue to level 2 but if not succeed, player is given another chance to play again. In level 2, with the understanding of characteristics of the received emails gain in level 1, player will be asks to identify the email type first, and then react to the corresponding email

received. From here, we can challenge the understanding and knowledge capabilities of the player.

3. Provide good feedbacks and response to the players.

Design:

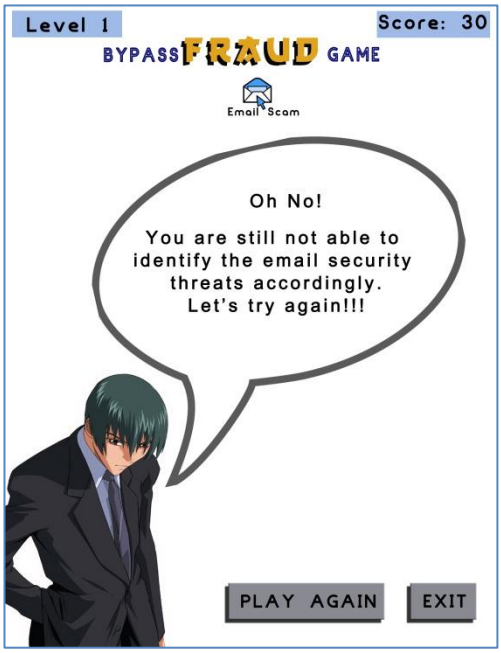


Figure 44: Behaviourism Theory (c)

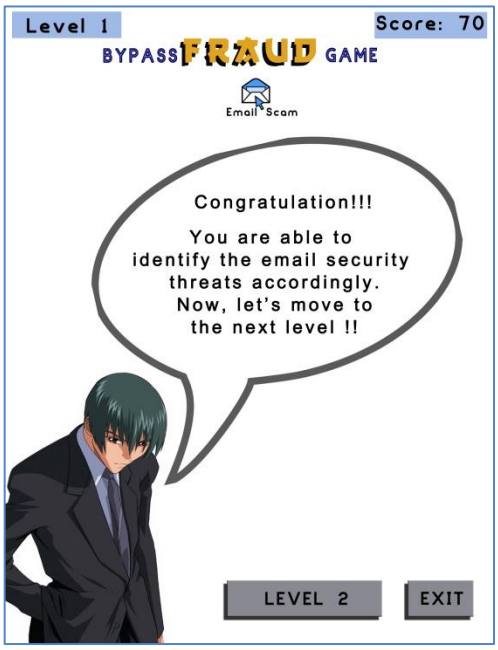


Figure 45: Behaviourism Theory (d)

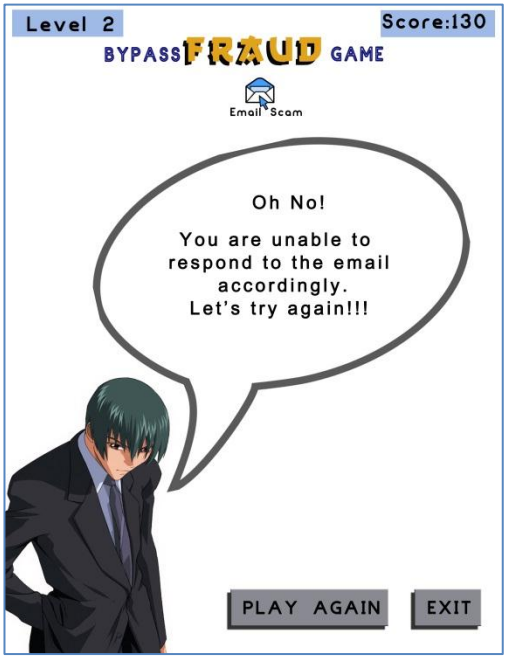


Figure 46: Behaviourism Theory (e)

Figure 47: Behaviourism Theory (f)

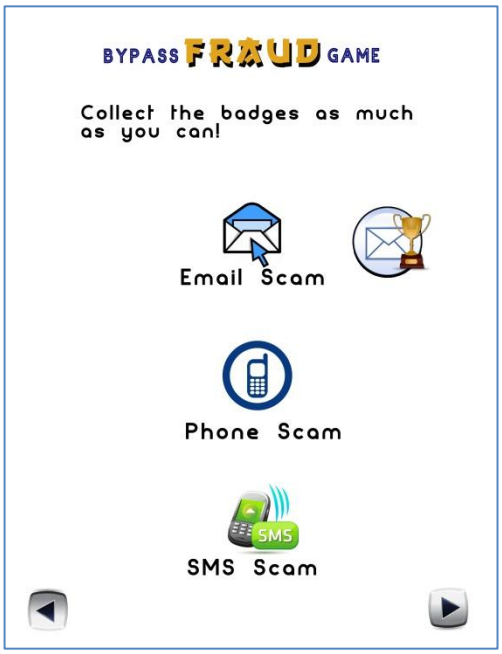


Figure 48: Behaviourism Theory (g)

This theory states that when a correct response and feedback is demonstrated, learning will occurs. Therefore, it is important to provide a good feedback in a game which can be in scores and rewards forms. By default, the score is zero at the beginning of the game. For any correct question answered by the player, the score will be increased by 20 points. However, if the answer is wrong, the score will be deducted 10 points. The score is updated along the way the player plays the game. For level 1, the player needs to answer 5 questions. If the accumulated score is lesser than 50, the player is given another chance to play again. Otherwise, the player will continue to the next level. The accumulated score from level 1 will continuously update in level 2. The player need to score higher points more than 150 to get badge reward. If not, the player is given opportunity to play again which can boost the motivation to explore the online banking fraud issues carefully. At the end, as shown in figure 48, the player can collect as much as badges reward at each of the fraud categories (email scam, phone scam and SMS scam).

Theory 2: Cognitivism

Principle:

1. Provide good screen design, interface and navigation

Design:

Figure 49: Cognitivism Theory (a)

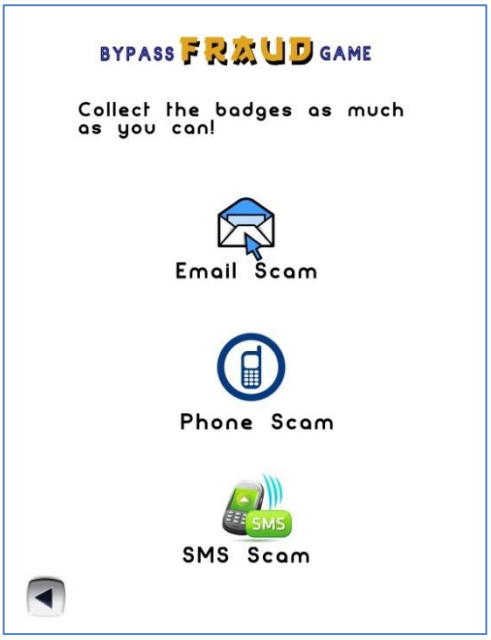


Figure 50: Cognitivism Theory (b)

The above screen shot figure 49 shows the game introduction interface of BFG mobile game based learning. At the beginning, when the game is loaded, the introduction screen is put on view. Player then can start to play the game by pressing start button or selecting other options for tutorial instructions. The game will start at the main start of online banking fraud situation. Figure 50 shows the main start of online banking fraud situation. The situation simulates real online banking frauds which are email scam, phone scam and SMS scam. When the player enters the situation for example email scam, a list of email will be displayed which shows the fraud emails, then the player need to solve the problem. Each situation has 2 levels that need to be accomplished in order to get the badges. Based on figure 49 and 50 above, BFG provides simple screen design, interface and navigation to successfully running in mobile devices. In cognitivist perspective, a simple screen design, interface, and navigation will help to gain attention which could support the transferring, remembering and recalling knowledge process in learners' memory.

2. Provide adventures storyline and game play.

Design:

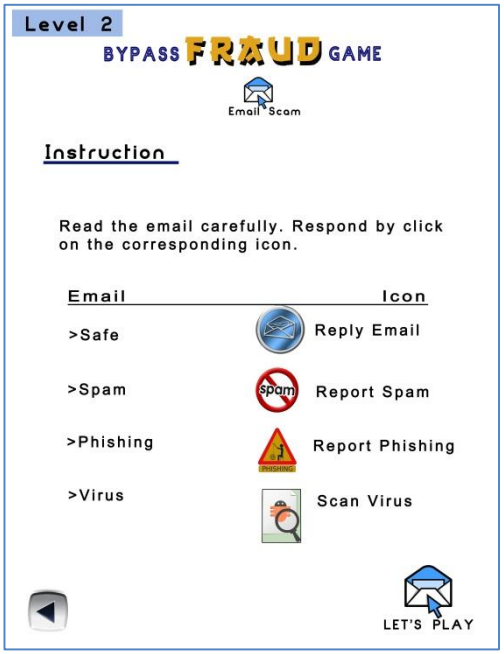


Figure 51: Cognitivism Theory (c)

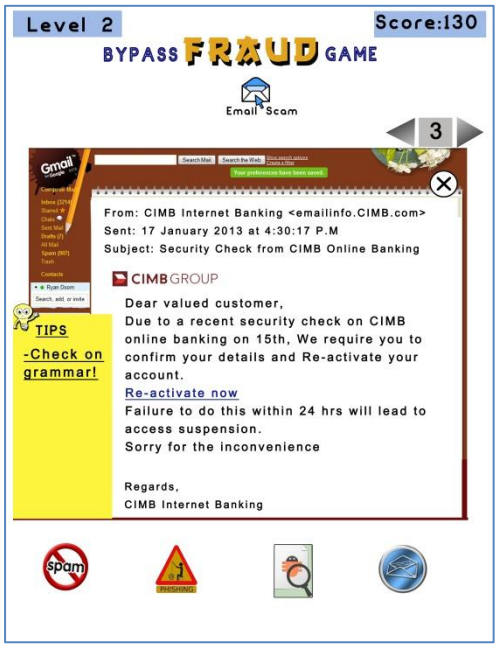


Figure 52: Cognitivism Theory (d)

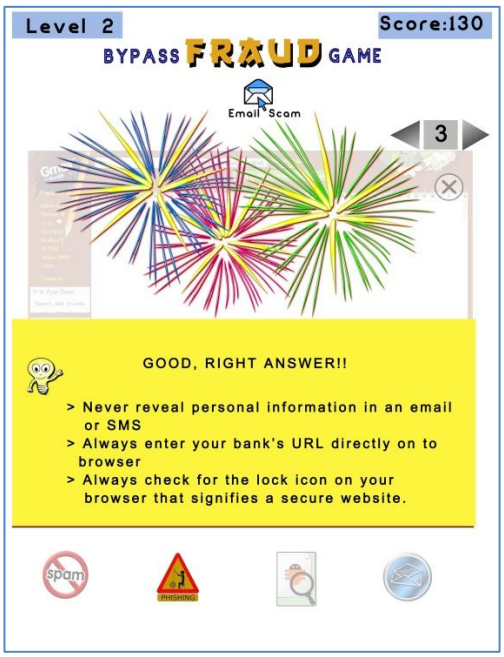


Figure 53: Cognitivism Theory (e)

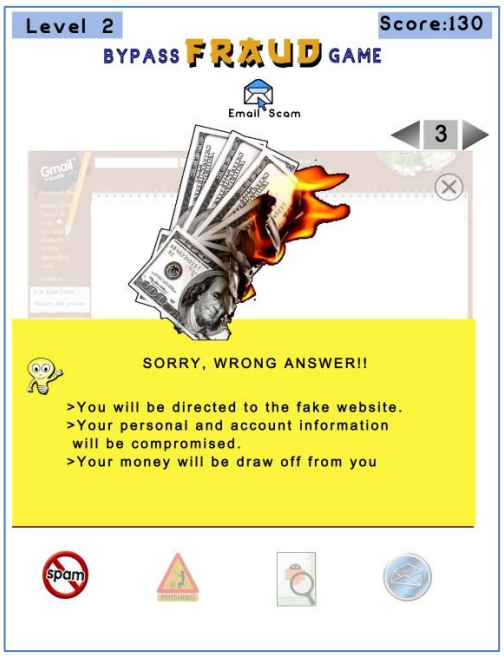


Figure 54: Cognitivism Theory (f)

Figure 51, figure 52, figure 53 and figure 54 above show the storyline of email scam in level 2. Cognitivism theory is focussing on the inner mental activities of the human mind and this theory is necessary to understand of how people are actually learnt (Kettanurak, Haseman, & Ramamurthy, 2001). It is believed that cognitivism attempts to build intrinsic motivation when learning and game experience is joining together. This theory is introduced in the level 2 of the game via the effects of the animation for each decision made by the player. Figure 52 above shows the email scam categories, where the player will receive 5 emails in the inbox. Then, the player needs to identify the email type first before react to the corresponding email received. Here, we test their knowledge understanding to categorized the type of emails received which has been learned in the first level before giving out the correct respond. A firework animation will pop out as a sign for correct answer and a burn out money animation will pop out as a sign for wrong answer. These animations aimed to support the learning understanding of the player as gaining understanding is important in the course of discovery.

Theory 3: Constructivism

Principle:

1. Pose good problems- realistically complex and personally meaningful

2. Offer different types of game levels, game play, and challenges.

Design:

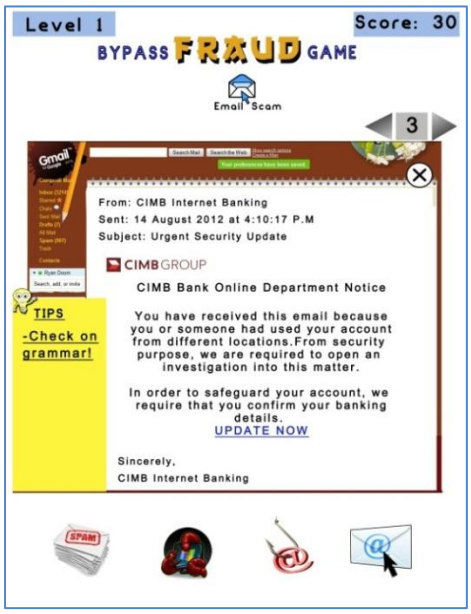


Figure 55: Constructivism Theory (a)

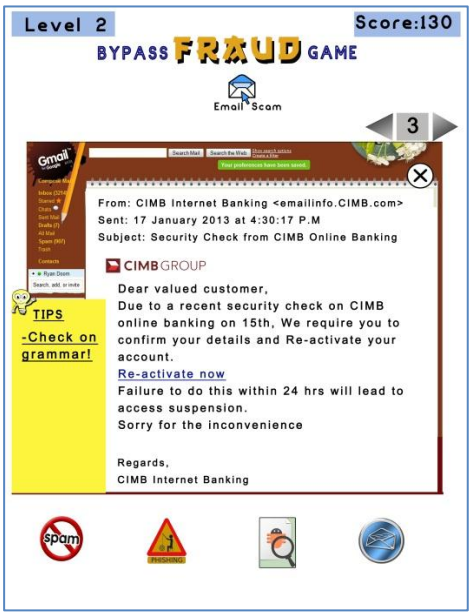


Figure 56: Constructivism Theory (b)

Constructivism theory states that learning is seen as an active process of constructing knowledge rather than acquiring it (Kettanurak, Haseman, & Ramamurthy, 2001). Therefore, the player should be given opportunities to explore and acquire knowledge that they want. This is because knowledge is created based on player's experiences and interactions during the play. Figure 55 and 56 above shows that BFG guides the knowledge construction process by providing real examples of email scam. From there, player is able to understand the characteristic of various online banking frauds and then able to deal with real life situations in the future. This theory also offers great game play and simple challenges by learning online banking fraud types and characteristics faced in different types of game level. The higher is the level, the harder to complete the task. Figure 55 shows the example problem from the first level where the player needs to identify the characteristic of the received email before classifying to the email security threats accordingly. Then,

when move to the next level, as shown in figure 56, the level of difficulties is increased as the player need to identify the type of the email before respond to the corresponding email received. The player will apply his existing knowledge that acquire from the first level. This is a simple way to stimulate recall of prior learning.

4.4 BFG PROTOTYPE

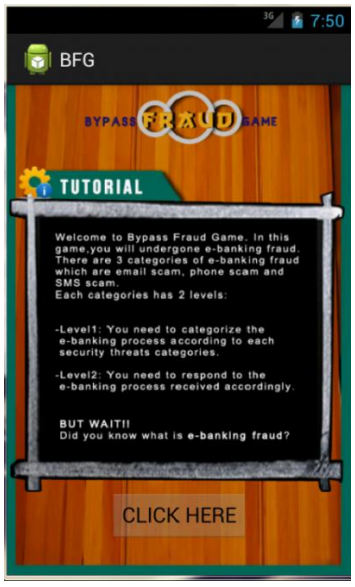
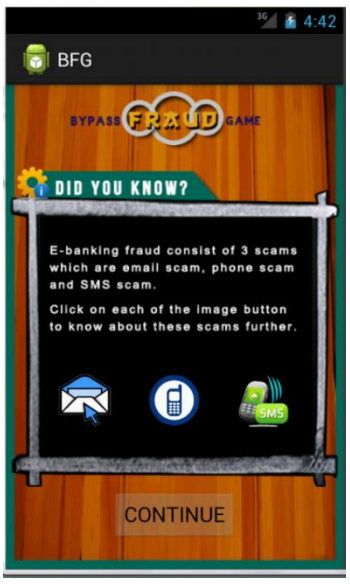
Description	Figure
4.3.1 BFG Welcome Page The player will visit the welcome page when first starting the game as shown in Figure 57. They can choose whether to explore the tutorial by clicking on tutorial button or straight away play the game by clicking the play button.	 Figure 57: BFG Welcome Page
4.3.2 Tutorial Page In this section, the player is given the opportunity to explore and identify the tips and tricks in identifying the e-banking fraud in email scam, phone scam and SMS scam. After exploring all the scams, player may proceed to Start Page by click on the continue button.	 Figure 58: Tutorial Page  Figure 59: Did You Know Page

Figure 60, 61, 62 and 63 shows tutorial on email scam which consists of 3 types of threats which are spam, virus and phishing.

Figure 60: Email Scam Page

Figure 61: Spam Page

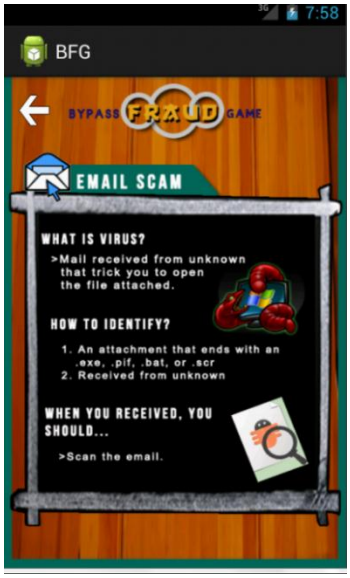


Figure 62: Virus Page

Figure 63: Phishing Page

4.3.3 Start Page

Figure 64 shows the main start of online banking fraud situation. The situation simulates real online banking frauds which are email scam, phone scam and SMS scam. The player needs to accomplish the entire task given in these scams.

Figure 64: Start Page

4.3.4 Level 1 for Email Scam Page

When the player enters the situation for example email scam, a list of email will be displayed which shows the fraud emails, then the player need to solve the problem.

For the first level, the player needs to identify the characteristic of the received email before classifying to the email security threats accordingly. There are 5 situations of emails fraud given as shown in the figure 66, 67, 68, 69, and 70. The player then needs to classify the email received by click on the respective icon based on the email categories.

By default, the score is zero at the beginning of the game. For any correct question answered by the player, the score will be increased by 20 points. However, if the answer is wrong, the score will be deducted by 10 points. The score is updated along the way

Figure 65: Level1 Game Instruction

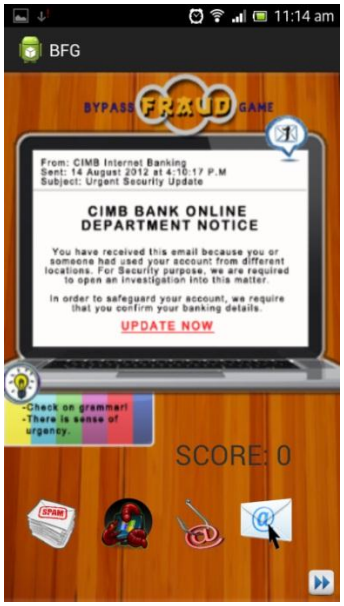


Figure 66: Level1 Question1

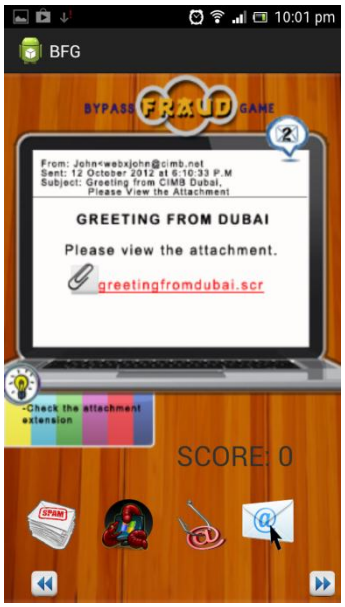


Figure 67: Level1 Question2

Figure 68: Level1 Question3

the player plays the game. For level 1, the player needs to answer 5 questions. If the accumulated score is lesser than 50, the player is given another chance to play again. Otherwise, the player will continue to the next level.

Figure 69: Level1 Question4

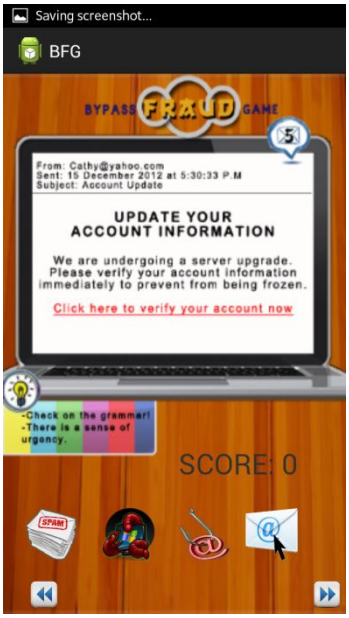


Figure 70: Level1 Question5

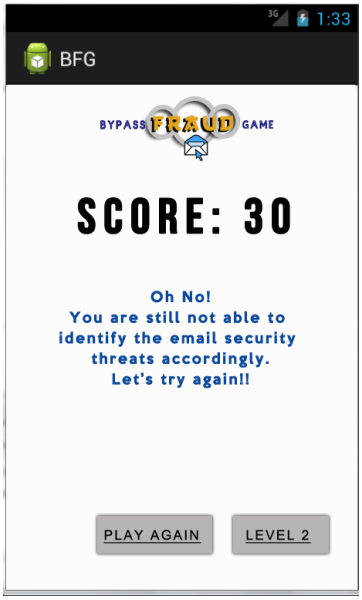


Figure 71: Level1 Try Again Page

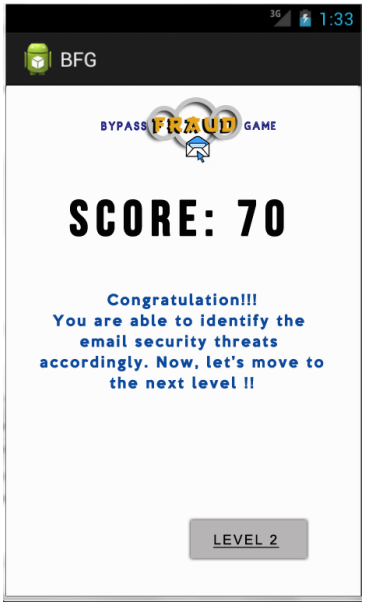


Figure 72: Level1 Congratulation Page

4.3.5 Level 2 for Email Scam Page

In the Level 2, the level of difficulties is increased as the player need to identify the email type first before respond to the corresponding email received. Figure 74, 75, 76, 77 and 78 shows the emails received by the player. The accumulated score from level 1 will continuously update in level 2. As mentioned before, correct answer will get additional 20 marks. The player need to score higher points more than 150 to get badge reward. If not, the player is given opportunity to play again.

In this level, when the player give a wrong answer, a pop up screen will come out with the animation of burn out money effect as shown in Figure 79. While, if the player give a right answer, a pop up screen with the animation effect as shown in Figure 80 will come out.

Figure 73: Level2 Game Instruction

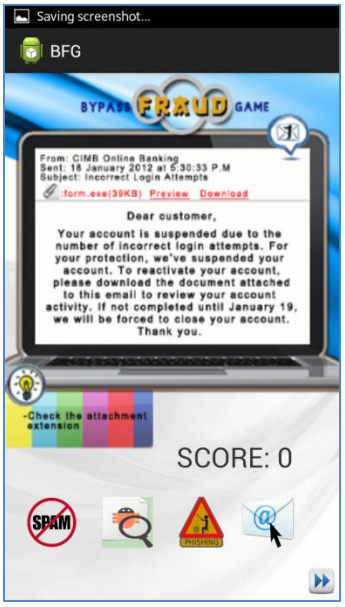


Figure 74: Level2 Question1

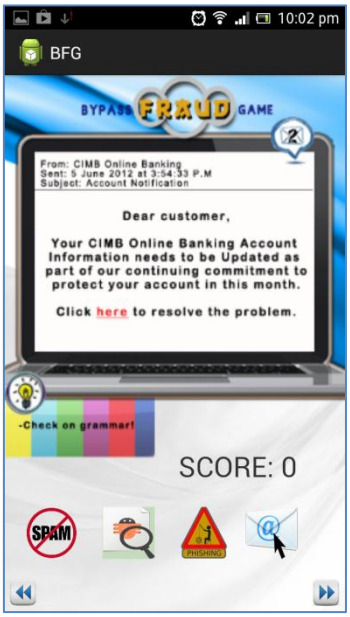


Figure 75: Level2 Question2

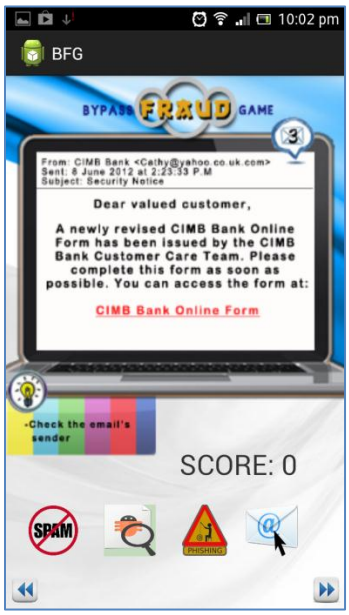


Figure 76: Level2 Question3

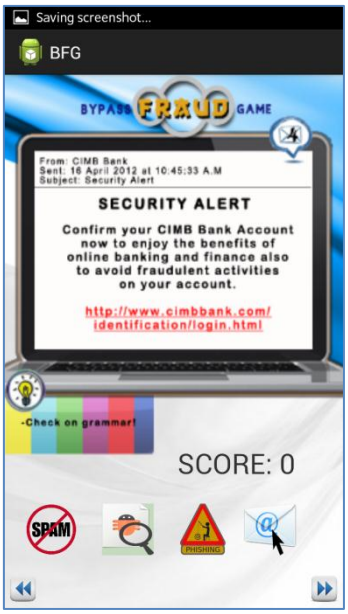


Figure 77: Level2 Question4

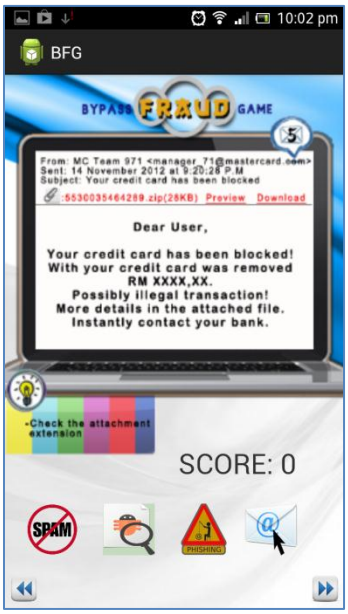


Figure 78: Level2 Question5

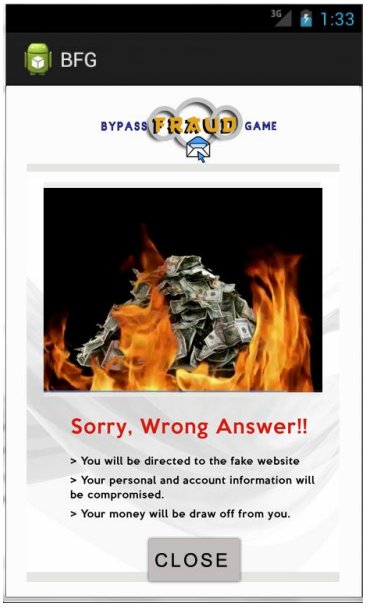


Figure 79: Wrong Answer

Figure 80: Right Answer

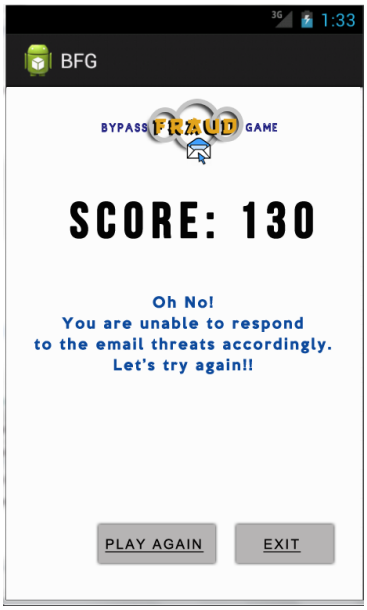


Figure 81: Level2 Try Again Page

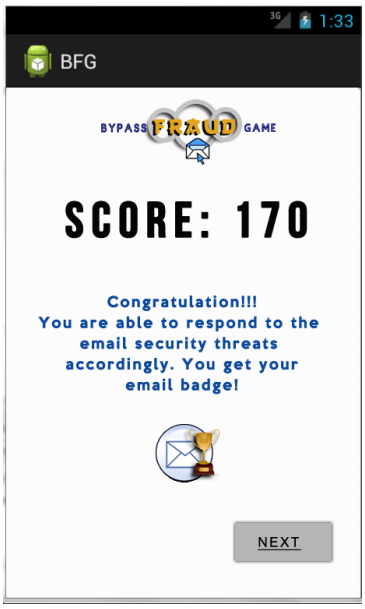


Figure 82: Level2 Congratulation Page

4.3.6 End Page

After the player complete the email tasks, he/she will earn an email badge as a sign of success completion as shown in Figure 83.

The player then will continue playing and explore the next fraud situation which are phone and SMS fraud and collect as much as badges reward upon the completion.

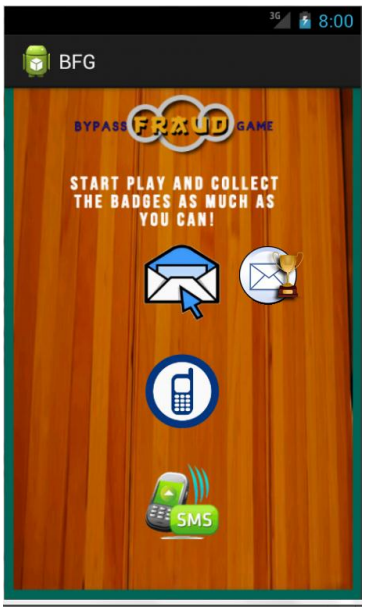


Figure 83: End Page

4.5 BFG TESTING

In order to meet one of the objectives of this project, BFG testing had been done to evaluate the effectiveness on adaption of learning theories in mobile game based learning to educate young adults on the internet banking fraud security. BFG Testing has been conducted by using Technology Acceptance Model (TAM). There are two sections to complete the instrument (See Appendix). Section 1 was designed to identify demographic attributes of the respondents. It contained demographic items such as gender, age and education background. The question in Section 2 were based on prior studies with modifications to fit the specific context of the game usage and subsequently developed from TAM scales, adapted from Davis (1989). In this research TAM model consisted of 15 items that measured perceived usefulness (PU, 5 items), perceived ease of use (PEOU, 5 items) and attitude towards usage (ATU, 5 items). The response scale for all items was a five-point, coded as 5: Strongly agree; 4: Agree; 3: Natural; 2: Disagree; 1: Strongly Disagree.

The sample data consist of 30 young adults aged 15 to 24 with various education background. When conducting the testing, author gave the participants a 20 minute hands-on experience to play with the game and then asked them to rate their perceived usefulness, perceived ease of use and attitude towards usage for the game.

4.5.1 Descriptive Analysis:

The descriptive analyses of the three factors are shown in Table 8. From the table below, we can see that all means are above the midpoint of 3.00 which results in positive acceptance by the respondents. Meanwhile, the standard deviations are range from 0.56 to 1.30.

Table 8: Summary of Data (N=30)

Question	Strongly Agree (5)	Agree (4)	Natural (3)	Disagree (2)	Strongly Disagree (1)	Response Average (Mean)	Standard deviation
Perceived Usefulness (PU)						**4.5**	
Q5	20 (67%)	7 (23%)	3 (10%)	0	0	**4.57**	0.6789
Q6	9 (30%)	18 (60%)	3 (10%)	0	0	**4.2**	0.6103
Q7	14 (47%)	12 (40%)	4 (13%)	0	0	**4.33**	0.7112
Q8	15 (50%)	12 (40%)	3 (10%)	0	0	**4.4**	0.6747
Q10	25 (83%)	3 (10%)	2 (7%)	0	0	**4.77**	0.5683
Perceived Ease of Use (PEOU)						**4.2**	
Q1	10 (33%)	14 (47%)	6 (20%)	0	0	**4.13**	0.7303
Q2	9 (30%)	10 (33%)	7 (23%)	3 (10%)	1 (3%)	**3.77**	1.1043
Q3	12 (40%)	12 (40%)	6 (20%)	0	0	**4.2**	0.7611
Q4	18 (60%)	11 (37%)	1 (3%)	0	0	**4.57**	0.5683
Q11	13 (43%)	10 (33%)	6 (20%)	1 (3%)	0	**4.17**	0.8743
Attitude Towards Usage (ATU)						**4.1**	
Q9	11 (37%)	10 (33%)	6 (20%)	3 (10%)	0	**3.97**	1.1834
Q12	12 (40%)	6 (20%)	3 (10%)	9 (30%)	0	**3.7**	1.2905
Q13	15 (50%)	9 (30%)	6 (20%)	0	0	**4.3**	0.7944

Q14	15 (50%)	13 (43%)	2 (7%)	0	0	**4.43**	0.6261
Q15	11 (37%)	11 (37%)	7 (23%)	1 (3%)	0	**4.07**	0.8684

4.5.2 Key Findings

This research proposes a mapping between some learning theories and approaches to mobile game based learning as it is believe that

4.5.2.1 Perceived Usefulness (PU)

PU is defined as the degree to which an individual believes that by using BFG game could enhance his or her understanding in the course. As shown in table 8 above, average response of 4.5 agrees that BFG game has made them learn on online banking fraud security effectively. This is due to the adaption learning theories in mobile game based learning development. The results conforms to as what had been discovered by Kettanurak, Ramamurthy and Haseman (2001) about constructivism theories as the main contributor toward successful learning process do make people learn effectively as knowledge is created based on learner's experiences and interactions. For example in this game, it guides the knowledge construction process by providing real examples of each email, phone and sms scam. From there, player is able to understand the characteristic of various online banking frauds and then able to deal with real life situations in the future.

4.5.2.2 Perceived Ease of Use (PEOU)

PEOU refers to the degree of ease to which an individual believes that the efforts required in using a system or game can directly affect game usage behaviour. The average response of the respondents on this game is 4.2 which indicate that behaviourism theory is one of the important theories to be adapted in mobile game-based learning. The result follows what had been revealed by Wu et.al (2012) that learning will occurs by stimulation and reinforcement.

4.5.2.3 Attitude towards Usage (ATU)

ATU is defined as individual's positive or negative feelings about performing the actual behaviour during playing with the game. According to table 8, respondents show positive behaviour during play with the game by the average response of 4.1. This shows that BFG is able to keep their interest to do a task in similar way as well as motivate them to use the game. The result adapts the cognitivism learning theory exposed by Kang (2004) which reveal that cognitive process as the main focus for learning resource that can impacted the learning environment. It is believed that cognitivist able to build intrinsic motivation when learning and game experiences is joining together. This theory is introduced in level 2 of game via the effects of the animation pop up for each decision made by the player.

As a conclusion, characteristics in learning theories should be adapted in the development of mobile game based learning. Behaviourism focuses on the reinforcement and control the player by providing good feedback from the game. In cognitivism side, the game should facilitate the support of conveying, remembering and recalling knowledge in player's memory. From constructivism viewpoint, the player should be given chances to discover and attain knowledge they want.

CHAPTER 5

CONCLUSION & RECOMMENDATION

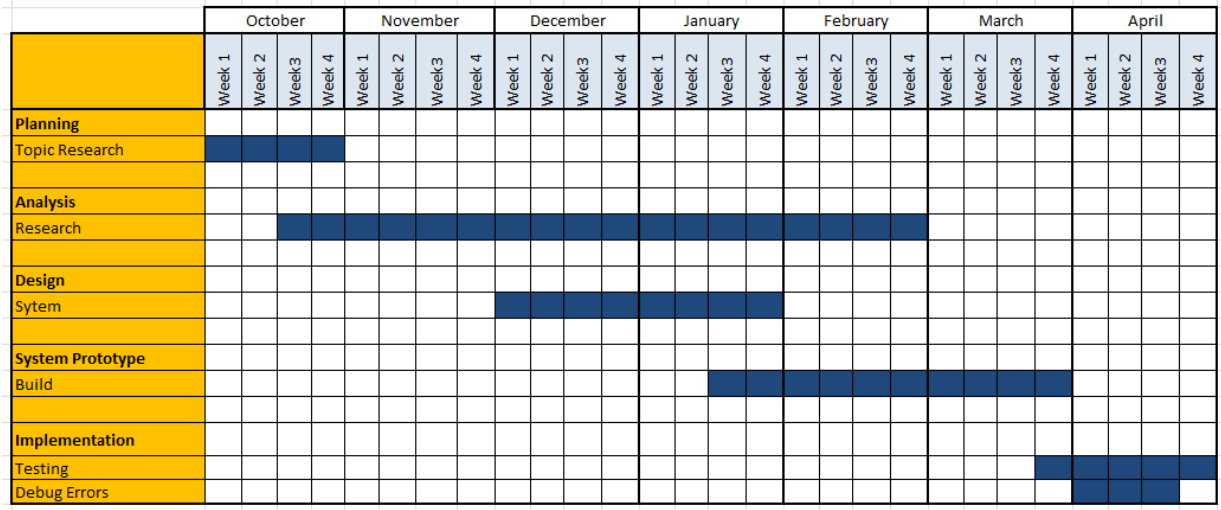
This study proposes a mapping between some learning theories and approaches to mobile game-based learning theories towards the development of Bypass Fraud Game that educate young adults on the online baking fraud security.

There are 3 main objectives that need to be achieved throughout the project. In objective 1, the author wants to identify online banking fraud security issues that related to young adults. This has been achieved through the development of the game at each situation and levels of the game. In objective 2, the author wants to study the behaviour of young adults towards internet system security. This is also had been achieved through the questionnaire survey. Meanwhile in objective 3, the author decides to adapt learning theories in the development stages and was successfully implemented. The effectiveness of the game has been evaluated through the survey question based on TAM theory. Through the feedbacks gathered, several recommendations have been found to be useful for further improvement in BFG.

Future works can be suggested for this study, for example, adapting more learning theories into mobile game-based learning to enhance learning as well as provide interactive animation that could attract users' interest to play the game. As conclusion, BFG is expected to help young adults in identifying the methods deployed by cyber criminals as well as precaution action to prevent from being attack.

APPENDIX

1.1 Gantt chart for the project in 2 semesters



1.2 Survey Question for Testing

SURVEY QUESTION

Upon completion of my project, I'm Roisah Fadhilah binti Saifullah, would like to conduct a survey for my Bypass Fraud Game. The objectives of this survey are as below:

- *To measure the effectiveness of Bypass Fraud Game (BFG) in educating young adults on Online Banking Fraud Security.*
- *To gather feedback on the efficiency of adapting learning theories in Mobile Game-Based Learning development.*

Appreciate if you could answer the questions below.

Please circle or mark the selection that most represents your perspective for the questions. **Please answer the following demographic information:**

Sex: M___ F___

Age (in years): _____

Education Background:_____

To what extent would you characterized Bypass Fraud Game (BFG) as having the ability to:

		Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
1.	I found that the tutorial given is helpful.	1	2	3	4	5
2.	I found that the instruction given during the game is clear and understandable	1	2	3	4	5
3.	Overall, I found the BFG interface is easy to use	1	2	3	4	5
4.	Learning to play BGF would be easy for me	1	2	3	4	5
5.	I know what Online Banking Fraud Security are after playing the BFG	1	2	3	4	5

6.	When playing the BFG, I am able to recognize the type of email, phone call and sms received	1	2	3	4	5
7.	When playing BFG, I know how to respond to the email, phone call and sms received based on its category.	1	2	3	4	5
8.	Using the BFG, enabled me to understand Online Banking Fraud Security more quickly	1	2	3	4	5
9.	Playing the game give me a lot of enjoyment	1	2	3	4	5
10.	I found using the BFG is useful in learning Online Banking Fraud Security	1	2	3	4	5
11.	It was easy for me to play with the interface of the game on the smartphone	1	2	3	4	5
12.	I have a generally favourable attitude toward playing the game	1	2	3	4	5
13.	I believe it is a good idea to play the game for better understanding on Online Banking Fraud Security	1	2	3	4	5
14.	I like the idea of playing the game	1	2	3	4	5
15.	Overall, I enjoy playing the BFG	1	2	3	4	5

REFERENCES

(ANZ), A. a. (2012). *Identifying Fraud*. Retrieved October 20, 2012, from ANZ Banking Group Limited: http://www.anz.com/auxiliary/security-centre/fraud-security-centre/protect-yourself/identifying-fraud/internet-fraud/

International Telecommunication Union . (2010). Retrieved February 3, 2013, from The World in 2010: http://www.itu.int/ITU-D/ict/material/FactsFigures2010.pdf

It is a Growing Threat to the National Economy. (2012, March 1). *New Straits Times*.

ABM. (2013, January 15). *Banks Team-up to Combat Online Fraud- Banks announce latest e-banking awreness campaign.* Retrieved February 1, 2013, from The Association of Banks in Malaysia: http://www.abm.org.my/Banks_Team-Up_to_Combat_Online_Fraud_-_Banks_announce_latest_e-banking_awareness_campaign.aspx

Alaxander, A. (2012, January 24). *Smartphone Usage Statistics 2012.* Retrieved October 24, 2012, from AnsonAlex.com: http://ansonalex.com/infographics/smartphone-usage-statistics-2012-infographic/

Alnajim, A., & Munro, M. (2009). An Anti-Pishing Approach that Uses Training Intervention for Phishing Websites Detection . *2009 Sixth International Conference on Information Technology* , 405-410.

Ariffin, L. J. (2011, October 24). *Nielsen: Malaysian Spend 20 hours Online per Week.* Retrieved October 14, 2012, from The Malaysian Insider: http://www.themalaysianinsider.com/mobile/malaysia/article/nielsen-malaysians-spend-20-hours-online-per-week/

Bandura, A. (1982). Self-Efficacy Mechanism in Human Agency. *American Psychologist 37(2)*, 122-147.

Bowman, D. (2009). Retrieved October 16, 2012, from http://www.information-management-architect.com/prototyping-methodology.html

C.R.Khotari. (2009). *Research Methodology: Methods and Techniques.* Delhi: New Age International (P) Limited .

Davis, F. (1985). A technolofy acceptance model for empirically testing new end-user information systems: theory and results. *Unpublished Doctoral dissertation, MIT Sloan School of Management, Cambridge, MA*.

Davis, F. (1989). Perceived usefullness, perceived ease of use, and userr acceptance of information technology. *MIS Quarterly 13(3)*, 319-340.

Eng, K. H. (2011). *Household Use of the Internet Survey Malaysia.* Selangor, Malaysia: Malaysian Communications and Multimedia Commission.

Examiners, A. o. (2012). *The 2012 Report to the Nations on Occupational Fraud and Abuse.* USA: Association of Certified Fraud Examiners,ACFE.Inc.

Ha, I. Y. (2007). Determinants of Adoption of Mobile Games under Mobile Broadband Wireless Access Environment. *Information & Management 44(3)*, 276-286.

Hwang, G.-J., Wu, P.-H., & Chen, C.-C. (2012). An Online Game Approach for Improving Students' Learning Performance in Web-Based Problem-Solving Activities. *Computers & Education*, 1246-1256 .

Kettanurak, V., Haseman, W., & Ramamurthy, K. (2001). User attitude as a mediator of learning performance improvement in an interactive multimedia environment: an empirical investigation of the degree of interactivity and learning styles. *Intl.Journal Human-Computer Studies*, 541-558.

Kiili, K. (2005). Digital Game-based Learning: Towards an Experential Gaming Model. *Internet & Higher Education 8* , 13-24.

Kumar, R. (2010). *Research Methodology: A step-by-Step Guide for Beginners.* New Delhi: SAGE Publication India Pvt Ltd.

Lenhart, A., Purcell, K., Smith, A., & Zickuhr, K. (2010). *Social Media & Mobile Internet Use Among Teens and Young Adults.* Washington, D.C: pewInternet.org .

Liu, C.-C., Cheng, Y.-B., & Huang, C.-W. (2011). The Effect of Smulation Games on the Learning of Computational Problem Solving . *Computers & Education*, 1907-1918.

M. Sadiq Sohail, B. S. (2003). E-banking and Customer Preferences in Malaysia: An Empirical Investigation. *Information Sciences*, 207-217.

M. Sadiq Sohail, B. S. (2003). E-banking and Customer Preferences in Malaysia: An Empirical Investigation. *Jornal of Information Sciences* , 207-217.

M.Tan, S. T. (2000). Factors influencing the adoption of internet banking . *Journal of the Association for Information System 1*, 1-43.

Malaysia, T. A. (2013, January 15). *E-Banking Fraud Awareness Banking 2013.* Retrieved February 1, 2013, from The Association of Banks in Malaysia: http://www.abm.org.my/e-Banking_Fraud_Awareness_Campaign_2013.aspx

Masrom, M., Mahmood, N. H., Zainon, O., Wan, H. L., & Jamal, N. (2012). Information and Communication Technology Issue: A Case of Malaysian Primary School. *ARPN Journal of Science and Technology*, 504-511.

Mininel, S., Vatta, F., Gaion, S., & W.Ukovich. (2009). A Customizable Game Engine for Mobile Game-Based Learning. *IEEE International Conference on Systems, Man and Cybernetics* , (pp. 2445-2450). Texas.

Moore, P., & Fitz, C. (1993). Gestalt theory and instructional design . *Journal of Technical Writing and Communication 23(2)*, 137-157.

MyCERT. (2011). *MyCERT Incident Statistic*. Retrieved October 14 , 2012, from Malaysian Computer Emergency Response Team: http://www.mycert.org.my/en/services/statistic/mycert/2011/main/detail/795/index.html

NCTI. (2011). *Experimental Study Design.* Retrieved December 16, 2012, from National Center for Technology Innovation: http://www.nationaltechcenter.org/index.php/products/at-research-matters/experimental-study-design/

NewStraitsTimes. (2012, March 1). *It is a Growing Threat to the National Economy.* Retrieved October 15, 2012, from CyberSecurity Malaysia: http://www.cybersecurity.my/en/knowledge_bank/news/2012/main/detail/2161/index.html

Ng., R. (2011, April 28). *Malaysians the Biggest Online Banking Users in Sotheast Asia.* Retrieved February 1, 2013, from The Edge Malaysia: http://www.theedgemalaysia.com/sports/185825-malaysians-the-biggest-online-banking-users-in-southeast-asia.html

Pak, K., & Shadel, D. (2011). *AARP Foundation National Fraud Victim Study.* Washington D.C: AARP Research & Strategic Analysis.

Quan-Yin, Z., Yin, J., Chengjie, X., & Rui-a, G. (2011). A UML Model for Mobile Game on the Android OS. *International Conference on Advances in Engineering* , 313-318.

RSA_Anti-FraudCommandCenter. (2010). *RSA Online Fraud Report February 2010.* RSA Security Inc.

S.Kang. (2004). Instructional Design and Development: A Brief Historical Overview. *Educational Technology vol.44*, 39-45.

Sakharova, I. (2012). Payment Card Fraud: Challenges and Solutions. *Intelligence and Security Informatics* (pp. 227-234). Washington D.C: IEEE.

Smith, M. (1999). *Learning Theory.* Retrieved February 2, 2013, from The encyclopedia of informal education: http://infed.org/biblio/b-learn.htm

TheNielsenCompany. (2012, April 25). *Malaysian Internet Usage Takes Off in 2010.* Retrieved October 10, 2012, from NielsenWire: http://blog.nielsen.com/nielsenwire/global/malaysian-internet-usage-takes-off-in-2010/

TheStar. (2011, October 12). *Cyber Security Malaysia.* Retrieved November 16, 2012, from Media Centre:

http://www.cybersecurity.my/en/knowledge_bank/news/2011/main/detail/2088/index.html

TheStar. (2011, February 16). *E-Banking Scams on The Rise.* Retrieved February 2, 2013, from The Star Online: http://thestar.com.my/news/story.asp?sec=nation&file=/2011/2/16/nation/8071653

Wells, J. T. (2011). *Corporate Fraud Handbook: Prevention and Detection.* New Jersey: John Wiley & Sons.

Wu, W.-H., Chiou, W.-B., Kao, H.-Y., Hu, C.-H. A., & Huang, S.-H. (2012). Re-exploring game-assisted learning research: The prespective of learning theoretical bases. *Computers & Education 59*, 1153-1161.

Xin, C. (2009). Discussions on Mobile Phone Game Implemented. *ISECS International Colloquium on Computing, Communication, Control and Management*, 514-516.

Zaibon, S. B., & Shiratuddin, N. (2010). Adapting Learning Theories in Mobile Game-Based Learning Development. *International Conference on Digital Game and Intelligent Toy Enhanced Learning*, 124-128.

Zhang, Q. (2009). Study on Fraud Risk Prevention of Online Banks. *2009 International Conference on Network Security, Wireless Communications and Trusted Computing*, (pp. 181-184).