ELECTRONIC WORKBOOK

by

Wan Aathena Wan Ahmad Marzuki

Progress Report submitted in partial fulfillment of

The requirements for the

Bachelor of Technology (Hons)

(Information and Communication Technology)

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CERTIFICATION OF APPROVAL

Electronic Workbook

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A project dissertation submitted to the
Information and Communication Technology Programme
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in partial fulfilment of the requirement for the
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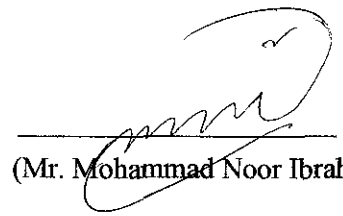
Approved by,



(Mr. Mohammad Noor Ibrahim)

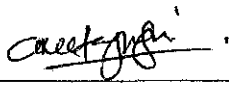
UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

January 2011

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.



WAN AATHENA WAN AHMAD MARZUKI

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ABSTRACT

Educations in Malaysia have gone through quite significant changes in line with the advancement of computer and communication technology. In current practice, each textbook comes with its companion workbook that we need to buy it separately from publisher. The problems is our curriculums for primary school always change so it is higher the cost for publisher and also for parents. This Electronic Workbook will replace the current workbook. The system will capture all the handwriting of both students and teachers and store them into the database. Therefore, students can review their work at anytime, anywhere. Teachers can mark students' homework at anyplace and anytime they want. Parents also can review their previous children's work as they log in into their own accounts. The handwriting of the students and comments given by teachers also can be seen by the parents. This application is most applicable for Apple iPad and tablet PC.

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LIST OF ABBREVIATIONS

Ajax	Asyncronous Javascript and XML
DOM	Document Object Model
EPUB	Electronic publication
JSON	Javascript Object Notation
MCQ	Multiple Choice Questions
MSC	Multimedia Super Corridor
OPF	Open Electronic Package
PDF	Portable Document File
WWW	World Wide Web
XML	eXtensive Markup Language

CHAPTER 1

INTRODUCTION

1.1 Background

Educations in Malaysia have gone through quite significant changes in line with the advancement of computer and communication technology. In Malaysia particularly, during the early days of independent, education is not so aggressive as today. Approximately 160 years back, students come into the class without textbook or workbook. Chalk and blackboard was widely used as the main material in school. For those students who can afford to own a small board and chalk will bring them to the class. After each class, the student will wipe out what they have written because the same board will be used for the next lesson. Therefore, they have to remember all that they have learned from the previous class.

Around 1850s, paper became cheap to be produced, therefore pencil and paper are used to replace the chalk and blackboard. The earliest paper samples that used for mapmaking and writing since the second century BC and it comes from northwestern and central China. And after 800 years, it expands to Korea and Japan, and it took a millennium to come to the Middle East. Baghdadis was the first created paper mills around 800 AD [1].

For the next generation of student, they use paper to copy all the notes and homework on the blackboard written by teachers. Then people start to change from blackboard to blank/ruled note book. However, it has its own advantage. By using ruled

notebook, students need to copy all the exercises written by teachers on the blackboard and this will help them to have neat handwriting. While for print workbook, the students can complete more exercises in shorter period.

In current practice, each textbook comes with its companion workbook that we need to buy it separately from publisher. There are several pros and cons of this current practice. As for the pros, students will be more familiar in doing exercises and it will help them to perform in examinations. Next, by having workbook, it will be easier for teachers to give exercises to students. Parents also can buy another workbook for their kids so that they can have more exercises in particular topics. For the cons of the current system, pupils have to bring a lot of books to school and it is sometimes burden them. As for parents, the cost is being increased since they have to buy additional books for their children.

Besides textbooks, students also need to bring the workbook. Every subject will has its own workbook. Workbook can be defined as a compilation of questions for every topic that students have learned in the textbook. There will be blank spaces for every question. Students can write the answer for the questions and solve the problems given according to what they have learned. The main objective of having this workbook is to make sure all the students fully understand on what they have learned in class.

Nowadays, print book also available in the form of electronic book or e-book. For example in Terengganu, students have been provide with e-book version of textbook. The softcopy version of textbook is installed in the Intel Classmate PC [2].People are more familiar and comfortable with this type of book because they no need to bring the print book which is heavy. Furthermore, e-book is very easy to buy and cheap compared to the print book that we have in the store. People can always download it from the web and this is the main reason why most of people will go for electronic

book rather than printed book. As technology is fast changing nowadays, they can just read the book via their smartphones or computers. Technology has made easy things become easier.

This project focuses on changing the concept of print workbook into the electronic version. This method will make the learning process become more interactive and effective. Electronic Workbook (eWorkbook) will help students become more interested to do revision since the electronic version of workbook will be more colorful, attractive and interactive. Students can explore certain concepts by just clicking on particular object that has been linked to WWW. As Web 2.0 become more popular, it will give one more opportunity to the students, teachers, and parents. Web 2.0 allows interaction between them. They can give comments and feedbacks. Other than that, with the technology available today, animations can be embedded into the website. Hence, it is actually makes learning process become more interactive and interesting.

This electronic workbook is actually a Web Based Application. The target users of this project are the primary school students, teachers, and also parents. The workbook will be available online and users need to have an account so that they can access all the questions in the database. They need to login into their account every time they want to access the account.

In this workbook, there will be several exercises and stages need to be completed by the students. Teachers also need to login to their account before they can mark and comment the students' work. For parents, they can always monitor their children performance when they log in into their account. Their account will have all the information of their children's performance in study.

What makes this application difference from other existing electronic workbook on the Internet is the students can directly write their answer on this workbook by using their own handwriting. Teachers also will mark the workbook and key in the score of the students into the database. The concept of this electronic workbook is just the same with the print workbook. The feature that makes this workbook difference from the print workbook is students no need to bring the workbook along with them. What they need is just a tablet PC or iPad with Internet connection. The normal electronic workbook that can be found on the Internet is just an electronic study pack where all information regarding the syllabus is stored online. Users cannot write on the note. Other than that, it provides electronic learning to the users.

The system will capture all the handwriting of both students and teachers and store them into the database. Therefore, students can review their work at anytime, anywhere. Teachers can mark students' homework at anyplace and anytime they want. Parents also can review their previous children's work as they log in into their own accounts. The handwriting of the students and comments given by teachers also can be seen by the parents. This application is most applicable for Apple iPad and tablet PC.

1.2 Problem statement

- ***Changing of curriculum for primary school***

  Our curriculums for primary school always change. Years ago, Malaysia starts to implement a new curriculum structure which is learning Mathematics and Science in English (ETEM) for primary school students. This scenario will increase the cost especially for parents and government itself. They need to buy new books every time the curriculum structure change

- ***Parents busy with their careers***

Parents nowadays are very busy with their careers and have limited time to review their children's workbooks. With paper based workbook, it is quite difficult for them to check their children homework. In current practice, the teacher encourages parents to check their children's workbooks by seeking a signature from parents on certain pages of the workbook. However, students tend to imitate their parents' signature and this practice does not seem work anymore.

- ***Missing workbook and need to redo***

Some parents may have a problem when their children lost the workbook. This is because they need to buy a new one and has to make sure the children redo all the previous activities on the book. Teachers also need to track back all the marks of the students. Students also need to start all over again doing the exercises. Students also can make corrections for all the wrong answers. This method will encourage them to learn from mistake. Print workbook does not provide space for the students to do all the corrections.

1.3 Significance of Project

- When the curriculum is changing, parents need to buy a new book for their children and this cost a lot of money since they need to buy the printed workbook for every subject. Same goes with the publisher, they need to print a new workbook and all the workbook in Bahasa Melayu on the bookshelf will be wasted. This changes cost a lot of money to either parents or schools. By having electronic workbook, the cost can be reduced as parents do not need to buy a new workbook since the administrator of the website will update the workbook for them.

- This is a hassle free application for those busy parents. By using this application, parents can review and will be notified if their children have assigned any homework. Plus, they can always check their children's scorecard online. This concept is very convenient for working parents. They can check their children's homework everywhere, anytime. No cheating from students.

- By implementing this workbook into the curriculum structure, this missing workbook problem will not be happened again. All the homework will be stored in the online database. Users just need an account and can access the workbook anywhere at any time.

1.4 Objectives of the project

The followings are the main objectives of this project. The objectives are;

- ***To study the requirements needed for the application***

  By having this application, parents can know the learning progress of their children easily. Since this website will be available 24/7, parents can always check their children's performance at anytime, anywhere they want, easy, and faster. The differences between paper based workbook and the proposed online workbook is users can access the system at anytime, anywhere. Other than that, by using online workbook, it is easier to update or make any changes to the workbook. If we use paper-based workbook, the publisher need to print the workbook every time there are any changes made. Mathematics for instance, there will be two papers, paper 1 and paper 2. Paper 1 consists of MCQ questions while paper 2 requires the students to show all the working steps. This system will automatically mark for the MCQ questions. It will save teachers' time and teachers can proceed with marking for the paper 2.

- ***To design and develop a suitable workbook system***

  By having this electronic workbook, everything is in real time basis. Students can do their homework at anytime as long as they are connected to the Internet. Teachers also can directly and easily check their students' homework at anytime and anywhere. When the students have completed doing their homework, teachers will be notified for checking. Teachers also can keep track which student is not finish doing the homework and as well as those who have submitted the homework late. Parents also will be notified automatically. As electronic workbook requires students to have a computer with Internet connection, this will help Malaysia to have a computer literate generation. Plus, it will expose students to know the new technologies if they know how to use Internet wisely.

1.5 Scope of Study

The scope of this project has been divided as below:

- Scope of users

  The target users of this project are primary school students especially students from Standard Four, teachers, and parents of the students.

- Context

  The context for this project is to improvise primary school students' homework using mobile devices.

- Syllabus

  For this project, the target subject is Mathematics since it has both objective and subjective questions. There are two papers for Mathematics which are Mathematics Paper One and Mathematics Paper Two.

- Schools

  This project is aiming for primary schools in Malaysia particularly. As several primary schools in Terengganu has implemented Intel Classmate PC in class. For now, the students no need to bring textbook to school because there is softcopy version of textbooks in the PC. Thus, this eWorkbook can replace the workbook and can be accessed using the PC.

- Modules

  This project only covers two modules which are for simple addition and also subtractions.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Nowadays, Internet and human are inseparable. People rely on the Internet more than ever. Everything related to Internet. From shopping up until paying bills and dealing with government can be done online. The revolution of Internet will never stop as the technology people will keep doing research about it. There are millions of websites on the Internet. As the Web 2.0 has become popular, the number of websites and the number of people using it will keep increasing.

Internet also nowadays has become a medium for people to gain knowledge. It has become an important feature of the learning environment. In the conventional way of learning, people use pen and paper to learn, but with the advancement of technology, this method been slowly disappear when the new way of education has been introduced. The introduction of electronic book (eBook) with the purpose to replace the conventional book has showing that people are into technology and using the Internet to the fullest. eBook can be easily downloaded from Internet.

Electronic Workbook (eWorkbook) refers to an interactive World Wide Web based electronic workbook which allows students to view exercises, sample questions, and notes online [3]. Electronic workbook is actually more to a strategy in organizing and structuring Internet-based learning and obviously it is not an advanced piece of technology [4]. eWorkbook is actually bringing the same concept with eBook when the

users can access it by using their personal computer or laptop and in softcopy. eWorkbook is actually and eBook but for doing homework or activities. For example, students in school will have two types of books which are text book and the workbook. As text book can be replaced by eBook, eWorkbook will replace the exercises book.

Technology is actually growing up rapidly. It is just only a matter of time for us to totally replace paper with mobile. Comics or exercise books, eBook and eWorkbook will take the place. This is not a weird thing as we can see it nowadays almost all types of books is available in the form of eBook. For example, if we do not have time to go to the bookstore to search for a book, we can easily go to a particular website and buy it online in the form of eBook. Normally, the book will be in the PDF (Portable Document File) format.

Due to the Mother Nature condition today, almost all company is trying to go green. If we implement this, lesser tree will be cut down since the demands for print book is decreasing.

2.2 The progress of Mobile Learning around the world

With Mobile Learning (mLearning), both books can be replaced in one device. In oversea especially in Europe, mLearning is actually a common thing [5]. Many people are busy and do not have time to attend a normal class in order to learn something. mLearning is actually a wireless learning that can be accessed through personal computers, laptops, and also smartphone. It involves wireless communication between people who involve in the learning process [6]. mLearning is actually a part of electronic learning or elearning while eLearning is part of Distance Learning(dLearning) and all of that is under Flexible Learning(fLearning) [6]. The main reason why we have mobile learning today is because of the technology that we have. Laptop computers can be accessed at anywhere and anytime as long as there is Internet connection available. It means that, users can always access to any website as they are connected to Internet [6].

There are a few reasons why mLearning is important and getting popular rapidly. The reasons are, the number of mobile phone users in the first half of 2005 is near 1.5 billion which is can be considered as ¼ of the world's population. This is the statistics for 5 years ago and it is already showing a very impressive figure. In 2006, the number of people who registered for wireless Internet is almost 2 billion people. People are getting comfortable with technology as they want it everywhere at anytime. That is why they want it wirelessly. The other reason is palm computers and mobile phones are common stuff in the market [6]. From this information, we can conclude that people in the world cannot live without Internet and want everything to be done on the go.

In 2008, the CEO of Ericsson has announced that out of 6.5 billion of world population, there are 3.3 billion people subscribe to mobile phone and additional 50 million people in the world for every month subscribe as new user According to the research done by London School of Economics, 85% of people think that having a mobile phone will increase their quality of life [5].

Because of all these reasons, many countries have taken it as advantage to implement mobile learning in education. There are lot conferences and researches have been done around Europe. United Kingdom (UK) is the leading provider of mobile learning. One of the four provisions is primary and secondary schools. Professor Mike Sharples has done a research with primary school students who analysed and recorded data on PDAs [5].

As mobile learning is aim to increase the quality and access by providing materials on handheld devices and to enhance the flexibility of learning [5], Intel has take it as an advantage for them to come out with a new product. Intel has introduced Intel Powered classmate PC as a way to make mobile learning become reality. There are

several countries involved in implementing the Intel classmate into their education system [7].

As in Russia, they have start using the computers in their education and exposed the children with information technology (IT) since 1986. All schools have been connected to the Internet by the Russian government. In order to broaden the electronic teaching material, the Russian government has come out with a programme named "Developing IT & Educational System". Because of the effort that has been shown by Russian government in education, Intel has interested to run an educational programme, named Intel Teach since 2002. The programme is basically will show teachers on how to successfully use ICT in order to improve the teaching and learning methods [8].

In 2007, Russia also has launched one more programe called "Computers for Students". The appearance of notebook computers has improved the interaction between students and teachers. Students will not only focus on the blackboard as before but they also can retrieve assignments on their notebook. The results will be entered by teachers and will be stored in the database. The database can be accessed by teachers [8].

By having notebook computer in the class also will improve the team working skills of the students. This is because, when they were given group assignments, they will complete it in their group. Other than that, this programme will have active involvement of children's parents in teaching process. As the result, they found that students who normally use computers for playing games now using it for education too [8].

While for Macedonian, they came out with an initiatives "Computer for Every Child". Their target is every primary school student will have one computer. In order to

have a knowledge-based generation, Macedonian has introduced information for early grade. Below is the survey that they have made in evaluating teachers who participating with the personal computer and laptops [9].

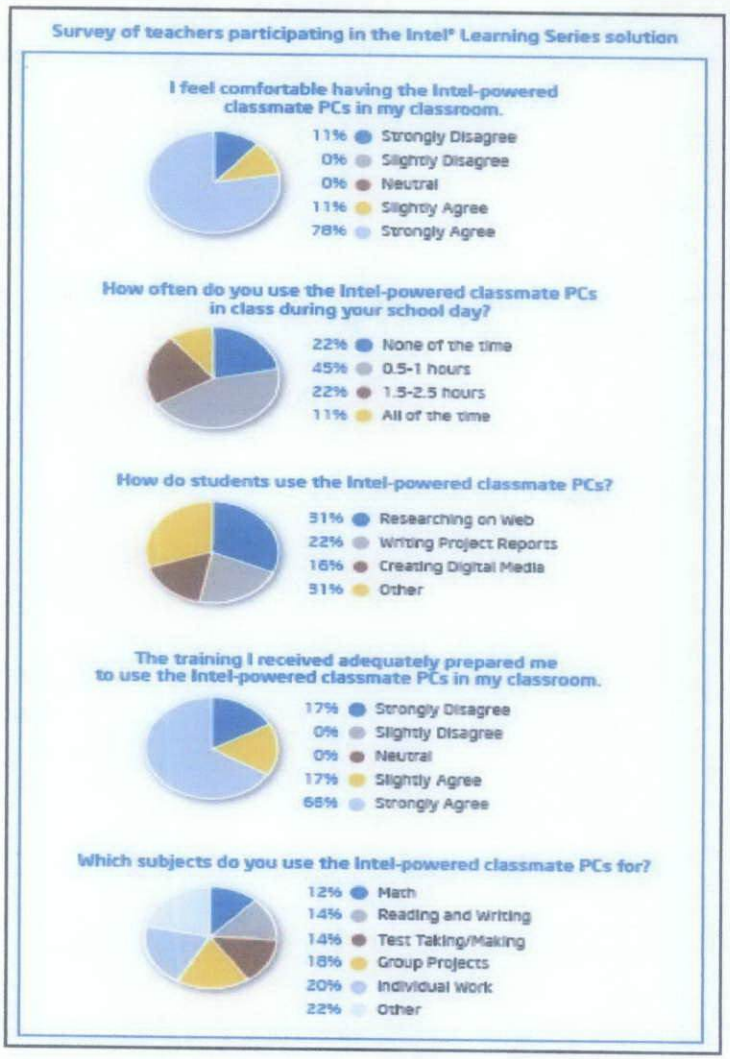

Figure 1: Survey of teachers participating in the Intel Learning Series Solution

From the survey, we can see that 78% of them are comfortable to have the Intel classmate PC in the classroom. 45% use it half an hour to one hour in class during school day, and there are several subjects used the PC in learning. It means, they indirectly allow technology to involve in their teaching [9].

South Africa also has started to implement mobile learning in their education system. They started to implement it in the university level when the University of Pretoria will provide mobile learning for Post graduate in education. They are all teachers in the rural schools [10].

ASIA

In Asia, technology can be quite complex because Asia consists of country with high technology and low technology. As for Japan, they always came out with new inventions and ideas. So, there will be no problem for them to adapt to the new technology. But it does not mean other poor country cannot follow the flow of technology. Japan also one of the countries in Asia that has successfully implemented mobile learning in education [10] [5].

As in Korea, they actually have been far ahead of Japan in introducing broadband access in homes. The government also tried to influence the development of Korea into an ubiquitous learning society. Korean Ministry Education also has included mobile learning as a part of the nationwide educational software context. They encourage the university and secondary school to implement mobile technology in learning [5] [10].

While for India, they are also interested in mobile learning. Many companies in India received contracts for the development of mobile learning from Europe and America. For ZMQ project in India, the project is basically engaging mobile learning material for under privileged and semi literate people. We can conclude that the developing country also interested in mobile learning [10] [11].

While in Vietnam, Intel has collaborated with one of the orphanage there in order to introduce the Intel Classmate PC to the orphans. Not only children with parents, orphans also need to be exposed to technology since they are the generation of the

future. According to the Orphanage Teacher, the program has gives a real opportunity to succeed. Other than that, it uses something that might make the children eager to learn new things. As technology is very interesting thing, it can be used as a way to encourage children to think about their education and future seriously. As been said by the project coordinator, the students are more excited when they learn using the notebook PC. This is showing that, the notebook has give great impact to them and they indirectly learn something new in class [12].

MALAYSIA

Malaysia's progression in technology is quite fast and this is parallel to the Wawasan 2020. This is a challenge to technology in order to establish a scientific and progressive society. The Government by all mean been trying to implement the technology for educations.

Due to the pressure of technology, the new generation of Malaysia is really good in technology. Nowadays, it is very common to see children playing with laptop or hand phone. This is telling that Malaysian young generation is not outdated and most of the new generation of Malaysia is aware about technology. In the Southeast Asia, Malaysia is the first country to have a cellular network [13]. So we can consider that the trend of using mobile phone is a little bit early come to the Malaysia compared to other countries.

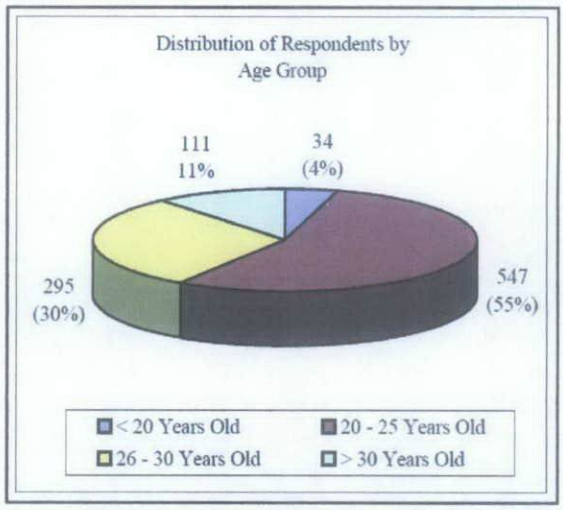

Figure 2: Distribution of mobile phone users respondents by age group

Figure 2 above is to prove that the young generations of Malaysia in the range of age 20 to 25 years old are the highest users of mobile phone [13].

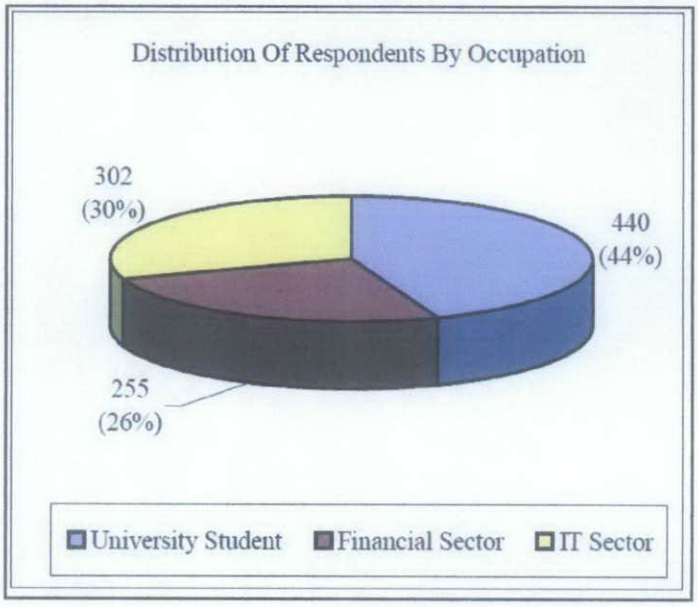

Figure 3: Distribution of mobile phone users respondents by occupation

The pie chart above shows the highest number of users that use mobile phone is university students. This is also can support the above point which is the young generation of Malaysian is exposed to the technology. From this, we can say that,

Malaysia is ready to implement mobile learning in education since the young generation is already familiar with technology [13]. Below is the statistics of hand phone subscribers by state in Malaysia.

State	Percentage share of hand phone subscriber base
Selangor	24.7
Johor	13.7
WP KL	9.7
Pulau Pinang	7.4
Perak	7.3
Sabah	6.4
Kedah	5.9
Sarawak	5.9
Pahang	4.5
Negeri Sembilan	3.9
Kelantan	3.7
Melaka	3.0
Terengganu	2.9
Perlis	0.8
WP Labuan	0.2

Figure 4: Percentage of hand phone subscriber

From the statistics, we can see even in the East Malaysia, which is normally a little bit slow in development also has a high number of phone subscribers compared to states in Peninsular Malaysia [14].

According to the Internetworldstats.com, there are 16, 902,600 Internet users in Malaysia. The statistics is as of June, 2009 which is 64.6% of Malaysia's population according to ITU [15].ITU is an agency for information and communication technology issues. Table below is the statistics of Internet users in Malaysia from the year 2000 until 2010.

YEAR	Users	Population	% Pen.	Usage Source
2000	3,700,000	24,645,600	15.0 %	ITU
2005	10,040,000	26,500,699	37.9 %	C.I.Almanac
2006	11,016,000	28,294,120	38.9 %	ITU
2007	13,528,200	28,294,120	47.8 %	MCMC
2008	15,868,000	25,274,133	62.8 %	MCMC
2009	16,902,600	25,715,819	65.7 %	ITU
2010	16,902,600	26,160,256	64.6 %	ITU

Figure 5: Statistics of Internet Users in Malaysia

From the statistics we can see that from the year 2000 to the year 2005, the number of Internet users is rapidly increasing. Year by year, the number of users is increasing [15]. We can conclude that, Internet is getting important to Malaysians. Mobile learning is not impossible to be implemented as the people are already familiar with Internet and technology. Below is the statistics for broadband subscriber in Malaysia.

Bilangan langganan jalur lebar
Number of broadband subscriptions

Tahun	Suku	TETAP ('000) ADSL	SDSL	LAIN-LAIN	TANPA WAYAR ('000) MOBIL	LAIN-LAIN	JUMLAH ('000)
Jumlah/*Total*							
2006	-	735.9	4.8	10.3	4.5	-	755.5
2007	-	1,002.4	6.5	16.9	96.4	-	1,122.1
2008	-	1,281.9	7.9	28.7	386.2	13.8	1,718.5
2009	1	1,362.2	8.1	52.9	469.5	19.0	1,911.7
	2	1,421.4	8.7	77.9	631.2	20.1	2,159.3
	3	1,462.3	9.4	114.8	775.7	20.7	2,382.9
	4	1,513.5	10.2	148.1	927.8	20.8	2,620.4
2010	1	1,561.3	11.0	168.7	1,160.2	21.2	2,922.4
	2	1,610.5	11.6	182.4	1,402.1	25.0	3,231.6
Jumlah Penduduk/*Total populations*							28,908.8
Kadar Penembusan penduduk/*Population penetration rate*							11.2%
Isi Rumah/*Households*							
2006	-	628.7	1.1	8.3	1.8	-	639.9
2007	-	858.1	1.4	14.4	38.0	-	911.9
2008	-	1,098.0	1.6	21.1	152.2	13.0	1,285.9
2009	1	1,167.9	1.5	45.7	269.7	17.9	1,502.7
	2	1,219.0	1.4	70.0	358.5	18.9	1,667.8
	3	1,253.1	1.4	106.2	440.6	19.4	1,820.7
	4	1,285.1	1.5	138.7	527.01	19.5	1,971.8
2010	1	1,321.3	1.5	158.2	659.0	19.8	2,159.8
	2	1,365.5	1.5	169.1	796.4	23.6	2,356.1
Jumlah Isi Rumah/*Total number of households*							6,285.0
Kadar Penembusan isirumah/*Household penetration rate*							37.5%
Bukan Isi Rumah/*Non- Households*							
2006	-	107.2	3.7	2	2.7	-	115.6
2007	-	144.3	5.05	2.5	58.4	-	210.3
2008	-	183.9	6.3	7.6	234.0	0.8	432.6
2009	1	194.3	6.6	7.2	199.8	1.1	409.0
	2	202.4	7.3	7.9	272.7	1.2	491.5
	3	209.2	8.0	8.6	335.1	1.3	562.2
	4	228.4	8.8	9.3	400.8	1.3	648.6
2010	1	240.0	9.5	10.6	501.2	1.4	762.6
	2	245.0	10.1	13.3	605.7	1.4	875.5
Year	*Quarter*	*ADSL*	*SDSL*	*OTHER*	*MOBILE*	*OTHER*	*TOTAL ('000)*
		FIXED ('000)			*WIRELESS ('000)*		

Figure 6: Number of broadband subscriptions in Malaysia

From there we can see that every year, the number of subscriber is increasing [16]. Malaysians are very interested with technology and Internet. The number of subscriber of wired and wireless broadband keeps increasing and this is a positive impact that we can see among Malaysians.

From the survey that has been done by Suruhanjaya Komunikasi dan Multimedia Malaysia (SKMM) there are 1.4% of primary students use Internet at home for education purpose. We can conclude that primary students also realize about Internet

and technology. They also know how to use technology for education purpose. It might not shock them if Malaysia government implements mobile learning in education [17].

There is 8% of primary students use Internet and there are 25.4% household users use it at school. It includes teachers and students. This is showing that, schools at Malaysia today has provide Internet and has exposed teachers and students to technology [17].

The government has already realized about the importance of Internet and mobile learning. This is why the government already has plan for Smart School. From 1999 until 2002 there were 88 schools selected to run as Smart Schools which is 82 were existing institution and 6 were new ones. There are 5809 computer sets and 261 computer technicians. This is showing that Malaysia's government really taking care about Malaysian education system and technology in Malaysia.

In the smart school roadmap, it stated that there are four waves of Smart School Milestones.

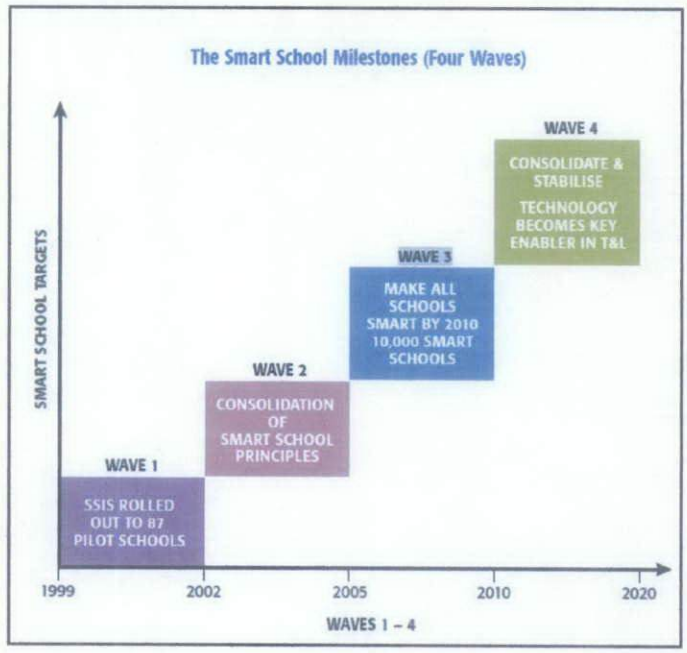

Figure 7: The Smart School Milestones (Waves 1-4)

In the Waves 3 which is from 2005 until 2010, Malaysian government has planned that to make all school smart by 2010. The Waves 4 will start from 2010 until 2020 when technology become key enabler in technology and learning. As in the roadmap, it also stated that between 2006 until 2010, we can see the culture of using ICT for teaching, learning, and management become more visible [18].

2.3 The eBook project in Malaysia

As what Malaysian has planned, in Terengganu, the Terengganu's e-book Project has been setup with collaboration with Intel. As what Intel has implemented in other countries such as Vietnam and Russia, Intel also introduced the Intel classmate PC to the primary students at Terengganu. The classmate PC will be installed all the textbook in PDF format. As being said by the Chief Minister of Terengganu State Government, YAB Menteri Besar Dato' Ahmad bin Said, this program represents a first step towards "harnessing the benefits of technology to make education more efficient". This is the better way in order to use technology to enhance learning because students will get excited when they come to the class. When students happy to come to the class to learn, it gives a positive impact on critical thinking and communication [2].

As being said by a teacher, teaching using the classmate PC will make things easier to teach and students will pay attention more since it is interactive. A student also agrees that her learning process is more fun than before. It is more student centered and project focused [2].

Not only that, government also has helped the citizen especially for those who stay in the rural area to get familiar with Internet. The rural area Internet programme (Program Internet Desa) is a programme where the citizen in the rural area can go online with no hassle. They can always go to the Internet hub and can explore the Internet as they want. This programme is actually under 8th Malaysian Plan. In the year 2000, there are 4 Internet center has been introduced and in 2003 it increase up to 40 Internet centers. This is actually give us a view that citizen in the rural area also interested in

technology and ready to change. Sometimes, they even more up to date than people who stay in the city. They would not be shocked to accept the changes in education [19].

Malaysia's government always has plan for Malaysian in ICT for every Malaysian Plan. Starting from 6th Malaysian Plan, government introduces one unit which is the National Information Technology Council (NITC). The function of this unit is to ensure that ICT is well integrated [20].

In 7th Malaysian Plan, the Multimedia Super Corridor (MSC) was launched in order to have a world class environment to attract the best multimedia enterprise. Also, the introduction of E-Initiatives such as E-Economy, E-Public service, E-Comunnity, and E-Learning [20].

The National Broadband Plan was launched in the 8th Malaysian Plan in order to operate broadband access across the country. The Malaysian Information Communication and Multimedia Services 886 Blueprint were introduced in order to integrate the cellular telephony, Internet, and broadcasting [20].

From all the examples above, we can see that Malaysia's government always finding a new ways to encourage its people to use technology as much as possible and it should be a common thing that one day the paper will be replaced by the mobile.

2.4 Technology Review

There are several technologies that has been used in order to develop online teaching, electronic learning, and ebook.

The Web 2.0 is the obvious technology that has been used by developers in developing websites. Web 2.0 provides more user interface and will allow users to do more than just retrieve information. Users can provide the data and also they can have control over the data. Web 2.0 is actually giving freedom to users [21].

The technologies that have been used in Web 2.0 development are Asyncronous Javascript and XML (Ajax). Ajax is actually used to update part of website. It will upload and download new data without reloading the full page. This will allow users to continue interact with the page. The data is formatted in XML or in Javascript Object Notation (JSON) [21].

Ajax is a good technique in updating the web page based on new data. The Javascript program will use the Document Object Model (DOM) to update the webpage and allow for a rapid and interactive user experience. Google Docs is actually implementing this technique to create the web based word processor [21].

For Apple, they are using electronic publication (EPUB) as their eBook format [22]. EPUB is free and open eBook standard. The files will have the extension *.epub*. This format will function as a single format [23].

Open Electronic Package is also an open eBook format. OPF is actually is an XML based eBook format created by E-Book Systems [24].

With all the technologies available, eWorkbook will be developed by using all those formats. By taking Apple as an example of big companies that has successfully develop eBook by using the EPUB format, eWorkbook also maybe can use the format too.

2.5 Advantages of eWorkbook

There are several disadvantages of using print workbook which are will become advantages of using electronic workbook. According to Alice Clark and Sherri Edwards, print workbook requires a lot of preparation time and expensive to produce [25]. It means more time needed in order to prepare for a print workbook, starting from the drafting stage of the book until the printing stage. It will take a lot of time.

While for electronic workbook, it is interactive. This is because electronic workbook can have animations and will make students remember more on theory and understand the concept of the particular subject better [25]. We take an example for a simple Mathematics. Instead of just write 2+2=4, we can animate it. For example, we use 2 apples in the basket and 2 apples outside the basket. When we move the apples outside the basket into the basket and showing that there are 4 apples in the basket, it will make students understand better. Colours and animations will make the student remember better.

By using electronic workbook, students will experience learning through activity and reflection .This will make students more active in class and also in learning. This is because they experienced themselves on how things work. This advantage is kind of similar with experiments. Using the electronic workbook, students can experience the learning because they can redo and resolve on the same problem [4].

Based on the interviews conducted by Drs. M.C.Kaptein and his team in their research paper, the electronic workbook should provide subjects with a freedom to express themselves. The workbook should be personalized. Therefore, for this project, Mathematics for Standard 4 in the Primary school is the most suitable subject to be used in order to develop this application.

According to a thesis paper prepared by Rosmawati Musa [26] , there are two types of question paper for the Mathematics subject in the primary school. The paper are Mathematics paper one and also Mathematics paper two. For Mathematics paper one, there are 40 multiple choice questions and for paper 2 there are 20 subjective questions. Students can answer the questions according to their understanding on the blank spaces provided [26]. Thus, students can express their feelings and creativity freely. They can

apply the knowledge that they already learnt in class to answer the particular questions [4].

The other advantage of eWorkbook is it is fostering computer literacy among primary students [25]. As we know that today's young generation is already exposed to computers and technology. So, it is not a problem for them if they need to do homework by using computer. By giving them homework online, this will encourage them to be more familiar with computers and technology.

eWorkbook is easy to update [25]. If there are any changes in questions or answers, the administrator can easily update and edit the questions. This is because; all questions will be stored in the online database. Other than that, if the students have changed their address or school, they can easily update the information in the profile which is stored in the online database.

In teachers' side, it will save teachers time if we are using eWorkbook in our education [25]. Teachers do not need to key in one by one the students' marks since it will automatically stored in the database once the teachers mark the student's exercise.

When using eWorkbook, students can do it anywhere and at anytime they want [27]. Nowadays, working parents are very busy with their schedule. Some of them will bring their children to their workplace or leave them at nursery until they are come back from office. This will make children not comfortable to do homework with pencil and paper. By having this eWorkbook application, students just need to online using any computers with Internet connection to do their homework. Doing homework online will make them feel comfortable.

No mess up to clean up and no more missing pages. Normally, children will mess up the table when they are doing homework with all the dirt that come from the eraser. By having eWorkbook, they no more need the eraser in order to do correction for the exercises. By having eWorkbook also, they will be no missing pages problems happen. Sometimes, when we buy workbook from publisher, there are cases that there are missing pages. So, it is time consuming to go to the bookstore to change the book with new book [27].

Students also can redo and revise any activities with the redo function. Since all the questions are stored online, students can always revise or redo the exercises. Other than that, it is healthier when using eWorkbook because no pencil involved [27]. According to the Childhood Lead Poisoning book, the disposal of products containing lead which is in pencil can cause reduction in IQ and attention span [28].

From all the advantages above, we can see that there are a lot of advantages of using electronic workbook among primary school students.

CHAPTER 3

Methodology

3.1 Systems Development Methodology

Prototyping

This project applies prototyping methodology. For this project, the methodology that will be used is prototyping. The prototyping-based methodology performs the analysis, design, and implementation phases concurrently and all the phases are performed repeatedly in a cycle until the system is completed. By using prototyping, we can always do any changing in the middle or at early process of development. For example for this project, if there are any changes in requirements, we can always go back to planning, analysis, or design again before proceed with the development of the system.

Prototyping also promote a faster development. Since this project need to be completed in a limited time, prototyping is suitable to be used. Other than that, prototyping methodology allows users to review the system and changes can be made if the system does not meet the requirements. This means, user requirements is easier to determine [29].

The analysis, design, and implementation phases will be performed concurrently and each cycle resulting in a system prototype. The last prototype will be called the system. Prototyping needs only initial basic analysis and design [30].

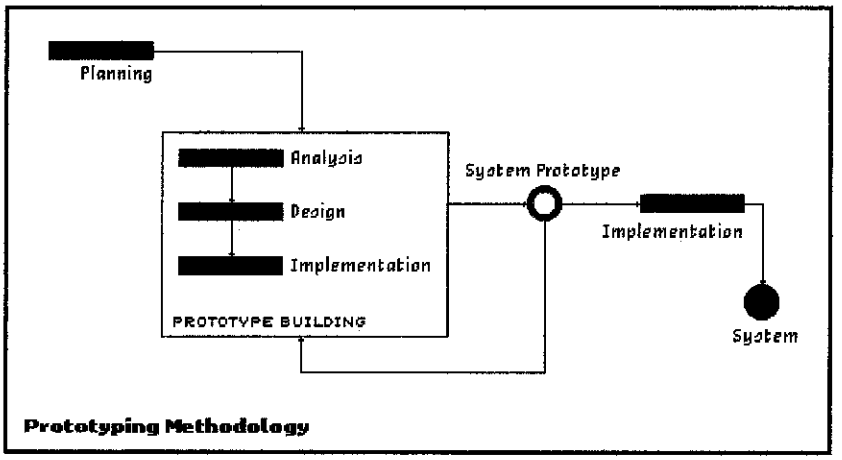

Figure 8: Prototyping methodology

3.1.1 Planning phase

During planning phase, all requirements have been gathered. After that, try to understand all the requirements. Other than that, did some review on other related projects by read all the journals, conference papers, and also information on the web. A Gantt chart has been made to make sure everything can be done in the given time period.

3.1.2 Analysis phase

During the analysis phase, all the requirements and information have been analysed. As the result, the system is identified that it will be used by primary school students in the Standard 4, teachers, and also parents of the students. There are a lot of related projects regarding mobile learning have been made by other researchers. World nowadays is already into the web based learning when there are a lot of electronic learning on the Internet. The use of eBook also has been widely used around the world and even in Malaysia, it is actually already

implemented in Terengganu. The technologies that have been used by other web developers also have been identified. There are several technologies and format can be used in order to develop this system.

3.1.3 Design phase

All the designs for this project are using the Unified Modeling Language (UML) Diagram.UML diagram is a standard set of diagramming technique. The objective of UML is to provide a common vocabulary of object oriented terms and diagramming technique that is rich enough to model any systems development project from analysis through implementation. The diagram is divided into two which are the modeling structure of the system and the modeling behavior [30].

Class diagram is a diagram that uses to create a vocabulary that is used by both the analyst and the users [30].

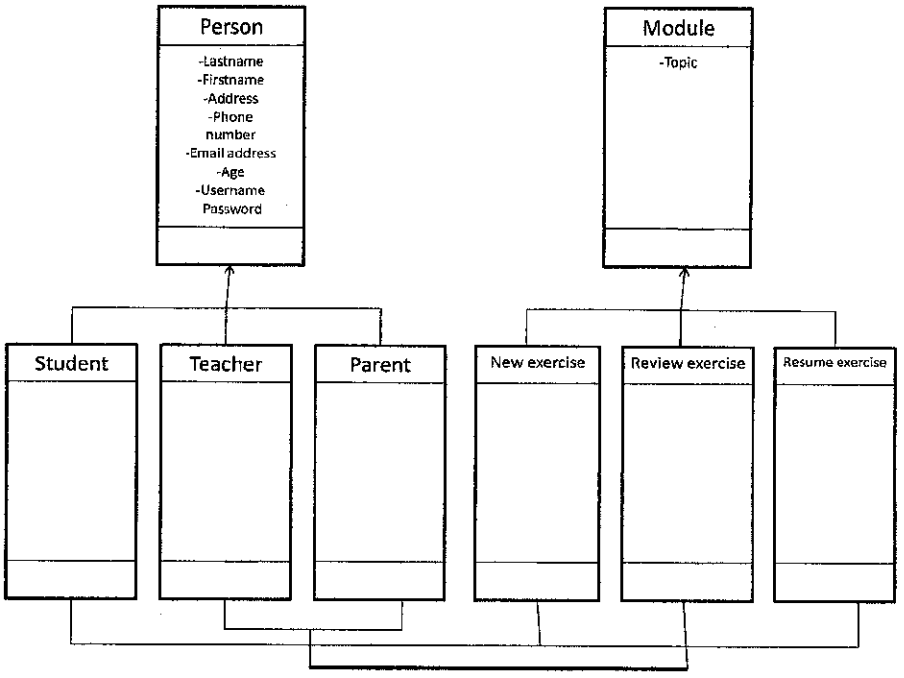

Figure 9: Class diagram

Activity diagram provide the analyst with the ability to model processes in an information system. It can be used to model workflows, individual use cases, or the decision logic contained within an individual method [30].

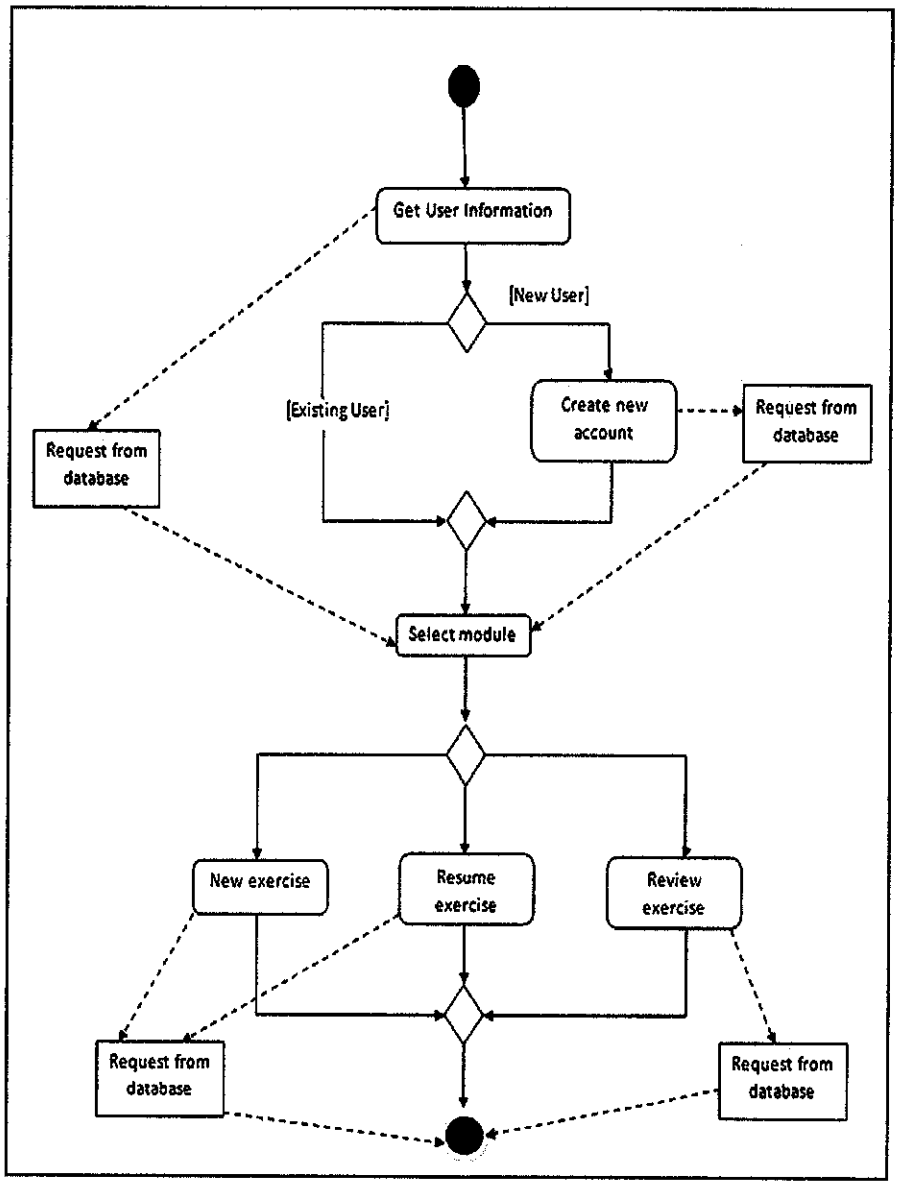

Figure 10: Activity diagram

Use case diagrams allow the analyst to model their interaction of an information system and its environment [30].

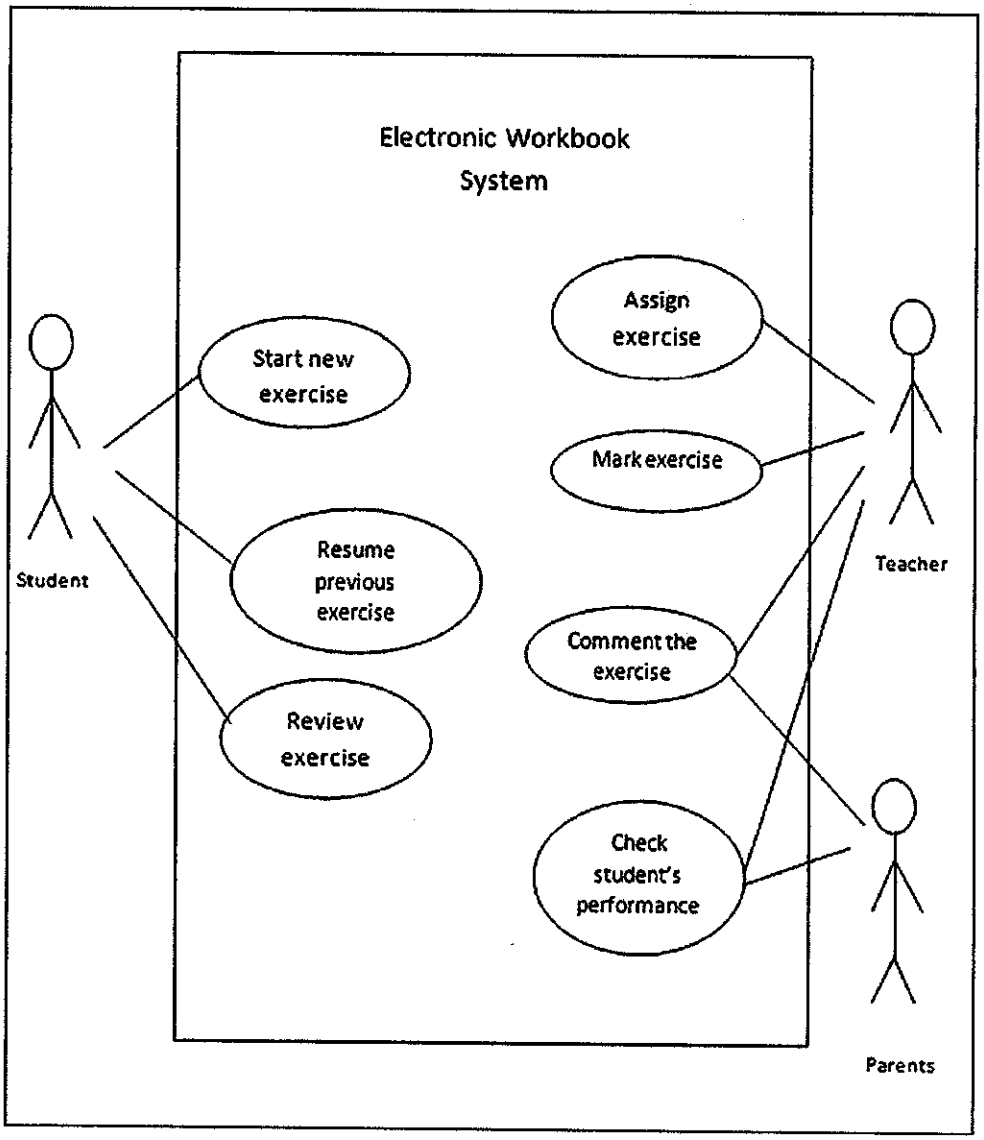

Figure 11: Use case diagram

Interface designs for the system are as below. There are three users which are students, teachers, and also parents.

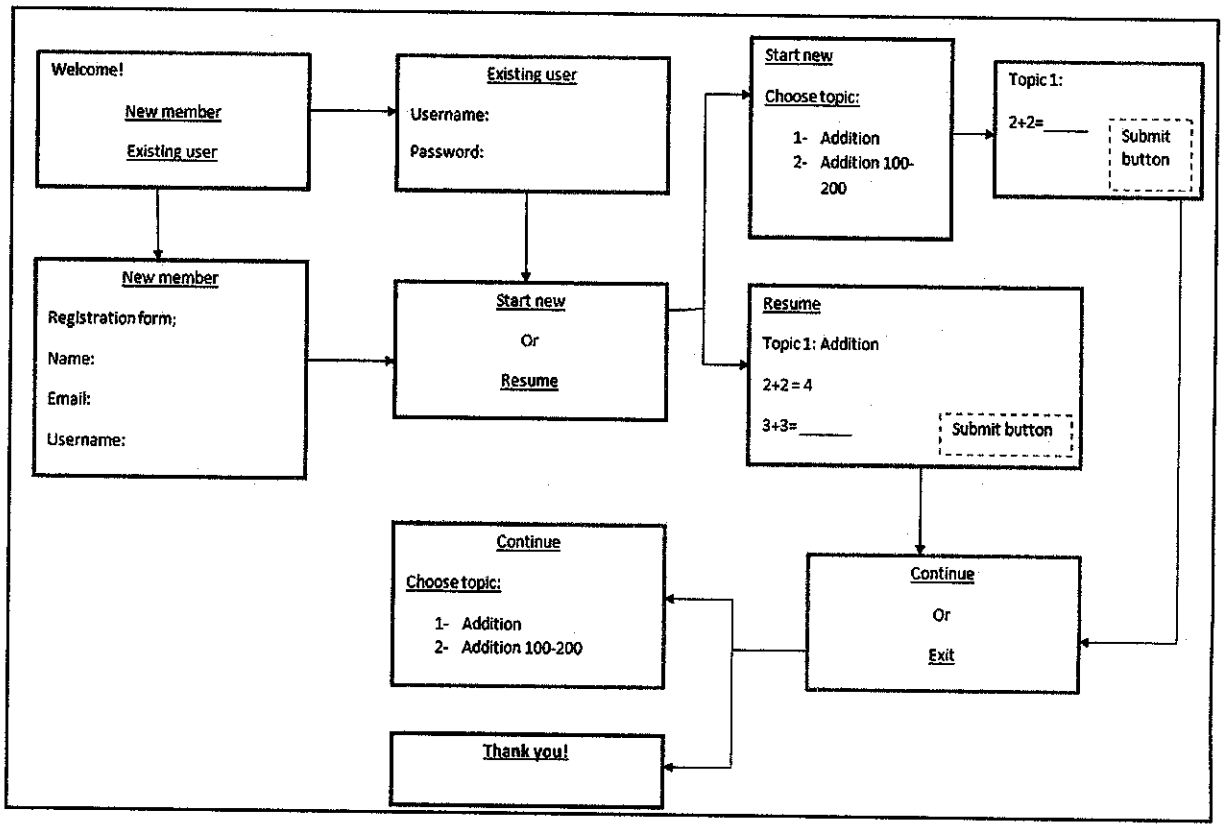

Figure 12: Interface diagram for students

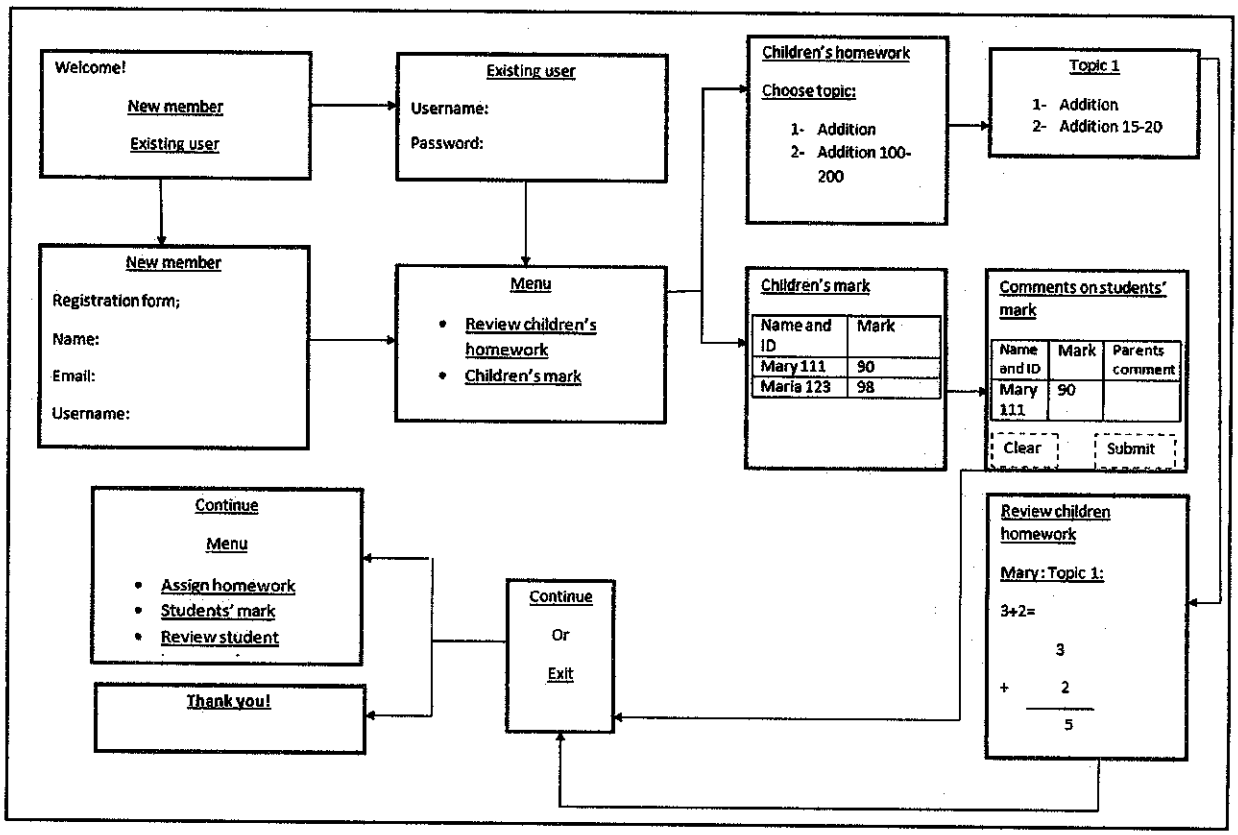

Figure 13: Interface diagram for parents

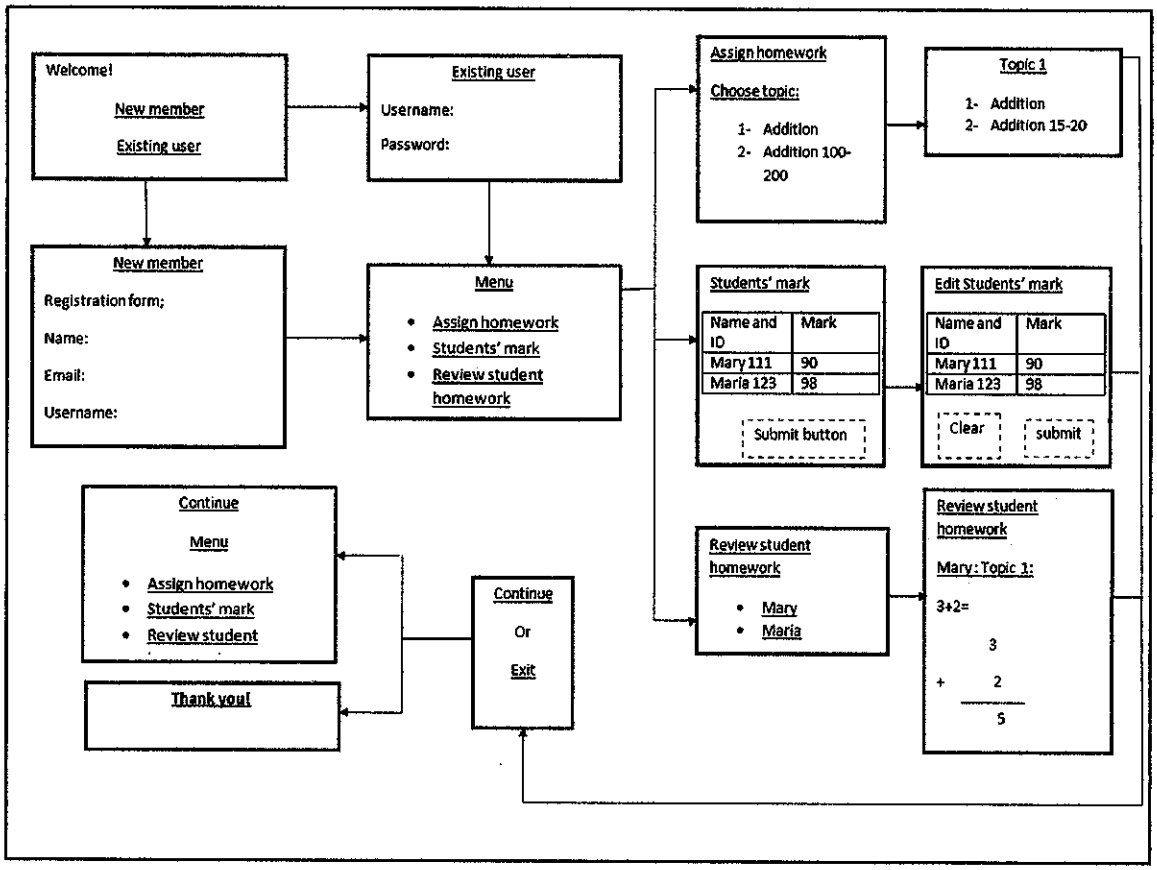

Figure 14: Interface diagram for teachers

Architecture design below shows how all the users and database interact with the internet. Everyone needs to connect with the Internet. Everytime users try to connect t the webpage, the information will be sent to the Internet and it will proceed to the web server or database. Web server will response and send the information back to the retriever.

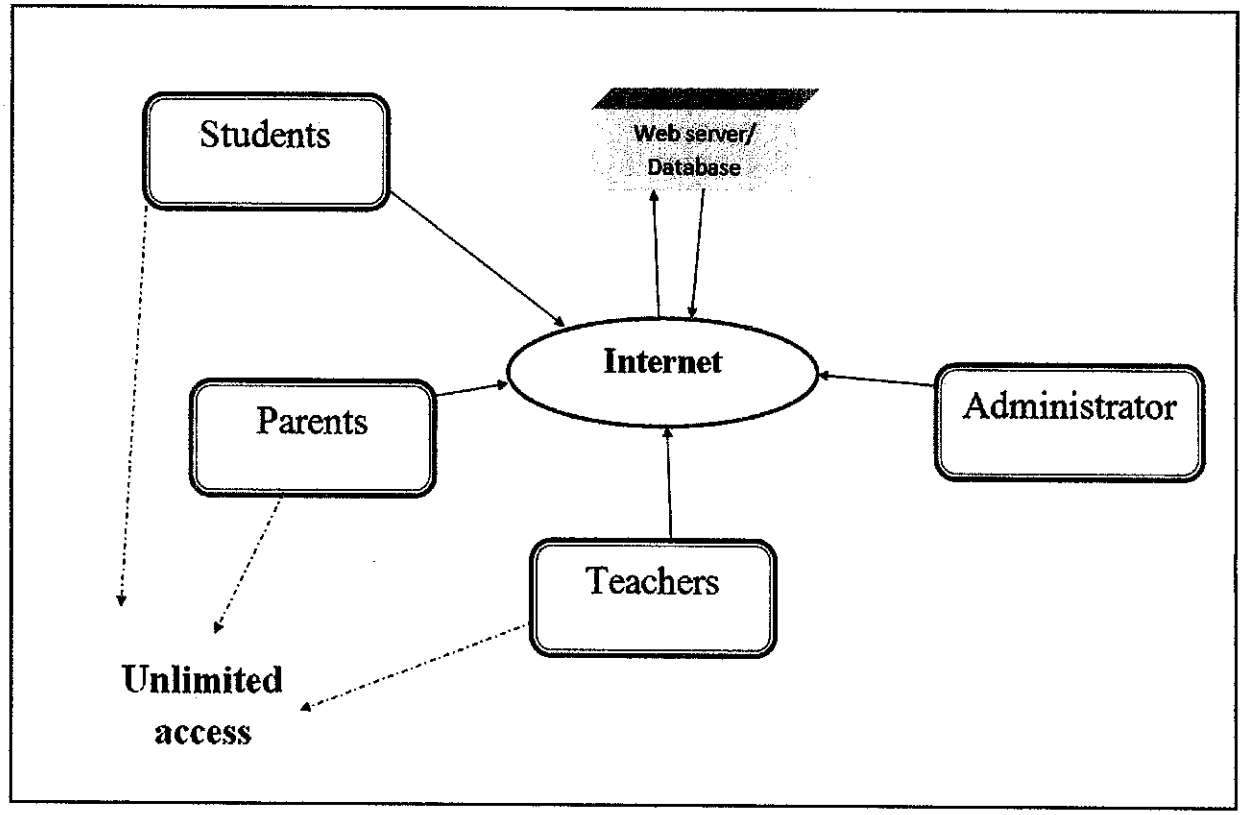

Figure 15: Architecture design

3.2 System Coding

Server side scripting, PHP were used as the programming language to develop this system. XHTML is used as the interface markup language for this system. The coding process had been done modularly, which means module by module. First for login and registration module;

```
if($login == '') {
                $errmsg_arr[] = 'Login ID missing';
                $errflag = true;
        }
        if($password == '') {
                $errmsg_arr[] = 'Password missing';
                $errflag = true;
        }
```

The above code snippet is from login page. The function of the code is to check whether user has entered the login information or not. If there is no input from users, it will prompt, 'Login ID missing' or 'Password missing'. This will help users to know if they missed to enter the information.

As for the main aspect in this system is to allow users to write on the canvas. For this function, Javascript has been used to create the canvas.

```
canvas = document.getElementById('canvas');
        if(canvas.getContext) {
                c = canvas.getContext("2d");
                iface.status = document.getElementById('status').firstChild;
                iface.xy = document.getElementById('xy').firstChild;
                iface.txy = document.getElementById('txy').firstChild;
```

The above code snippet will setup the canvas to be seen by users. Then after user can see the canvas, they can write on it by using pencil.

```
pencil: function() {

                this.name = 'pencil';
                this.status = 0;

                c.lineCap = 'butt';
                c.lineWidth = 1;
```

The above code snippet shows the pencil function. After the user can write on it, users also can erase it by using eraser.

```
eraser: function() {

                this.name = 'eraser';
                this.status = 0;
                this.inherit = tool._brushes; this.inherit();

                c.lineCap = 'square';
                c.lineWidth = 7;
                c.lastStrokeStyle = c.strokeStyle;
                c.strokeStyle = c.fillStyle;
```

The eraser function is as above. This function will make sure user can erase what they have write on the canvas.

CHAPTER 4

Results and Discussion

4.1 The snapshots of the system

Below are the snapshots of the Electronic Workbook system:

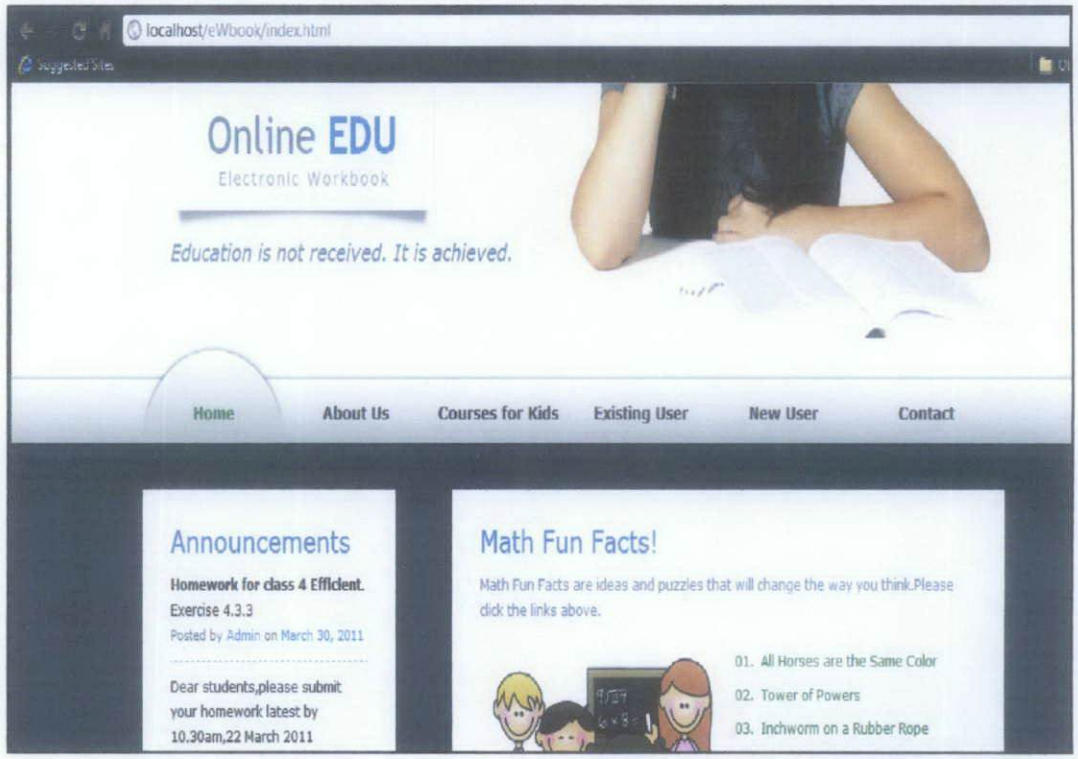

Figure 16: The homepage of the system

Instead of login function, the new user who do not has the login ID and also a password can create an account at registration form.

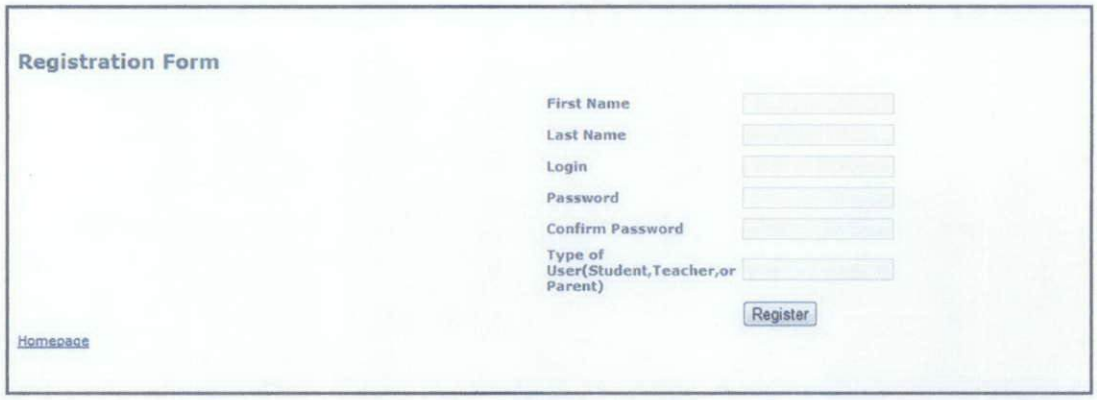

Figure 17: The registration form

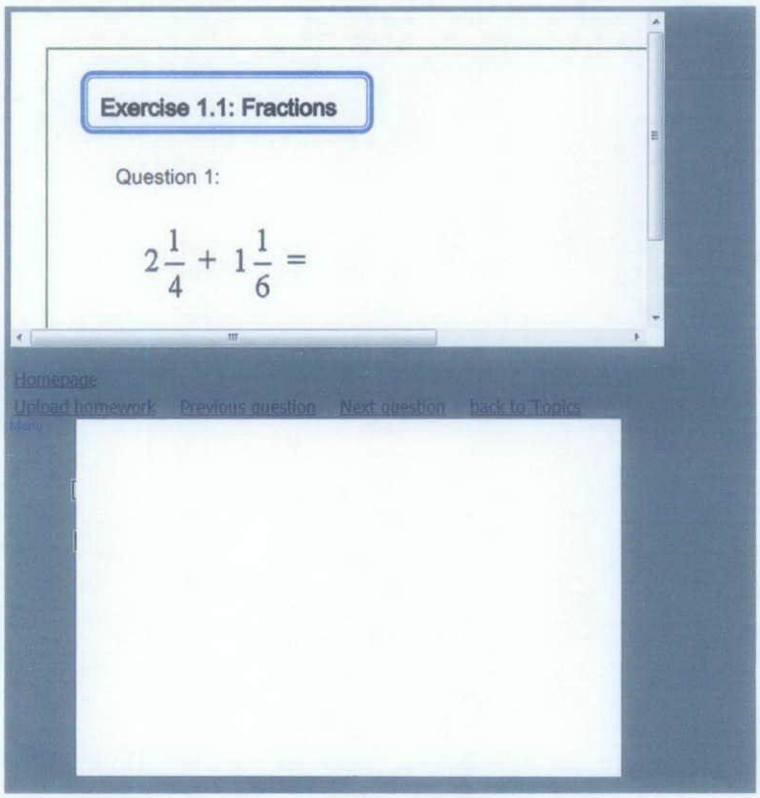

Figure 18: Interface of electronic workbook

At the side of the book, there is a menu where users can click on it to change the function from pencil to eraser. Other than that, there is a function where users can save the work.

Figure 19: The menu button

In the menu button, there are several options that can be clicked by the users. The options are the pencil, the eraser, and also the save option. User have to click the save option in order to save their work.

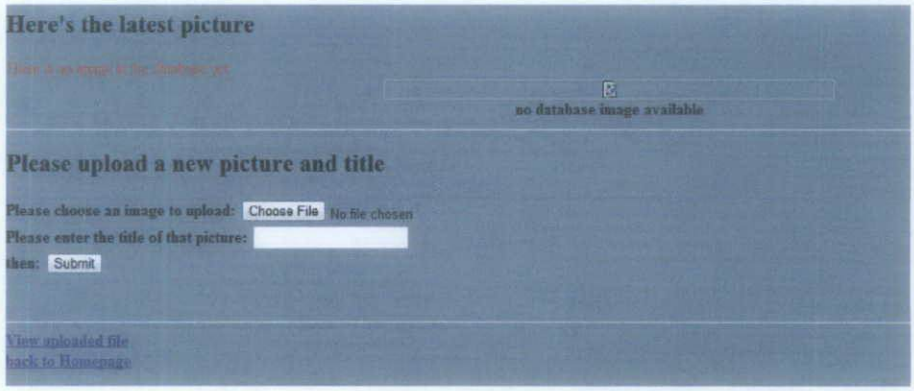

Figure 20: Upload homework page

In this page, students will upload their saved homework into the database. The purpose of uploading it into database is because to make sure teachers can retrieve it back in order to check and give marks.

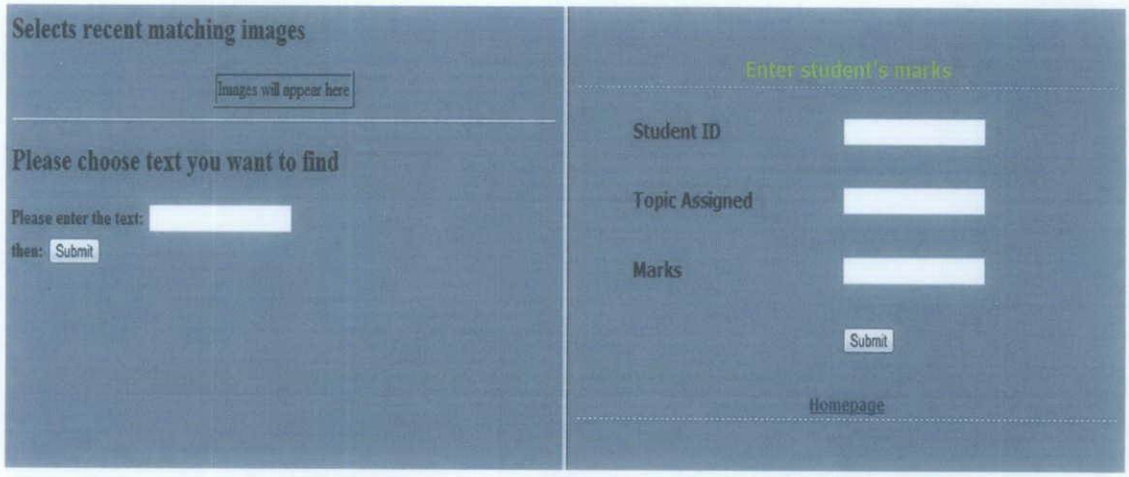

Figure 21: Upload marks page

In this page, teachers will retrieve the uploaded homework and mark it. Then, teachers will enter the marks into the database.

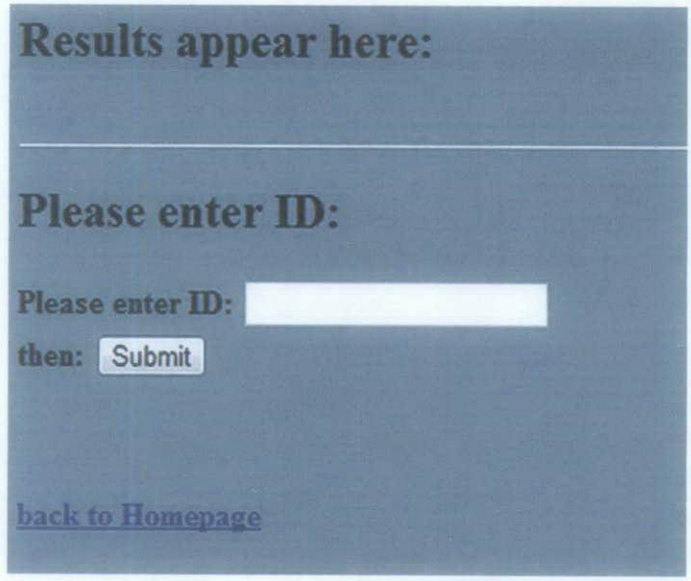

Figure 22: Check students' score page

In this page, students, teachers, and parents will check the marks just by enter the student ID.

CHAPTER 5

Conclusion and Recommendations

As for conclusion, electronic workbook is possible to be implemented into education system. There are many related projects have been done around the world showing that the acceptance of mobile learning and electronic learning are very good. For this project, electronic workbook is just a new version of eBook that has successfully implemented by others and has been widely used across the globe. The demand for eBook also increasing since there are a lot of touchscreen devices and computers has been introduced such as iPad and Samsung Galaxy tab.

As for the technology, there are a lot of technologies that can be used in order to develop this system. Web 2.0 is the main technology that can be used. Ajax and XML can be implemented in order to make this system more reliable and efficient. As for now, the author is already done with planning, analysis, and design phases. The next phase is the testing phase where the author will start to test the project.

As for recommendations, this project can be enhanced by adding other subjects too, since the Science subject also has been changed from Bahasa Malaysia into English. Science subject involve with some graphics where students need to draw themselves some of the processes.

Also, for future enhancement, this system can be made as an mobile application that can be installed in the mobile phone. This application might be used by parents to check on children's performance on the go. This application also can help teachers to assign homework to the students.

Other than that, email notification can be implemented in this system. The system will email the parents when the children submit their homework. This will help parents to observe their children even they are busy working.

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