



كلية التربية

كلية معتمدة من الهيئة القومية لضمان جودة التعليم

إدارة: البحوث والنشر العلمي (المجلة العلمية)

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Preparing Students for the Digital World

The Essential Role of Technology in Primary Education

By

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MSc Technology for Teaching and Learning

Class of 2012

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﴿ المجلد الخامس والثلاثون - العدد الثامن - أغسطس ٢٠١٩ م ﴾

http://www.aun.edu.eg/faculty_education/arabic

Acknowledgements

I would like to thank all those that gave me the confidence to travel to the UK to study for a Masters degree .Throughout this time I have learnt a lot of important elements of teaching and learning that is simply not possible for women in my country . I hope to make use of all these skills by bringing this new knowledge to Saudi Arabia.

Plagiarism Statement

This Dissertation is part of my submission for attaining MSc Technology for Teaching and Learning 2011 - 2012. I declare that this dissertation is the result of my own independent investigation and all sources have been duly acknowledged in the Bibliography.

Signature : Date:

Abstract

The purpose for this project was to examine the requirements for Primary School children when progressing from Key Stage 2 into Secondary School (Key Stage 3) and then to build an e-learning application to teach and test children on these requirements.

The project began with a Literature Review that examined the educational requirements as set out in Governmental requirements; this was then followed by a look at teaching methods for children and software development styles and approaches.

This was then followed by the design and implementation of the e-learning application the author wished to create. This had two separate designs, one for boys one for girls. The reasoning behind this design approach was the author's idea based upon her learning throughout this course as well as the findings throughout the research section of this project.

After building and deploying the application the author then proceeded to evaluate the application by having a group of primary school children to test the application and provide an evaluation. An evaluation was also sought from teachers. This collective feedback was then utilised to conduct an evaluation of the author's project.

The findings were that the application was highly desirable and received very high ratings. The main constructive feedback was that that some children were put off using the application due to the testing element; something that is not common in primary education and that some elements of the application were a little difficult for the age group.

Demo URL: http://ghada.x10.mx/gender_select.htm

Introduction

Progressing from primary school to secondary school can be a daunting experience for all pupils; there are many fears and worries that a pupil will have such as fitting in, making friends and being able to complete the work that is required of them. Whether fortunately or unfortunately the lack of formal testing at Key Stage 2 (the last 4 years of primary school) means pupils and teachers cannot be sure that pupils have learnt all of the government requirements.

That said, testing does exist in primary schools, however, they are rarely standardised due to restrictions that are in place from the government. Therefore, the author wishes to seek out a middle path whereby pupils can learn and be informally tested for the sole reason of making sure they are prepared to progress to secondary school.

Consequently for this reasons the author wishes to investigate the learning requirements at Key Stage two and then create a suitable solution in the form of an e-learning tool for free distribution to schools. As part of the process the application will need to be evaluated by teachers and students to further the development of the application and steer its development in the correct direction.

Project Aim

“To research the ICT skills needed for children before starting secondary school for the purpose of creating a program that schools can use to teach and test them”

This aim sets out the overall objective of the project as briefly explained in the introduction.

Project Objectives

The aim can be broken down into several different steps or objectives in order to create a plan and structure for the project. The author has chosen to write 4 objectives in total.

1. Research current articles about what ICT skills are required by pupils by the time they research secondary school
2. Research development tools and development methodologies required to build the program
3. Design and Implement the program software
4. Evaluate the programs successfulness though in school trials

These four objectives cover the main four areas that the author wishes to focus on throughout her study.

Scope

The scope of the study is focused on researching the requirements of ICT at Key Stage two and other important related areas such as how an e-learning application can be created effectively to foster learning. The research will not be questioning the requirements as this would mean researching an additionally topic and this is not possible to do concurrently without reducing the level of research and information on the selected topic.

Limitations

Limitations will help the author to keep focused on what the main goal of this project is. There scope has defined the focus, however, the limitations are limited to use within a primary school environment only. For example, adults will require a different type of design and approach to e-learning than young children, and children will learn in a different way. So this means the findings of this project will be limited to primary school education.

Literature Review

Introduction of Literature Review

The purpose of a literature review is to examine information that has already been written on the author's selected topic or closely related to the author's topic (Machi and McEvoy, 2008). This information will then provide the author with much background information on the subject

that can be utilised within the project. This helps in many ways, for example to stop the reproduction of primary research. If the author's intended research has already been carried out several times by other more qualified researchers then it is not necessary to repeat the research unless it is to strengthen a particular argument or is altered slightly so that the information is not repeated. Therefore the literature review will not only help give the author the best understanding of the topic but will also help to shape and define the author's primary research.

The literature review has been divided into four research categories, these are the four areas that the author wishes to analyse and gain a better understanding about, thus gaining the necessary skill set required to complete all of the chapters of this project, for example, understanding the different development techniques and which is most suitable for the project, what is the contents going to be of the application and where is it going to come from and all related information under the same area of study.

- **Educational requirements** - of e-learning in relation to what the government requires and their recommends within the UK, that is, what the government has set the standard as being. What software are children expected to know before starting secondary school. Also information that any organisational has suggested on the topic, what other researchers have examined and concluded a child needs to know before starting secondary school. A summary will be produced summing up the findings from this first category.
- **Teaching methods for children** – This section will look at the different methods of teaching children of primary school age. It will examine what particular techniques are useful in teaching children as well as any particular restrictions that are placed on learning activities. It will also examine any special requirements for building and developing applications for children. This is because children learn in a different way to adults (Pearl and Pearl, 1994) and need to have an

application designed which is suitable for them. For example, many kids' toys have large buttons and are colourful, and therefore the author feels the application is most likely to also be colourful and have large enough buttons, children like colour(Ward, 2006). A dull application with a serious feel to it is likely to not bring interest to children (Kunert, 2009). Finally this section will look at testing methods for children, IE. What methods are best to assess children, is it though an array of questions, what are the standard tests for children at key stage 2 and what method do they utilise. Discovering this information will assist greatly in providing the author with enough information to correctly build and develop the most suitable software for children.

- **Approaches to Application Building** - This section looks at the technical side of development, for example, how is an application build? What are the stages involves? And what alternative approaches are available for this? Is the author going to use Rapid Application Development (RAD) or the Waterfall Methodology? (Perry, 2006) All of these decisions need to be examined and made before the application can be designed or implemented otherwise the author risks developing an application utilising the wrong techniques that results in serious problems throughout the project (Ibrahim, 1995). The research will also look at important requirements such as usability and accessibility (Jacko, 2011). These relate to two concepts to take into consideration when building applications. Firstly, accessibility that relates to the use of the application by disabled users, (Factor, 2002) the author needs to make sure the application conforms to all accessibility require such as can the application be used by people with the most common disabilities such as being deaf, blind, colour blind and unable to use a mouse correctly. Secondly it will look at usability, this relates to building an application that is easy to use and does not cause difficulty to the user (Factor, 2002). A system that flows well and is easy to navigate.

- **Development Software** – This section of the literature review will examine the various different types of development software available to the author. What the advantages and disadvantages are for each different type of software; for example, is the author going to use a coding based program such as Adobe Flash that will require a lot of hand coding and designing to work correctly (Chun, 2009), or is the author going to utilise a program such as Adobe Captivate that mainly works using a drag and drop structure (Huettner, 2011). The advantages and disadvantages of each of the available software will be examined in an effort to select the most suitable software to for the application required as well as what fits best with the author’s skill set and previous knowledge and training from University.
- **Summary of Literature Review** - This section will summarise that literature review as a whole, look back over what has been learnt and how summarise how it will help in the other chapters of this project such as the design and implementation and the evaluation methodology. This will then leave the author is strong position to proceed onto the next chapter and be able to create an effective design for the project.

Analysis of the literature review will be carried out throughout each section of the literature review as each section is studied. The analysis will not be carried out at the end, only a summary will be produced. The analysis technique will be conducted by comparing difficult research on the topic, for example, professor A might feel approach X is the most appropriate and professor B might feel that approach Y is most appropriate. As part of the challenge of the author she must understand the topic well enough to determine which researcher’s approach is most suitable for this project. Wherever possible the author will utilise pre-existing strategies to help follow in the line of academics and not make decisions based on person opinions or feelings.

Educational Requirements

Firstly we will look at what are the requirements for children based upon the government advice on the subject. In the UK with the exception of Scotland all of the guidance on teaching comes from the national government. Education of children is broken down in to key stages. These key stages at level 0 and progress to level 5. Each key stage takes approximately 2 years to complete. Below is a table outlining the different key stages in the UK (Direct.gov.uk, 2012b).

| Key Stage | Ages | School Years | Forms |
|-----------|-------|--------------|---|
| 0 | 3-5 | | Nursery / Reception |
| 1 | 5-7 | 1-2 | 1st-2nd form infants |
| 2 | 7-11 | 3-6 | 1st-4th form juniors |
| 3 | 11-14 | 7-9 | 1 st – 3 rd secondary level |

Direct.gov.uk (2012)

This research is focuses on children that are in their last two years of primary school teaching (aged 9 – 11) and are preparing to enter secondary school. Therefore the key stage that is relevant to this research is keys stage two.

The next step is the find the government requirements for children who are at key stage two within England, Wales and Northern Ireland. This information is available online and is based the requirement for schools to abide by these laws are given in the Education Act of 2002.

The requirements for children at key stage two are given in two large documents, 132 pages and 22 page document available via the website (Direct.gov.uk, 2012a). The information in this document has been summarised below to provide a concise detail of the requirements of all children in England, Wales and Northern Ireland.

Key stage two covers four years of academic study and therefore is the biggest of all key stages. This research focuses on the skills required for key stage two and assumes that all children by the age of 11 have already learnt the skills required for key stage zero and one (ages 0-7).

Year 3 – Age 7

At this stage children should be able to do the following different types of activities on their own utilising ICT. Add text and graphics together, this can be done via a program such as Paint or Microsoft Publisher (Musick and Willett, 2000). Both Programs allow for the easy combination of text and graphics.

Children should also be able to edit sound files; this could be as simple as making them shorter or longer, adding different audio files together or simply mixing tracks together. There are many software programs that allow a child to do this. For example, Real player offers many of these tools (Real.com, 2012) other tools include Sound recorder (Surhone et al., 2011).

Children need to also learn about databases and how information is stored in a database. Simple storage databases need to be created that can hold information such as name, age, address. Microsoft Access is the most common tool for teaching this program (Anita, 2010).

Basic software simulation is also required, whereby children and use software to predict the answer to a specific question. For example, they can utilise a simple program called Mission Control that is utilised to create different types of rocket launch simulations (Keen2Learn.co.uk, 2012). The users are required to create different types of simulations using this or other similar software.

Sending Email, this is one of the most common practices within adult life, sending emails is one of the most important ICT skills required for children to learn. Without this knowledge a child will be significantly disadvantaged from others. Send email can be done via two methods, schools will often provide children with their own email address if possible, as every student should have one (Leask and Meadows, 2000) or they can use other services such as Hotmail or Gmail. Learning both techniques are important.

Year 4 – age 8

From year 4 the level of ICT skills required is increased and the tasks become harder as with all subjects. Students are required to be able to perform the following tasks.

Producing work for a variety of different audiences such as for children and adults. The children are taught about the different types of themes and approaches that can be used when creating documents. For example, formal fonts for formal work and highly graphical fonts for graphical content (Sedlack et al., 2008).

Designing their own graphics is also a requirement (as per the same document); students should be able to use a software design tool such as a drawing package to create their own graphics. This could involve adding different shapes together to create their own designs such as buildings, logos and other objects. Subjects like this can be combined with other skills such as those art skills acquired by the pupils. Students can then be taught how to use skills from other subjects to aid them in ICT as well as using ICT to aid other subjects.

Querying databases is the next stage of the database learning activity according to this governmental guidance. Children are taught how to use programs like Microsoft Access to manipulate a database, for example, they can be taught to search a database and use yes or no queries. This information allows students to handle large amounts of data as and when required.

To create graphical representations by the creation of graphs and diagrams. Microsoft Excel comes with a number of different types of controls to allow a student to create different graphics such as pie charts, bar charts, scatter diagrams and customise them as required (MacDonald, 2007).

Create basic animation by using software such as Roamer World. This allows pupils to create an animal or object and then apply different rules to the object so that it follows instructions. This is the child's first

introduction to programming and understanding how a computer can be used to design and control an object. This is extremely important since computers are used to control almost everything in today's world (Kosky et al., 2009) from washing machines to cars to phones computers are programmed to follow instructions and run and manage things. In an increasing digital world children need to be made fully aware of how computers are controlling everything and how the world is functioning on this basis.

Year 5 Aged 9

When the student enters into the next year (year 5) the level of skill needed is increased again, the following skills should therefore be taught by schools and learnt by students according to the government's national curriculum (Direct.gov.uk, 2012a).

The next requirement is for children to be shown the difference between design software and non-design software. For example, they can be shown the difference between Microsoft Paint and Microsoft Word. The difference is that one program is created for design and the other program is made for using text and graphics together. When using Microsoft Word to edit graphics it becomes very limited so children should can be taught to use each software for what it is designed for and not to use the wrong software.

Children at age 9 will also be taught how to use their data to perform more complicated search on it. They will use more queries to be able to analyse the data they have collected better. They will also be taught how this information can be used with other types of software so that they can create graphical data such as pie charts from database data. The main tools used for this are usually Microsoft Access and Microsoft Excel (Feddema, 2007). These two programs both created by Microsoft have been designed with compatibility in mind and work very well together.

Understanding the importance of the accuracy of data and how this can be done is also an important area that is to be taught from a young age. Students will be taught methods which can be used to check that data is valid. For example, ways that data can be restricted to certain requirements. For example, a database can be told to only allow a number to be entered in a certain box. This is called data validation (Anderson, 2010). Children will be taught the different methods of validating information within databases and checking how accurate it is.

Spread sheets are also taught in this school year in detail showing them how they can be used for various reasons such as for business or calculating averages for mathematics. The use of formulas will be concentrated on instead of the graphical side of spread sheets. This is one of the main classes that will teach students the use of ICT across a big range of classes.

Controlling external hardware such as alarms, lights and motors are taught with the use of what is called a control box (Jarratt and Shepard, 2004). These control boxes are connected to a PC often via a USB connection and are then able to plug in different types of hardware. This hardware will then be controlled by the PC. For example, the student can then connect 3 lights into a control box (Red, Yellow and Green) and then program the computer to display the lights in different patterns, such as the pattern of traffic lights. Children should then be taught to use scientific equipment that will help to teach them more about science and monitoring the environment.

These types of projects are often good to inspire children to bring out what they are interested in, for example, if a child really likes the programming elements of computing then they might be encouraged to pursue this independently or if a child is seen to be very good at graphic design then this might be encouraged. Children can also work in groups on various projects where each student has his or her own strength and by working in a group can build something that they would not have been able to do if they were on their own. This encourages group work and

shows a child how it is important to work together uses each person's strengths to make a team. This helps prepare them for the outside world where it is important to become specialised.

Year 6 – Aged 10

In year 6 children are to be taught how to make their own multimedia project. This can be a presentation for example. Children will combine a number of lessons and skills they have learn together in order to make this presentation. For example, children could be split into groups and asked to make a multimedia project about animals, each group being given 1 animal to focus on. The children will then use all of the different skills they have learnt to produce this video. This might include filming raw footage or editing other videos that have been taken from other sources such as YouTube. Children can then add text and sound to the video the make it a full multimedia project.

The use of IF statements in spread sheets will also be taught to children in year 6. They will learn how to change data based upon IF statements. For example, if aged is < 16 do not allow as a new member. Or how to charge people over 18 a different rate to people under 18.

The use of control boxes is then increased with the use of other types of hardware such as light and sound sensors. The students then have the opportunity to create more complicated software. For example, a burglar alarm. For example, IF sound is detected then activate the alarm. Once the basic concept is understood the children can then build a big number of software applications to do many different tasks.

Summary of Government Requirements

All of these skills mentioned above are designed to prepare students for secondary school as well as make sure they have the necessary skills to help them throughout their future studies. Children are not assessed at ICT at the end of Key stage 2; they will only be assessed at English, Maths and Science (Direct.Gov.Uk 2012).

Key Stage 2 is the Key Stage that this research must focus on as it is the Key Stage that matches the age requirements of this research which is the last 3 years of Primary school before children join secondary school.

A lot of requirements have been identified, with approximately 20 different subjects that are required to be learnt over a three year period. This is a large number of subjects or topics and creating a single application that teaches and tests children all of these 20 subjects will not be practical. Therefore I need to make a choice as to whether I wish to make this software Test only based software, teach only a selection of subjects, or focus only on the last year of education. This decision will be made later after more secondary research can be done.

Teaching Methods for Children

Children can be taught in many different ways, just as adults. How children should be taught is a big topic of debate and many different people throughout history have argued and debated over the topic and many famous people have different opinions of the topic (Cubberley, 2004). This leaves the author with a difficult job which is to decide which method or approach is correct. If scholars disagree with each other and cannot decide which method is best then who am I to argue my points. For example, some scholars have taught the method of a strong teacher – student relation, others have focused on a strict discipline where students should be isolated throughout their education process (Cubberley, 2004).

Taking these points into consideration and trying to keep the work that is to be done practical and usable in schools the author feels the best approach is to follow the current teaching styles that are allowed in schools. Asking teachers to teach in an un-normal method might lead to many other problems that the author has not thought about. The only exception is the use of e-learning to assist with the teaching.

In the UK teachers are allowed to use most teaching styles as long as they are covering the required material within the time allowed (Westwood, 2008). There are four main methods in which someone can be taught and research has shown that people learn best when they learn with their preferred method. The main methods are:

- Visual Learning (lots of visual material)
- Auditory Learning (voice or though audio and video and possibly working in group work)
- Kinaesthetic learning (Physical activities)
- Tactile (demonstrations / practical) (TeachingEnglish.org.uk 2012)

The use of ICT has grown a lot over recent years (Processen, 2007) and ICT is being used more and more in the classroom also children are also being raised on technology and therefore the skill level of children in 2012 is a lot higher than it was in previously. Many children use computers at home from a young age, this helps to increase the teaching level, however, children who have come from a background without computers in the home due to being poor could be very disadvantaged as they do not have the same level of skill as other students their age. This will mean these children will find it harder and unable to practice at home.

Conclusion

Formal testing of children is something that is not encouraged at a young age and there has been a lot of debate about the topic, therefore the software that is used to test these children should not be a very formalised test, instead the testing method could best be implemented using a new approach that gives children a score based upon other factors such as the time it takes them to complete an exercise or the number of attempts they take to complete a task successfully. This will make the tests more like an exercise whereby a teacher shows children how to do a calculation for example, and then the children need to use the formula on 10 questions. This is an informal style of test and therefore will not be seen by parents as trying to grade children from a young age.

Software Selection

This literature review also needs to cover the different software that can be used to build the required application. There are many different types of software available that we can use to build this software but which is most suitable? In order to find out which software is most suitable it will be needed to look at the requirements of the software and then the available options to find out which software matches the closest. Not only should one look at the types of software available but also the different types of approaches to building software.

The application that the author wishes to build needs several primary features such as the ability to play audio, video and conduct a test. In order to achieve this there are three options to choose from, each with their own advantages and disadvantages.

The first option is to build the application from start to finish utilising one of many different programming languages (Licker, 1997). Since the program is built from the ground up many different options will exist. For example the author could hand program the application using a web language such as PHP or ASP.net (Mantri et al., 2011). One of the advantages of using this technique is the application will be native to the internet meaning the application can immediately be made available online, and therefore instantly available anywhere in the world (where there is an internet connection). One major disadvantage of building the application utilising this technique is it relies on a constant internet connection, should there be an issue with internet access this could disrupt a teachers planned class.

Building an application from start to finish using no third party applications means the software can fully customised (Jerkovic, 2009) to the authors exact requirements and there are very few constraints that needed to be followed. The difficulty with this approach is the author will need an in-depth understanding of a programming language in order to create all of the features needed.

The second option available is to utilise a non-programming based 3rd party application. This type of application does not require any programming skills and allows the designer to create an application using a drag and drop interface (Siegel, 2009). The main advantage of utilising this approach in the author's opinion is no programming language is needed to be learned and therefore the learning of the software package will be easier and less time consuming. The main disadvantage of this approach is the author will be limited to the functions available in the software (Services). For example, if the author wants to include a specific function if it is not available in the 3rd party application she will not be able to add this feature. An example of a third party applications include Microsoft PowerPoint or Adobe captivate.

The third option is a hybrid option which is 3rd party software which allows drag and drop development as well as programming, this approach allows basic functionality to be created using the drag and drop features and more advanced features to be added using a programming language (Dewsbury, 2008). One of the main disadvantages in the author's opinion is a good knowledge of programming is still required to create a good application. Examples of hybrid applications include Adobe Flash and Microsoft Silverlight.

With these three options to choose from the author needs to think about her current experience, facilities required and time restrictions for this project. The authors current experience includes some web development experience using basic PHP code, a good understanding of Microsoft PowerPoint, an intermediate knowledge of Adobe captivate and little knowledge of Adobe Flash and Microsoft Silverlight. The facilities required for the application will not be very advanced as the application intended for children and therefore complex functionality is not required. The application main requirements are the ability to hold a graphical user interface, sounds, and videos and provide tests. The time constraints of this project is approximately 3 months which has to be divided into many parts and the author has set 3 weeks for the development of the application.

Taking these 3 points into consideration the author feels the most suitable option is to use Adobe Captivate. This will allow for a quicker development and therefore a more advanced application.

Software Development Life Cycles (SDLC)

Now that the author has decided upon the correct software to use she must now look at the different methods of designing the software. According to (McManus and Wood-Harper, 2003) there are two primary methods of development that can be used known as the Waterfall methodology of development and Rapid Application Development. According to (McManus and Wood-Harper, 2003) the two approaches offer different advantages and disadvantages and depending upon the requirements of the application. One method cannot be considering the best as one quantitative and qualitative research, it is the circumstances that make something more suitable than another.

The first option mentioned by (McManus and Wood-Harper, 2003) is the waterfall development methodology; this methodology involves several stages that are organised in a special order. The names of the elements of the waterfall are sometimes named differently but apply to very similar development stages. The stages are explained below based upon the writings of (McManus and Wood-Harper, 2003):

1. **Analysis of requirements** - this part requires a full list of the requirements of the new system to be analysed. These can be organised in a format selected by the designer.
2. **Design** - this stage involves the creation of a plan for the different areas of the application. These include a dataflow diagram, a structure chart, wireframe design, any database design, accessibility requirements, usability requirements, colour scheme and interface design.
3. **Implementation** - this stage is the stage where the application is built. The strict guidelines of design phase are followed to make sure the application is built as required.

4. **Feedback** - this part is when the developer shows the application to the customer and finds out if any minor alterations are required. This stage will not be required for the authors application as there is no client to obtain feedback from, instead the author just needs to check to make sure it matches the design requirements.
5. **Alterations** - if changes are required they will be implemented here doing a second implementation stage
6. **Testing** - the testing stage is designed to make sure there are no mistakes in the code or functionality of the application. For example, input fields will be checked to make sure they are working correctly.
7. **Publication** - the final stage is when the application is handed over to the customer or in the case of the authors application will be ready for use in the primary research.

The advantages of this approach is time is not wasted on concepts that or features that the client does not require. There is a lot of time spent getting the planning correct before beginning the design. The main disadvantage is that the customer will need to wait longer to see how the application. Also this approach is sometimes not suitable for very small applications as planning is not necessary and Rapid application development will be more suitable.

Rapid Application Development (RAD)

Rapid application is the other main development method that is commonly used by developers. Rad as written in the name is rapid or fast, little time is put into the planning stage and development starts quick (Shelly and Rosenblatt, 2011). The first version of the application is then given to the customer to get feedback.

The stages involved in Rapid application based on the writings of (Shelly and Rosenblatt, 2011) are:

1. **Small plan** - a small plan is needed to understand the basic requirements of the application. This could be obtained via a meeting with the customer.
2. **Implementation** - the development begins quickly based on the information provided by the customer. A lot of the time the design concepts are left to the designers. This can sometimes be a good idea as designers are specialist in what they do; they will best understand how to make a creative design which usually will be more creative than the customer can do.
3. **Feedback** - the client will be given the first stage of development quickly within a short space of time.
4. **Implementation** - stages 3 and 4 will be repeated until the client is happy with the final design. This stage can last a long time depending on the exact requirements of the application.
5. **Testing** - this stage is the same as within the waterfall development.
6. **Publication** - this stage is the same as within the waterfall development

The main advantage of this approach is the customer can see the work quickly, while the main disadvantage is without a fixed design a lot of work might need to be changed. This approach is useful in certain circumstances but not so much in others. For example, to create a website like ebay without a plan would not be a good idea.

Based on the two options that have been discussed above the author has decided to utilise the waterfall method of development. This is because the waterfall methodology involves a lot of planning which the author feels is necessary to be done before implementation. This will help the author to fully understand how the application will be created and the user will move through the application from area to area. Therefore the design selection will be quite large and include the following elements:

- **Colour Scheme Design** – This will be selected based on suitable colours for children.
- **Layout** – This will first include a hand drawn design, followed by a wireframe design.
- **Data flow diagram** – this will be used to design the navigation of the application
- **Structure Chart** – this chart will be similar to the data flow diagram but shows the structure in a more simple way

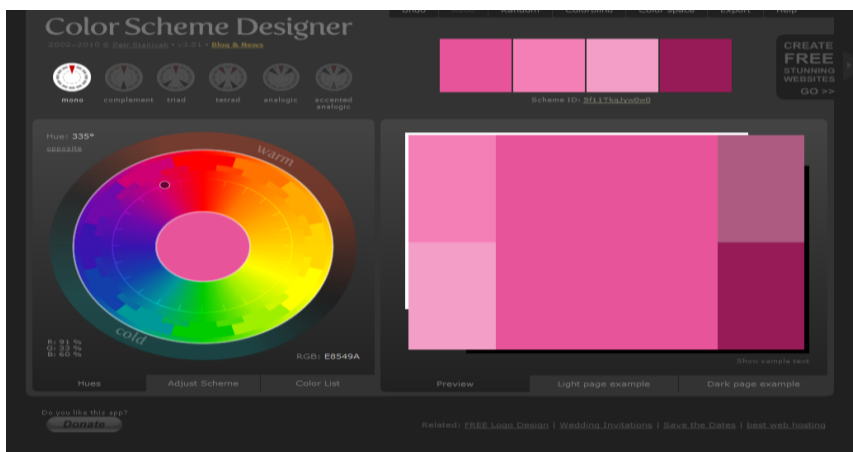
This concludes all of the information required within the literature review to provide the author with enough material to move onto the design section of the application.

Chapter 3: Design

This chapter includes the plan for the application that is to be developed. The first step that the author has chosen to do is to select the colour scheme for the website. Since the author does not feel that she is a strong designer she has located several useful tools that will help her to select a suitable colour scheme. There are many books that speak about colour scheme selection and several websites have taken this information and implemented a colour scheme generator based upon matching colours. All that is required is the author to select a colour for the application and then several other colours that go well with the selected colour will be generated.

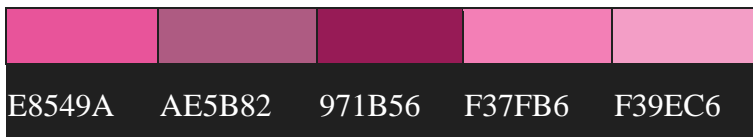
Since the application is to be created for children the author wishes to use two cartoon themes, one for boys and one for girls. Using the tools available at colourschmedesigner.com the following colour scheme has been generated for the girls and the boys:

Girl's Colour scheme



The colour codes are then provided by the website for easy use in the implementation stage (shown below)

Primary Colours:

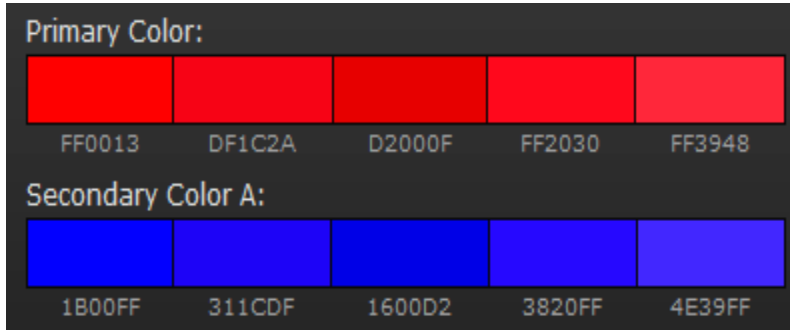


Boy's Colour Scheme



The colour codes are then provided by the website for easy use in the implementation stage (shown below)

Primary Colours:



Screen Resolution

Screen resolution refers to the quality of the graphics that are displayed and higher resolutions allow for better quality graphics. That said higher resolutions have higher requirements from the output devices, such as monitors. If a designer selects a resolution that is too high it will not display correctly on many users computers. To determine which resolution is suitable for today’s Internet users the author has referred to the W3C schools website; an organisation that specialises in web standards. The following has been taken from the W3C website:

| Date | Higher | 1024x768 | 800x600 | 640x480 | Other |
|--------------|--------|----------|---------|---------|-------|
| January 2012 | 85% | 13% | 1% | 0% | 1% |
| January 2011 | 85% | 14% | 0% | 0% | 1% |
| January 2010 | 76% | 20% | 1% | 0% | 3% |
| January 2009 | 57% | 36% | 4% | 0% | 3% |
| January 2008 | 38% | 48% | 8% | 0% | 6% |
| January 2007 | 26% | 54% | 14% | 0% | 6% |

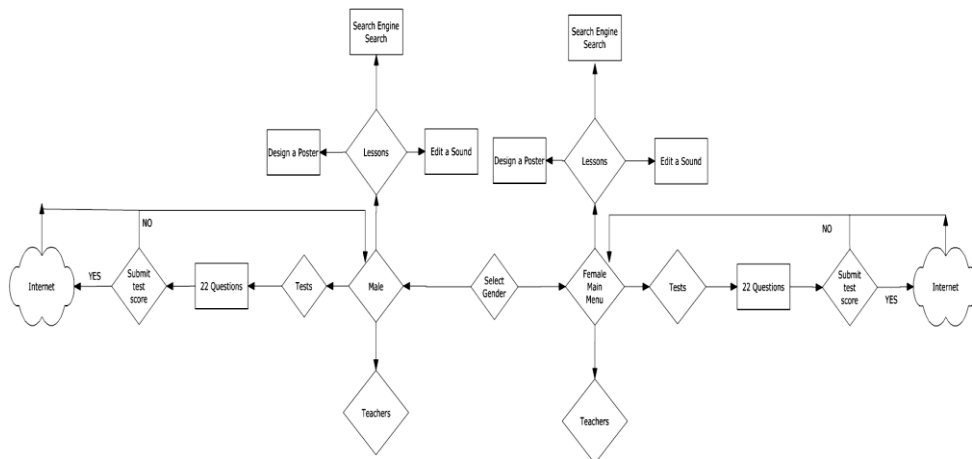
http://www.w3schools.com/browsers/browsers_display.asp

As can be seen from the above table as of 2012 over 85% of internet users have a screen resolution higher than 1024x768, and only 2% of users have a screen resolution of 800x600 or lower. This means that it is safe to produce an application with a screen resolution of at least 1024x768 without risking display issues on user computers.

Since the users are also going to be school children the resolution should not be too high as this will result in smaller graphics and therefore possibly create a strain on the user’s eyes. Taking both of the above points into consideration the author has decided to set her design size at:

768x575 Pixels

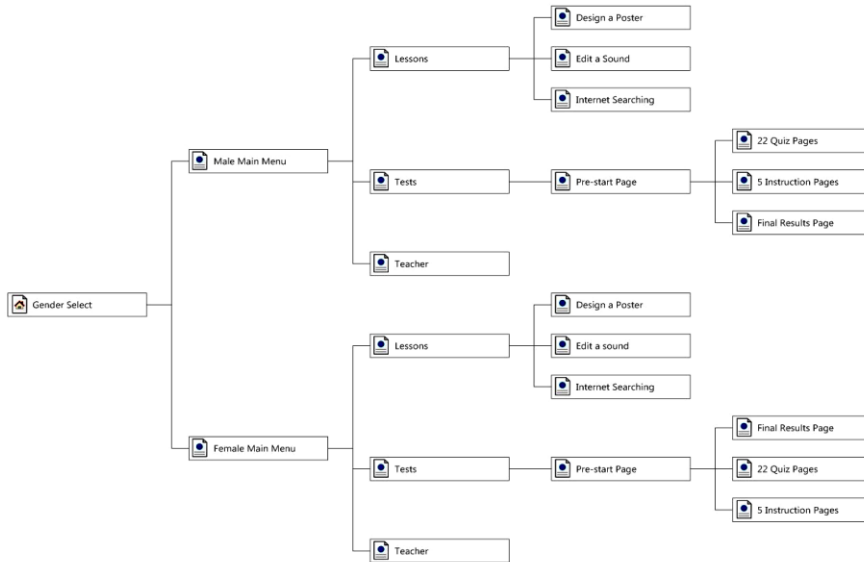
Flow Chart



The above dataflow diagram has been created to outline how a user will move through the application. Planning the project in this manner is very useful as it allows for a much easier implementation process as the author is fully aware of the requirements of the system and can work from this diagram as a guide. A software program called Smart Draw was utilised to produce this design

Site Map

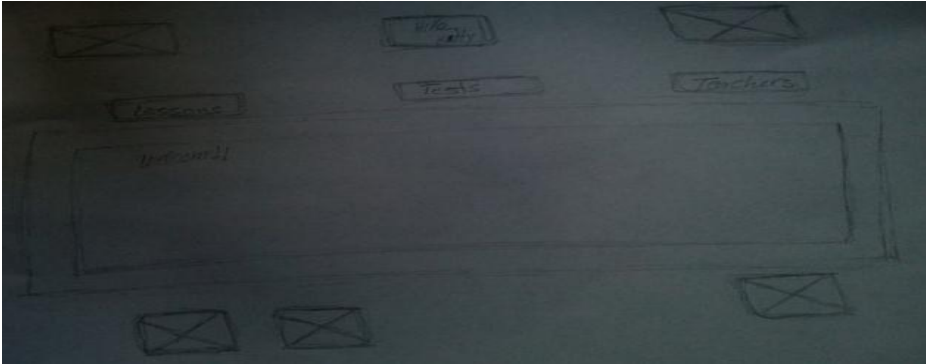
The site map outlines all of the pages that will be created for the project and also shows their position within the website hierarchy. This can be used within combination of the dataflow diagram for a clear implementation process.



As can be seen from the above site map there will be a gender select page followed by two identical sets of pages, one for the boys and one for the girls. All 22 pages of the quiz have not been shown in the site map due to the size. The total number of slides for the project is approximately $36 * 2$, this is calculated by adding up the total number of slides shown above and then multiplying it by two. A software program called Smart Draw – was utilised to produce this design.

Hand-drawn design

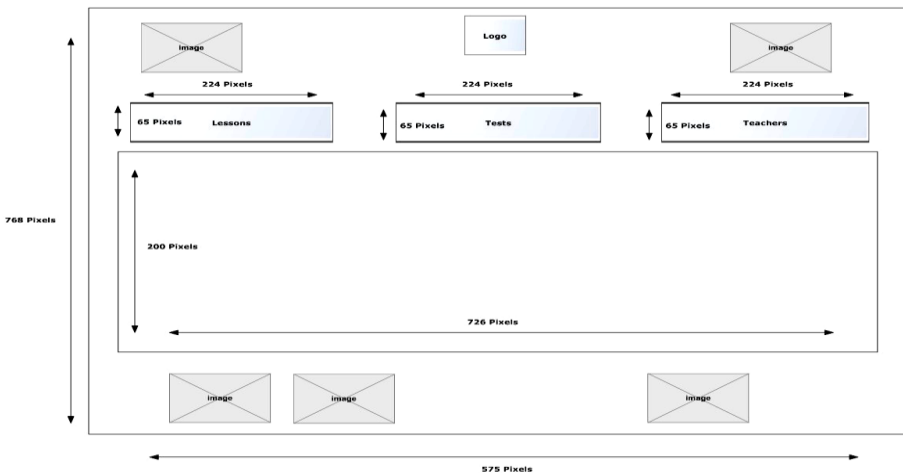
The next stage of development was to draw an initial design by hand. This would provide the author with a concept to work from. One sketch is shown below and others are included within the appendix.



The navigation will have three primary links (Lessons, Tests and Teachers). These will be positioned at the top of the application, equally spaced. The main website content will be placed within the centre of the website. Other images will be placed around the background and border of the website for design purposes. The boy's design slightly differs in positioning, however, the 3 menu buttons and hierarchy are to be created identically.

Computer Drawn Designs

Next the author wanted to create a better design using Smart Draw the author then drew a detailed planned drawing. Sticking to the waterfall development methodology the author invested a lot of time into the planning stage, making sure everything was correct so that during the implementation stage the chances of any big errors was reduced.



The exact size requirements have also been outlined using the arrow tools. This will make implementation easier.

Chapter 4: Implementation

This next chapter follows the implementation process from start to finish outlining how each element or feature of the application was implemented. Every unique feature has been explained during this chapter, however, if the same feature is utilised more than once the explanation is not repeated.

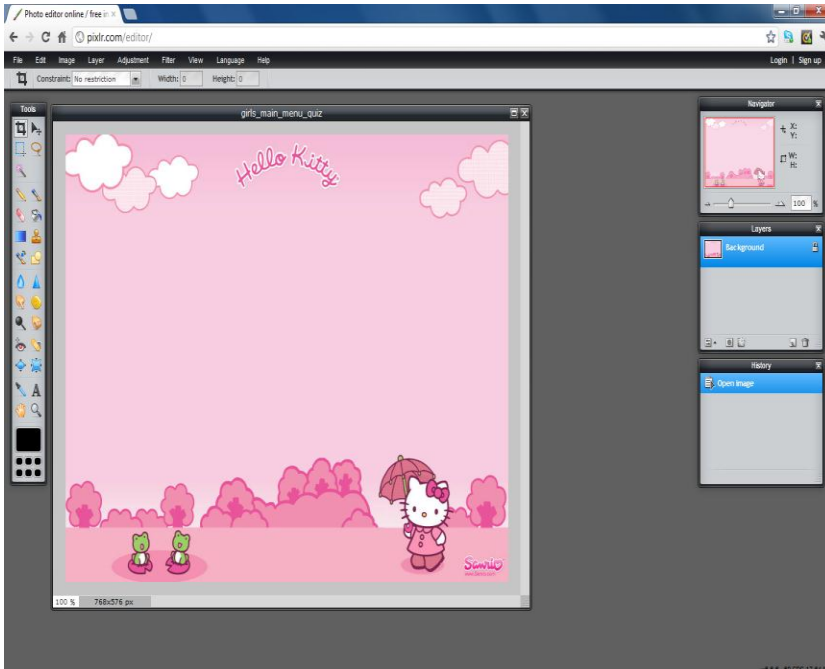
The first task of the implementation was to select some suitable images for use with the application. This included two background images (one for boys and one for girls). These were selected using Google Images. There are some legal implications that should be noted at this point. This is that images cannot simply be taken from the Internet and used as a designer requires. This is because the majority of online images are likely copyrighted, meaning they belong to someone and their permission is required to use their image. If no permission is obtained or royalty fee paid, should the application become popular and the original copyright owner made aware of the unauthorised use it is likely he or she will ask for compensation and possibly consider legal action. Since this project is for demonstration purposes only images were used without copyright considerations.

After selecting the background images other images were selected including several graphics for use within the application. The next stage of development was then to design the application stage. The application stage is the template or menu system that we be used to connect the user to different areas of the program.

An online editing tool called Pixlr at Pixlr.com was utilised for all of the graphic design work. The reason the author selected this program is she finds it a useful, online tool that can be utilised in all locations and offers many advanced features similar to Photoshop.

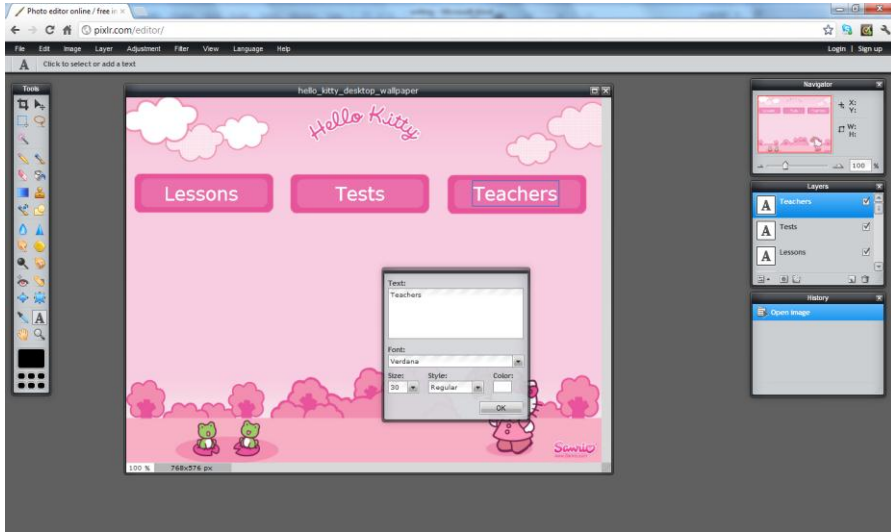
Step One

The first step was to resize the selected background image to the exact size required for the application. Resizing the image can be done with this tool by selecting the complete image (Select All / Shift A) and then selecting free transform. Pixlr.com shows the new size dynamically in the navigation window so that it can be set correctly.



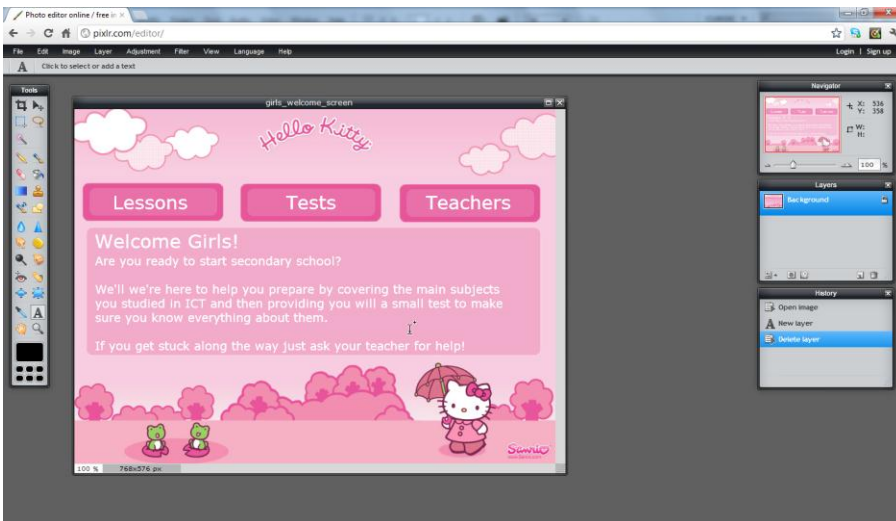
Step Two

The second step was to create some buttons for use with the application. They will be the navigation buttons. Buttons can either be created as part of the main image or they can be created separately and then later utilised separately. On this occasion the author has decided to make the images as part of the background. After creating the design of the background by drawing two squares the author then utilised the text tool to add text to the buttons. A popup box (shown below) is used to modify information such as text size and font.



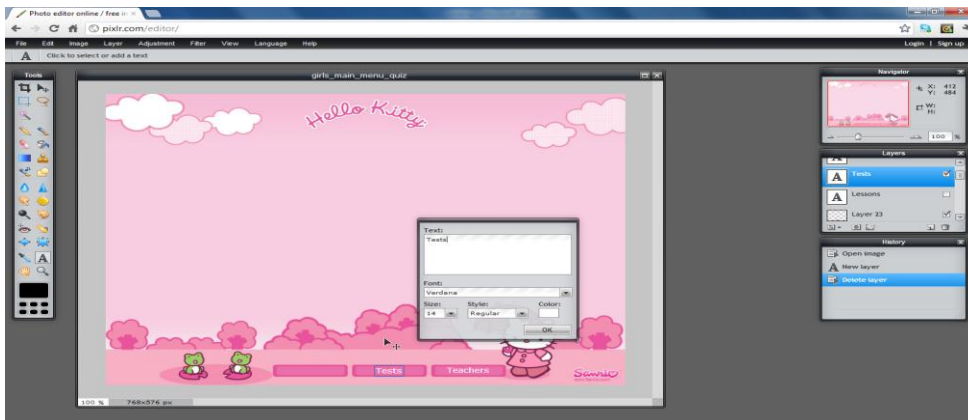
Step Three

For the third stage the author wished to complete the design for the home page of the application, this was done by adding a large box in the middle with welcome text. To match the colours to those given in the design the author used the same colour codes and entered them via the collect select pallet.



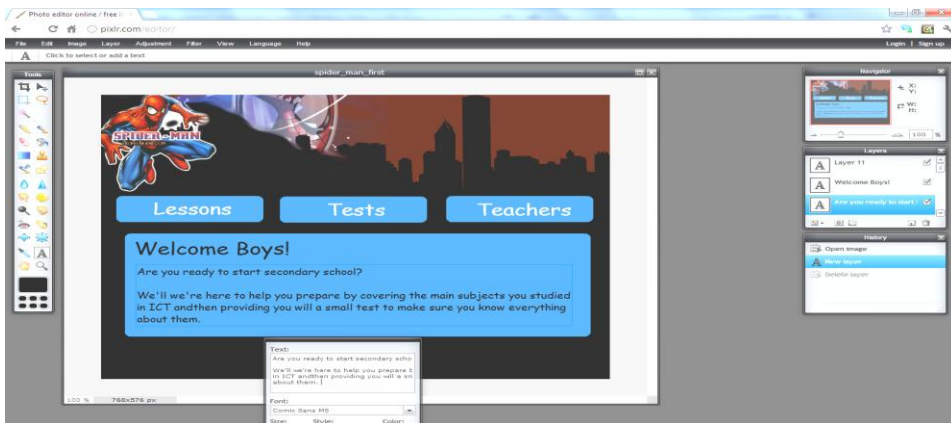
Step Four

This step was to create a second version of the template for the internal pages. This was to be used for all of the internal pages. The home page design is nice but is too big accommodate the content the author needs to add therefore this second version with smaller buttons has been created.



Step Five

The same process was then repeated again as the author planned to have two copies of the application one for boys and one for girls. The final stages of this are shown in the pictures below. The implementation stages were all as above.

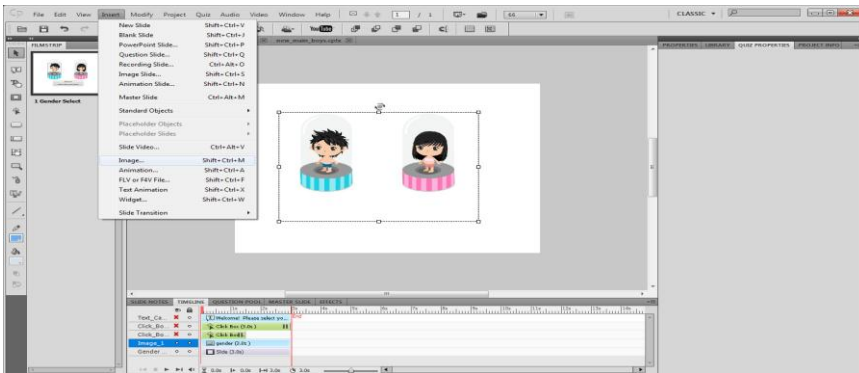


Step Six

The next stage of the implementation was to begin using the selected development software (Adobe Captivate). What the author first wanted to do was to create the first page of the application (Gender Select Page). This is the page where the pupil will start from and make their first selection.

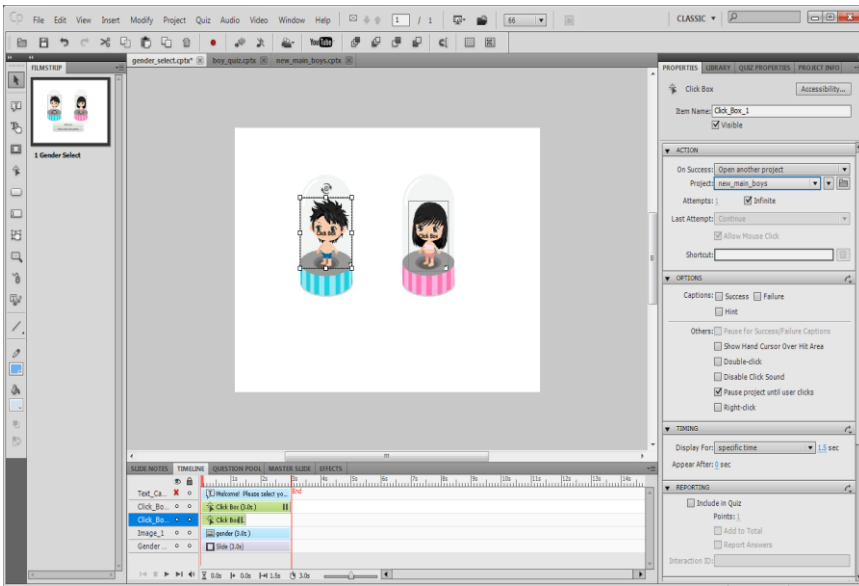
This had two separate designs, one for boys one for girls. The reasoning behind this design approach was the author's idea based upon her learning throughout this course as well as the findings throughout the research section of this project.

This first page was created by selecting new and setting the resolution to the desired size 768x575. Then the author inserted the selected picture via the insert menu shown below.



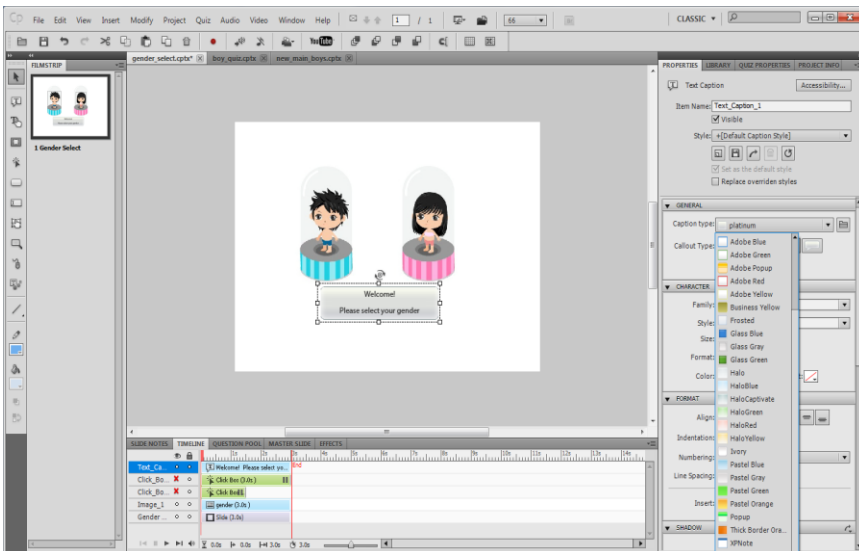
Step Seven

In order make each picture link to the correct location the author needed to create two links. Adobe Captivate provides a technique of adding invisible links known as click boxes. These boxes can be drawn anywhere on the stage and then linked to the desired location. A screen shot of this is below.



Step Eight

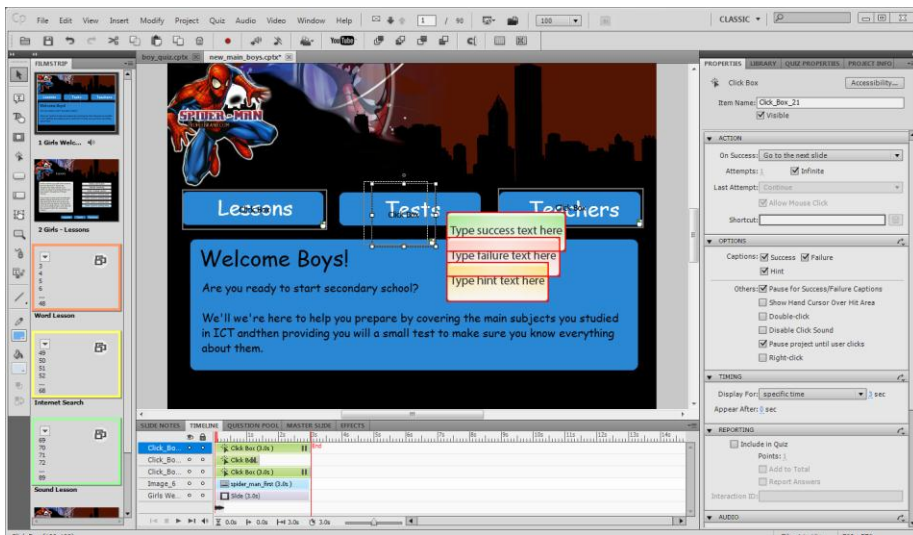
The file stage for this element of the development was to add a box to provide guidance to the user. This was done by inserting a text area box, the colour scheme and fonts can then be selected from the right hand menu.



Step Nine

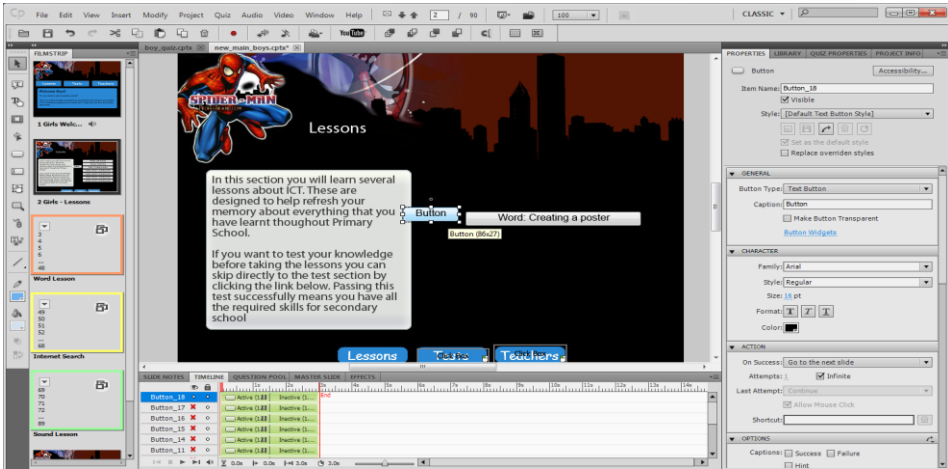
The first major part of the application can now be built. This first part is going to be the e-learning part of the application where students will be able to learn about the various subjects required for key stage 2. The second major element which will be discussed later is the e-assessment facility.

The first task was to create the menu page in the same fashion as the gender select page. This meant importing the images and adding click boxes to the three buttons (shown below).



Step Ten

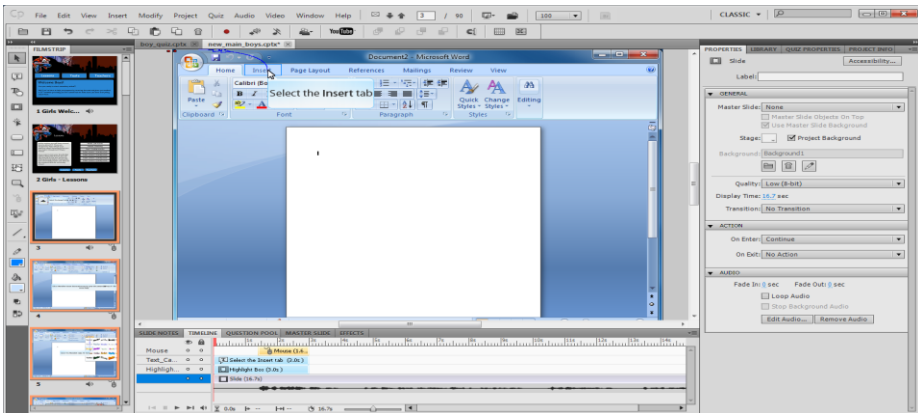
The application has three main pages, lessons, test and teachers. The first part the author wished to develop was the lessons. The first part of this was to create another menu page for the lessons. This was done using captivate buttons. Text was also added and links were created to connect back to the home page. The image below shows some of this process.



Step Eleven

To educate the students about the various areas of ICT they are required to know the author decided to use video tutorials. Creating the video tutorials was a challenging task as they required planning and merging of several components.

Firstly the author needed to plan out the lesson on paper. This was the step by step process for the video, such as which buttons to click, what to demonstrate, where to save and retrieve files. After creating the plan the author then utilised the inbuilt video capture software (simulation software) to make a recording of the lesson. This process is shown below:



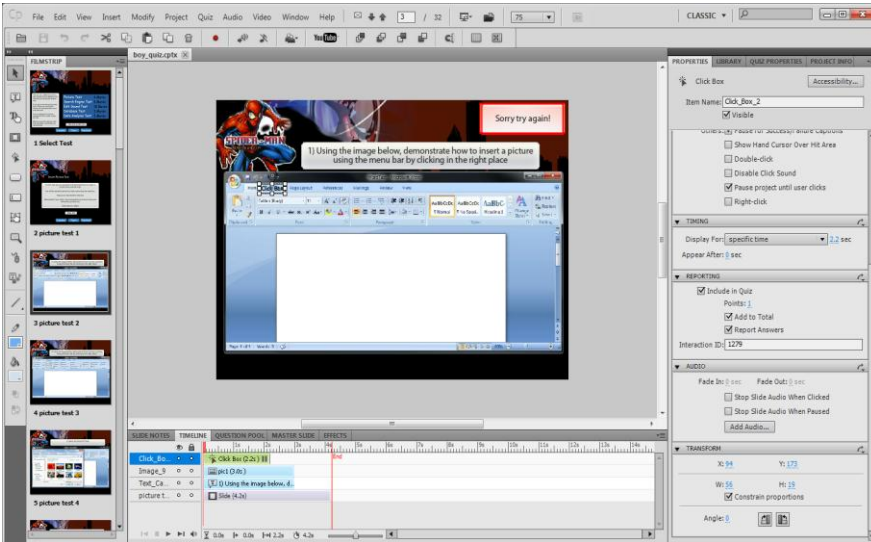
Next the author wanted to add a step by step voiceover which is intended to provide guidance to the pupil as he or she works their way through the lesson. The author utilised specialist “Text to Speech” (TTS) software to keep all of the voice and sound the same to give it a greater professional feel.

The best software the author could find was from a company called ImTranslator.net. The quality of the Text to Speech was very good. Scripts were written for use by the website and then several files were created for the video. These video files were then imported into Adobe Captivate directly onto the slides they were intended for. Examining the above image you can see the wave bar at the bottom of the timeline. This process was utilised for the three videos the author created for this project.

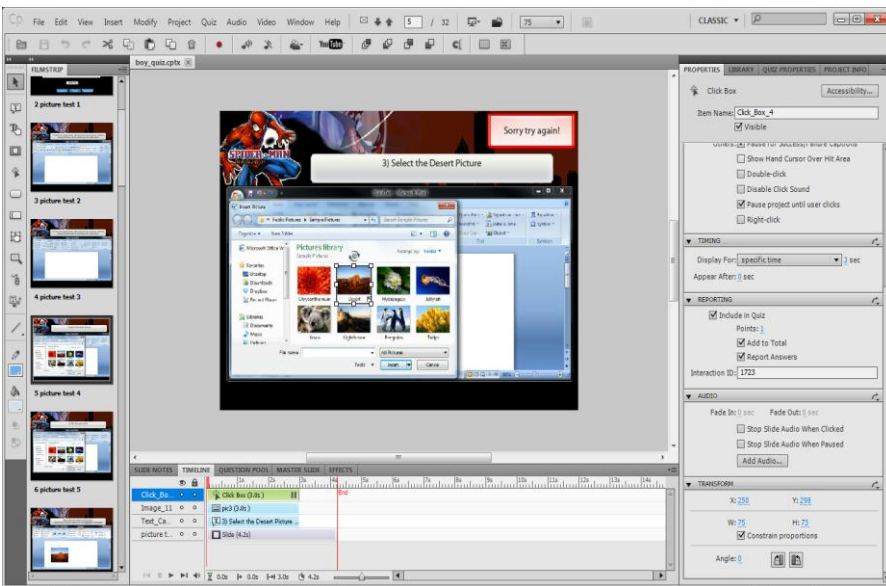
Step Twelve

The next stage of implementation was to develop the testing facility. For this feature the author wanted to make full use of ICT to provide an invigorating experience for pupils and therefore deciding what approach to take required some thought and investigation. After reviewing all several resources on Adobe Captivate the author discovered some different and customisable techniques in which testing can be conducted. These techniques were then used to create a virtual Microsoft Office test screens whereby the user should then click.

Since the first test is inserting a picture into Word several screen shots were taken of the different steps (Click Insert Tab, Click Insert Picture, Select Picture and Click Insert). The author then carefully drew around the exact location that students must click on using click boxes. Captivate was then programmed so that if the user clicks on the click box they score a point and if fail to click in the correct location they will not score a point. After two incorrect attempts the user will fail the test of the section he / she is on and then automatically move onto the next test.



The above image shows the click box drawn over the insert tab.

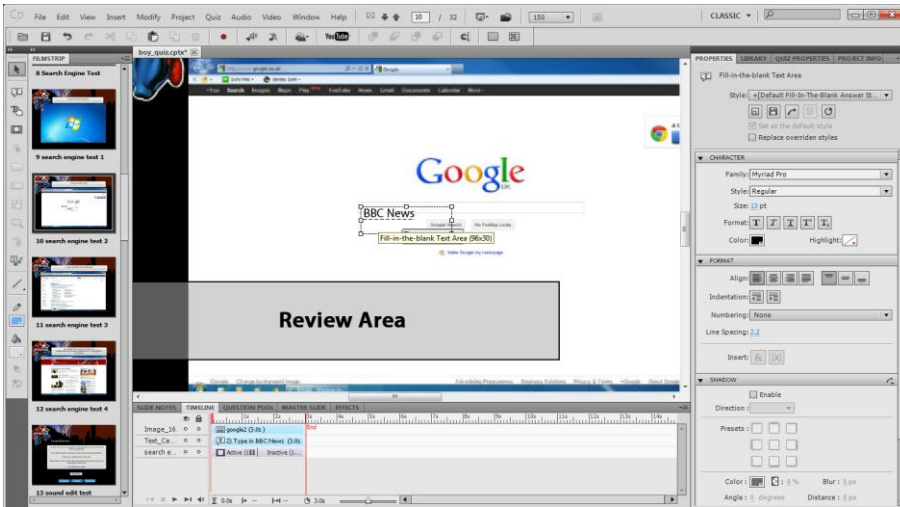


The above image shows another click box drawn over the picture. Looking above the screen shot of Microsoft Word is the instruction. This instruction shows “select the desert picture”.

Step Thirteen

Some parts of the quiz utilised the text entry box. For example when testing children how to conduct a Google search they must need “BBC News” into the search box and click search in order to continue.

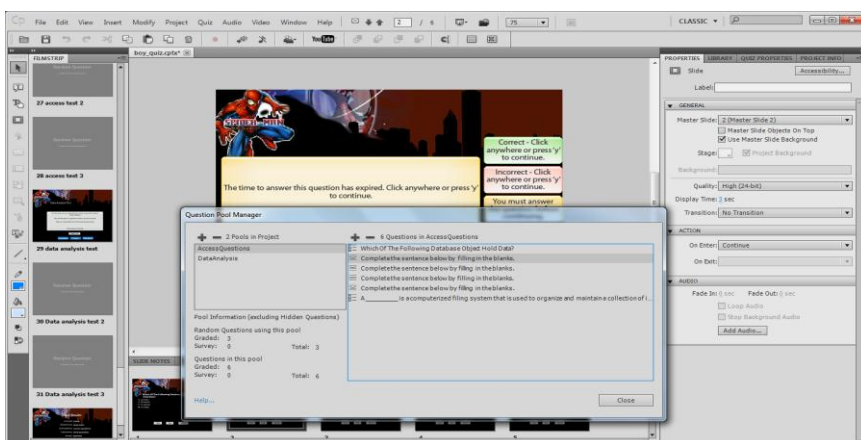
This process is partly shown below:



Step Fourteen

To make the testing facilities diverse the author also utilised the inbuilt testing system to ask pupils multiple choice questions on the test topics. Question can be added individually or as part of a pool of questions.

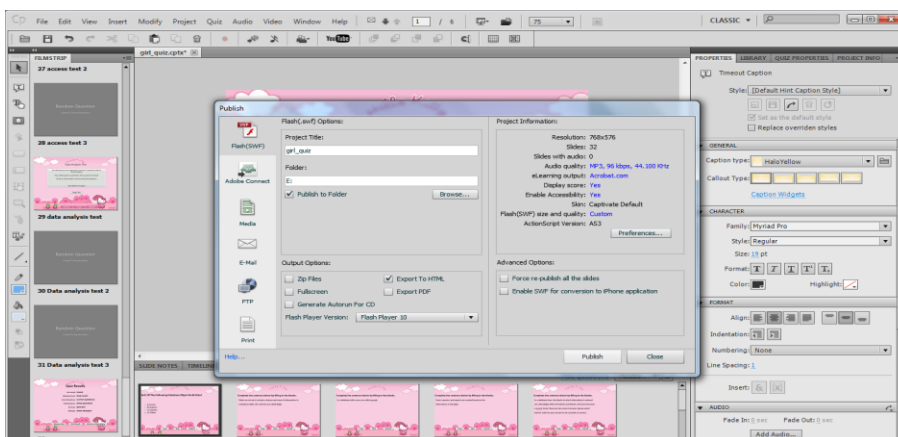
Since the test is quite important for pupils to pass and the likelihood of cheating is higher on computers the author decided to create the questions utilising the question pools. The question pools come with several advantages such as being able to provide students with different questions each time the test is sat. Also different pupils will receive different questions, therefore lowering any risk of cheating.



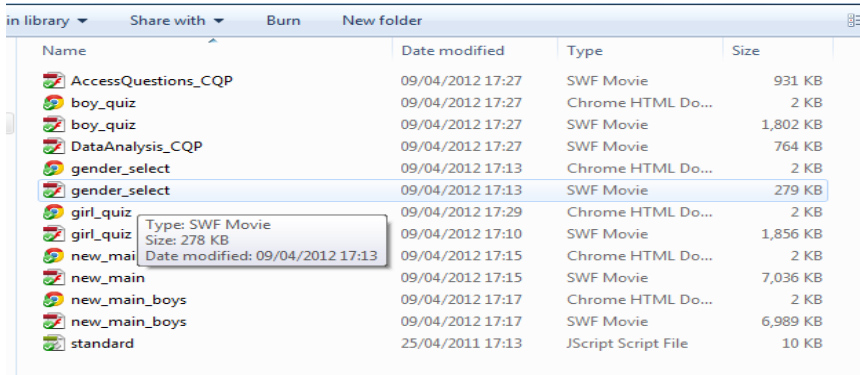
The above image shows part of the question pool creation. The author created two sets of question pools, one for question on Microsoft Access and another set for questions on Data Analysis techniques.

Step Fifteen

Next the author needed to upload the website to the Internet so that it can be shown to the required parties as well as be used easily in the primary research. To do this the first step was to export the file. This is done in Captivate under Publish. The author just needed to check the export to HTML box.



The same process was also repeated for the additional files, since the author had a total of 5 project files (gender select, boys teaching, girls teaching, boy's quiz and girl's quiz).

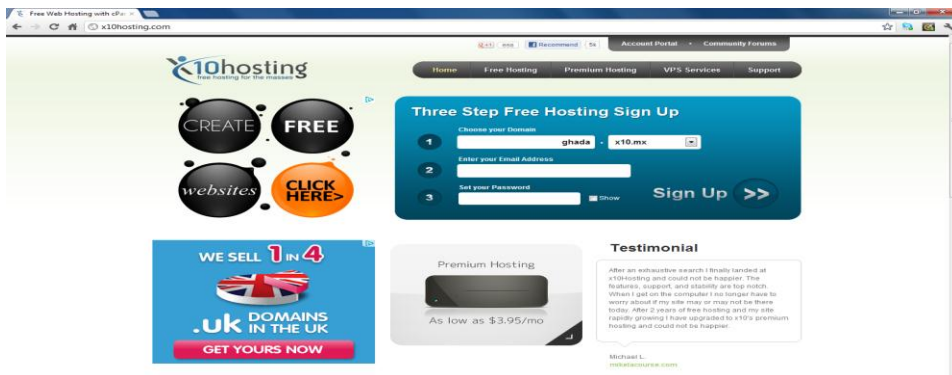


| Name | Date modified | Type | Size |
|---------------------|------------------|---------------------|----------|
| AccessQuestions_CQP | 09/04/2012 17:27 | SWF Movie | 931 KB |
| boy_quiz | 09/04/2012 17:27 | Chrome HTML Do... | 2 KB |
| boy_quiz | 09/04/2012 17:27 | SWF Movie | 1,802 KB |
| DataAnalysis_CQP | 09/04/2012 17:27 | SWF Movie | 764 KB |
| gender_select | 09/04/2012 17:13 | Chrome HTML Do... | 2 KB |
| gender_select | 09/04/2012 17:13 | SWF Movie | 279 KB |
| girl_quiz | 09/04/2012 17:29 | Chrome HTML Do... | 2 KB |
| girl_quiz | 09/04/2012 17:10 | SWF Movie | 1,856 KB |
| new_mai | 09/04/2012 17:15 | Chrome HTML Do... | 2 KB |
| new_main | 09/04/2012 17:15 | SWF Movie | 7,036 KB |
| new_main_boys | 09/04/2012 17:17 | Chrome HTML Do... | 2 KB |
| new_main_boys | 09/04/2012 17:17 | SWF Movie | 6,989 KB |
| standard | 25/04/2011 17:13 | JScript Script File | 10 KB |

The exported files are shown above. Captivate creates a lot of files, especially when being used for quizzes.

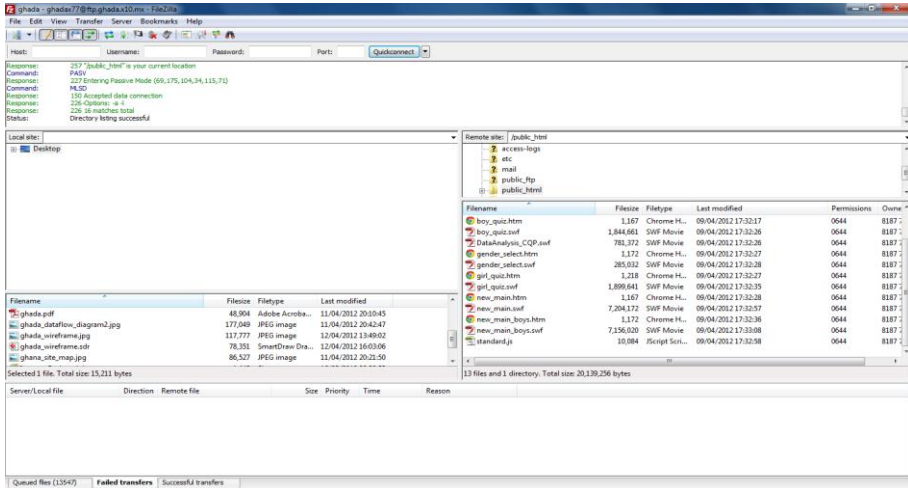
Step Sixteen

The final step was to register for some web space to host the website. This was done with a company called 10hosting.com The author selected the name ghada.x10.mx for the website. After following the instructions the web space was automatically setup and then the FTP details were provided to the author.

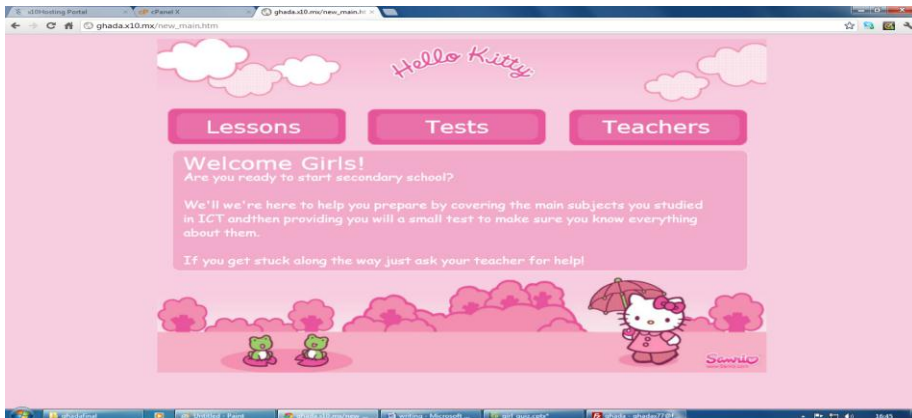


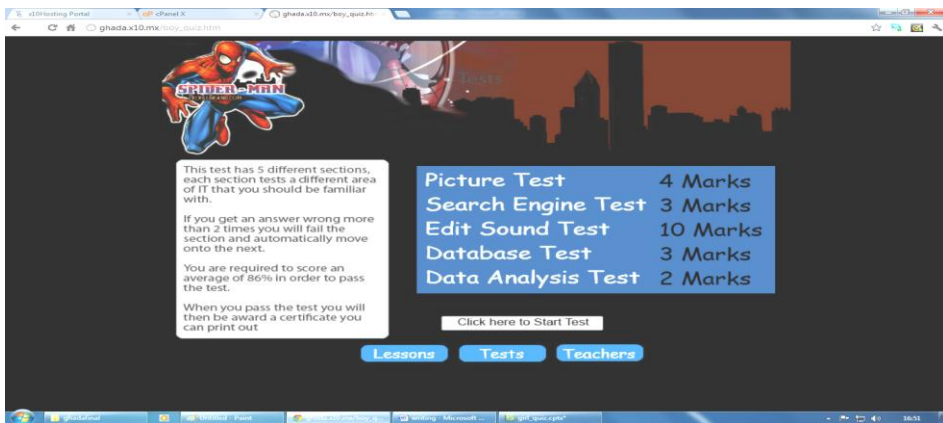
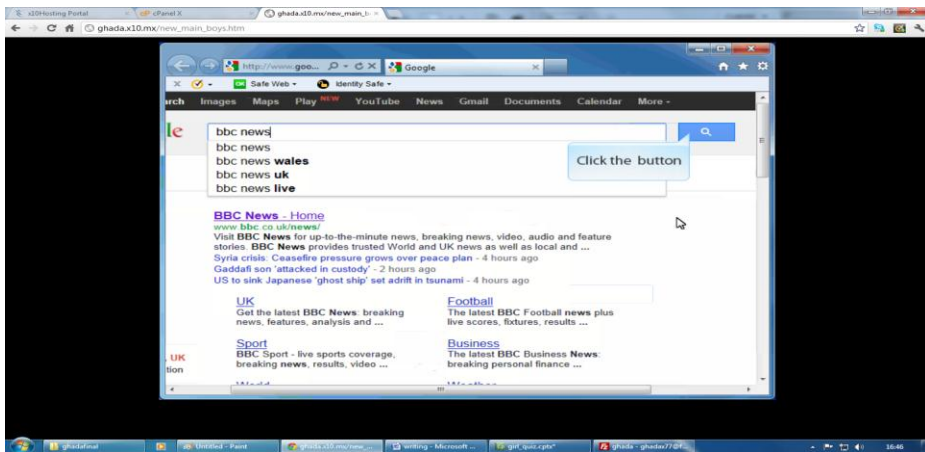
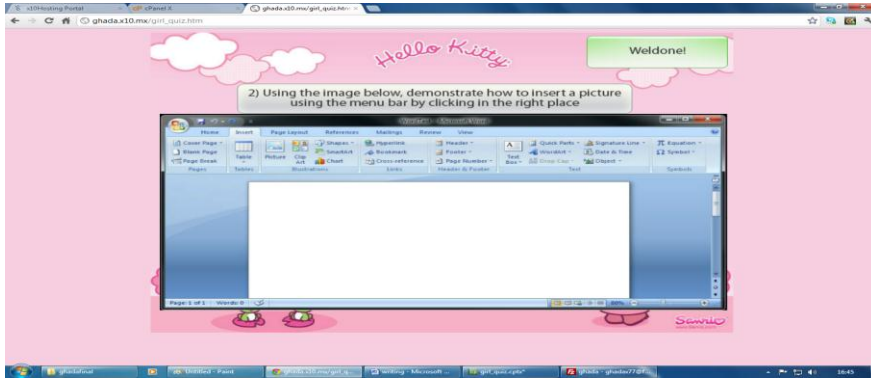
Step Seventeen

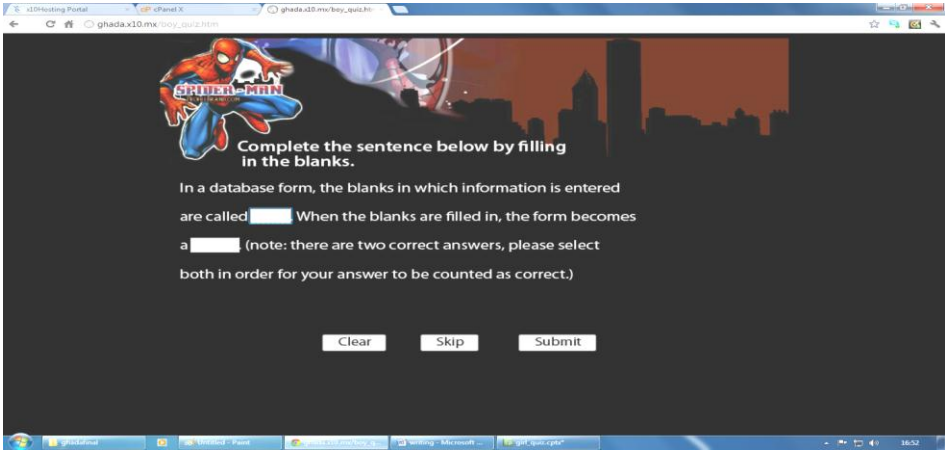
These details were then entered into FileZilla an FTP program to connect to the new web hosting. After the connection was established all of the files were then copied across into one directory.



Screen Shots of Final Project







Chapter 5: Research Methodology

Preliminary Teacher Interviews

Despite all of the key stage requirements being listed on the UK government website it is also important that the author get confirmation that this is actually what is being taught in schools. If schools are not teaching the key stage skills as required by the government this will mean one of several things. It could indicate that the requirements of the government are too high and it is simply not possible for children to learn such a large amount of skills at this age or it could also indicate that the teachers are not doing a good enough job to teach all of the government requirements such as a short space of time. If the case is that teachers are struggling to teach such a large amount of information in a short space of time then the utilisation of an e-learning tool might actually assist them in covering all of the government requirements. Before this can be fully investigated some small primary research will be carried out at several schools. The author has decided to conduct this research in the form of qualitative research as she wishes to gain as much information from the teachers she can interview as possible. The research will be conducted in the form of an interview; these interviews will be held with any primary school teacher that teaches 9 – 11 year old students (Key stage 2). The questions are outlined below:

- 1) Do you have any difficulties teaching all of the government ICT requirements for key stage two?
- 2) Can you explain the difficulties encountered when fulfilling these requirements?
- 3) What do you find the most difficult ICT requirement to teach?
- 4) Do you feel the government's requirements are too easy, too hard or just right?
- 5) How do most students perform in ICT lessons?

Information about Research

Purpose of Research

The purpose of this particular primary research is to assess the application and its content for suitability for use within the UK classroom environment. The areas of interest include the usability, likeability, effectiveness and suitability for primary school children. The findings from the research will then provide the author with firm understanding of the requirements for the next version of the software.

Requirements of Research

The requirements for the research will firstly include a participating school. Several local schools will be approached to request their assistance. This will firstly be done informally at the author's daughter's school. If this approach fails to provide any results then several additionally schools will be contacted either by telephone or in writing.

The school will need to provide 15 – 20 students with access to internet enabled computers. Also several teachers will also be required to test out the software and provide additional feedback. The application has already been uploaded to the internet for easy access, other options included adding the application to a CD and installing it on every computer, however, this approach was not necessary due to the advances in Internet technology.

Audience

The audience are a mixture of boys and girls who are as close academically as possible; they should also be in their last 2-3 months of primary school, as this will mean that they should have almost finished their studies and completed almost the entire Key Stage 2 syllabus. The teachers will be those that teach this group of pupils as they are most likely to understand the requirements and their level / ability.

Options available

The author has read about two research methods, quantitative and qualitative, both of which will offer advantages and disadvantages. Due to both approaches having these pros and cons by utilising both methods the author can maximise her findings. For example, votes in the form of a survey can be used to find out the most popular features and design characteristics and then qualitative research in the form of open questions can be used to gather a deeper feedback.

Most suitable option

Based on the findings about quantitative and qualitative research the author has decided to utilise both approaches as this will provide the greatest level of feedback as possible. Since the students are larger in number they will be assess via quantitative methods. This will provide the author with statistical data that can easily be analysed and will present the author with a clear overview of the general consensus of the students. Teachers will be interviewed and therefore utilise qualitative methods, this is because the teachers will be few in number and will be most likely to provide an in-depth explanation as to their thoughts and feelings on the application.

Questionnaire & Interview Design

The questions that the author has set for the post-experiment questionnaire are written below, several of the questions are based upon usability guidelines taken from UsabilityProfessionals.org (2012), some are utilised directly, others have been altered and additional questions added.

Student Questionnaire

1. Gender
 - a. Male , Female
2. I think I would use the application again
 - a. Strongly Agree , Agree, Neutral, Disagree, Strongly Disagree
3. I found the application complex?
 - a. Strongly Agree , Agree, Neutral, Disagree, Strongly Disagree
4. I thought the application was easy to use
 - a. Strongly Agree , Agree, Neutral, Disagree, Strongly Disagree
5. I found the application to flow well
 - a. Strongly Agree , Agree, Neutral, Disagree, Strongly Disagree
6. I thought there was too much inconsistency in the application
 - a. Strongly Agree , Agree, Neutral, Disagree, Strongly Disagree
7. I think most children could use this application easily?
 - a. Strongly Agree , Agree, Neutral, Disagree, Strongly Disagree
8. I felt confident using the application
 - a. Strongly Agree , Agree, Neutral, Disagree, Strongly Disagree
9. I liked how the lessons were taught to me?
 - a. Strongly Agree , Agree, Neutral, Disagree, Strongly Disagree
10. I found the tests too easy?
 - a. Strongly Agree , Agree, Neutral, Disagree, Strongly Disagree
11. I found the tests too hard?
 - a. Strongly Agree , Agree, Neutral, Disagree, Strongly Disagree
12. I would like to learn like this more often?
 - a. Strongly Agree , Agree, Neutral, Disagree, Strongly Disagree
13. I felt comfortable completing the test?
 - a. Strongly Agree , Agree, Neutral, Disagree, Strongly Disagree
14. The application has made me less worried about studying ICT in secondary school?
 - a. Strongly Agree , Agree, Neutral, Disagree, Strongly Disagree
15. On a scale of 1 – 10 how would you rate the application
 - a. 1 – 10 (1 = Very bad 10 = Very Good)
16. On a scale of 1 – 10 how would you rate the colour scheme
 - a. 1 – 10

17. What would you like to see changed or improved?

a. Text Box

The questionnaire has been build using FreeOnlineSurveys.com and can be viewed at:

<http://freeonlinesurveys.com/s.asp?sid=5640966yjfiyqdb37817>

Teacher Interview

1. I found the application complex?

a. Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

b. Please Explain

2. I thought the application was easy to use

a. Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

b. Please Explain

3. I found the application to flow well

a. Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

b. Please Explain

4. I thought there was too much inconsistency in the application

a. Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

Please Explain

5. I think most children could use this application easily?

a. Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

Please Explain

6. I liked how the lessons were taught to me?

a. Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

Please Explain

7. I think the tests are too easy for children?

a. Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

Please Explain

8. I think the tests are too hard for children?

a. Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

Please Explain

9. On a scale of 1 – 10 how would you rate the application

1 – 10 (1 = Very bad 10 = Very Good)

Please Explain

10. On a scale of 1 – 10 how would you rate the colour scheme

1 – 10

Please Explain

11. What would you like to see changed or improved?

Please Explain

12. Is there any other feedback you would like to give?

13. (Additional questions asked)

Number of participants

- 15– 20 School Children (2 classes if possible)
- 4 School Teachers

Format / Program

1. Each student opens the website (ghada.x10.mx) and has 30 minutes to test out the application.
2. After the 30 minutes each student will then open the survey URL <http://freeonlinesurveys.com/s.asp?sid=5640966yjfiyqdb37817> and asked to complete the questions.
3. The teachers present will also evaluate the software and be interviewed about their experience.

Chapter 6: Analysis of Results

This chapter will examine all of the data that the author has collected and analyse it accordingly. There are two sets of data to be examined and each set will be studied independently. After this the results will then be summarised as a whole for utilisation when drawing conclusions in the final chapter.

The areas to be analysed are as follows:

- Teacher Interview and Questionnaire
- Student Questionnaire

Teacher Interview and Questionnaire

This set of data was collected from the ICT teacher at Cardiff Muslim Primary School as per the requirements mentioned in the research methodology. The questionnaire consisted of 13 questions in total. The findings from this analyse will help to shape the second version of the application to ensure that it is suitable and has the approval from actual primary school teachers. The questionnaire was focused around the content and functionality of the application and the questions were divided up accordingly.

The first set of answers is discussed below:

Question 1) I found the application complex: Disagree

Question 2) I thought the application was easy to use: Strongly Agree

Question 3) I found the application to flow well: Agree

These answers above demonstrate that the ICT teacher has given a very high rating for the ease at which the application can be used. The teacher gave the highest rating for ease of use (question 2) and the second highest rating for questions 1 and 3. Since these results have five options to select from the ICT teacher has given almost the highest ratings possible, meaning she was very pleased with this part of the application. Therefore from the teacher's point of view (pupils are examined later) there is nothing wrong with these elements of the application.

Question 3 also had a follow on open question whereby the ICT teacher answered :

“The link between the sessions was easy to understand. After watching the programs they were then able to answer questions”

Again this is very positive feedback from this ICT teacher and also being an ICT teacher her opinion counts a lot as any problems with the computer system should have been easily identified by her.

Question 4) I thought there was too much inconsistency in the application: Strongly Disagree

Teacher Explanation: *“the choice of program suited the gender and encouraged the children to be engaged”*.

The feedback to this open question highlights the benefit of using cartoon themes for children’s application. This was one of the core principles the author wished to incorporate into the application based upon her own experience with children and as a primary school teacher. The author wishes to build on this approach in the future, however, special consideration will be needed in order to utilise copyrighted material such as that from Disney cartoons.

Question 5) I think most children could use this application easily? Strongly Agree

Teacher Explanation *“they were able to use it without help as it had clear instructions”*

Question 6) I liked how the lessons were taught to me: Strongly Agree

Teacher Explanation *“the explanation were clear and even demonstration online was adequate”*

These responses indicate that students were able to use the application without any help from teachers. This is also one of the considerations the author wanted to implement as one of the benefits of e-learning applications is that in theory it creates the illusion that many teachers are present, teaching, and providing assistance, therefore creating less strain on the teacher and allowing those students that are able to work alone to carry on alone whilst the teacher focuses on assisting those students that have difficulties.

Question 7) I think the tests are too easy for children: Disagree
Teacher Explanation: *“as we would like them to enjoy using ICT the tests were moderate enough for them”*

Question 8) I think the tests are too hard for children: Disagree
Teacher Explanation: *“the children found it easy enough”*

The teacher felt the tests were almost perfect; however, the author was worried that this part of the application might have been too difficult, although the purpose is to assess the required level for secondary school. Therefore the tests do need to be at the required level whether students find it too hard or not. That said, if the student feedback also highlights this point the author might need to look again at the structure and layout of the testing.

Question 9) on a scale of 1 – 10 how would you rate the application: 8

Question 10) on a scale of 1 – 10 how would you rate the colour scheme: 9

The ICT teacher has again given very high scores for these two questions, indicating that these elements of the application are almost perfect and does not need to be changed, however, the author will also be strongly considering student feedback along with the teacher feedback.

Question 11) what would you like to see changed or improved?

Teachers Explanation: *“You’ve done excellent work”*

This sums up the ICT teachers main opinion of the application, here the teacher has had the opportunity to provide constructive feedback, however, she has chosen the praise the application. This feedback from this ICT teacher has overall been very positive.

The next strange is to analyse the student feedback to determine if it matches the teachers. If so the application will not require any changes.

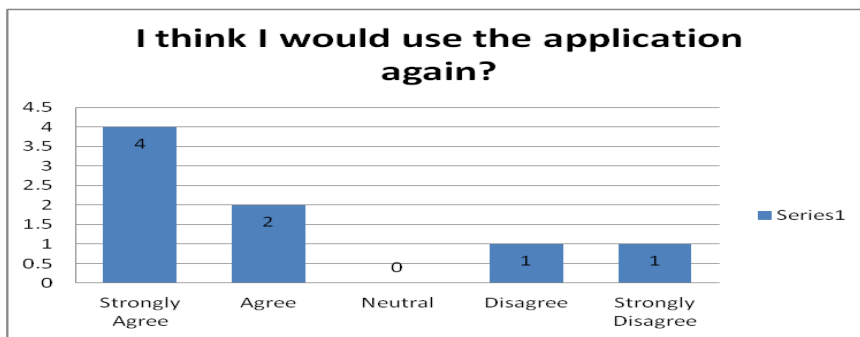
Analysis of Student Questionnaires

The class at the selected primary school had a total of eleven students. Unfortunately, yet interestingly several students did not want to take part in the research. The reason for this from the author’s understanding of the situation is that they were worried about completing the test and therefore did not participate. This might have been due to the students’ unfamiliarity with the author, if the exercise was carried out without the author and only be the teacher this hopefully would not have been the case.

Therefore in total 8 students used the application, completed the test and completed the questionnaire. One of the difficulties the author has faced with the test element is because the author used the in-built score recording feature via Acroabat.com all users are required to sign up for an account by registering and providing an email address. This presented two problems, firstly by law and as a restriction on the Acrobat website users must enter their data of birth and be aged over 13. Secondly the author was told that the majority of students do not have email addresses. Therefore instead of rebuilding the application and making large changing to the system the author decided to create 8 email addresses for the students to utilise to report their score. During this time no personal information was used from the students.

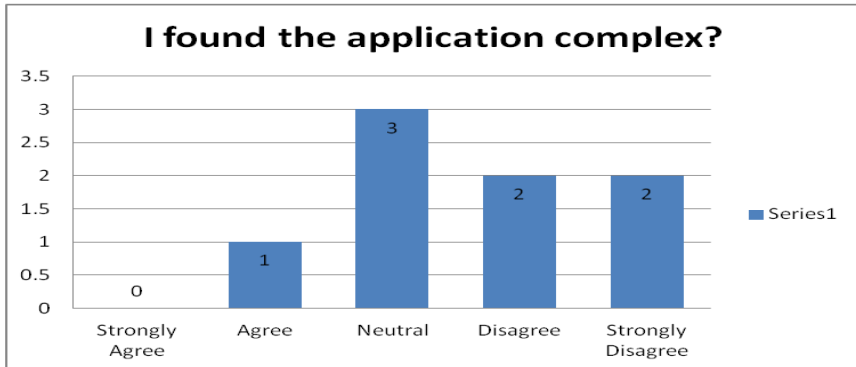
The questions for the students and teachers were actually identical, therefore they will be analysed in the same manner, however, the use of graphical data can also be employed due to having several results to combine and prepare.

When students were asked if they were interested in using the application again the following results were obtained:

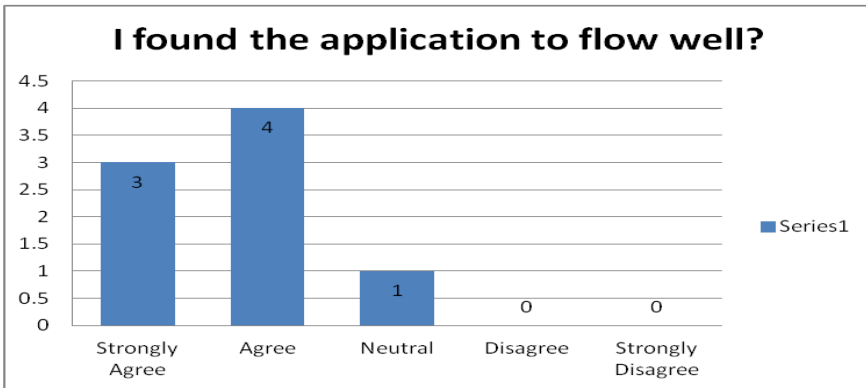


As shown above 6/8 students were very interested in using the application again, although 2 students did not appear to like the application. The reason for this will hopefully be discovered from the later questions.

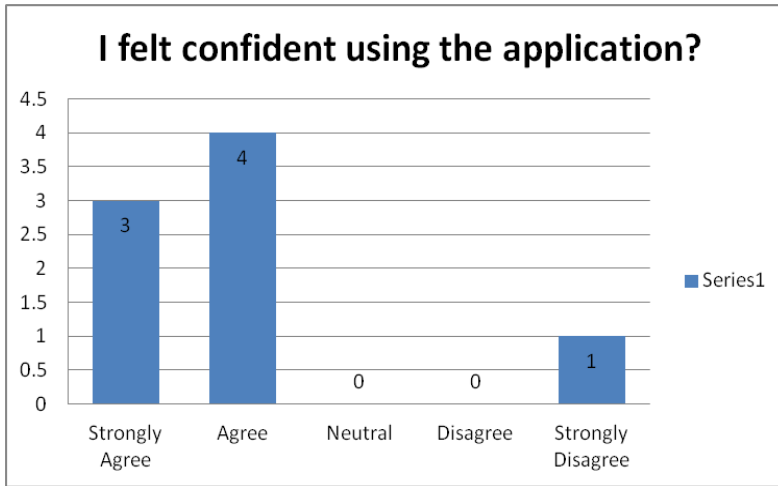
Next the students were asked if they found the application complex. They responded with the following results:



The above results show that the students have had some problems with the application, which differs from what the teacher's opinion was on the software. This time the negative results were 4/8 (50%). This indicated that half of the students had problems with the complexity of the software. The reason for this could be due to the program being too complicated, not clear enough, or the pupils' level of ICT not being strong enough. Additional questions below will shed more light on this topic.

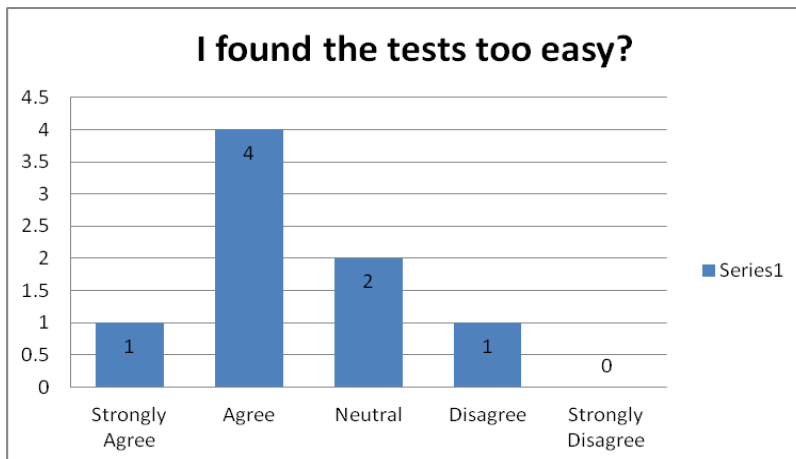


The answers to these questions indicate that the students did not find much difficulty at all with the flow of the application, meaning the navigation, resolution, user interface were all implemented well. Combining the findings with the previous question indicate that the problem the students' faced is most likely related to the content being too difficult for them and not the application.

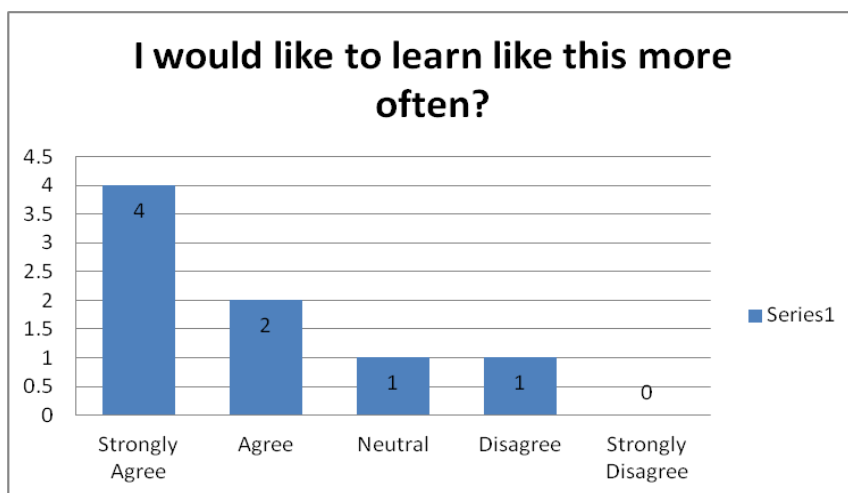


Here 7/8 students have started they are confident using the application. Since several students decided not to participate it could mean that the students that did use the application were confident enough to use the application without fear. That said they have still faced problems with the learning material.

Question 10 asked students about the test to determine how the students felt about it, if they felt it was too easy, too hard etc. The results of this question are shown below:

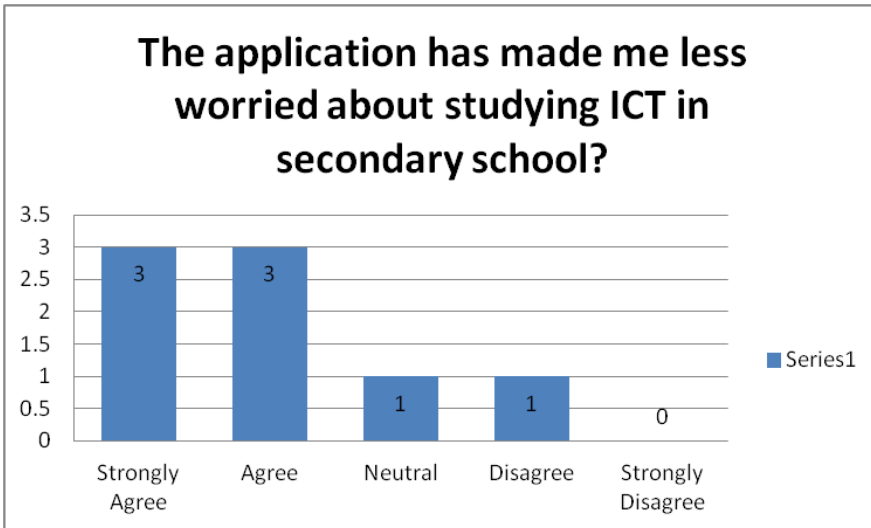


The results show that 5/8 students rated the tests as easy or just about right, whilst 3/8 students found them hard. This indicates one of the problems with the application and when students have stated the complexity of the application they are referring to this part according to the author's interpretation of the research.

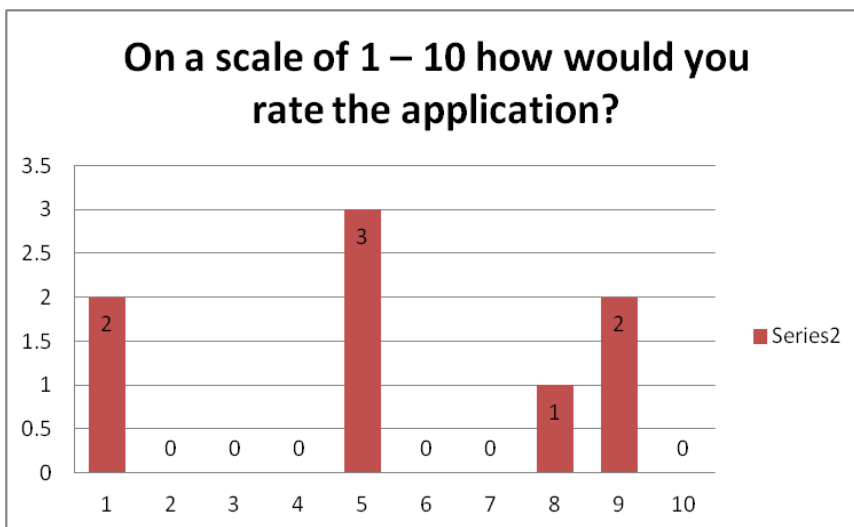


Despite the difficulties with the test 6/8 students are very keen to learn more like this utilising e-learning applications. 2/8 however did not warm well to the idea. Further examination shows that the students that found the test difficult are actually the same students as those that are not too keen to continue learning in this style. This again emphasises the importance of the test and how it needs to be modified to create a greater assessment environment. It is also likely based upon the answers to this question that the hard test has had a negative influence on the students which has made them worried about using the same technology again in the future.

Question 14 was a very important question as it related to the main aim of this project, which is to provide an application that makes sure students are ready for and test them to ensure that, they can go to secondary school and be prepared enough by completing the full requirements of Key Stage 2.



After utilising the application and completing the test 6/8 students (75%) have clearly stated that they are now less worried about starting secondary school. Starting secondary school is often daunting for many students and removing one less reason to worry is a significant achievement. 20% of the students did not feel a huge benefit; possibly they have become more worried due to the complexity of the test, although 75% is a great result.



The overall rating of the application given by the students at the chosen primary school is quite diverse. 3 students have given a high rating which indicates high satisfaction with the application with 3/8 have also given only 5/10 which indicates an average rating. Also 2 students have given the application 1/10. These results have been very diverse and drawing a conclusion to this question is slightly difficult. Therefore the author examined the two questionnaires of the student that gave 1/10 for the application and again the reason is due to difficulties with the test. Since students at primary school levels rarely set formal tests (according to the findings from the literature review), the author feels this might be the reason why some students decided not to participate or did not like the test.

Question 16 looked at how students felt about the colour scheme. The results from this show a high likability with 6/8 giving a rating of 5 or more and only 2 rating it less at 4 or below. This means, as found in the other questions that the design is definitely not the problem students have with the application.

The final question is an open question which asked students “ What would you like to see changed or improved?”, the results of this question are shown below:

-the easy ones

-i would like to see the brightness improved.

**-thank you everything is ok thank you
-nothing**

-nothing

-more mind boggling questions please

-no -easy to use

-I liked the lesson.

Overall the feedback has shown that majority of students have liked the lesson. One student spoke about the brightness needing improvement. This participant was a boy and therefore used the dark Spiderman background. This was the only complaint that the author received and therefore this type of change will not be implemented due to the limited complaint.

Summary

In summary the findings have shown that on the whole the application was very much liked by the students and teacher. The teacher did not raise any issues and really liked the application on all levels. The students however highlighted quite a lot of discontent with the testing facility. This was the only major problem discovered throughout the primary research and therefore this is one of the critical areas for improvement in any future updates.

Chapter 7: Conclusion and Project Evaluation

Throughout this project the author has worked hard to produce an advanced yet easy to use application suitable for pupils in their final year of primary school. Before building the application the author thoroughly researched several important areas within her literature review including governmental educational requirements, teaching methods for children, approaches to application building and development software. These four subject areas covered all of the fundamental requirements for developers when building a suitable application.

After completing the application the author then proceeded to carry out primary research at a local primary school in Cardiff to obtain feedback to further develop the application. The response from the primary research was greater than the author could imagine with the majority of students providing very high ratings. The only negative findings from the pupils were testing mechanisms and test content of which 25% of the students were dissatisfied. The feedback from the ICT teacher at the selected primary school was also very impressed with the application and offered no criticism. The questionnaire also showed high ratings across all of the different areas in question.

Problems Encountered

There were several problems encountered throughout the project, the main problem being only one school from ten was happy for the author to conduct her primary research. Finding this one school took a lot of effort and time which resulted in some delays in conducting and completing the author's primary research.

The author also had several challenges to overcome when creating the application using Adobe Captivate, one of the biggest challenges was to discover a way to make the tests within the application more interactive as Adobe Captivate primarily offers only standard multiple choice questions. The author later decided upon using screen shots of all of the different tasks that she wanted to assess and then combining them with click boxes. These click boxes were placed over the exact location the user was meant to click. If the user clicked the right location they will score a point and move onto the next slide, however, if they clicked the wrong location then they are given a second chance, if they fail this second chance they will then have to move onto the next stage of the quiz and "fail" the current section.

Some of the problems encountered included finding it very hard to find a participating school. The author contacted over 10 schools, however, the majority did not respond and those that did were not willing to assist in the author's research. The author finally was able to locate a school after much research.

A second problem that was also discovered was that Adobe Acrobat.com only allows users who are aged over 13 to register with them. This meant in theory no one could register with them legally. To avoid any potential problems, the author created several dummy email accounts which were used instead to record the information. In the future another solution will need to be thought of such as storing the information locally in schools, through a local database.

Completion of Project

Overall the author feels she has succeeded in completing this project, this is due to the fact that the main aim of this project was to create a suitable e-learning application to teach and educate children in ICT. The author has developed this application which has also been evaluated and proven to be a very much liked application which just a few problems that will need changing for a second version. All of the supporting objectives were fulfilled in order to support the author in making the correct decisions the first time around.

Author's future Plan for this Project

The author has got much inspiration after completing this project and wishes to continue building and developing e-learning applications. The market, especially in the Middle East seems to be booming and products are in high demand. Therefore the author wishes to peruse this line of work in the near future.

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