Interactive, Educational Numeracy Package for children who will attend the S.A.F.C Foundation

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Children learn best while playing and it is the aim of this project to prove this theory. This dissertation will conduct research into how children learn and it will aid the development of the program. The program is aimed to aid childrens mathematical skills via a game. The overall result of the project was pleasing and it allowed the developer to develop an interactive game which the children enjoy to play.

I want to firstly thank both Susan and Ray Fairley for their continued support through my education.

I also want to thank David Brazier for his support and advice thorough this project his has given all the advice that was needed.

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1 – Introduction

This document is part of the final year project for the module "CIF 300 – Undergraduate Project". The project is to develop an 'Interactive, Educational Numeracy Package' for children who attend the S.A.F.C (Sunderland Association Football Club) Foundation. The S.A.F.C Foundation is a charitable origination which works closely with children in the local community promoting literacy, numeracy, educational initiatives and healthy living. The S.A.F.C Foundation has a computer suite at the Stadium of Light, where children will go for a day to learn about Numeracy, Literacy and Healthy Eating.

1.1 - Sponsor's Information

The client for this project is Phil Cowler of the S.A.F.C Foundation; The Foundation is part of Sunderland Football Club, which allows children to spend a session (normally a full day) at the Stadium of Light. Phil is one of the 'teaching staff' and is one of the people who will benefit directly from the development of the interactive game.

1.2 - Problem Description

The S.A.F.C Foundation has asked for the development of an Interactive, Educational Numeracy Package to aid children. This is essential to the Foundation as they currently only have PowerPoint presentations, which are not interactive and require the staff to check the student's answers which means the staff will be able to aid children rather than checking answers. The integration of an interactive package will not only aid the children, but it will also aid the staff,

and this will mean that staff will be able to help children with their problems more as they won't be required to check answers.

1.3 - Aims and Objects of the Project

Throughout the development of the interactive game it will be essential to hit all of the aims and objectives that have been outlined. The Aims will be outlined first and then the report will move onto the objectives that will be achieved by the end of the project.

1.3.1 – Aims of the Project

- To create an interactive game that child will find aesthetically pleasing.
- To have varying difficulties within the game.
- To create a challenging Game.
- To create an extensive database of questions to call from.
- To ensure that the game is fully functional when given to the client

1.3.2 – Objectives of the Project

- To conduct intense research into the subject of cognition.
- To gain a deeper knowledge of how children learn.
- To develop an interactive game that incorporates aspects that are essential to children's learning.

- To build a better Knowledge of programming languages such as, ActionScript3, PHP and MYSQL
- To manage time efficiently and try to complete all deadlines on time.

The main objective of the project is to ensure that the interactive game is of a high standard and that the S.A.F.C Foundation can use the game for all children.

1.4 – Limitations

When originally planning to develop the system the author thought that the main constraint that would be placed upon the author would be the CRB (Criminal Records Bureau) check as the developer would be working with children in the test sessions, however after an initial meeting with Phil, the client for the project it was revealed that the developer would not be left alone with children at any point so the check would not be required.

The other major constraint that the author will face during the development of the system will be getting groups together at the foundation to participate in tests sessions for the system. Having these sessions will improve the system greatly as it will allow the developer to gather information on the system, as well as any bugs which may need fixing, and most importantly to find out what the children think of the game.

1.5 - Structure of the Report

The document will outline the problems that the SAFC foundation currently faces with the system that they have in place. The first chapter will summarize the project, what the author has been asked to develop for the S.A.F.C Foundation. This chapter will also contain the aims and objectives project, and what will be undertaken throughout the project. After evaluating the problem it will

be essential to conduct research into the chosen topic, this will form the second chapter. This chapter will outline the research that was undertaken in order to get a better knowledge into the subject Cognition; this will also contain the research that was conducted in to the current system as well. The topic Cognition is a broad subject to be researching into so it was decided that the basics would be covered, and in-depth research into cognition in children would be a better way to go with the topic.

The third chapter will cover the project management activities that were undertaken in order to ensure the project is a successful one. Chapter 4 will define the requirements analysis behind the ethos of the program. This chapter will also depict the hardware and software requirements for the interactive game. Chapter 5 is the System development chapter and this chapter will contain the architecture of the system, as well as initial designs, final designs and screenshots of the first version of the system. The Project Development chapter will be the sixth chapter; this chapter will contain the architecture of the program as well as screenshots of the final user interface. The seventh chapter will contain all of the testing of the project from start to finish which will include both white box and black box testing. The penultimate chapter will evaluate how well the project went, and how if anything the project could be improved. Finally chapter nine will outline how the developer could improve the system further, which will include recommendations that were made to the client on how to keep the database up to date.

2 – Cognition and its impact on this project.

2.1 - Introduction

Whilst setting out the original proposal it was defined that the research topic would be “Multi sensory aspects of multimedia learning in primary education”. This would include research into Human–computer interaction (HCI) in children’s learning, how music and the surroundings help children learn, and how children learn through games, but after an initial meeting with the author’s supervisor it was decided to narrow the topic, and it was decided that the topic would be “cognition”. Cognition is defined in the dictionary as **“**the mental acquisition of knowledge through thought, experience, and the senses”. Compact Oxford English Dictionary of Current English (2008).

Research into Cognition also leads into the psychology of the way children learn. This chapter will highlight the research that has been conducted and how this research will impact on the Interactive game.

2.2 - Current Applications

The current system that the S.A.F.C Foundation has in operation, examples of which can be found in Appendix B. the functionality within the current applications is lacking. This is because the programs are developed in PowerPoint. The main reason that this is an obstruction to the SAFC Foundation is that they require members of the team to check the children’s work to ensure that the answers are correct. Although the samples of the current application that have been supplied are not all numeracy games, it does help to understand what activities children are asked to participate in while at the SAFC Foundation.

Further to this the client supplied a set of standards for the numeracy activities that children should have achieved by the time they go to the SAFC Foundation. The standards make clear exactly what kind of question should be incorporated into the system. The original idea was to develop an "Interactive Game" which would have a numeric product which the children arrive at by simply adding a set of numbers together. However, after examining the standard that the children should have achieved in the age group I am developing the system for it became clear that it might be a little too simple for the older age groups. Therefore, the system would need to be adapted to accommodate the older age groups.

A copy of the standards can be found in Appendix C.

2 .3 - Cognition

The first element of cognition that was investigated was "Perception". Greene, J. & Hicks, C. stated that "*perception is the process by which the information for our senses is perceived by us.*" They go on to explain how there are many theories of perception, the first of which is "Gestalt's Law of Organization" which was founded by German psychologists (including Koffka, Köhler and Wertheimer) and was adapted from the Fundamental principal of perceptual organization which is the law of Prägnanz which states that: several Geometrically possible organizations one will actually occur which possesses the best simplest and most stable shape (Koffa, 1935). (Eysenck MW. 2006). Below are examples of Koffa's Law, firstly "Closure" which can be seen in Fig 2.1 which is represented by a circle with a section of the circumference missing from it, but we have the inclination to complete the shape, meaning that the circle in Fig2.1 appears to be a full shape.

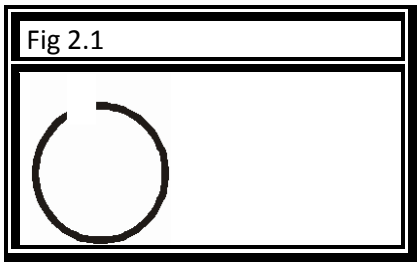
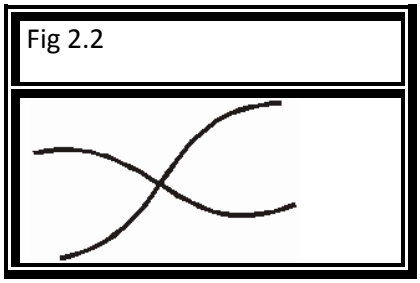
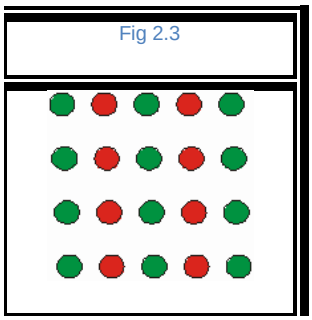


Fig 2.2 shows "***Good Continuation***" in which there is not a smooth line but the way we mentally process the picture, it appears that there is.



Finally Fig 2.3 shows how elements are arranged so that they appear to be similar.



Figs 2.1, 2.2, and 2.3 all: Images: Zanker, J

The investigation then led into Sensory Memory, which is the first of the three elements of memory, Sensory memory is followed by Short-Term Memory, and finally Long-Term Memory. Most research has been focused upon the Tachistoscope or (T-Scope). *The T-Scope is used to project images on to a screen at great speed and it is thought to test Perception, Memory, and Learning.* Eysenck MW. (2006).

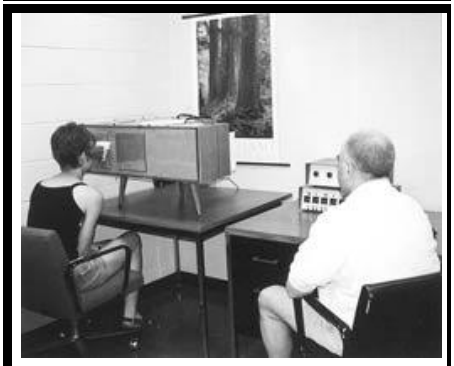
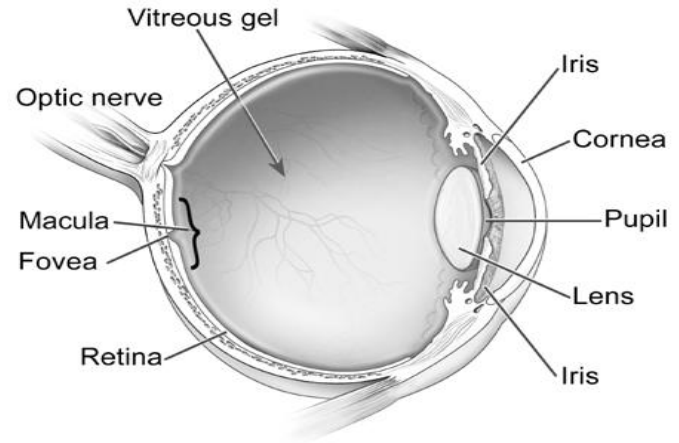
Fig 2.4	*Fig 2.5*
	

Fig 2.4 – Image: Carlyle, C. ***Fig 2.5 – Image: National Eye Institute***

An examiner will present a stimulus for a controlled time, usually on the order of hundredths or even thousandths of seconds, in a carefully controlled position, so that the stimulus is projected into the subject's fovea (Ashcroft MH. 1994).

After research into the Tachistoscope it was decided that it would not be practical to use the same methods as the Tachistoscope uses. The reason for this is that the way the Tachistoscope works is by flashing images onto a screen for a short period of time. This will not be advised when creating an interactive game for children as answers to the questions will have to appear on the screen for a longer period of time so the children can click on them more easily. Therefore similar methods to the tachistoscope would also be ill-advised as a number of the children attending the SAFC Foundation may have learning difficulties and this may hinder their experience.

2.4 - Memory

Research was then conducted into memory to try and determine how it was used. Benfjafield, J. was the first place for this research *and* he had some very valid observations into how cognition

affects children. The first of which was that “Psychological Structures develop over the life of a person” (***Benfjafield, J. 1992***). Yet he didn’t expand on which environments children work best in, or what colours and shapes help them learn more. The investigation led back to a previously used text**,** Eysenck WM. (2006) which linked back to memory and learning, then further linked back into both short term and long term memory. It is stated that “there is a distinction between both short and Long-Term Memory” and both are present within the brain.

Also known as “Separate-Store” memory, Waugh-Norman believed that once a human has seen an article (Stimulus) it would be forgotten unless it was rehearsed.

The above diagram illustrates the theory that there are two different memory modes, and that they are accessed in different ways. It is assumed that after information enters primary memory,

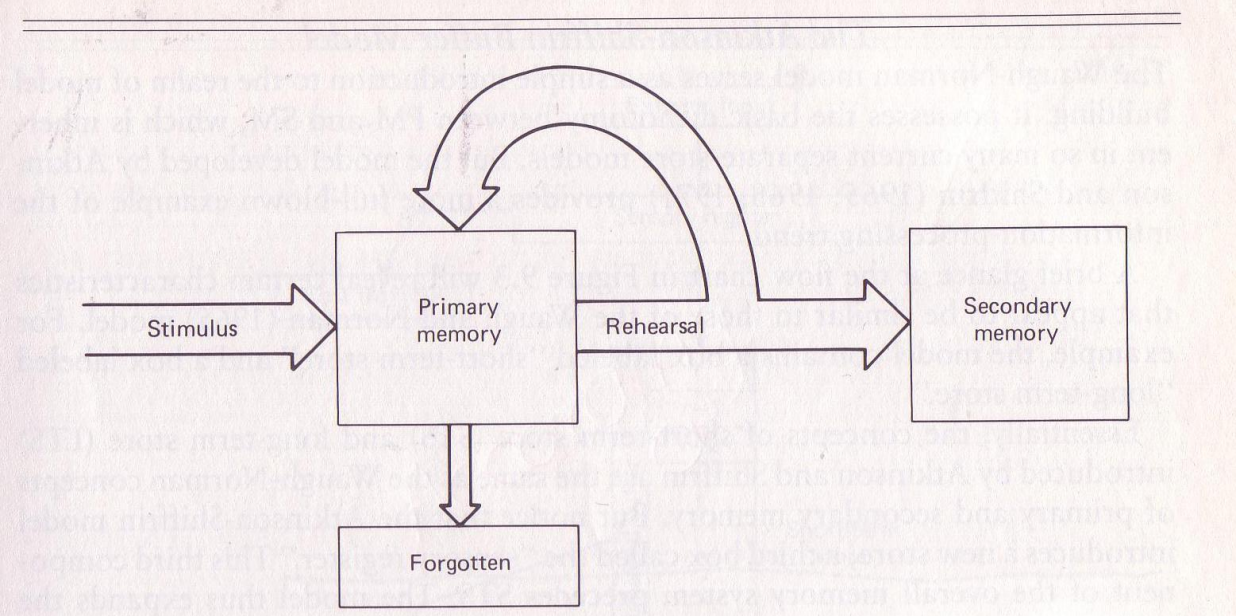


Figure 9.2 The Waugh-Norman memory model. (After Waugh, N. C., and Norman, D. A. Primary memory. *Psychological Review*, 1965, 72, 89–104. Fig. 2, p. 93. Copyright 1965 by the American Psychological Association. Reprinted by permission.)

Fig - 2.6 – Mind Map

Maltin, M.W. (1994)

unless it is rehearsed then will be forgotten.

However the Waugh-Norman diagrams leaves questions unanswered, For example it doesn't state how much rehearsal is required for a piece of information to be passed from Short-Term memory to the Long-Term memory store, furthermore, this model doesn't explain how events can be logged into memory, an example of this could be the death of a loved one.

2.4.1 - Short-Term Memory

Short-Term Memory which is also known as "Primary Memory" or "Active Memory" (Greeg, VH. 1986) or "Recent Memory" (medicineNET.com) refers to the capability of accumulating a small amount information within the mind, which can be recalled for a short period of time. Short term memory is normally tested by the means of memory span, which is a number of "words or numbers that a person can hold onto or recall" (medicineNET.com). The way a standard memory span test works is when an individual is given a set of characters/numbers, at the rate of one per second. Once the sequence has ended the individual will be asked to recite then characters/numbers in order. An average score for a memory scan for an adult is seven (7).

Waugh & Norman's (1965) theory also used such a test; Waugh & Norman would give an individual a set of 16 digits, however, Waugh & Norman tried two different approaches. A subject was shown the digits for one second each and would be asked to recite them. The experiment was the repeated but showing four per second. The individuals would be shown a set of digits such as "7 9 5 1 2 9 3 8 0 4 6 3 7 6 0 2".

The graph the comparison of an individual had been shown one digit per second and being shown four digits per seconds.

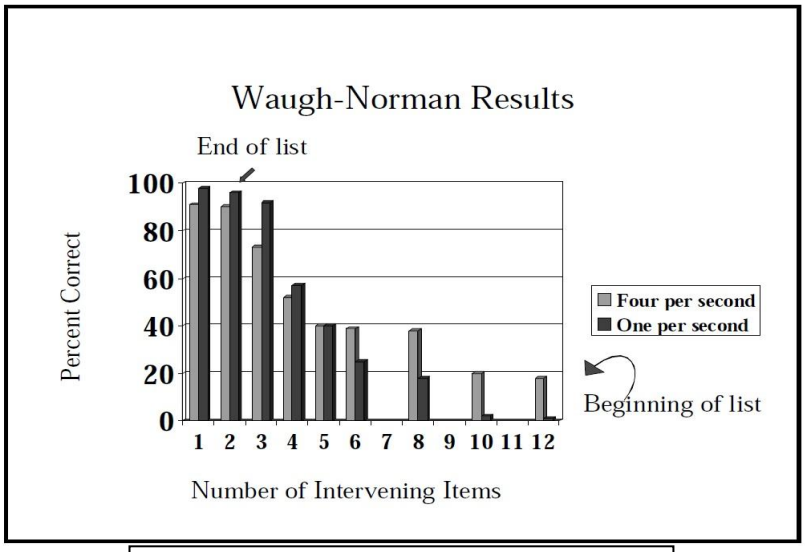


Fig 2.7 - Waugh & Norman Test results

2.4.2 - Long-Term Memory

Long-Term memory is the process by which information is stored permanently for later use. This information may be available in Long-Term Memory for as long as the person is alive. There are two types of Long-Term Memory "Episodic" and "Semantic". Episodic Memory is the memory of events and experiences, and Semantic memory is absorbed facts and skills. The diagram below shows how said memory is stored. The information that is stored in semantic memory is copied from events in the persons' life, and we can learn new skills, facts and information from life experiences.

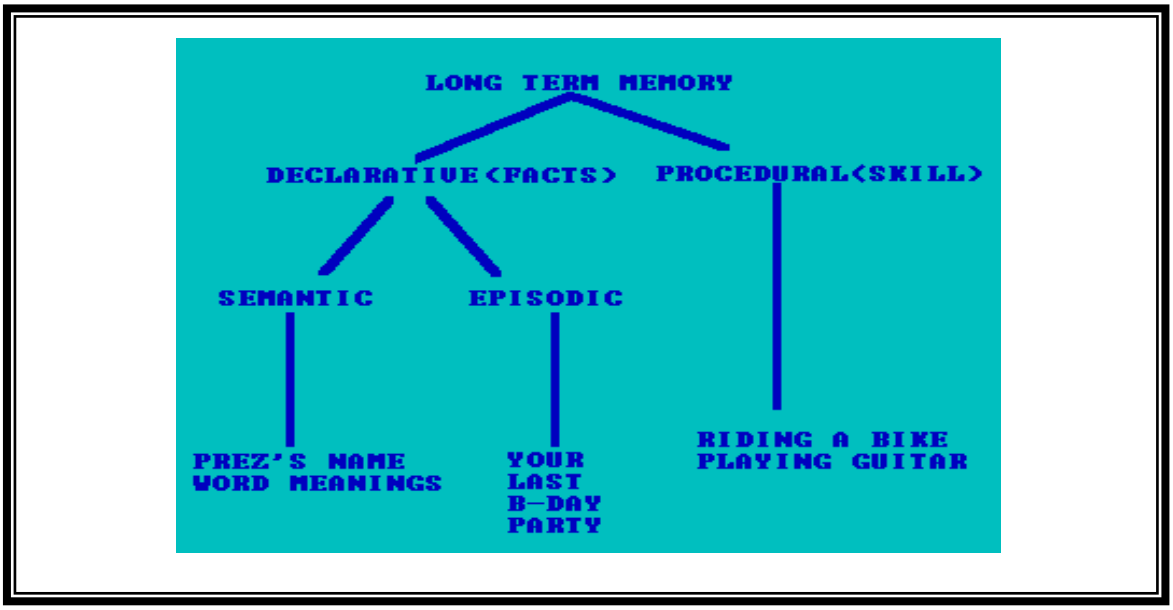


Fig 2.8 – Long-Term Memory Structure

2.4.2.1 – Episodic Memory

Episodic memory is the memory which enables a human to recall past events in their life. This means that humans use episodic memory to recall events, such as "Your Last Birthday Party". Dudai, Y. (2002) expands on this by explaining that it's not just the "How, What and Where" an event has taken place, but also episodic memory takes into account the "When".

2.4.2.2 – Semantic Memory

Semantic memory is "the organized knowledge about the world". Matlin, MW. (1994) This means that when asked if for example an orange is a fruit or a vegetable, semantic memory automatically realises that an orange is a fruit, without having to look up exactly which point in time the individual learnt that. Other examples of semantic memory are,

1. Remembering the chemical formula for water is H20

2. Knowing which month contains the shortest day of the year (December)

(Examples from Matlin, MW. (1994) p87).

Further to this Tulving, E. (1987) added a third type of memory into the equation, Procedural. Procedural memory is slightly different to both Episodic and Semantic; the reason is that Tulving stated that Procedural memory is based on how you learn to do something. Examples of this are

1. Riding a Bicycle

2. Knowing how to dial a number on a telephone.

Our knowledge of pictures and faces allows you to see a "face" in the word "Liar":

Fig 2.9 – Face

2.5 - Cognition in Children

When moving onto Cognition in Children it was apparent that studying cognition in children during classroom learning would be essential to the development, as it would contain an example of cognition in a classroom setting. It seemed that starting in the classroom would be the best place to start the investigation, and see how children lean in classrooms and try and adapt the settings. Over the course of a Child's education it is thought that they will spend 12,000 hours in a class room. This section is going to look into how the classroom atmosphere aid learning, and how this can be improved. Though this will not strictly apply to the development of the Interactive Game it will help adapt said game to benefit the set up that the SAFC Foundation have. Following research into Marx, R.W., Winne, P.H., & Walsh, J. (1985). It became apparent that numerous assumptions were made in their research on students, and therefore decided to move on to their study on the classroom. A team of researchers went into classrooms and categorised them as "system of task environments". Newell, A. & Simon, H.A. (1972), they identified three main issues

- Task Dimension: the way a human behaves in different situations, e.g. Walk, Talks etc.
- Performance learning development dimensions: by keeping a controlled environment it is easier to distinguish performance, and development in a task.
- Individual difference dimensions: this refers to each individual being a member of a population, who differ "systematically", meaning that every individual's fate will be different.

Further to this Doyle, W. (1983) expanded on the "cognitive nature of the classroom task environment". He also believe that there are three main features in academic tasks, they are

- Conditions: Marx, R.W., Winne, P.H., & Walsh, J. (1985). They believe that the best place for a child to learn is in the classroom. The reason for this is that it is familiar

surroundings, as well as the time that is available. They also believed that when a child is taken out of the classroom they don't get the same amount of teaching time as in the class. According to Marx, R.W., Winne, P.H., & Walsh, J. (1985). Outdoor activities are not held for as long as classroom studies.

- Operations: Doyle (1983) discussed his concerns of student's cognitive operations within a classroom. He stated that there was four general cognitive plans, below are the two most important.

- The first of these was, memory plan, this is where the student is required to replicate information

- This is followed by procedural, which is used when students need to use "Predictable formulae" or "Algorithms".

- Product: Products contribute towards the way students' cognitive plans are directed. One of the main issued raised was that the product of the classroom tasks is appropriate to the quality of feedback that an individual receives.

2.5.1 - Cognition in Children with learning difficulties

Children with learning difficulties are categorised into three groups, which are

- Mild Learning Difficulties: children who have mild learning difficulties can have suffer from low self-esteem, and motivation. A child with mild learning difficulties may include,

    - have immature listening/attention skills
    - have immature social skills
    - rely on a teaching assistant to direct them within the class situation
    - have a poor auditory memory

- have a poor visual memory
- have difficulty acquiring basic literacy and numeracy skills
- have difficulties with comprehension skills
- need a high level of support with investigation and problem-solving activities
- have poor verbal and non-verbal reasoning skills
- have difficulties with applying what they know to other situations
- Have some motor coordination difficulties.

- Severe Learning Difficulties: children with severe learning difficulties may have 'significant intellectual cognitive impairments' (Teaching Expertise). This may mean that they will struggle to participate in school curriculum without help. These children may use signs and symbols to communicate but 'most will be able to hold simple conversations'

- Profound Learning Difficulties: which is also known as 'mental retardation', 'intellectual disabilities' or 'developmental disabilities', and this doesn't refer to dyslexia or any other specific difficulties. A person with profound learning difficulties will also have very little or no language, and will also need aid with menial task, feeding, and dressing themselves**.**

People that have mind learning difficulties can live a healthy normal life.

Experts you IQ to determine whether a person has learning difficulties they are as follows,

- Mild Learning Difficulties : IQ of 50-70
- Severe Learning Difficulties : IQ of 20 – 50
- Profound Learning Difficulties : IQ of less than 20

Stats Supplied by: British Institute for Learning Disabilities.

Hames, A. (2006) study which was conducted with children 7 year old and younger, and also distinguishes the difference between "mainstream schooling and specialist schooling for children with learning disabilities". Hames, A. (2006) research stated that the majority of children with

Severe or Profound learning difficulties were attending “Specialist” schools. This meant that a lot of children in mainstream schools would not interact with the children with learning difficulties. Currently there are a lot of mainstream schools which welcome children with such difficulties, meaning all of the children can interact with each other.

Normally if a child has “Learning difficulties” they are referred to “Child psychiatric services” states Rothenberger, A. (2006). He then moves onto declaring that “Learning difficulties may be related to cognition but also to emotion”, but conduct problems usually come from disturbances in “cognition, emotion and parenting;”

> “About 985,000 people in England have a learning disability (about 2% of the population). 796,000 of them are aged 20 or over”
>
> - Estimating Future Need/Demand for Supports for Adults with Learning Disabilities
>
> In England, Institute for Health Research, Lancaster University (2004)

2.6 - Cognition in Computing

Research then led into cognition in computing. The first topic researched was "Human-Machine Interaction", Suchman, L A. (1985), stated that we no longer just use computers, we interact with them. This also includes the popular discussion of computers, along with their design, and their use. This section will help understand how computers can aid learning, including what the best set up is for this learning process, including sound and visual aspects.

Computers can be used effectively as cognitive tools. “Computers as cognitive tools...” Jonassen, D. (1995). Although the journal was for “Computing in higher education” but I believe that this journal could also impact on the development of the Interactive Game.

Jonassen, D. (1995) “application of technologies, primary computers, as cognitive tools, rather than instructional media”. The main part of this that was looked into was “Multimedia/Hypermedia Constructions”. Multimedia refers to the incorporation of sound, graphics, animation and video. Multimedia is normally organised in to hypermedia. Hypermedia refers to the nodes, which are the basic units of information storage, which can consist of text, graphics, sound or video clips.

Hypermedia/Multimedia can be used as cognitive tools. “Hypermedia/Multimedia construction is based on the idea of knowledge of design” in which the focus is no longer on the “Teacher as the Transmitter” and more focused upon the “Students as collaborators”.

Carner, Lehrer, Connell, Ericksen(1992) stated that designing a multimedia presentation was a complex process, they also indicated the tools that are needed in the design of these presentations. Although this project is to develop an interactive game, these tools will be vital in the development of the game. These skills include project management skills, organisation skills and reflective skills, of which will be vitally important in the development of the interactive game. Jonassen, D. (1995) believes that computers can most effectively support meaningful learning and knowledge construction”, but he stressed that this study was for people in “Higher Education”. This statement is true but this is also true for the children that the interactive game is aimed at, though this will be achieved in a slightly different way, mainly because the children that the game is aimed at are all between the ages of 5 and 11 years of age, and the way to stimulate young children will be different to what simulated children in higher education.

Bilal, D. (2005) believes that children can learn more effectively though an effective system design. The journal goes onto say that it is essential to gather Children's likes and dislikes as the first step to developing an effective system. The game will also need to keep the Children's attention, and it is also essential to make the game fun. In the eyes of children a visual design is essential, along with colourful backgrounds, recognisable characters and a well laid out screen s.

Bilal, D (2005) also suggests that having children as design partners takes a program one step further. This is a very good theory, but in the development of small systems it is a lot harder use that resource. Although throughout the development of the interactive game, there will be several testing sessions in which it will be possible to get feedback from my target audience, and this will allow for a better, more pleasurable experience for the children.

The visual design will be essential in the development of the interactive game. The journal states that "Children cared for black and white text with colour surrounding it." This will impact on the design and development of the game. The reason for this is that the game is being developed for the SAFC Foundation, who's main colour scheme is red and white.

When designing a multimedia system there are major issues that have to be investigated. The main reason for this was issues with the layout of the system. Thompson, N., McGill, TJ(2008) also state that if a system is going to be used as a learning tool then "dimensions of human cognition" should be incorporated into the design.

2.7 – Conclusion

After research into cognition it became apparent that there are many different factors that will have to be considered in the development of the interactive game. One point that was raised that will be very apparent in the development will be to use colourful backgrounds and recognisable characters. This is very achievable in the interactive game; this is due to the specification that was originally supplied by the S.A.F.C Foundation which stated that the game would have to have the football theme. This means that the player will have a red and white top on, which is recognisable to children that will be attending the foundation. Further to this the crowd behind the goal will have the red and white stripes.

There will be several testing sessions throughout the development of the project. Bilal, D (2005) stated using children as design partners takes a project to another level, so having said testing sessions will get the best out of the development of the game. This should also allow children with learning difficulties to use the game and see how they adapt to using it, and this could also be a part to be changed after the first testing session.

Marx, R.W., Winne, P.H., &Walsh, J. (1985) raised the point that children learn best in familiar surroundings and that “Days Out” are not a good idea as children don’t get the same amount of time to be taught. This is a different matter when children attend the SAFC Foundation as they go for a full afternoon and it will be surroundings that a lot of children have being to before with a lot of children being Sunderland fans.

Waugh-Norman's memory model is a very good example and shows how an individual learns. This gives a basic idea on how through rehearsal information is passed from primary memory to secondary memory.

3- Project Management

During the development of the interactive game it is essential to manage a project effectively to ensure that all tasks are completed in the specified time frame. It was decided to follow an agile development method, as this was the most appropriate for the development of the system.

3.1 – Agile Development

The agile design approach (Lethbridge, T. & Laganière, R. 2005) was chosen over different approaches as it offers a more appropriate model for the development of the interactive game. Following an agile method will offer many benefits compared to other models such as the waterfall model (Lethbridge, T. & Laganière, R. 2005). Following an agile method will allow the scheduling of test sessions through the development of the interactive game; this is because the agile method approach is based around small, incremental releases. The benefit of this to the waterfall model is that the developer doesn't have to wait until the end of the development of the system as with a 'Waterfall' model to test and get evaluation of the project. Another advantage to using an agile method approach is that it will require the developer to complete the development in stages and not to move on until that section of the game is completed. The main disadvantage to using an agile method in the development of the interactive game is that agile methods encourage Test Driven Development (TDD). However using TDD in the development of the game will not be practical. This is because when developing the game it will be essential to test every aspect after the game is working then test the aspects that have been developed, and then also to test aspects as they are added to ensure that all aspects work as they are added.

3.2 – Project Tracking

The project will be kept on track by sticking strictly to deadlines, which were imposed on the project to ensure that these deadlines can be found in Appendix A in the form of a schedule and a Gantt chart. The schedule will be kept up to date as it will be essential to have aspects of the system completed by the time of the project development deadline. The schedule will have Actual Start and Actual Finish sections which will show where the development of the system is falling behind and where time can be made up, further to this the schedule will show which aspects of the project are running ahead of schedule.

While using an agile method through the development of the game it will be essential to incorporate testing sessions. These sessions are clearly marked on the schedule, and this will allow the potential users to give feedback to the developer which will improve the overall system. This will be assessed through Observation.(Brown, L. 2004)

The Gantt chart is a visual representation of the schedule based on the “Planned” start and finish times not the actual start and finish times. The Gantt chart also displays the amount of time in hours that are planned each week to spend on each task within the project.

4 – Analysis

The analysis process began at the beginning of the project and was used to collate the main requirements for the development of the project. This stage was used to initially find out exactly what the client wanted from the program in more detail, as well as to help the developer gage what the topic for research would be to enable the developer to develop a successful system.

4.1 – Requirements Analysis

Requirements analysis is the process in which the developer gains a better understanding of the customer's needs and expectations for the application they are developing. Further to this the requirements analysis stage is clearly defined in the software development life cycle model. Requirements are the explanation of how a system should perform or a description of system properties or attributes; however it can also be used to describe what the application is expected to do. The requirements analysis process along with the Documentation Processes are both critical the success of a project.

4.2 - Hardware Requirements

With the 'Interactive game' being developed in Adobe® Flash®, it will be essential that the systems that will be running the game will have the minimum specification for Flash player, or the game will not run efficiently. Further to this if the minimum specifications are not met then it will also hinder the children's experience of the game.

According to flash minimum specifications the computer systems that will be running the game will have to have the following specifications:

Windows®	**Macintosh**	**Linux®**
Intel® Pentium® II 450MHz, AMD Athlon™ 600MHz or faster processor (or equivalent)	PowerPC® G3 500MHz or faster processor Intel Core™ Duo 1.33GHz or faster processor	Modern processor (800MHz or faster)
128MB of RAM	128MB of RAM	512MB of RAM, 128MB of graphics memory
128MB of VRAM*		

*Recommended for GPU hardware acceleration–dependent features. Flash Player will use software mode for systems that do not meet the system requirements.

However for the game to run on several machines at the same it was decided to host the game on the developers web space as it would allow more users to experience the game at the same time. The main difficulty with this is that it requires the computers that will run the system will require an internet connection and for a better experience for the children then said computers will require a broadband connection to ensure that the children do not suffer any problems while playing the game.

4.3 – Software Requirements

Thought out the development of the game the developer will require several different programs to complete the process, and successfully develop the best game possible. The primary program that will be required for the development is Adobe Flash CS4 to develop the 'Interactive Game'. The developer used Flash CS4 as it gave a better variety of options to use in actionscript 3 compared to actionscript 2.

Pro's of using Adobe Flash

- Supports audio, animation, and advanced interactivity
- Integrates well with other Web technologies
- Is widely used. This means that most visitors to a Web page incorporating a Flash animation will be able to view it without downloading and installing the Player application. (In fact, probably 96% of Web users already have Flash Player installed .)

Con's of using Adobe Flash

- encourages design abuse

taken from hyperwrite.com

Following the development of the game it will be crucial to create a database and from there develop it to include all of the questions that will be required and they will be called by the database via the flash game. It was decided that PHPMYADMIN would be the greatest way to not only create the database but also to enter the questions into the database. Using PHPMYADMIN will allow the developer to gain knowledge of SQL to create the questions within the database. Following this the developer will create a form via PHP; this will be done via Adobe Dreamweaver. The reason for using PHP to create the form is it will allow the form to link to the database for easier entry for a user to add new questions. When originally planning the development C# was going to be used but PHP offered more versatility to the developer and also linked into both the flash element as well as the database.

5- System design

When developing the system an iterative approach was used which meant that the design stage had various different stages. The stages started with system designs which were shown to the client at the first meeting. After this the design stage moved onto the development and finally on to the final development of the system. Initial designs can be found in appendix G.

5.1 – System Architecture

The system that has been developed was developed in different stages which meant that sections of the system needed to be working before the next can be completed. The stages that had to be completed were the flash element, the php scripts and the databases of questions and user scores. Below shows how each aspect communicates with each other to ensure that the game runs successfully.

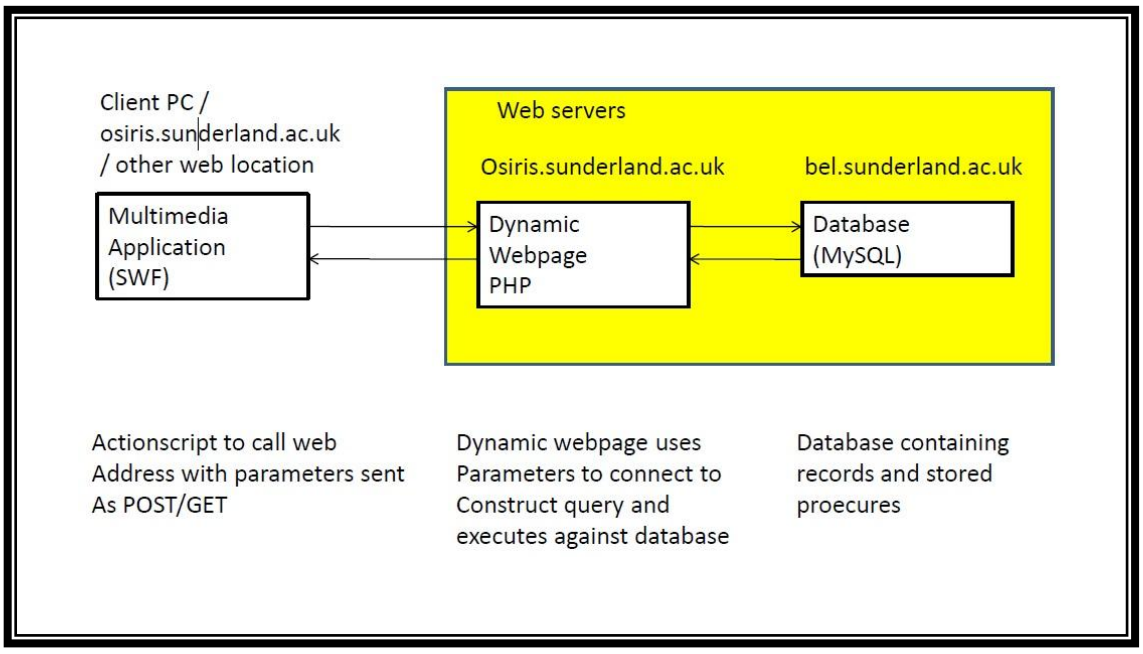


Fig 5.1 – Database connecting to php then to flash element.

A php file was created that allowed staff at the SAFC foundation could add questions to the database of questions. Fig 5.2 shows how this works

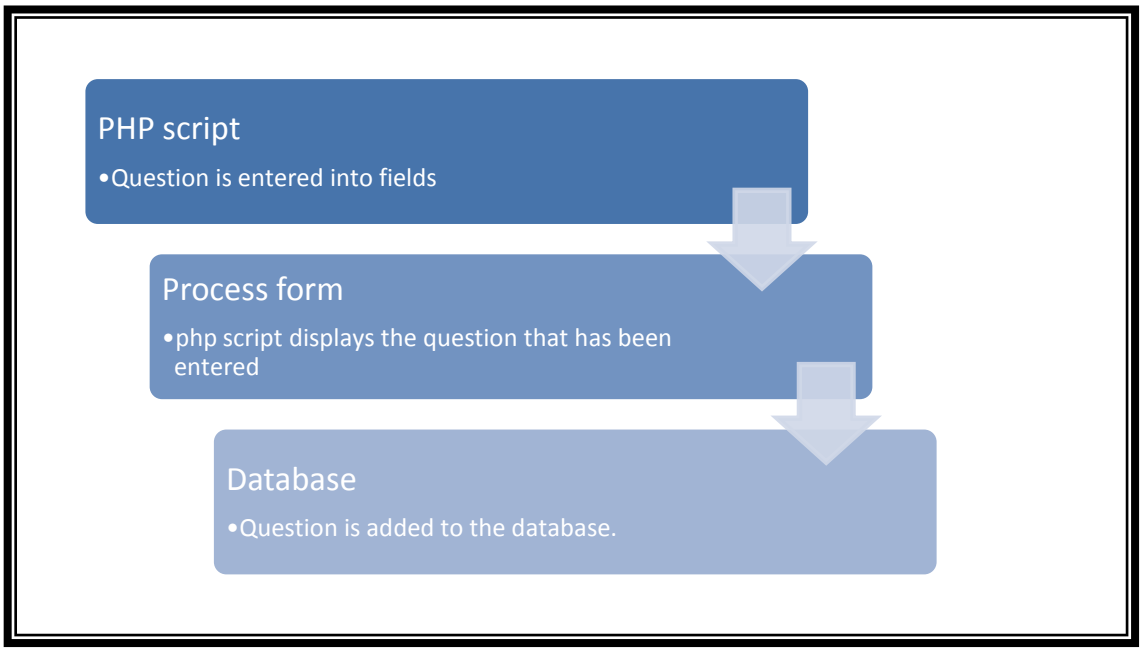


Fig 5.2 Php to Database

5.2 – Research Impact on Design

Following research into cognition, which lead into cognition in children, this allowed the developer to get a better understanding on how children learn, as well as what colours are best to use to aid them in learning. However some of the points that were raised would not be very practical to implement into the final system. The research that that was conducted gave a good idea of what needed to be implemented in the system, yet the user sessions were the best forms of research that could have been conducted.

The initial build of the system relied heavily upon the research that was undertaken, this aided with the colours that would be used in both backgrounds as well as the text that was to be used. The research that was conducted stated that black text on a white background was the most

effective for children, yet with the designs that were drawn up many of the backgrounds were more colourful, as the developer thought that having a lot of white backgrounds would lose the interest of the children so a lot of the screens had been developed with the red and white of S.A.F.C.

After an initial test session with the users, they said that the test for the questions shouldn't be black, and should be a "Different colour", so in the development stage it was decided to have the text in blue, and bold, which will aid the children to have a better experience overall whilst playing the game.

The research that was conducted into cognition as well as the user test sessions that were held aided the developer to not only ensure that the program was pleasing to children but it also meant that the children had a say in the development so it gave the developer more information on how the children like the things that they are using. The developer thought that the user sessions aided more than the research that was conducted into cognition.

5.3 – Database View

One of the essential aspects to the interactive game will be the database of questions, which will be vital to the effective running of the system. The first task was to initially set up the database ready for the information to be input. Fig 5.1 shows the fields that would be required in the database as well as the information that would be input into each. When initially creating the database it was determined that only three fields would been needed, they were,

Question

Correct Answer

Group Number

Following the database with the fields being created, the following layout was given via PHPMyAdmin.

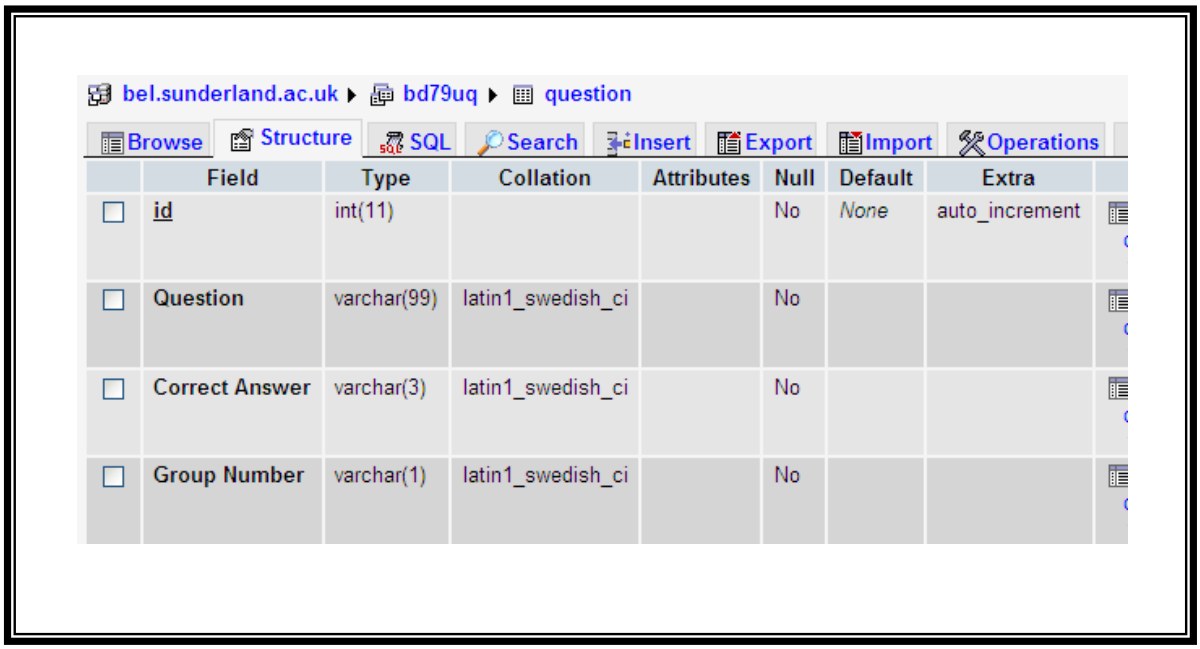


Fig 5.3 – Database View (PHPMyAdmin)

After developing the database then the developer could not only link it to the Interactive Flash Game, but could also create a PHP form for members of the foundation staff to add questions to expand the database.

Another database was created to store the user's names and the scores that they have achieved whilst playing the game. This was a feature that was added as the client asked if there was a way to have a league table of the highest scores whilst playing the game. Unfortunately in the development of the system there was no logical place to use the league table however it would be a logical aspect to add to the flash element. However it would mean changing the well done screen to see how the children are progressing up the league table.

5.3.1 – Data Dictionaries

question

Field	Type	Null	Default	Comments	MIME
ID	Int	No		AI	
Question	text	No			
Correct Answer	int(5)	No			
Group Number	int(1)	No			

scores

Field	Type	Null	Default	Comments	MIME
First Name	text	No			
Second Name	text	No			
School	varchar(255)	No			
Score	int(3)	No			

5.4 - Conclusion

In conclusion the system that has been developed has all of the aspects that were ask for my the client for the project. The only aspect that is missing is the league table which was asked for by the client if there was enough time at the end of the project. yet the developer managed to develop aspects which were not asked for by the client and this has improved the staff at the foundations experience of the system as it more user friendly for them to add more questions to the database.

6- Project Development

The interactive game has been developed in several iterations. Developing the game this way has allowed the evaluation of what had been completed, and allowed the developer to change any aspects that may have needed to be changed. The following chapter will reveal the structure of the final game works. The model shown in chapter 6.1 applies the designs that were explained in the previous chapter. This chapter will show then system architecture and then each of the sections that are vital to the running of the game will also be explained.

6.1 – Program Architecture

Below are the aspects of the flash game, what each part doest as well as why they are essential to the system. This will be followed by a flow graph which will show how each aspect is used within the system.

6.1.1 – Flash Element

This is the main part of the interactive game which will be used by the children who will attend the Foundation. This aspect is essential to the running of the game, the reason for this is this is the aspect that contains all of the information for the running of the system. However the elements below are also essential to the running of the system as each are as important to the running of the system as the next.

6.1.2 – Database of Questions

The database of questions is also vital to the running of the game. The all though the database only contains four fields as shown in fig 5.1. but this was all the information that was required for the system to run effectively. The database that was created is pretty extensive, however the developer thinks that only have 20 questions per age group will result in some questions being repeated more than others.

6.1.3 – Database of Scores

This feature was added as an extra to enable the S.A.F.C foundation to see which pupils are scoring highest, and that will enable them to see which children are scoring higher than others and if necessary they can change the difficulty that the children are playing. This feature will allow the foundation to get a lot more out of this feature and suggestions for this feature will be given in Chapter 9.

6.1.4 – PHP script to read in questions

The php script was essential to the running of the system as it enabled the developer to pull the questions from the database of questions and display them into the game screen of the element. This php script output the questions as a URL encoded variables which allowed flash to read in the questions.

6.1.5 – PHP script to add questions to database

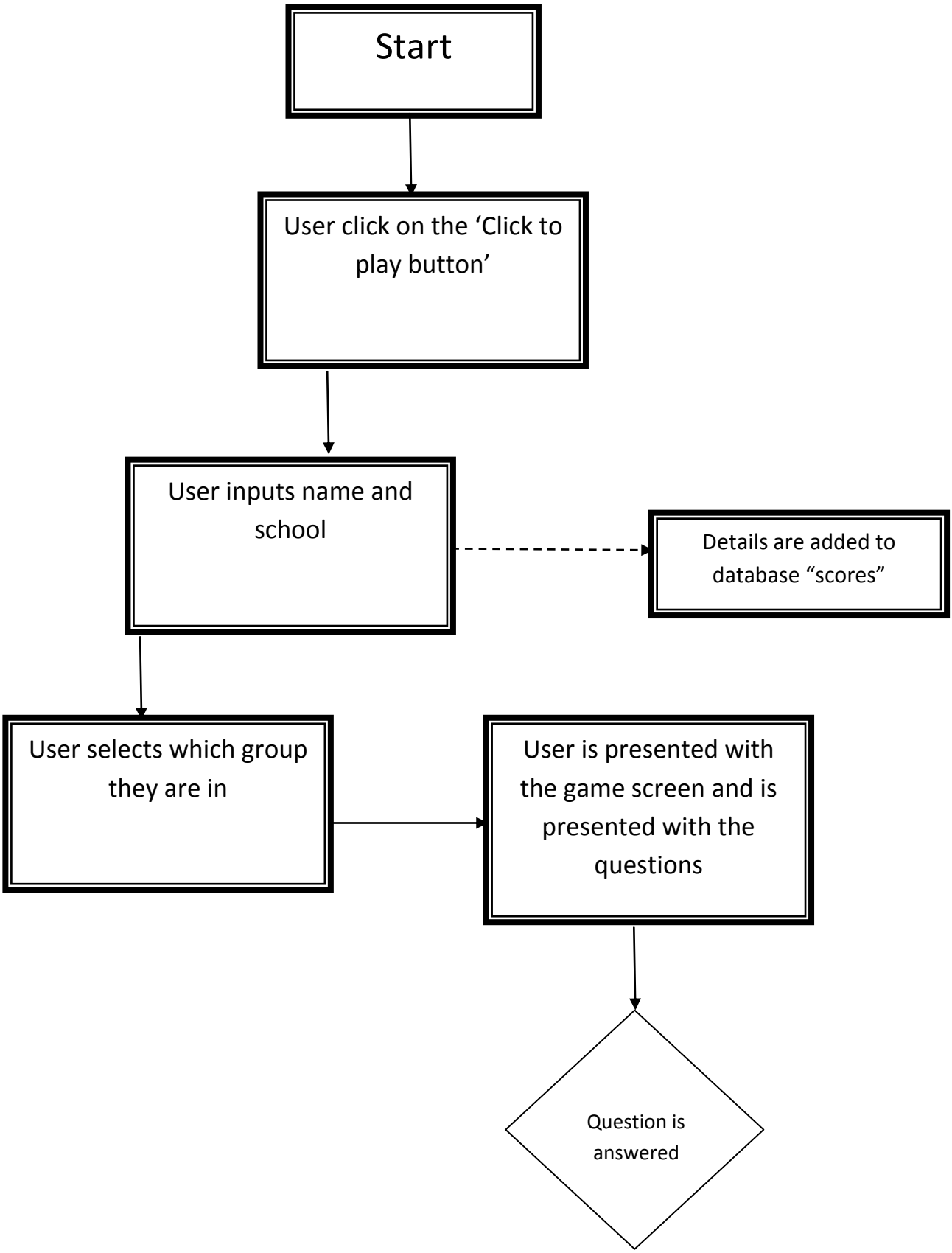
This php script makes it easier for the staff at the S.A.F.C to add questions more easily to the database. The reason for adding this into the project was that the staff at the foundation do not

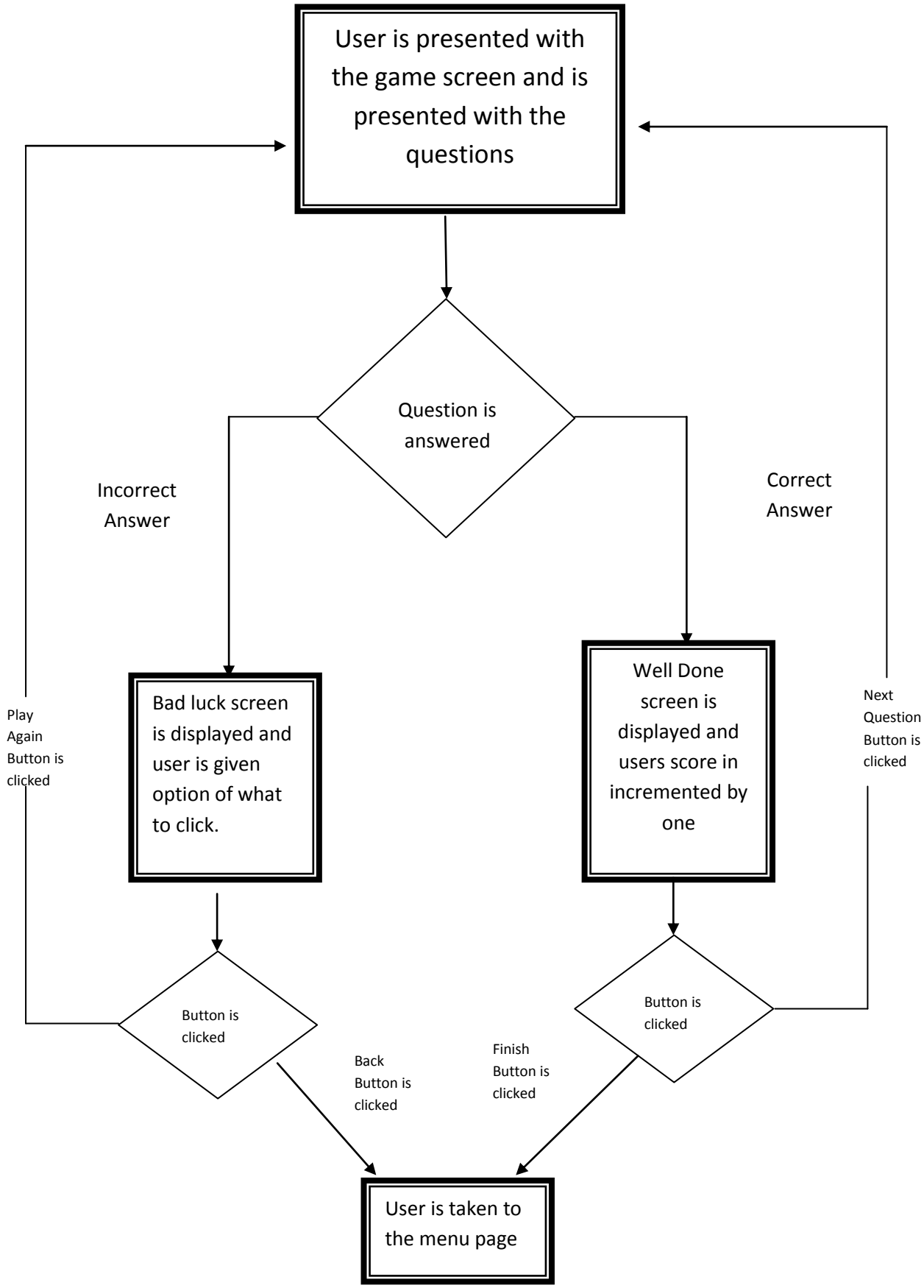
have a vast knowledge of SQL so it was decided to add a simple form to the program so that members of staff could add questions to the database more easily. However the developer didn't incorporate an edit question in the database. This is a suggestion for future development, further suggestions can be found in Chapter 9.

6.1.6 – PHP script to add users names to database

After the User enters their name into the fields there is a script running in the background which adds them to a database automatically. This was developed so that the children's scores could be logged and the foundation could also monitor weather some of the group's questions are too hard or maybe even to easy. This feature was developed to that if a child got a higher score than last time it would say well done you scored more but after an initial meeting with the client for the project this was taken out. However if in future the client wanted this attribute to be added then it is a simple change to the system.

All of these aspects come together to make the game. The flow diagram shows exactly how each aspect of the system comes together as a whole. Following the flow chart will be the user interface for the full system which includes the user interface for the php form for adding a question to the database and after the question has been entered into the fields what the user is then shown to determine whether or not the question has been added successfully.


Start
User click on the 'Click to play button'
User inputs name and school
Details are added to database "scores"
User selects which group they are in
User is presented with the game screen and is presented with the questions
Question is answered

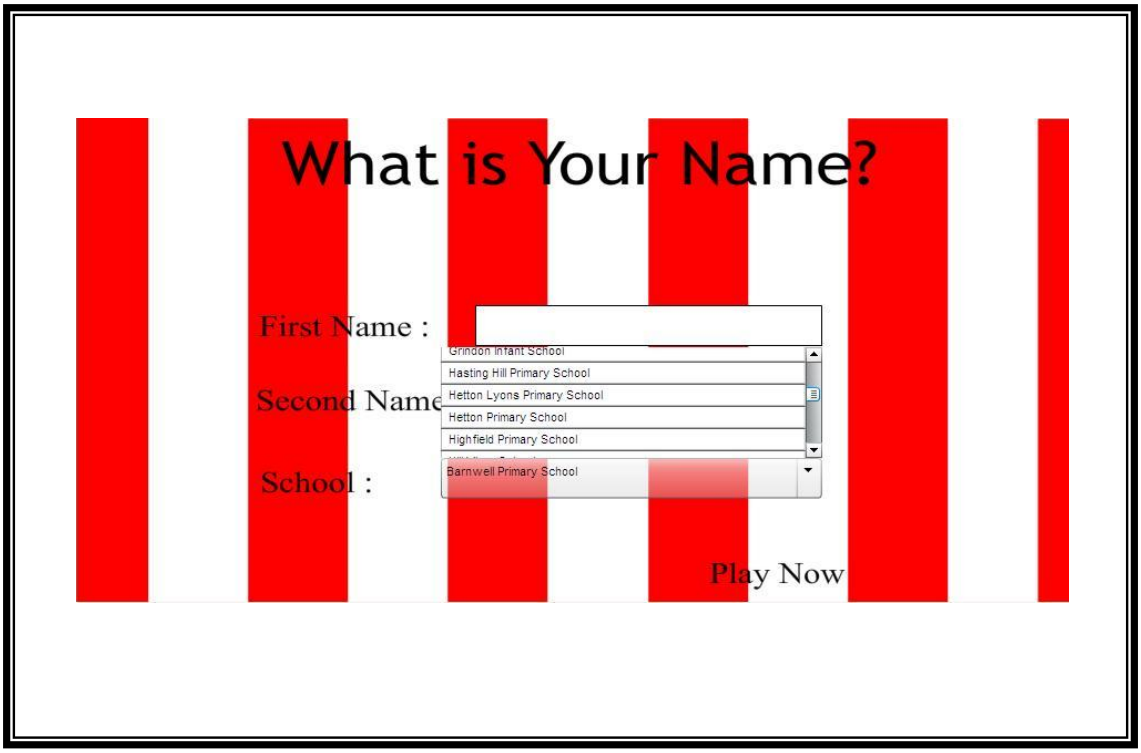

User is presented with the game screen and is presented with the questions
Question is answered
Incorrect Answer
Correct Answer
Bad luck screen is displayed and user is given option of what to click.
Well Done screen is displayed and users score in incremented by one
Play Again Button is clicked
Next Question Button is clicked
Button is clicked
Button is clicked
Back Button is clicked
Finish Button is clicked
User is taken to the menu page

6.2 – User Interface

The user interface is essential to the game, as one of the aims of the overall project was to 'To create an interactive game that children will find aesthetically pleasing'. Below are screenshots of the final version of the game which include changes that were made from the initial meeting with my client to the test sessions with the children. Chapter 7.2 will document the test sessions that were carried out which proved to be a valuable part of the project and this aided the developer to develop a better game over all for the children.

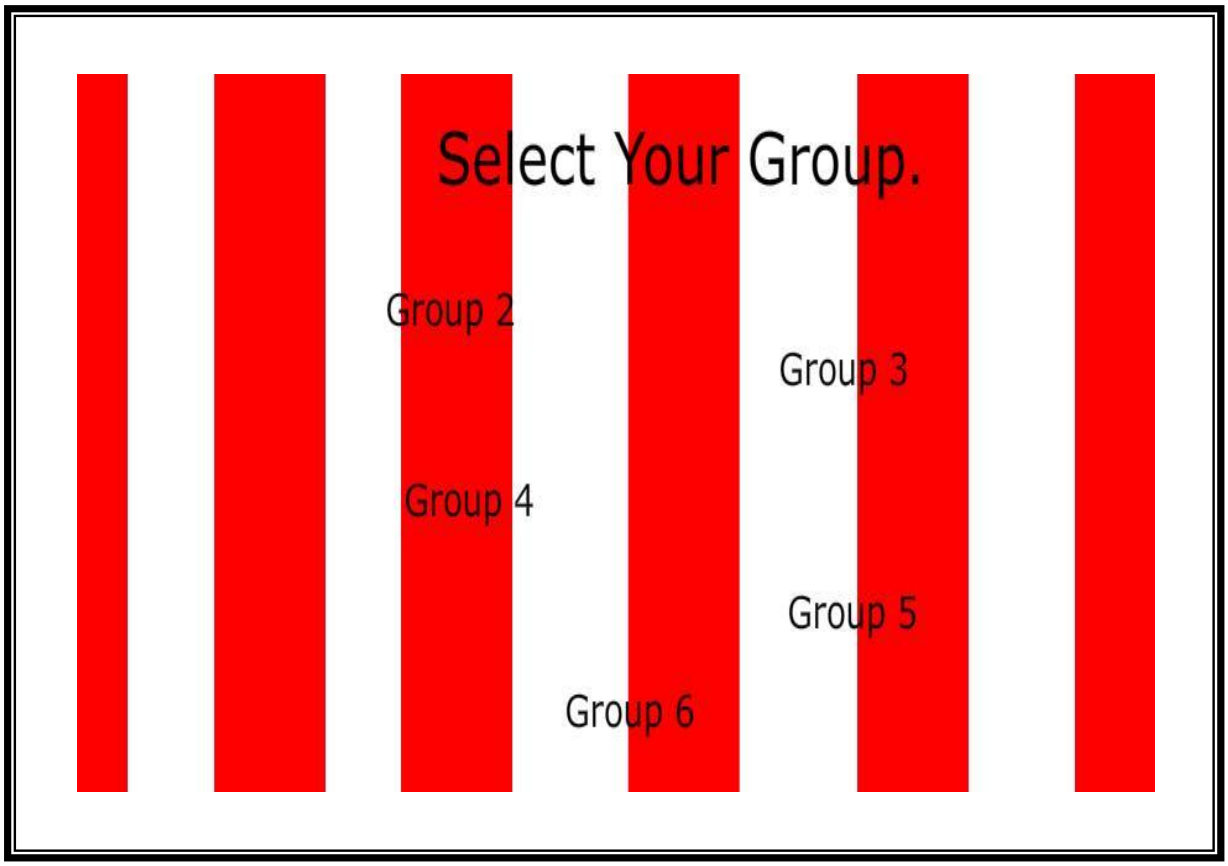
6.1- Main Screen for the game.

When the user enters the game they are presented with the current screen. Rather than having a lot of different aspects to the screen it was decided to have the simple click button but as well as the button there was the rotating Sunderland badges in the four corners of the screen to make the screen look a little less plain, this also means that the SAFC foundation is getting the logos of the football club into the system. The 'Click to play' button was moved from its original place the reason for this is explained in Chapter 7.2.2.



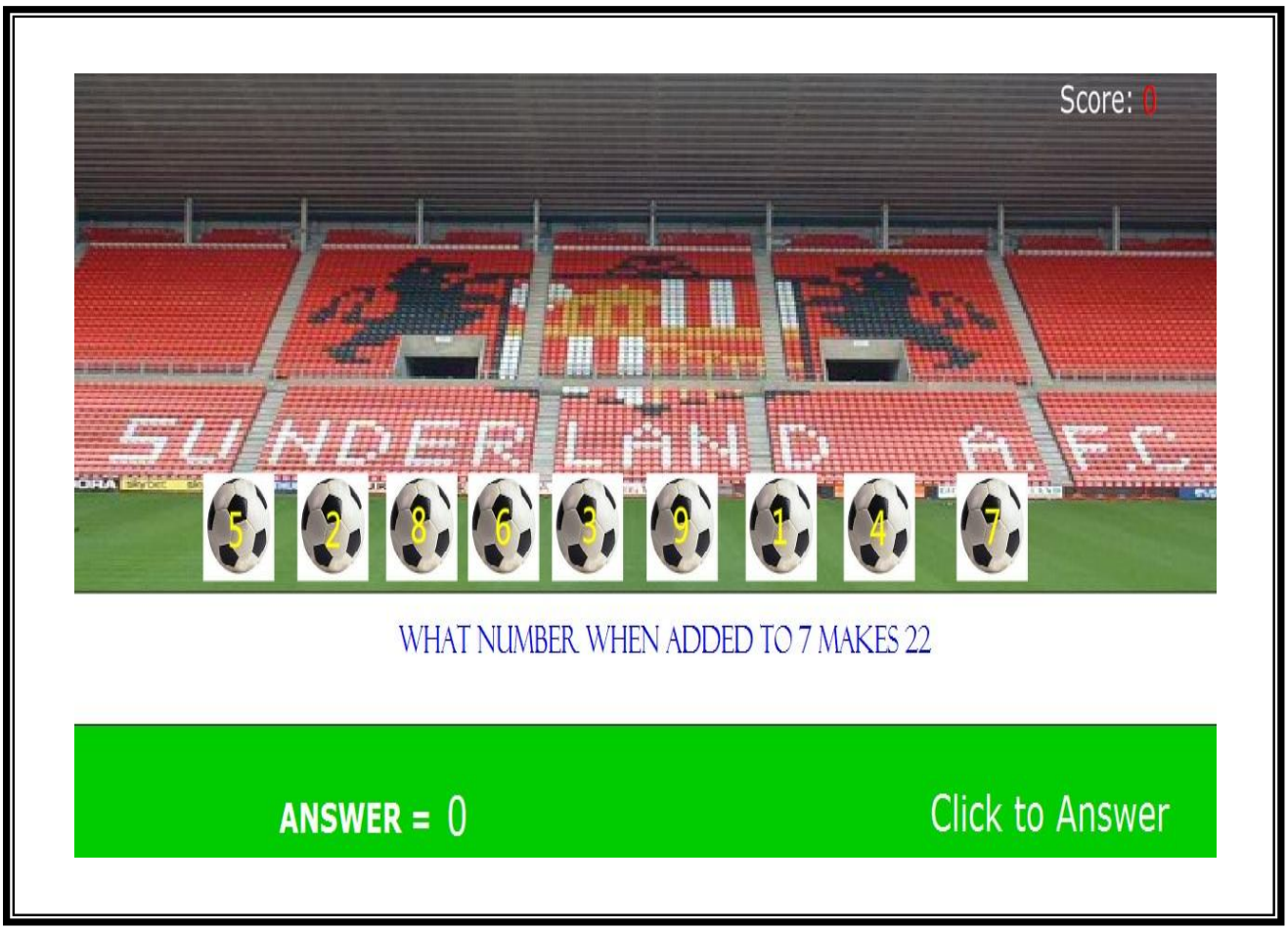
6.2 – Name Entry Screen

After clicking the 'click to play' button is clicked the user will be presented with following screen. The screen has the red and white stripes of S.A.F.C, which was a requirement from the client. Further to this the users can relate to the red and white stripes and the text is visible. The users will have the drop down list of schools this was implemented following observing users entering names into the fields, and it seemed a better idea all-round to only ask users to input their names.



6.3 – select your group Screen

The group select is similar to the name entry screen with the red and white stripes of the Sunderland football club. This screen also has the group numbers which determines which question set is selected, which is used as a difficulty gauge. The research that was conducted stated the children lean best with white backgrounds with black text, however this wasn't appropriate to the system, however black text was used to great effect on this screen

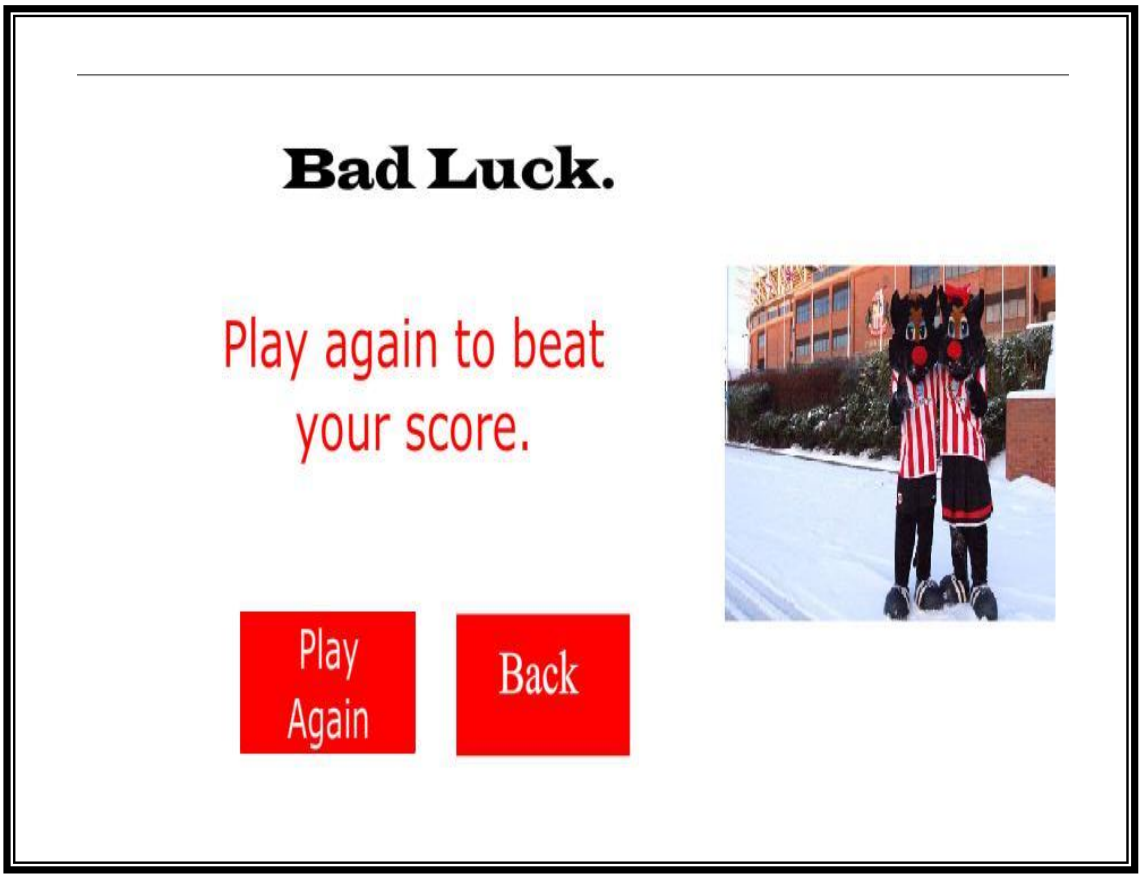


6.4 – Game Screen

This screen is the screen that children will spend the most amount of time on, so it had to be developed to try and keep the users concentration as well as bright colours. Further to this the game had the most going on in it. Yet this screen was the hardest to develop as after the fields were set out there was a lot of white space and the developer could not decided what was to be put in the white space. It was decided to add an image of the stadium of light in the back ground so it gives the children more of a feel of the stadium. Further to this the text that was used for the question was blue. This was changed after a test session with potential users. Other notes from this session can be found in Chapter 7.2.

6.5 – Well done Screen

For the well done screen it was decided that instead of have a lot of white space to incorporate an image of correct SAFC players. This was so that the children could relate to the game a little bit more. The image that was used was of Sunderland's current start player Darren Bent celebrating. The only thing with both this screen and the one below (the bad luck screen) is that there is to much white space on it. However in the test sessions children said that there was a little too much red and white within the game.

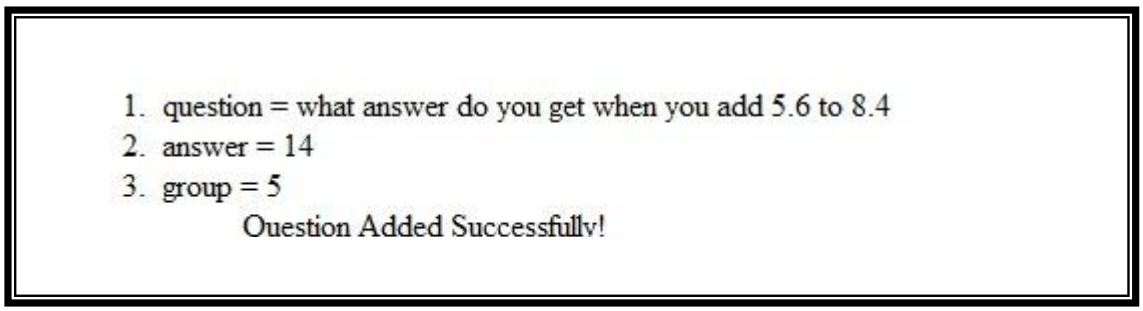


6.6 – select your group Screen

This screen has an image of the two mascots ‘Samson’ and ‘Delilah’ standing outside of the Stadium of Light. It was decided to use this image over the image that was in the earlier versions of the game as it meant that the children could relate more to the image of the mascots over the image of the player that was used in previous versions.

6.7 – Add Question Form

6.8 – Output after question in submitted



Following the user typing the desired question and answer into the fields they will select which year the question is for. Following this the member of staff pressing the “Submit query ” button the user is shown what question was added along with the answer and which group it’s for and whether or not the question had been added to that database. It was decided to incorporate this page into the design for the program as it enabled novice users to maintain the database and add new questions.

7 – Testing

7.1 – Development Testing

Throughout the development it is essential to test every aspect of the game to ensure that all aspects are working correctly. This will be under taken by using 'Black Box Testing' and 'White Box Testing'. It is vital to complete a thorough test of a system that you test via both black box and white box testing.

7.1.1 – White Box Testing

White box testing which is also known as "glass box, structural, clear box and open box testing", White box testing works on the basis that the tester has a good knowledge of the background workings of the system. There are six different types of white box testing (William, L. 2006), unit, integration, function/system, acceptance, regression and beta. However not all of these methods of testing will not be appropriate to the game. When testing the game the developer will test via integration. The reason for this is that integration testing is "testing in which software components, hardware components, or both are combined and tested to evaluate the interaction between them" (IEEE, 1990). The testing that has been undertaken can be found in Appendix E

Following white box testing it will be essential for the developer to also use black box testing. Below shows how this testing was undertaken.

7.1.2 – Black Box Testing

Black Box testing or '*functional testing*' as it is also known is a method of testing, where as the internal workings of the system are not known by the tester. An example of this is a tester only knowing the inputs and the expected output are, yet never knows how the system arrives at said conclusions. The tester would not even examine the code and doesn't need any further knowledge of the program other than its specifications.

There are several Advantages of 'Black Box Testing these include:

• The test is unbiased because the designer and the tester are independent of each other.
• The tester does not need knowledge of any specific programming languages.
• The test is done from the point of view of the user, not the designer.
• Test cases can be designed as soon as the specifications are complete.

However with these advantages come at a price, in the form of the following disadvantages

• The test can be redundant if the software designer has already run a test case.
• The test cases are difficult to design.
• Testing every possible input stream is unrealistic because it would take an inordinate amount of time, therefore many program paths will go untested.

The black box testing was undertaken at the end of the development of the game. The way that the game was tested via black box testing was to get a user to play through the game and leave them to play it. The developer thought it wasn't appropriate for him to play through the game so an independent tester was asked. They enjoyed the game and thought that it would b stimulating for children further to this the game was fully functional apart from the score aspect. All of the options worked well, however there was a slight delay on the text displaying on the screen. After testing the flash element the tester tested adding questions to the database which worked and added them to the database with the new Auto Increment number for the ID.

7.2 – User Testing

7.2.1 - Test Session 1 – With Users (4th March 2010)

When initially planning this test session it was planned that questionnaires would be made to take into the session to get the users views on the session. However after arranging the first test session it was revealed that the test would be for year 3 children (aged 7), so it was decided as an alternative observation would be used to ensure that the developer could get all of the

information that was needed, which included suggestions for improvements for the system after the users had used the game.

After the children had tested the game they gave suggestions on how the interactive game could be improved. The suggestions all seemed to be a good idea, some of which are planned for further development which included more colour on the age entry screen, as well as having 'fans' behind the goal posts which are made of the numbers, which would give the game more of a football feel.

The developer also asked the children questions to discover their views on the layout of the game. When asked what the children thought about the numbers that were used for the goalposts, their notion was they were big enough, which means that if year 3 children think the number are big enough then it would appear that they would not need changing, but the children said that the game should be a full screen application, so the size of the text may be altered to incorporate a larger screen.

Following speaking to the children, the game was shown to the client of the system to see what he thought could be added to the system to improve it.

7.2.2 – Test Session with Client (7th March 2010)

Following the first test session with the children, the project sponsor Phil (Cowler) was unavailable to give his views on the system, however it was arranged that a meeting would be held later in the week. This meeting was to obtain the views of the sponsor on the product and see if there was any aspect that needed to be changed during further development. This meeting

proved to be a valuable one, as Phil thought there was a lot of good points about the system, yet he also thought that there was aspects that could have been changed.

This changes that Phil said that needed implementing were small changes that are going to be easy to implement, but there were changes that he said should be applied that will require changes within the “Game” part of the product.

Starting with the ‘Welcome screen’, Phil suggested that the click to play button should be relocated. The reason for this is that having it at the bottom of the screen may make it harder for some of the children to locate, so it as agreed that it would be moved to the centre of the screen. As shown below, in Fig 7.1.

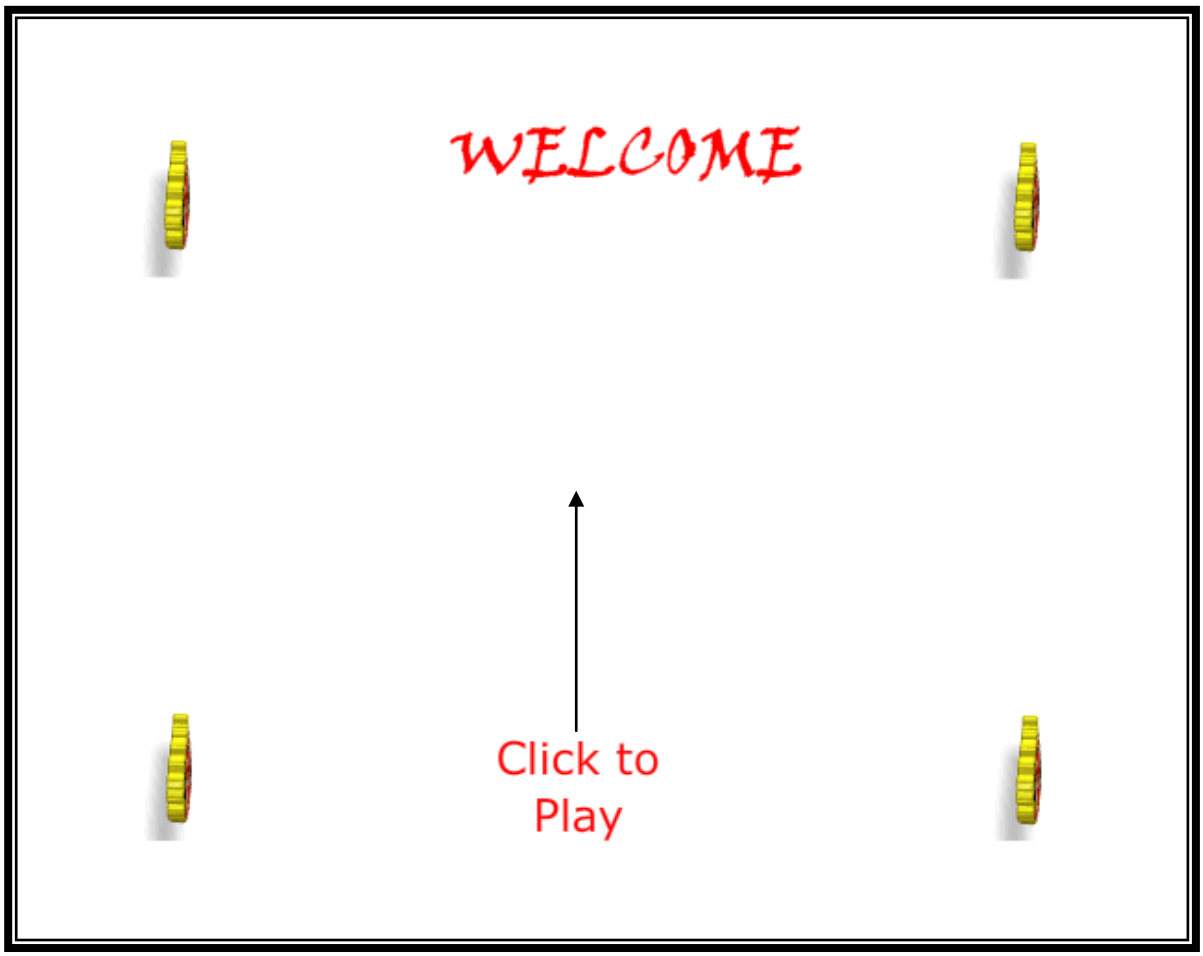


Fig7.1 – Main Screen

The name input screen was in need of colour when the meeting took place, but Phil was informed that after observing the children inputting their names that development would include a list of the schools in a drop down list so that the children could select their schools from the list. Phil was happy with the select a group page, it was explained that it was select a group over select a year because if a child is not at the same level of ability as other children then it is a little less obvious to the children that they are a little behind.

After moving onto the 'Game' screen Phil started to give more and more ideas into what could be used on the screen, and how it could be improved from how it was when we met. The first change that is to be implemented what change the 'numbers' from being in the shape of a goal post, to changing them to being footballs with the numbers in the middle. Following this advice this was changed, but this addition expected there would be white space behind the footballs. This meant that at the next test session I would get views of the children what should be in the background, but the initial idea is to have a set of goal posts in the background, so it would look like a training pitch. It was also commented on that the 'Click to Answer' button might have been a little small, so it had been enlarged for the next test session.

Finally Phil was shown both the 'Well Done' and 'Bad Luck' screens. His view on the bad luck screen was that the older children would like the figure that is on the screen. However as explained in the last section the younger children thought that the image needed changing, so it was decided that a image of the clubs mascot 'Samson the cat' would be more appropriate to use for the screen for children of all ages.. Whereas the screen for 'Well Done' it was decided to change the name of the button that was being used to 'Next Question', and to remove the text saying 'move on the next question' as it looked like a button and children would try and click it, and add a score sections, which as well as being on the 'Game' screen it the children would be able to keep a content check of their score.

7.2.3 – Test Session 2 – With Users (10th March 2010)

Unfortunately the second test session was only 6 days following the first, which meant that all of the changes that were to be implemented could not be completed. Yet the session proved very helpful for changes that were to be implemented. The test session was conducted in two parts, firstly the children tested the same game that was tested by the year three children, however after that they then played with an edit of the game with a few subtle differences. The older children didn't have any problems clicking on the click to play at the bottom of the screen, but further development will be moving this as shown in fig 7.1. (Cooke, L 2005)

The children's notion was to add the colours of S.A.F.C to the background of the 'Name Entry' screen, which seems a reasonable idea, this was the original idea for the developer, but it was left blank to get feedback and views from the users. The users didn't think that anything needed changing on the select year screen. On the 'Game' screen the children were full of ideas on how the game could be improved. These changes are mainly colour changes, and changes to the background. Although these changes are to the original game, these changes can be implemented into the changed game. The best suggestion that was put forward was to have the S.A.F.C badge in the background. This is a very good option to add to the game, even after the 'Game' screen has been changed this could be added to the edited screen. The children suggested that the question could appear in different colours, as well as flashing. The first point could be implemented, however to have the question "flashing" would not be a good idea (), the reason for this is that some of the children that attend the Foundation may be sensitive to flashing images.

When moving onto the 'Well Done' screen the children were asked for suggestions on images to be used, the ideas that the children put forward varied but a lot of the suggestions could be

implemented. These included having images of current players and staff of the team on the side of the screen; this is an aspect that will be implemented to the final system. Finally the 'Bad Luck' screen, the children had a lot of ideas on how this screen could be improved. Although the children had a great deal of good ideas there were some of the ideas that were a little inappropriate to the system. The first of which was to have Alan Shearer on the bad luck screen, but this would be a little unsuitable for the system as he never played for or has been associated with Sunderland in his career. An excellent suggestion from the children was to have sound effects on both the 'Well Done' and 'Bad Luck' screens, the ideas that were put forward were a roar if the question was correct, and a boo if the question was answered incorrectly.

Following this session the children were asked to comment on the additions/changes that had been implemented into the system in the short time after the first test session. The main changes were on the 'Game' screen, the first change was changing the numbers to footballs with the numbers inside them. The children thought that this was an improved screen, and agreed that the numbers within the balls looked better, but they also gave ideas on how this could be improved. The numbers that were in the balls were red as shown below, and clashed with the black and white of the balls below. The users commented that the numbers could be a light blue, or a green to make them standout more, FIG 7.2 shows the possible colours for the balls. The final development will have the balls in yellow, as they are a lot easier to see compared to the blue and green numbers.

Fig 7.2 – Game Screen with Two different Colours in the Footballs

Further to this the users give very good ideas on how to improve the background which was white when the test took place. The best suggestions that were put forward were to have the balls along the sideline, or to have a set of goalposts in the background. The latter would allow a flash animation to ensure the balls 'flew' into the goal, and if the answer is wrong then the ball would hit 1 of the goalpost's. The only hindrance to this would be with numbers that will need two or three different numbers then only the last number would have to bounce off the post.

The users also suggested that the answer to the question could be the number of point available for the question. It was decided to avoid this as it would mean with questions being called at random some children would get different scores and if children's scores are 100 or more points less than their peers then they will be disheartened and may not play the game again. The final point that was raised was that the children didn't want the questions to be red on the white background, and it would be a good idea to have them in different colours for each different question. This is a very good idea, but the colours used will have to be bright and bold.

8 – Project Evaluation

The project has now successfully ran from the scheduled start to the scheduled finish, following the initial set of dates that were set. There were a few changes that had to be incorporated into the plan these can be found in 8.3 the personal refection. The reason for this chapter being at the end of the document is to evaluate the project as a whole as well as to reflect on how anything within the process could be changed. Firstly this chapter will evaluate the project management process that was used throughout the project, this will be followed by an evaluation of the system overall, which will include any problems that were encountered through the project. Finally the chapter will end with an overall evaluation of how the author thinks they worked, along with any problems that were encountered along the way and how they we overcome.

8.1 – Project Management Methodology

As a whole following a project management methodology strictly has made the project run smoothly overall. Having followed an agile approach all though the project it aided the developer to keep to the deadlines that were imposed thought out the project. This Included scheduling test sessions with the potential users into the time that was given for the development of the system. The developer felt this to be a necessary step as the information that was gathered from the users was invaluable to the further development of the system. Further to this having self imposed deadlines assisted having sections of work complete before it was possible to move onto the next section, however, if the developer did fall behind schedule then it was possible to make the work up, but when the development fell behind it as a struggle to get caught up, as well as doing the work for that week as well. Falling behind was during the development stage, so when the developer fell behind it was a little easier to catch up, as during the development there was

no documentation scheduled into the time so it was only a case of catching up in the development stage.

Following an agile method enabled the developer to follow the schedule that was created very closely which meant that the majority of the tasks were completed on time all though some tasks were behind schedule. However some of the tasks that were set were completed ahead of time. Below shows the amount of tasks, and when they were completed.

Tasks :	**42**
On Time :	21
Behind Time :	10
Ahead of Schedule:	11

Overall it appears the half of the project was completed to time. More importantly 11 of the 42 tasks were completed ahead of schedule which means that the developer was working well to deliver the targets to get tasks completed in the specific time frame. Unfortunately 10 tasks were actually late in finishing which the developer was not happy with overall. This means that nearly ¼ of the tasks were late. Which ranges between a day and a week late. However 70% of the late starts were only between 1 and 2 days late so the developer wasn't far of schedule. The developer is disappointed that 3 schedules starts are more than 3 days late in starting and this could have been avoided.

8.2 – System Evaluation

As mentioned in Chapter 7.2.2 the developer had a meeting with Phil, the client to acquire his views on the system that had been developed up to the stage that it was when the tests took place. A month has passed since this meeting and the game is now complete and the developer conducted an evaluation of the system with the client for the final time. The final version of the game incorporated the suggestions that the client recommended in the last meeting along with various changes that the users put forward by them users in both test sessions.

Following a final meeting with the client for the project he was pleased overall with the outcome of the project. However he was full of questions about what had been completed as well as what else needed to be added to the program. The client was informed that the database only had 20 entries for each year group which he was informed would have a higher probability of having repeated questions. The developer informed the client that this would be a lot easier to rectify with the php page that had been developed to ensure that novice users could add more questions to the database. The client for the project also made comments on aspects of the system. The first comment he made toward the system was on the list of schools. He stated that there were some schools that would not attend the foundation as well as schools that will attend that were not in the list.

Another aspect that the client commented on was the balls that are on main screen still had the white around them. The developer agreed with the client on this point and agreed that it needed to be changed as it didn't look very professional and when the project is revisited this will be changed to make the game look more professional overall.

The developer feels that the project overall has been a successful one and believes that he has covered all of the aspects that the client asked for in the original specification. However with two aspects of the systems not fully functional the developer doesn't believe that the project could have been better. Yet the aspects that are not fully functional do not hinder the users overall experience of the game and the game would function without the aspects. The first of which is that the score ticker does not carry the scores from screen to screen this means after the user answers a question correctly and click next question the score goes back to zero. Further to this the developer tried to set variables into the system to that if the user clicked group 2 then only group 2 question s would appear however this aspect of the program would not hinder the experience of playing the game as the questions will still appear on the screen and let the children play the game.

9 – Future Development

Following finishing development of the interactive game it has become apparent that there is room for further development of the system if a developer wanted to extend the work that has been completed throughout the development of the game. The main development that an external developer could implement would be to have a more extensive database of questions to ensure that there is less chance of children encountering the same questions over. The reason for this is that during the development stage the developer only had a set amount of time to ensure that all tasks were completed so the database was not as extensive as the developer would have liked.

Further to this the only other changes that the developer believes could be implemented to the system would be small changes that would aid the children's experience of the game. The first of which is on the name entry screen, the way that the screen is currently set out the children have to search through a list of the schools in alphabetical order. This component of the game could be improved so that as the child starts to type the name of the school it automatically enters. However this may not be the best idea for the younger children may not get the correct spelling for the school.

Another suggestion that has been put forward to the foundation is regarding the children's scores. With this function being built into the system it could be implemented by the foundation which would all them to have some sort of prize for the highest score every month or from every school. This feature will also aid the staff at the foundation to add further questions to the database and maybe change questions if some questions are easier for children if they are getting higher scores then they would be able to

The final changes that could be implemented into the system would be to have a better range of options for the answers to questions, such as having shapes and angles to click on to give a better

experience overall and also would mean that the S.A.F.C. Foundation would be able to use the games as a longer activity and means that the children will learn more.

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Appendices

Appendix A – Schedule & Gantt Chart

Schedule

Task No	Task Name	Number Of Hours	Planned Start	Actual Start	Planned Finish	Actual Finish	Deliverable
Planning : 30 Hours							
Initial Proposal							
1	Draft Initial Proposal	3	3rd Oct	3rd Oct	5th Oct	6th Oct	Paper copy of draft proposal
2	Finalise Proposal	3	6th Oct	7th Oct	8th Oct	8th Oct	Paper copy of final proposal
3	Draft Schedule	3	10th Oct	10th Oct	11th Oct	12th Oct	Paper copy of draft schedule
Definitive Brief							
4	Introduction	1	13th Oct	13th Oct	14th Oct	15th Oct	Introduction of Definitive brief
5	Context	2	17th Oct	17th Oct	22nd Oct	22nd Oct	Context of Definitive brief
6	Research Section	6	23rd Oct	23rd Oct	25th Oct	24th Oct	Research section of Definitive brief
7	Proposed solution	3	26th Oct1	25th Oct1	27th Oct	27th Oct	Proposed solution of Definitive brief
8	Progress report	3	28th Oct	28th Oct	29th Oct	29th Oct	Progress report of Definitive brief
9	Generate GANTT Chart	1	30th Oct	30th Oct	30th Oct	30th Oct	Print of Gantt Chart
10	Collate Definite Brief	5	31st Oct	1st Nov	2nd Nov	2nd Nov	Print of Definitive brief
Research : 100 Hours							
11	Define Initial Research Subject	5	8th Oct	8th Oct	9th Oct	10th Oct	Verified brief signed by supervisor.
12	Read Journals and books on Cognition	15	13th Oct	15th Oct	25th Oct	25nd Oct	Research Notes
13	Read Journals and books on Memory	10	26st Oct	26st Oct	6th Nov	6th Nov	Research Notes
14	Read Journals and books on Cognition in Children	10	7th Nov	8th Nov	13th Nov	13th Nov	Research Notes

15	Read Journals and books on Cognition in Computing	15	14th Nov	14th Nov	28th Nov	30th Nov	Research Notes
16	Gather all notes together for research	5	30th Nov	30th Nov	3rd Dec	2nd Dec	Compiling of notes
17	Plan Literate Review	5	4th Dec	21st Nov	6th Dec	21st Nov	Arrange sections of research chapter
18	Write Literature Review	30	7th Dec	7th Dec	17th Dec	16th Dec	Chapter 2 of dissertation
Development : 160 Hours							
19	Develop Basic System	20	11th Jan	16th Jan	22nd Jan	22nd Jan	Working system
20	Further Development	20	23th Jan	23rd Jan	31st Jan	31st Jan	Working system
21	Test Features	10	15th Feb	16th Jan	17th Feb	17th Feb	Test Cases
22	Develop Database Of Questions	25	12st Feb	12th Feb	28th Feb	28th Feb	Database of Questions
23	Test Session 1 and evaluation	10	1st Mar	4th Mar	5th Mar	4th Mar	Observation Notes
24	More Development of both Database and System	30	6th Mar	5th Mar	20th Mar	9th Mar	Working system and more questions in data base
25	Test Session 2	10	22nd Mar	10th Mar	26th Mar	10th Mar	Observation Notes
26	Final Development	25	15th March	11th Mar	6th April	8th April	Fully working system to present to SAFC
Evaluation : 45 Hours							
27	Evaluate prototypes with client	15	13th April	12th April	16th April	16th April	Letter from client
28	Evaluate impact of literature on development	10	29th Mar	29th March	3rd April	5th April	Chapter 8 of dissertation
29	Evaluate Overall System	20	13th April	13th April	18th April	18th April	Chapter 8 of dissertation
Documentation : 65 Hours							
30	Structure Dissertation	5	11th Dec	10th Dec	13th Dec	13th Dec	Chapters and headings of dissertation

31	Write Abstract	1	15th Mar	15th Mar	25th Mar	25th Mar	Abstract of dissertation
32	Write Chapter 1 (Introduction)	5	16th Dec	10th Dec	23rd Jan	28th Jan	Chapter 1 of dissertation
33	Write Chapter 3 (Project Management Approach)	7	4th Feb	14th Jan	15th Feb	28th Jan	Chapter 3 of dissertation
34	Write Chapter 4 (Analysis)	7	26th Mar	26th Mar	31st Mar	31st Mar	Chapter 4 of dissertation
35	Write Chapter 5 (System Design)	5	18th Mar	18th Mar	22th Mar	22th Mar	Chapter 5 of dissertation
36	Write Chapter 6 (Project Development)	5	6th Mar	6th Mar	12th Mar	12th Mar	Chapter 6 of dissertation
37	Write Chapter 7 (Testing)	5	17th Mar	1st Mar	20th Mar	15th Mar	Chapter 7 of dissertation
38	Write Chapter 8 (Project Evaluation)	5	20nd Mar	20nd Mar	25th Mar	25th Mar	Chapter 8 of dissertation
39	Write Chapter 9 (Future Development)	3	1st April	1st April	9th April	9th April	Chapter 9 of dissertation
40	Generate TOC	2	10th April	10th April	12th April	12th April	Table of contents for dissertation
41	Print Bind and Submit Dissertation	5	13th April	18th April	15th April	20th April	Dissertation completed.
42	Prepare for Viva	15	15th April	15th April	6th May	6th May	Power Point Presentation

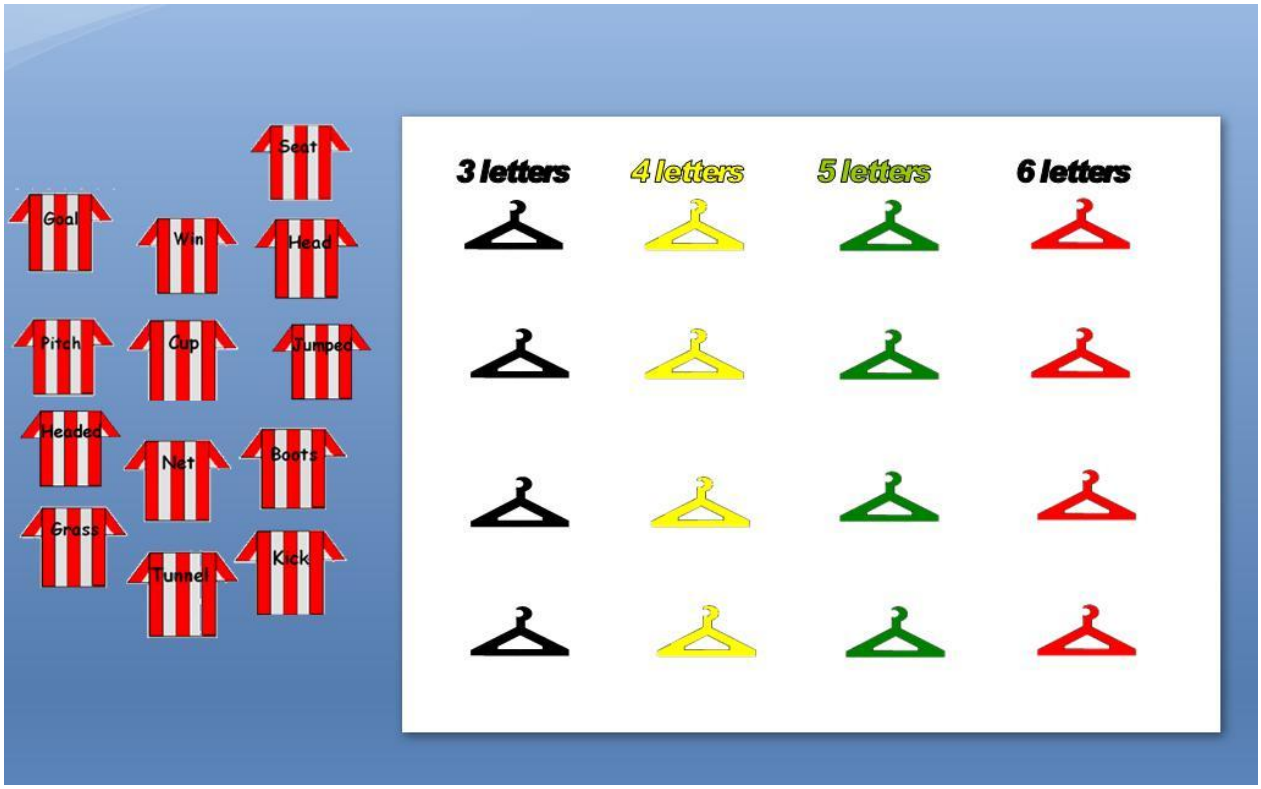
Total Hours - 400

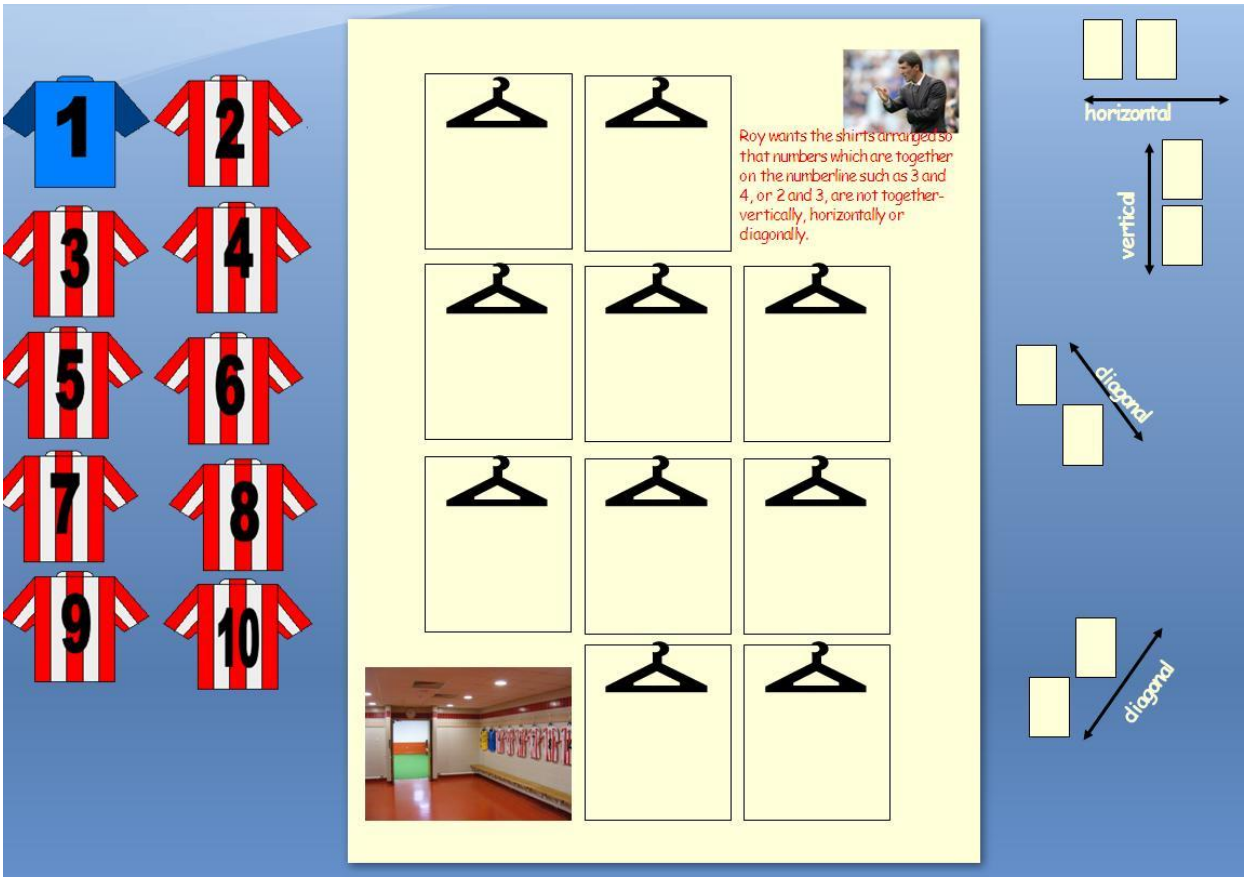
Gantt Chart

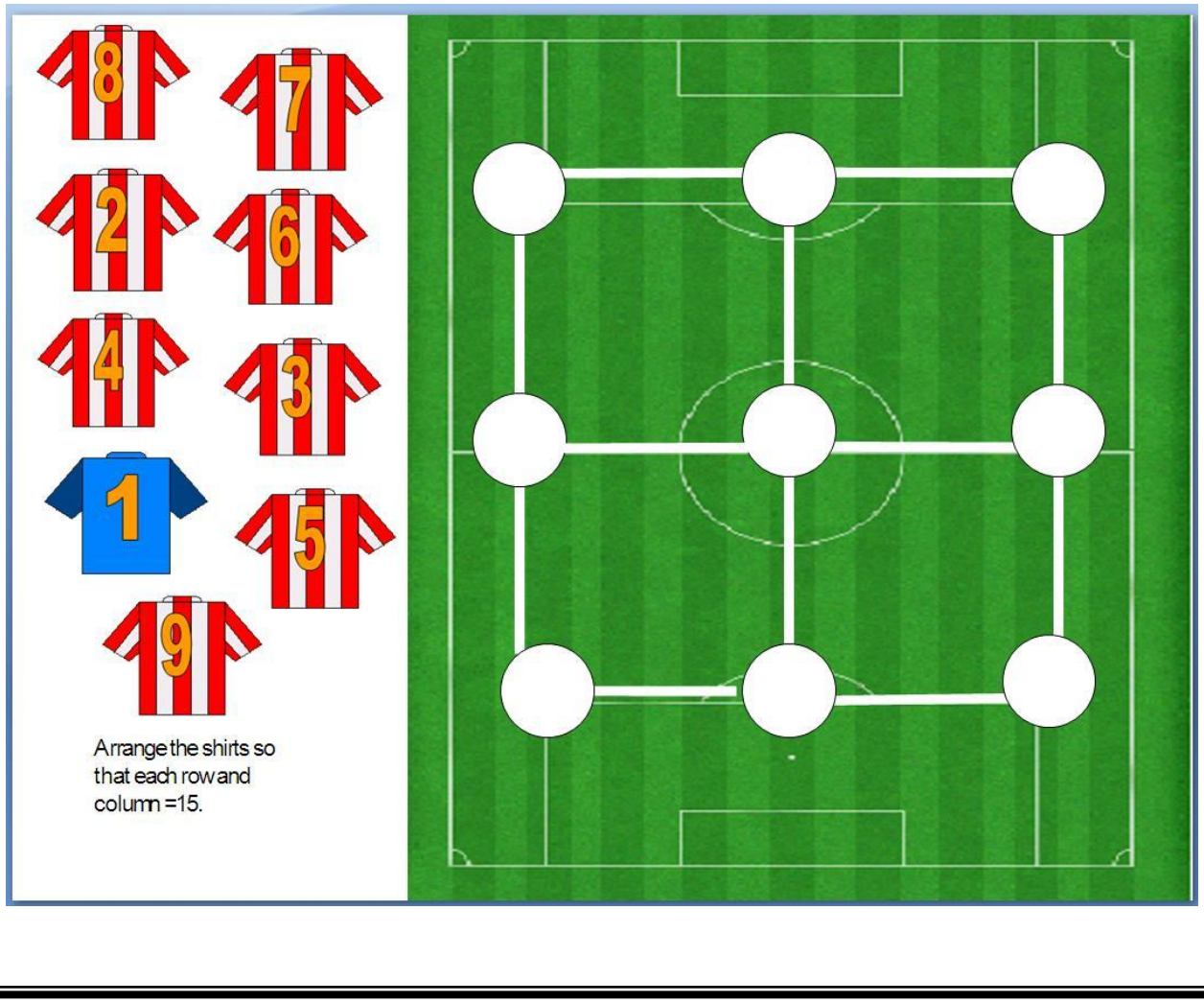
Up-to-Date Gantt Chart

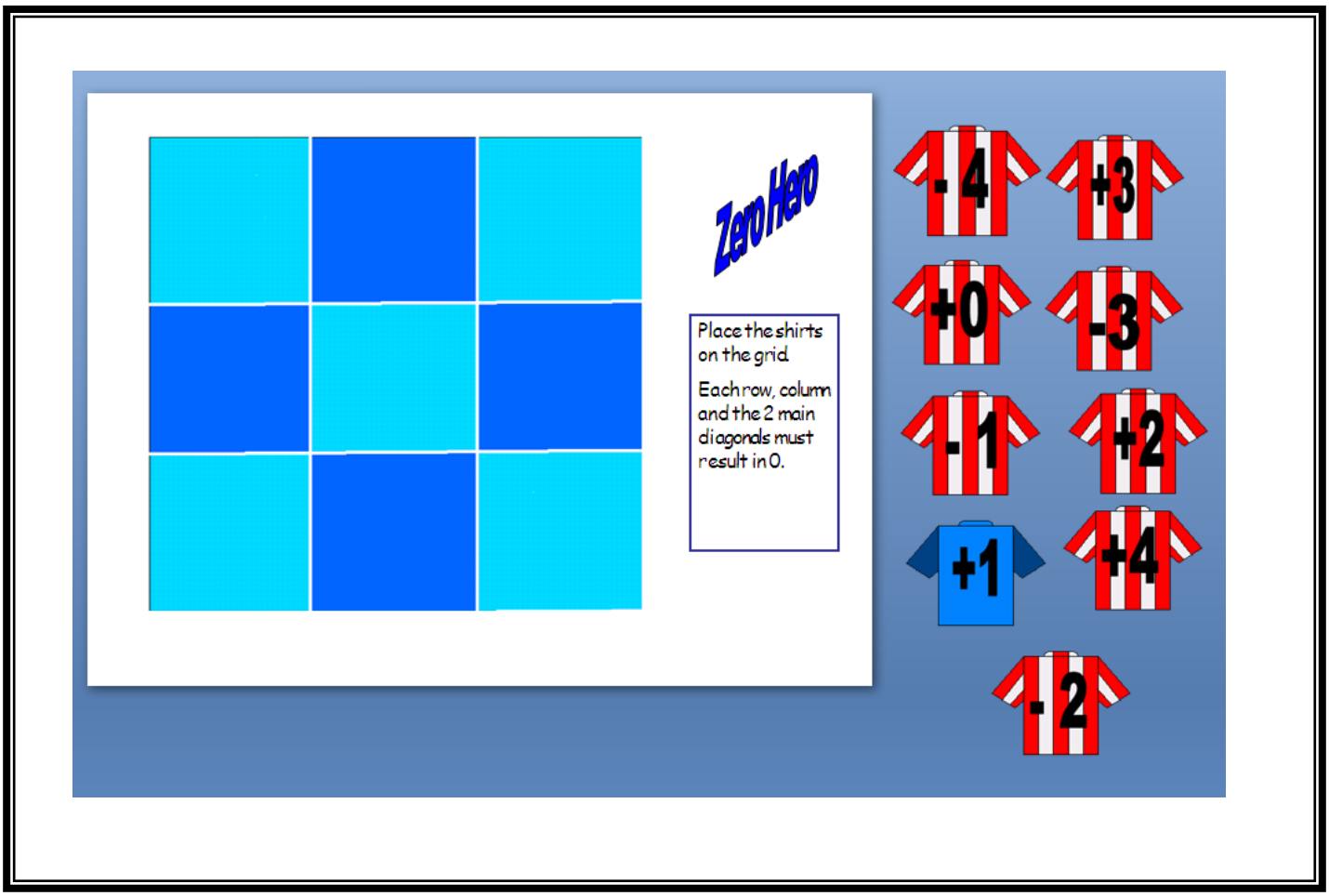
Appendix B – Current Applications

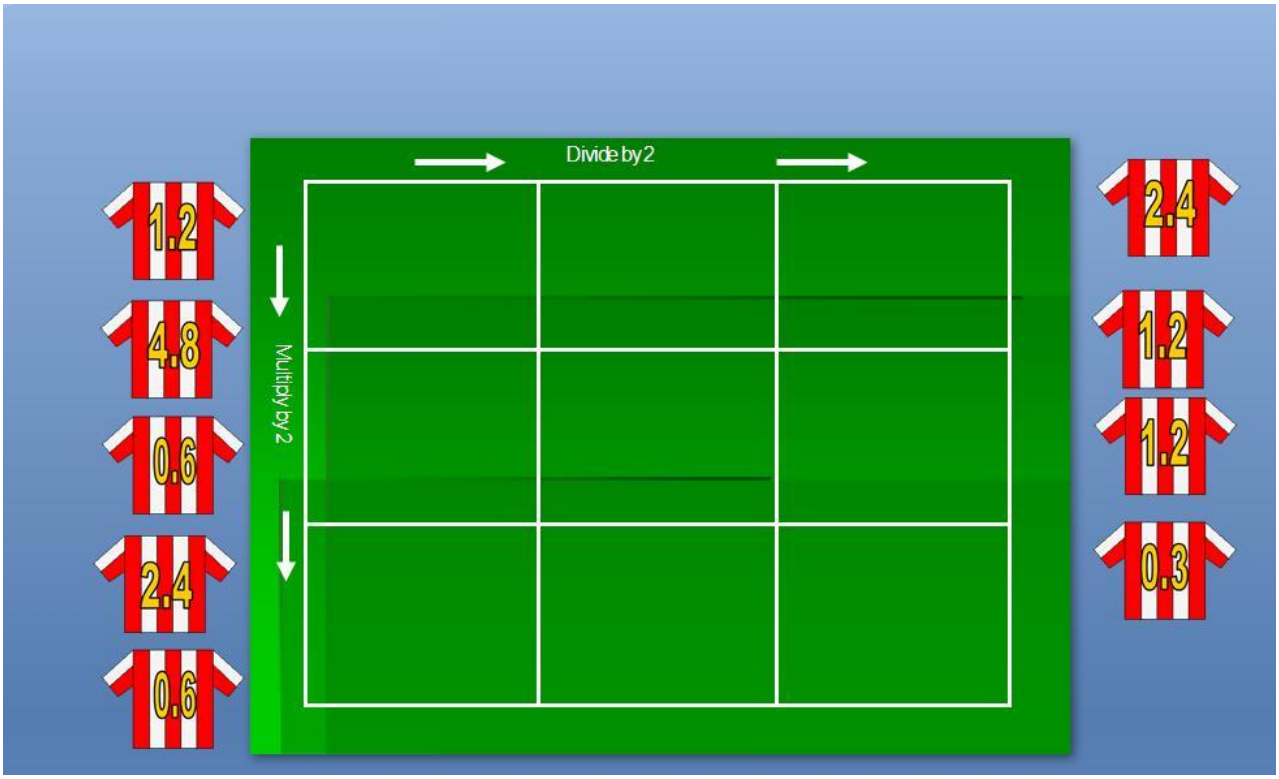
Year 2 – Literacy




1
2
3
4
5
6
7
8
9
10
Roy wants the shirts arranged so that numbers which are together on the numberline such as 3 and 4, or 2 and 3, are not together- vertically, horizontally or diagonally.
horizontal
vertical
diagonal
diagonal


8
7
2
6
4
3
1
5
9
Arrange the shirts so that each row and column =15.


Zero Hero
Place the shirts on the grid.
Each row, column and the 2 main diagonals must result in 0.
-4
+3
+0
-3
-1
+2
+1
+4
-2

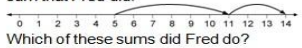

Divide by 2
Multiply by 2
1.2
4.8
0.6
2.4
0.6
2.4
1.2
1.2
0.3

Appendix C – Progression

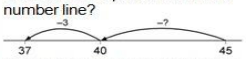
Y1 Say the number that is one more or less than any given number, and ten more or less for multiples of 10

Autumn		Spring		Summer	
A1 *I can work out the number that is one more or one less than numbers up to 20*	There are seven beads in this pot. I am putting one more bead in the pot. How many are in there now? How did you know? How can you check? This time there are ten beads in the pot. I take out one bead. How many beads are left in the pot? How did you know? How can you check? Start with a different number of beads in the pot. Ask your partner to put another bead in or take one out and then say how many there are in the pot. How will you know if your partner is right?	*A2* *I know the number that is one more or one less than any number up to 20 or more*	Use the numbers 15 to 20. Choose a pair of numbers to make this sentence true: ☐ is one more than ☐ How many different pairs can you find that make the sentence true? Can you make the sentence true with other numbers?	*A3* *I can say the number that is ten more or ten less than 10, 20, 30, …*	Use these numbers: 10 20 30 Choose two of the numbers to make this sentence true: ☐ is 10 more than ☐ How many different sentences can you make? How do you know your sentences are true? Can you use other numbers to make the sentence true? Use one hand to pick up some 10-pence coins from this pile. How much did you pick up altogether? Put 10 pence back. How much do you have now? How did you work that out?
B1 *I can use counters or the number line/100-square to find the number that is one more or one less than a number* *I can find the number that is ten more or ten less for a particular tens number*	There are four counters in the pot. How many will there be if I put in one more? There are six spots on my dice. Imagine there is one less spot. How many spots would there be? I am thinking of 30. What is ten more/less than 30? How could a number line or 100-square help you?	*B2* *I can say the number that is one more or one less than a number* *I can say the number that is ten more or ten less than a multiple of ten*	What is one more than 18? What is one less than 15? Can you ask me a one more/less question? How will you know if my answer is right? I will clap where a number is missing. What is the missing number? 12 22 32 42 [one clap] 62		

Y2 Add or subtract mentally a one-digit number or a multiple of 10 to or from any two-digit number; use practical and informal written methods to add and subtract two-digit numbers (K0)

Autumn		Spring		Summer	
A1 *I can add and subtract some numbers in my head*	What is 37 + 8? What number facts might you use to help you work this out? How many do you need to add to 37 to get to the next multiple of 10? How might you partition 8 to help you? How could you show that on a number line? What is 37 – 8? Which number facts will help this time? How much do you need to subtract to go down to the multiple of 10 before 37? How much more do you need to subtract?	*A2* *I can add and subtract some numbers in my head* *I can add and subtract bigger numbers using practical equipment or by writing notes to help me*	What is 48 + 5? How did you work it out? What is 48 + 50? How did you work this out? How do you know that the answer is **not** 53? Could you write something or use apparatus to help you explain?	*A3* *I can add and subtract two-digit numbers using practical equipment or written notes to help me*	Show me how you could use a number line/bead-string/written not to work out the answer to these calculations: 38 + 20 49 – 27 58 + 34 72 14 Can you work out the answer a different way? Which way do you find most helpful? Why?
D1 *I can add and subtract some numbers in my head*	Look at the number line. It shows the sum that Fred did.  Which of these sums did Fred do? 5 + 7 + 2 = 14 5 + 6 + 3 = 14 5 + 5 + 4 = 14 5 + 8 + 1 = 14 What is 34 + 8? What number facts might you use to help you work this out? What do you need to add to 34 to get to the next multiple of 10? How might you partition 8 to help you? Find the answer for each of these. Explain how you worked out your answers. 58 + 9 = 35 + 40 = 72 – 8 = Find the missing number. 1 + ☐ + 5 = 35	*D2* *I can add and subtract some numbers in my head* *I can add and subtract bigger numbers using practical equipment or written notes to help me*	What is 37 + 50? How did you work this out? Find the answer for each of these. 36 + 29 = 30 – 15 = 25 + 10 + 9 = Explain how you worked out your answers.	*D3* *I can add and subtract two-digit numbers using practical equipment or written notes to help me*	What is 34 + 48? What number fac might you use to help you to work this out? How many do you need t add to 34 to get to the next multipl of 10? How might you partition 8 to help you? Show me how you could work out the answer to 47 – 29. What about 72 – 12? Can you work out your answer in a different way? Which way do you f most helpful? Why? Find the missing number: 12 + ☐ + 25 = 58

Y3 Add or subtract mentally combinations of one-digit and two-digit numbers (KO)

Autumn		Spring		Summer	
A1 *I can add and subtract one-digit and two-digit numbers in my head (e.g. 62 + 7, 7 + 45, 48 – 6, 60 – 8)*	Look at this calculation: □5 + 8 = □□. Write a digit in each box so that the calculation is correct. How else can you do it? What patterns do you notice? Repeat with □2 – 7 = □□. What is the largest multiple of 10 you can add to 38 if your answer must be smaller than 100?	*A2* *I can add or subtract one-digit and two-digit numbers in my head (e.g. 62 + 7, 7 + 45, 48 – 6, 60 – 8)*	What is 46 + 8? Explain how you did it. How would you add 18 to 46? What is 73 – 7? Explain how you did it. How would you subtract 17 from 73? Think of two numbers that have a difference of 9. Write a number sentence to show this. Now find and record some more pairs of numbers with a difference of 9. What is 58 + 30? What is 58 + 29? How do you know? What is 58 – 30? What is 58 – 29? How did you work these out? Show me on an empty number line.	*A3* *I can find the sum of or difference between one-digit and two-digit numbers in my head (e.g. 7 + 45, 45 – 7)* *I can add several one-digit numbers in my head*	Here are some calculations: 52 – 9 8 + 74, 71 – 68, 4 + 5 + 6 – 8. Wha strategies did you use to work out the answers? Could you use a different method? How could you check that your answer is correct? Do this calculation in your head: 12 – 11 + 10 – 9. How did you do it? Use this method to work out 13 – 12 + 11 – 10. Now work out 22 – 21 + 20 – 9 and 82 – 81 + 80 – 79. Write down another calculation that you could work out quickly in this way.
D1 *I can add or subtract a one-digit number to or from a two-digit number* *I can add or subtract a multiple of 10 to or from a two-digit number*	Look at this problem. Explain how to work it out. Wilf has 68p in his money bank. He adds another 5p. How much is in his money bank now? What is the missing number? What calculation is represented on the number line?  Sam adds a 50 g weight to scales containing 45 g. What is the weight on the scales now?	*D2* *I can add or subtract two 2-digit numbers* *I know how to find the difference between two 2-digit numbers*	A 95 g orange is placed in some balance scales. There is 35 g in the other pan. How much needs to be added to the 35 g so that the scales balance? How did you work this out? The difference between the heights of two children is 37 cm. What could their heights be? Are your suggestions reasonable? Roughly how old do you think the children would be? Find the different totals you can make by adding pairs of these numbers: 47 50 8 29 Choose two calculations where you used a different strategy to find the total. Explain why you chose different strategies.		

Y4 Add or subtract mentally pairs of two-digit whole numbers (e.g. 47 + 58, 91 – 35) (KO)

Autumn		Spring		Summer	
A1 *I can add and subtract two-digit numbers in my head (e.g. 26 + 47, 43 – 16)*	Work out 37 + 58 (or 91 – 35) in your head. Tell me how you did it. Did anyone do it a different way? How could we record the method that you used? What number do you need to add to 46 to make 92? How did you work it out? Is there a different way to do it?	*A2* *I can add and subtract mentally pairs of two-digit numbers and find a difference by counting on*	What strategies would you use to work out the answers to these calculations: 47 + 58, 91 – 35? Could you use a different method? How could you check that your answer is correct? The difference between a pair of two-digit numbers is 13. What could the pair of numbers be? How would you calculate the answer to 93 – 86? Why would you choose that strategy?	*A3* *I can add and subtract mentally any two-digit numbers you give me, such as 56 + 22, 58 + 39, 64 – 37, 98 – 89*	Work out 56 + 27. Explain what y did. What did you notice about th numbers that helped you choose how to do it? Repeat with other calculations. The difference between a pair o two-digit numbers is 17. What could the pair of numbers be?
D1 *I can use mental addition and subtraction to help me solve problems*	Why do 37 + 25, 47 + 15 and 57 + 5 all give the same answer? What strategies would you use to work out the answers to these calculations: 37 + 48, 81 – 36? Could you use a different method? How could you check that your answer is correct?				

Y5 Extend mental methods for whole-number calculations, for example to multiply a two-digit by a one-digit number (e.g. 12 × 9), to multiply by 25 (e.g. 16 × 25), to subtract one near multiple of 1000 from another (e.g. 6070 – 4097)

Autumn		Spring		Summer	
A1 *I can work out some calculations in my head or with jottings.* *I can explain how I found the answer*	Which of these subtractions can you do without writing anything down? Why is it possible to solve this one mentally? What clues did you look for? What is the answer to the one that can be solved mentally? How did you find the difference? Talk me through your method. [If the child explains a method of counting backwards, ask:] Is it possible to count up as well? Why will this give the same result? Which is easier? If 2003 is the answer to a similar question, what could the question be?	*A2* *I can identify calculations that I can do in my head or with jottings*	One orange costs 15 pence. How much would five oranges cost? How did you work it out? Could you do it differently? Four bananas cost 68 pence. How much is one banana? Is there another way to do it? Which of these calculations would you work out mentally, using jottings if you wish? 9 × 25 3456 + 1999 6007 – 1995 14 × 6 96 ÷ 8 Why is it possible to solve these mentally? What clues did you look for? Explain your methods. Suggest a subtraction calculation involving four-digit numbers that you would answer by counting on.		
E1 *I can use different mental strategies for multiplication and division depending on the numbers involved.* *I can explain why I chose a particular method*	Explain how you would work out 25 × 5, 1000 ÷ 5, 23 × 7. Why did you choose this method for this calculation? Show me and explain the jottings that you did to support your mental calculation.				

Y6 Use approximations, inverse operations and tests of divisibility to estimate and check results

Autumn		Spring		Summer	
A1 *I can estimate and check the calculations that I do*	Roughly, what will the answer to this calculation be? How do you know that this calculation is probably right? Could you check it a different way? Should the answer be odd or even? How do you know?	*A2* *I can estimate and check the result of a calculation*	What would be the best approximation to work out 4.4 × 18.6? Give your reasons. Roughly, what answer do you expect to get? How did you arrive at that estimate? Do you expect your answer to be greater or less than your estimate? Why? This answer is wrong. How can you tell? Find two different ways to check the accuracy of this answer. Should the answer be a multiple of 5? How could you check?	*A3* *I can estimate and check the result of a calculation*	I added three odd numbers and my answer was 50. Explain why I cann be correct. Roughly, what answer do you expe to get? How did you arrive at that estimate? Is this calculation correct? How do you know? What inverse operation could you u to check this result? Should the answer be a multiple of 3? How could you check?
B1 *I can estimate and check the calculations that I do*	Roughly, what will the answer to this calculation be? How do you know that this calculation is probably right? Could you check it a different way? Should the answer be odd or even? How do you know?	*B2* *I can estimate and check the result of a calculation*	How do you know that 234 is divisible by 3? Should the answer be a multiple of 4? How could you check? I think that the answer to 3768 × 3 is wrong. How can I tell? What would be the best approximation for 9.8 × 31.8?	*B3* *I can estimate and check the result of a calculation*	Is this calculation correct? How do you know? What inverse operation could you u to check this result? I multiplied two odd numbers and m answer was 186. Explain why I cannot be correct. Should the answer be a multiple of How could you check? This sequence of numbers goes up by 40 each time. 40 80 120 160 200 … This sequence continues. Will the number 2140 be in the sequence? Explain how you know.
D1 *I can estimate*	Roughly, what will the answer to this calculation be? How do you know that this calculation	*D2* *I can estimate*	What would be the best approximation to work out 2 × (8.4 + 19.7)? Give your reasons.	*D3* *I can estimate*	How did you arrive at that estimate? What inverse operation could you u to check this result?

Appendix D – Test Data

ActionScript 3 Tests

Test Number	User Input	Expected result	Actual result	Pass/Fail

1	stop();
	play_game.addEventListener(MouseEvent.CLICK, advance);
	function advance(event:MouseEvent) {
	gotoAndPlay(3);
	}
		Screen to stay on 1st scene	Screen to stay on 1st scene	Pass

2	list.addItem({label:Witherwack Primary School");	Add school to list	nothing	Fail
3	var listList = new List();	**Creates no list of type list**	**Creates no list of type list**	Pass
4	list.addItem({label:"Witherwack Primary School"});	Add school to list	School added to list	Pass

5	level6.addEventListener(MouseEvent.CLICK, group6);
	function group6(event:MouseEvent) {
	gotoAndPlay(4);
	}
		Sets game level at 6	Sets game level at 6	Fail

6	level6.addEventListener(MouseEvent.CLICK, group6);
	function group6(event:MouseEvent) {
	gotoAndPlay(4);
	level =6;
		Sets game level at 6	Sets game level at 6	Pass

	}			

7	var vRecordId:uint;
	//random recordId in the database.
	vRecordId = Math.random;
		Select random record from database	System crash	Fail

8	var vRecordId:uint;
	//random recordId in the database.
	vRecordId = Math.round(Math.random()*15);
		Select random record from database	Select random record from database	Pass

9	// set up the variable for the answer var answer = 0;	Set answer to 0	System fail	Fail
10	// set up the variable for the answer var answer:Number = 0;	Set answer to 0	Set answer to 0	Pass

11	//adds four to answer
	four.addEventListener(MouseEvent.CLICK, addfour);
	function addfour(event:MouseEvent) {
	answer+=4;
	}
		Add 4 to answer	Add 4 to answer	Pass

12	//check to see if answer is correct
	if(answer == correctAnswer1)
	{
	score ++;
	gotoAndPlay(5);
	}
		If answer correct go to scene 5 if wrong go to 6	System crash	Fail

	//if answer is wrong go to another page.
	else
	{
	gotoAndPlay(6);
	}			

13	Correct answer == correctAnswer1;
	//check to see if answer is correct
	if(answer == (correctAnswer1))
	{
	score ++;
	gotoAndPlay(5);
	}
	//if answer is wrong go to another page.
	else
	{
	gotoAndPlay(6);
	}
		If answer correct go to scene 5 if wrong go to 6	System crash	Fail

14	//check to see if answer is correct
	if(answer == parseInt(correctAnswer1.text))
	{
	score ++;
	gotoAndPlay(5);
	}
	//if answer is wrong go to another page.
	else
	{
	gotoAndPlay(6);
		If answer correct go to scene 5 if wrong go to 6	If answer correct go to scene 5 if wrong go to 6	Pass

	}			

15	varvRecordId:uint;
	//Request to find question file
	varrequest:URLRequest = new URLRequest(
	"http://osiris.sunderland.ac.uk/~bd79uq/allquestions.php?id=" + vRecordId);
	varvariables:URLLoader = new URLLoader();
	variables.dataFormat = URLLoaderDataFormat.VARIABLES;
	variables.addEventListener(Event.COMPLETE, completeHandler);
		Connect to database	System crash	Fail

16	var request:URLRequest = new URLRequest(
	"http://osiris.sunderland.ac.uk/~bd79uq/my_question.txt");
	var variables:URLLoader = new URLLoader();
	variables:dataFormat = URLLoaderDataFormat.VARIABLES;
	variables.addEventListener(Event.COMPLETE, completeHandler);
		Connect to database	System crash	Fail

17	var request:URLRequest = new URLRequest(
	"http://osiris.sunderland.ac.uk/~bd79uq/my_question.txt");
	var variables.URLLoader = new URLLoader();
	variables.dataFormat = URLLoaderDataFormat.VARIABLES;
	variables.addEventListener(Event.COMPLETE, completeHandler);
		Connect to database	Nothing happens	Fail

18	var request:URLRequest = new URLRequest("http://osiris.sunderland.ac.uk/~bd79uq/allquestions.php"); var variables:URLLoader = new URLLoader();	Connect to database	Nothing happens	Fail

	variables.dataFormat = URLLoaderDataFormat.VARIABLES; variables.addEventListener(Event.COMPLETE, completeHandler);			

19	var request:URLRequest = new URLRequest(
	"http://osiris.sunderland.ac.uk/~bd79uq/allquestions.php?id=" + vRecordId);
	var variables:URLLoader = new URLLoader();
	variables.dataFormat = URLLoaderDataFormat.VARIABLES;
	variables.addEventListener(Event.COMPLETE, completeHandler);
		Connect to database	Connect to database	Pass

20	stop();
	one.addEventListener(MouseEvent.CLICK, addone);
	function addone(event:MouseEvent) {
	answer +1
	}
		Answer to be increased by one	system crashes	Fail

21	answer == 0;
	one.addEventListener(MouseEvent.CLICK, addone);
	function addone(event:MouseEvent) {
	answer +1
	}
		Answer to be increased by one	system crashes	Fail

Database Tests (My SQL & Oracle)

Test Number	User Input	Expected result	Actual result	Pass/Fail
1	CREATE TABLE ""BD79UQ"."QUESTIONS" ("QUESTION" VARCHAR2(99 BYTE) NOT NULL ENABLE, "CORRECT_ANSWER" NUMBER(3,0) NOT NULL ENABLE, "GROUP" NUMBER(1,0) NOT NULL ENABLE,)	Table to be Created		Fail
2	CREATE TABLE "BD79UQ"."QUESTIONS" ("QUESTION" VARCHAR2(99 BYTE) NOT NULL ENABLE, "CORRECT_ANSWER" NUMBER(3,0) NOT NULL ENABLE, "GROUP" NUMBER(1,0) NOT NULL ENABLE)	Table to be Created		Fail
3	CREATE TABLE "BD79UQ"."QUESTIONS" ("QUESTION" VARCHAR2(99 BYTE) NOT NULL ENABLE, "CORRECT_ANSWER" NUMBER(3,0) NOT NULL ENABLE, "GROUP" NUMBER(1,0) NOT NULL ENABLE);	Table to be Created	CREATE TABLE succeeded.	Pass
4	CREATE TABLE "BD79UQ"."QUESTIONS" ("QUESTION" VARCHAR2(99) NOT NULL ENABLE, "CORRECT_ANSWER" INT(3,0) NOT NULL ENABLE, "GROUP" INT(1,0) NOT NULL ENABLE);	Create table via PHPmyAdmin	Error starting at line 1 in command: CREATE TABLE "BD79UQ"."QUESTIONS" ("QUESTION" VARCHAR2(99) NOT NULL ENABLE, "CORRECT_ANSWER" INT(3,0) NOT NULL ENABLE, "GROUP" INT(1,0) NOT	Fail

			NULL ENABLE) Error at Command Line:3 Column:26 Error report: SQL Error: ORA-00907: missing right parenthesis 00907. 00000 - "missing right parenthesis" *Cause: *Action:	
5	CREATE TABLE `bd79uq`.`Questions` (`Question` TEXT NOT NULL , `Correct Answer` INT(5) NOT NULL , `Group Number` INT(1) NOT NULL)	Create table via PHPmyAdmin	Your SQL query has been executed successfully (Query took 0.0192 sec)	Pass

6	<?php
	
	/* Mysql & PHPmyAdmin */
	
	mysql_connect("bel.sunderland.ac.uk","bd79uq","U24121985");
	mysql_select_db("Questions");
	
	$sql = mysql_query("SELECT * FROM Questions");
	
	while($rows = mysql_fetch_assoc($sql)) (
	var_dump($rows);
	)
	
	?>
		Connect to database		F

7	<?php /* Mysql & PHPmyAdmin */	Connect to database	Error : Warning: mysql_fetch_assoc(): supplied	F

	mysql_connect("bel.sunderland
	.ac.uk","bd79uq","U24121985")
	;
	mysql_select_db("Questions");
	
	$sql = mysql_query("SELECT *
	FROM Questions");
	
	while($rows =
	mysql_fetch_assoc($sql)) {
	var_dump($rows);
	}
	
	?>
			argument is not
			a valid MySQL
			result resource
			in
			/home/bd79uq/
			public_html/allq
			uestions.php on
			line 10	

8	<?php
	
	/* Mysql & PHPmyAdmin */
	
	$link =
	mysql_connect("bel.sunderland
	.ac.uk","bd79uq","U24121985")
	;
	mysql_select_db("Questions",
	$link);
	
	$sql = mysql_query("SELECT *
	FROM questions")or
	die(mysql_error());
	
	while($rows =
	mysql_fetch_assoc($sql)) {
	var_dump($rows);
	}
		Connect to database	Error : No database selected	F

	?>			

9	<?php
	
	/* Mysql & PHPmyAdmin */
	
	$link = mysql_connect("bel.sunderland.ac.uk","bd79uq","U24121985");
	mysql_select_db("Questions", $link) or die(mysql_error());
	
	$sql = mysql_query("SELECT * FROM Questions") or die(mysql_error());
	
	while($rows = mysql_fetch_assoc($sql)) {
	var_dump($rows);
	}
	
	?>
		Connect to database	Error : Access denied for user 'bd79uq'@'%.sunderland.ac.uk' to database 'Questions'	F

10	<?php
	$con = mysql_connect("bel.sunderland.ac.uk","bd79uq","U24121985");
	if (!$con)
	{
	die('Could not connect: ' . mysql_error());
	}
	mysql_select_db("bd79uq", $con);
	$result = mysql_query("SELECT * from
		Connect to database	id=13&Question=what+number+is+missing+from+the+pattern+3%2C6%2C9%2C12%2C+%2C18+&CorrectAnswer=15&GroupNumber=3	Pass

```
question ORDER BY
Rand()LIMIT 1");

while($row =
mysql_fetch_array($result)
)
       {
              echo "id=" .
Urlencode($row['id']). "&"
;;
              echo
"Question=" .
Urlencode($row['Question']
). "&" ;;
              echo
"CorrectAnswer=" .
Urlencode($row['Correct
Answer']). "&" ;;
              echo
"GroupNumber=" .
Urlencode($row['Group
Number']);
       }
mysql_close($con);

?>
```

Linking Database to Flash Element

Test Number	User Input	Expected result	Actual result	Pass/Fail

1	onClipEvent (load) {
	
	loadVariables("http://osiris.sunderland.ac.uk/~bd79uq/allquestions.php", this, "question");
	
	}
		Load Question into field on Game screen	System Crash	F

2	Loader.load("http://osiris.sunderland.ac.uk/~bd79uq/allquestions.php","question");	Load Question into field on Game screen	System Crash	F

3	varrequest:URLRequest= new URLRequest("http://osiris.sunderland.ac.uk/~bd79uq/alllquestions.php");
	varvariables:URLLoader= new URLLoader();
	variables.dataFormat= URLLoaderDataFormat.VARIABLES;
	variables.addEventListener(Event.COMPLETE, completeHandler);
	try
	{
	variables.load(request);
	}
	catch (error:Error)
	{
	trace("Unable to load URL: " + error);
	}
	function completeHandler(event:Event):void
	{
	varloader:URLLoader= URLLoader(event.target);
	
	Question.text= loader.data.Question;
	
	}
		Load Question into field on Game screen	System Crash
			
			(11 Errors)
				F

4	varrequest:URLRequest = new URLRequest(
	
	"http://osiris.sunderland.ac.uk/~bd79uq/allquestions.php");
	var variables:URLLoader = new URLLoader();
	var variables:dataFormat = URLLoaderDataFormat.VARIABLES;
	var variables:addEventListener(Event.COMPLETE, completeHandler);
	try
	{
	var variables:load(request);
	}
	catch (error:Error)
	{
	trace("Unable to load URL: " + error);
	}
	function completeHandler(event:Event):void
	{
	var loader:URLLoader= URLLoader(event.target);
	Question.text= loader.data.Question;
	
	}
	
		Load Question into field on Game screen	System Crash
			
			(3 Errors)
				F

5	varrequest:URLRequest = new URLRequest("http://osiris.sunderland.ac.uk/~bd79uq/allquestions.php"); var variables:URLLoader = new URLLoader();	Load Question into field on Game screen	System Crash (1 Error)	F

	var variables:dataFormat = URLLoaderDataFormat.VARIABLES;
	var variables:addEventListener = (Event.COMPLETE, completeHandler);
	try
	{
	var variables:load(request);
	}
	catch (error:Error)
	{
	trace("Unable to load URL: " + error);
	}
	function completeHandler(event:Event):void
	{
	var loader:URLLoader= URLLoader(event.target);
	Question.text= loader.data.Question;
	
	}			

6	try
	{
	var variables:load = (request);
	}
	catch (error:Error)
	{
	trace("Unable to load URL: " + error);
	}
		Load Question into field on Game screen	System Crash
			
			(10 Errors)
				F

7	try
	{
	var variables.load (request);
	}
	catch (error:Error)
	{
		Load Question into field on Game screen	System Crash
			
			(1 Error)
				F

8	var request:URLRequest = new URLRequest(
	"http://osiris.sunderland.ac.uk/~bd79uq/allquestions.php");
	var variables:URLLoader = new URLLoader();
	variables.dataFormat = URLLoaderDataFormat.VARIABLES;
	variables.addEventListener(Event.COMPLETE, completeHandler);
	try
	{
	variables.load(request);
	}
	catch (error:Error)
	{
	trace("Unable to load URL: " + error);
	}
	function completeHandler(event:Event):void
	{
	var loader:URLLoader= URLLoader(event.target);
	
	question.text= loader.data.Question;
		Load Question into field on Game screen	No errors but no question displayed.	F

```
}
```

Admin input for New Questions <PHP>

Test Number	User Input	Expected result	Actual result	Pass/Fail
1	<CENTER><img src="SAFC Foundation new.jpeg.jpg" width="472" height="100"></CENTER> <CENTER>Enter new question below</CENTER> <form action='process_form.php' method='POST'> <label for='question'>Question:</label> <input type='text' size='50' name='question' /> <label for='answer'>Answer:</label> <input type='text' size='50' name='answer' /> <label for='group'>Group:</label> <select name='group'> <option value='2'>Group 2</option> <option value='3'>Group 3</option> <option value='4'>Group 4</option> <option value='5'>Group 5</option> <option value='6'>Group 6</option> </select> <CENTER><input type='submit' /></CENTER> </form></body></html>	Clear field on page with drop down list of groups	Clear field on page with drop down list of groups	P

2	<?php /* * Add Question Form.php *Discription : add question to database * */ questionlabel = array("Question" => ‘Question’); correctanswerlabel = array("Correct Answer" => ‘Correct Answer’); grouplabel = array('Group 2' =>1 , 'Group 3' => 2, 'Group 4' =>3 , 'Group 5' => 4, 'Group 6' =>5); $submit = "Add Question"; ?>	Add question to database	Question notadded	Fail
3	<?php /* * Add Question Form.php *Discription : add question to database * */ questionlabel = array("Question" => "Question");	Add question to database	Question not added	Fail

	correctanswerlabel = array("Correct Answer" => "Correct Answer"); grouplabel = array('Group 2' =>1 , 'Group 3' => 2, 'Group 4' =>3 , 'Group 5' => 4, 'Group 6' =>5); $submit = "Add Question"; ?>			
4	<?php /* * Add Question Form.php *Discription : add question to database * */ $questionlabel = array("Question" => "Question"); $correctanswerlabel = array("Correct Answer" => "Correct Answer"); $grouplabel = array('Group 2' =>1 , 'Group 3' => 2, 'Group 4' =>3 , 'Group 5' => 4, 'Group 6' =>5);	Add question to database	Question added	Pass

	$submit = "Add Question"; ?>			
5	What is 25 divided by 5 5	What is 25 divided by 5 5 Group 2	• question = What is 25 divided by 5 • answer = 5 • group = 2	Pass
6	<html> <head> <title> Add to Table </title></head> <body> - question = work out 18+28 to the nearest 10 - answer = 50 - group = 6 Question Added Successfully!	<html> <head> <title> Add to Table </title></head> <body> - question = work out 18+28 to the nearest 10 - answer = 50 - group = 6 Question Added Successfully!	Question added	Pass

Appendix E – Client Feedback

From: Phil Cowler
Sent: 16 April 2010 18:52
To: 'paulfairley69@googlemail.com'
Subject: Feedback

Paul has created a system that has covered the requirements that were asked of him in the specification. As well as this he has also completed more than was needed and this will benefit the staff here at the foundation. I wish him well for his future and it has been a pleasure to meet with him for feedback sessions.

Phil Cowler

Primary Coordinator

p.cowler@safc.com

Tel: 0191 5535312

England 2018/22 FIFA World Cup™ Bid

DONATE FOR FREE - The Giving Machine allows online shoppers to donate to SAFC Foundation without costing them a penny. Register with the website prior to shopping online, select Sunderland AFC Foundation as your beneficiary and Sunderland Foundation could receive a percentage of your total spend as a donation. This means you can support the work of Sunderland Foundation without having to spend more or donate directly. Register now at www.thegivingmachine.co.uk

FEBRUARY FOOTBALL FUN - During February half term we have a range of football activities from two-day coaching courses to drop-in sessions throughout Sunderland and County Durham. Call 0191 5515315 for more details.

WIN A GRAND IN YOUR HAND - Look out for SAFC Foundation lottery sellers on match days for your chance to win in our match day lottery. Tickets are sold throughout the Stadium of Light for just £1 and you could be going home £1,000 richer! All money raised goes to helping projects in the region.

IN THE LAST 12 MONTHS… SAFC Foundation has worked with over 34,000 young people and their families, ran 1,150 education projects, supported over 1,500 schools, helped 6,500 people develop skills and developed 4,500 relations.

Appendix F – Definitive Brief

Introduction

What am I going to do?

I have been asked to develop an Interactive, Educational Numeracy Package for children that will attend the SAFC Foundation. The children that attend the foundation are year's 2 through to year 6 which is ages 5 through to age 11. This document will outline exactly what I am going to develop and exactly how I plan to develop the system. This document will also include schedules which will list the tasks that I am going to undertake, as well as how long said tasks will take in both expected and actual times, this will run parallel with the Gantt chart which will give a visual representation of the schedule.

In section 2 I will elaborate on who my client is, and what they do, and how they currently do what they do. This will also give me the opportunity to include what system is currently in place, although this will only explain the system and will use my research section to elaborate on what the weaknesses are with the current system, and how I think it could be improved.
Section 3 will highlight the research that I have prepared so far, this will also emphasize the area in which I am researching, and how this changed from my initial idea for research. Further to this I will also be looking in to the current system that the SAFC Foundation have in place, the strengths and weaknesses of the current system.

Section 4 is the section where I will explain exactly how I plan to help the client, along with what hardware and software will be required. This section will also explain what constraints will be placed upon me. Initially I will explain the system and what features will be built into the system.

The final section will review exactly what has been completed thus far. This will include meetings with my client, including what was discussed.

There is a segment in the appendices what will include designs for the system that I plan to develop, including the login screen, age difficulty screen and the in-play screen.

Context

Who? What? How?

I am developing a system for my client, Phil Cowler, who is a member of SAFC Foundation. The SAFC Foundation is a "charitable foundation which works closely with children in the local community promoting literacy, numeracy, educational initiatives, healthy living etc."

The SAFC Foundation has a computer suite at the Stadium of Light, where children will go to learn all about Numeracy, Literacy and Health Eating. The way the foundation currently teaches is through a computer based system, in the form of power point presentations. I have looked into what the Foundation currently does and this is the basis for part of my research. Examples of the current system can be found in the Appendices.

The problem seen by the SAFC Foundation is that the presentations require a member of staff to check all of the students work. This could be improved by simply producing the tasks in flash, with drag and drop elements which will tell the students if the answer is correct, or incorrect.

The current system could be improved vastly with very little changes, by converting the current software into flash games it will give the tutors more time to help other children rather than checking whether or not each students work was correct.

Proposed Solution

Proposed Development

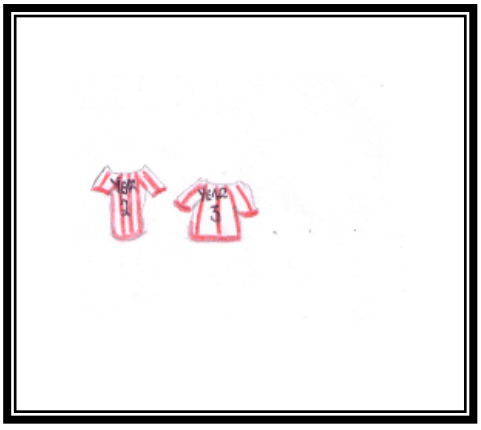
I plan to develop a new application for the Foundation to aid students with literacy, the way that I plan to do this is via an "Interactive game". The specification that I was issued stated that "all activities the children undertake always have a football theme." So from this I decided to create a piece of software that has the goal as the focal point, with several numbers placed on top, and the student will be asked to make a number with the numbers on the goal, e.g. making 13 in 3 shots. This means that there will be several different combinations that will make up the required number. When first opening the program the user will be asked which "year" they are in, this will have five Sunderland shirts with year as the players name then the varying number for the student's year, see appendix : FIG 1.1

After logging in the student will be asked to enter their name in the boxes provided (FIG 1.2), and this will be stored on a database. The reason for doing this is after the children play the game once it will store their score and, as they play and improve message will appear on the screen. These messages will be encouraging, and will tell the player how well they done. An example message would be "Well done, You beat your best score" or "you nearly scored as many as last time, play again to see if you can improve". The scores will also be used to show the player moving up the league table and example of this can be seen in appendix: C FIG 1.3. This also adheres to the specification given to me by the Foundation as it has the football theme.

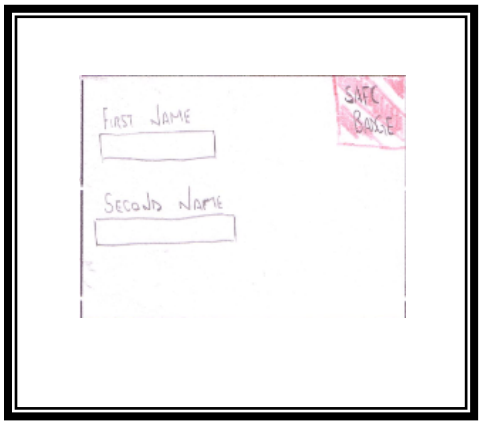
I plan to have a separate database, which will contain questions and these questions will be called randomly from said database so that not all the questions are in the same order, or maybe not called at all.

Appendix G – Initial Design sketches

Menu



Year Select



Name Entry

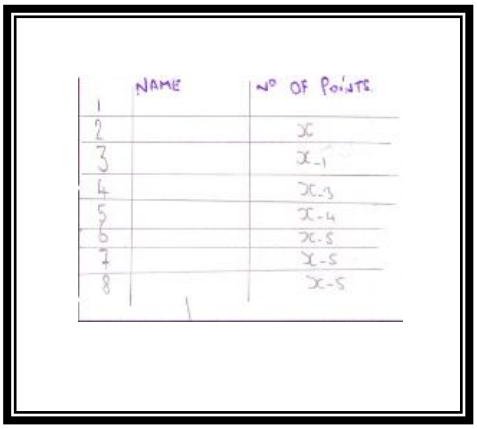
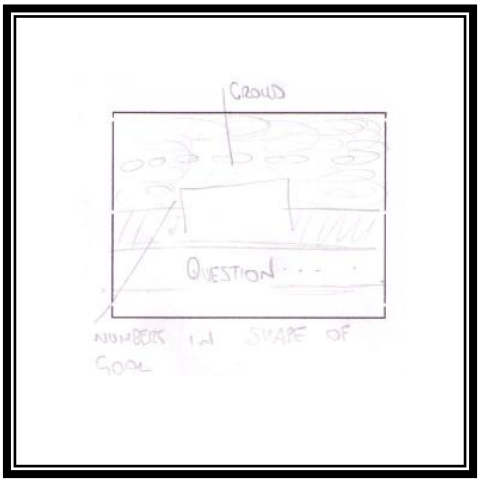
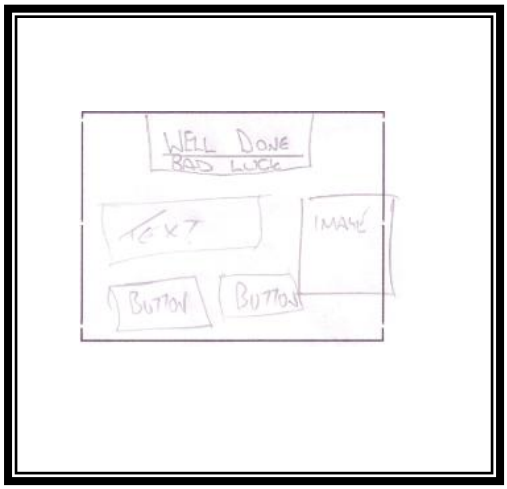


Table of users (Stadium of light in Background)



Game Screen



Well Done/ Bad Luck Screen

Appendix H – Specification

Project 20	
Suggested Project Title:	Interactive, Educational Numeracy Package for children attending the SAFC Foundation
Academic Area:	Interactive Digital Media
Project Description: (client details, current context/situation/problem, proposal for problem solution)	Sunderland Association Football Club has a charitable foundation (the SAFC Foundation) which works closely with children in the local community promoting literacy, numeracy, educational initiatives, healthy living etc. They have a computer suite at the Stadium of Light where local school children come in for half a day to work on literacy, numeracy and healthy living projects. The software products used/to be developed, and all other activities the children undertake always have a football theme.
Specific Requirements: (e.g. programming language)	**Student to determine. Suggestions are:** **Adobe Flash** **C#** **XNA** Student should work closely with client and target audience throughout development.
Practical Outcome: (The project will produce an X type of system, whose functionality will be a, b, c…)	
Suggestions for Research Focus: (Topic of literature review that will help inform the product development)	
Suggested Reading:	
Additional Info: (e.g. variations of the project)	External Client – Phil Cowler SAFC Foundation Access is initially via Siobhan Devlin, Module Leader

Appendix I – Sample Program Code

Action Script 3

```
var vRecordId:uint;
//random recordId in the database.
vRecordId = Math.round(Math.random()*15);
//Request to find question file
var request:URLRequest = new URLRequest(
        "http://osiris.sunderland.ac.uk/~bd79uq/allquestions.php?id=" + vRecordId);
var variables:URLLoader = new URLLoader();
 variables.dataFormat = URLLoaderDataFormat.VARIABLES;
 variables.addEventListener(Event.COMPLETE, completeHandler);
//tries to load link if not error is thown up
try
        {
                variables.load(request);
        }
                catch (error:Error)
        {
        trace("Unable to load URL: " + error);
        }
//Load in the question fields information
function completeHandler(event:Event):void
        {
                var loader:URLLoader= URLLoader(event.target);

                txtQuestion.text= loader.data.Question;
                correctAnswer1.text= loader.data.CorrectAnswer;
        }
```

```
stop();

// set up the variable for the answer
var answer:Number = 0;

// add listener
addEventListener (Event.ENTER_FRAME, userAnswer);
function userAnswer(event:Event){answerbox.text = String (answer);
}

//adds one to answer
one.addEventListener(MouseEvent.CLICK, addone);
function addone(event:MouseEvent) {
	answer+=1;
}
//adds two to answer
two.addEventListener(MouseEvent.CLICK, addtwo);
function addtwo(event:MouseEvent) {
	answer+=2;
}
//adds three to answer
three.addEventListener(MouseEvent.CLICK, addthree);
function addthree(event:MouseEvent) {
	answer+=3;
}
//adds four to answer
four.addEventListener(MouseEvent.CLICK, addfour);
function addfour(event:MouseEvent) {
	answer+=4;
```

```
}
//adds five to answer
five.addEventListener(MouseEvent.CLICK, addfive);
function addfive(event:MouseEvent) {
	answer+=5;
}
//adds six to answer
six.addEventListener(MouseEvent.CLICK, addsix);
function addsix(event:MouseEvent) {
	answer+=6;
}
//adds seven to answer
seven.addEventListener(MouseEvent.CLICK, addseven);
function addseven(event:MouseEvent) {
	answer+=7;
}
//adds eight to answer
eight.addEventListener(MouseEvent.CLICK, addeight);
function addeight(event:MouseEvent) {
	answer+=8;
}
//adds nine to answer
nine.addEventListener(MouseEvent.CLICK, addnine);
function addnine(event:MouseEvent) {
	answer+=9;
}

// set up the variable for the answer
var score:Number = 0;
```

```
// add listener for current score
addEventListener (Event.ENTER_FRAME, currentscore);
function currentscore(event:Event){scorebox.text = String (score);
}

clickanswer.addEventListener(MouseEvent.CLICK, clickanswer1);
function clickanswer1(event:MouseEvent) {

//check to see if answer is correct
if(answer == parseInt(correctAnswer1.text))
{
        score ++;
        gotoAndPlay(5);
}
//if answer is wrong go to another page.
else
{
        gotoAndPlay(6);
}
}
```

PHP

```
<?php


//Connects to database of questions

$con = mysql_connect("bel.sunderland.ac.uk","bd79uq","U24121985");


if (!$con)

{

	die('Could not connect: ' . mysql_error());

}

mysql_select_db("bd79uq", $con);

$result = mysql_query("SELECT * from question ORDER BY Rand()LIMIT 1");

// retrevies all data from the question and out puts it.

while($row = mysql_fetch_array($result))

	{

		echo "id=" . Urlencode($row['id']). "&" ;;

		echo "Question=" . Urlencode($row['Question']). "&" ;;

		echo "CorrectAnswer=" . Urlencode($row['Correct Answer']). "&" ;;

		echo "GroupNumber=" . Urlencode($row['Group Number']);

	}

//closes connection

mysql_close($con);


?>
```

My SQL

Creating Database

```
CREATE TABLE `scores` (
  `First Name` text NOT NULL,
  `Second Name` text NOT NULL,
  `School` varchar(255) NOT NULL,
  `Score` int(3) NOT NULL
) ENGINE=MyISAM DEFAULT CHARSET=latin1;
```

Add Rows

```
INSERT INTO `bd79uq`.`question` (`id`, `Question`, `Correct Answer`, `Group Number`) VALUES
('15', 'what is 15 - 6', '9', '2');
```

Appendix J – Supervision Records

DEPARTMENT OF COMPUTING, ENGINEERING & TECHNOLOGY
Project Supervision Record

Student: PAUL FARLEY	Date: 29.09.09

Main points of discussion/Progress or issues since last time:

Project topic - nonetary and research topic - educational theories & HCI

Recommended actions:

Need interest in project proposal or based. (Try to think of alternative)

Agreed deliverables for next time:

Project proposal

Other comments:

Date & time of next meeting:

Supervisor name & signature: Peter Dunne	Student signature:

DEPARTMENT OF COMPUTING, ENGINEERING & TECHNOLOGY
Project Supervision Record

Student: PAUL FARLEY	Date: 26.10.09

Main points of discussion/Progress or issues since last time:

Been thinking about how to do project. Still waiting for Siobhan to get back re project.

Recommended actions:

Agreed deliverables for next time:

Project proposal

Other comments:

Date & time of next meeting:

Supervisor name & signature: Peter Dunne	Student signature:

DEPARTMENT OF COMPUTING, ENGINEERING & TECHNOLOGY

Project Supervision Record

Student: PAUL FAIRLEY	**Date:** 20/10/09

Main points of discussion/Progress or issues since last time:

DISCUSSED RESEARCH HCI
- LOOK AT AGE GROUPS
- COGNITION – PSYCHOLOGY } NUMERACY

Recommended actions:

USE KEY WORDS IN ATHELS – GUIDED BY RESEARCH

Agreed deliverables for next time:

Other comments:

Date & time of next meeting:

Supervisor name & signature:	*Student signature:*

DEPARTMENT OF COMPUTING, ENGINEERING & TECHNOLOGY

Project Supervision Record

Student: PAUL FAIRLEY	**Date:** 3.11.09

Main points of discussion/Progress or issues since last time:

DISCUSSED DEFINITIVE BRIEF
SIGNED OFF PROPOSAL
RESEARCH

Recommended actions:

EDIT DEF BRIEF
PRODUCE GANTT
FURTHER RESEARCH

Agreed deliverables for next time:

DEF BRIEF ETC
EVIDENCE OF RESEARCH

Other comments:

Date & time of next meeting: 17.11.09 4.00 PM

Supervisor name & signature:	*Student signature:*

DEPARTMENT OF COMPUTING, ENGINEERING & TECHNOLOGY
Project Supervision Record

Student: PAUL FAIRLEY	Date: 17.11.09

Main points of discussion/Progress or issues since last time:

System architecture.

Recommended actions:

Get started on backend modules.

Agreed deliverables for next time:

System architecture, and other class system docs.

Other comments:

Do remember to bring all project materials to meetings.

Date & time of next meeting:

Supervisor name & signature:	*Student signature:*

DEPARTMENT OF COMPUTING, ENGINEERING & TECHNOLOGY
Project Supervision Record

Student: PAUL FAIRLEY	Date: 01/12/09

Main points of discussion/Progress or issues since last time:

DISCUSSED DEF BRIEF
REFERENCING

Recommended actions:

FURTHER RESEARCH

Agreed deliverables for next time:

DRAFT RESEARCH

Other comments:

Date & time of next meeting: 4.15 15/12/10

Supervisor name & signature:	*Student signature:*

DEPARTMENT OF COMPUTING, ENGINEERING & TECHNOLOGY

Project Supervision Record

Student: PAUL FAIRLEY	**Date:** 15/12/10

Main points of discussion/Progress or issues since last time:

LIT REVIEW
CITATIONS

Recommended actions:

DISTIL QUOTES
REWORD SOME ASPECTS
USE BLACK TEXT ONLY
CHECK REFERENCING

Agreed deliverables for next time:

L. LOGS
DEVELOPMENT

Other comments:

Date & time of next meeting: 4.30 19/01/2010

Supervisor name & signature: *Student signature:*

DEPARTMENT OF COMPUTING, ENGINEERING & TECHNOLOGY

Project Supervision Record

Student: PAUL FAIRLEY	**Date:** 19/01/10

Main points of discussion/Progress or issues since last time:

RESEARCH DEVELOPMENT
— REFERENCING
WRITING STYLE

Recommended actions:

AS PER FEEDBACK SHEET

Agreed deliverables for next time:

FIRST REVIEW

Other comments:

Date & time of next meeting: 2ND FEB

Supervisor name & signature: *Student signature:*

DEPARTMENT OF COMPUTING, ENGINEERING & TECHNOLOGY
Project Supervision Record

Student: PAUL FAIRLEY	Date: 04/02/10

Main points of discussion/Progress or issues since last time:

WRITING STYLES – REFERENCES IN ALL CHAPTERS

DATABASE SOLUTIONS

Recommended actions:

Agreed deliverables for next time:

SCREEN SHOTS/DEVELOPMENT

Other comments:

Date & time of next meeting: 2ND MARCH

Supervisor name & signature:	*Student signature:*

DEPARTMENT OF COMPUTING, ENGINEERING & TECHNOLOGY
Project Supervision Record

Student: PAUL FAIRLEY	Date: 02/03/10

Main points of discussion/Progress or issues since last time:

DESIGN

DATABASE LINK

TESTING

EVALUATION

Recommended actions:

Agreed deliverables for next time:

TABLE OF CONTENTS

TESTING REGIME

Other comments:

Date & time of next meeting: 16/03/10

Supervisor name & signature:	*Student signature:*

DEPARTMENT OF COMPUTING, ENGINEERING & TECHNOLOGY
Project Supervision Record

Student: PAUL FAZALEY	Date: 16/03/10

Main points of discussion/Progress or issues since last time:

TESTING CHAPTER

CONTENTS PAGE SECTION"..

CITATIONS TEST.

Recommended actions:

Agreed deliverables for next time:

Other comments:

Date & time of next meeting:

Supervisor name & signature:	*Student signature:*

DEPARTMENT OF COMPUTING, ENGINEERING & TECHNOLOGY
Project Supervision Record

Student: PAUL FAZALEY	Date: 23.03.10

Main points of discussion/Progress or issues since last time:

READ THROUGH CHAPTERS

DISCUSSED TESTING/ APPENDICES

SCREEN SHOTS

Recommended actions:

Agreed deliverables for next time:

Other comments:

Date & time of next meeting:

Supervisor name & signature:	*Student signature:*

Appendix K – Leaning Logs

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 11th Oct
Description		
1. *This week I worked on:* The initial proposal along with a first draft of my schedule. Further to this I also made a start on my definitive brief by completing the introduction and making headway on the context of said brief.		
2. *Time Spent on above work:* 11 Hours		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* Proposal: after choosing which project I thought would be an interesting one I started thinking about the development, what I could do, and how I would go about doing it. Schedule: this was pulled together by figuring out both start and end dates and then estimating how long it would take to do each aspect of the project. Introduction: I highlighted what I planned to do for the project and also outlined the task that had been asked of me.		
4. *Explain* ***why you worked in the manner described above****:* The reason that I worked in the manner that I did was that I first had to come up with the idea that I wanted to develop and then make sure that the idea was valid when meeting with my supervisor. From there I could generate the Schedule and begin work on the definitive brief		
5. *Think about and write down what you have found out/learned from your actions this week:* This week I have found out what the project I am going to do and I have started forming (writing) ideas down for when I have an initial meeting with my client.		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Finish the context part of the definitive brief. Need to arrange an initial meeting with Client to run though ideas. Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e18th Oct

Description

1. *This week I worked on:*

Finishing the context of the definitive brief and also on completing the research section on the brief. From this research my supervisor can check I'm heading in the right direction for my topic, and if needs be it's at an early enough point to be changed.

This week I also have my first meeting with my sponsor to run though the ideas that i had for the development of the system.

I also started to do solid research into my research topic after being agreed with the supervisor. The topic for research would be cognition.

2. *Time Spent on above work:* 13 Hours

Reflection

3. *Explain* ***how you did the work*** *listed in section 1:*

The context was an extension from the work that I completed last week.

I also had to start reading both journals and books into cognition so that I could start forming both my research chapter but a more immediate check would be in the definitive brief.

4. *Explain* ***why you worked in the manner described above****:*

The research was conducted by searching through the library looking for appropriate texts that would allow me to get the best information on Cognition, and cognition into children.

5. *Think about and write down what you have found out/learned from your actions this week:*

I have learnt a lot this week about cognition and memory, the majority of which has been complied in my notes for the development of my 2nd chapter "Research into Cognition".

Carry Forward

6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.*

Continue to research into cognition and memory. Up Date Gantt Chart

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 25th Oct

Description

1. *This week I worked on:*

Further research on both Cognition and Memory.

This week I have also completed more of the definitive brief, by completing both my proposed solution and also completing a progress report.

2. *Time Spent on above work – 16hrs*

Reflection

3. *Explain **how you did the work** listed in section 1:*

I furthered research into cognition and memory by making more notes on both subjects looking forward to the research chapter.

I also completed the proposed solution and progress report and added them to the definitive brief. And read over everything that i have done thus far in preparation for the hand in next week.

4. *Explain **why you worked in the manner described above**:*

The research was carried out to give a better basis 4 the research chapter, and it will also help me structure the chapter after i know what topics i have to discuss.

5. *Think about and write down what you have found out/learned from your actions this week:*

This week, was similar to last week in such that I have learnt more on the topic of cognition.

Carry Forward

6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.*

Get David(supervisor) to check trough the definitive brief before the hand in on Thursday next week. Up Date Gantt Chart

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 1st Nov

Description

1. *This week I worked on:*

Further Research into Memory.

Generating a Gantt chart that corresponds to the dates that I have self imposed deadlines.

I also finished my definite brief, which also included edit that i was advised to make during a feedback session.

2. *Time Spent on above work – 11 Hours*

Reflection

3. *Explain **how you did the work** listed in section 1:*

For the research I made further notes.

Generating the Gantt chart I used my schedule and created the chart in excel, and generated it by hand.

4. *Explain **why you worked in the manner described above**:*

For the Gantt chart I felt it was easier to edit through the project if it was made in excel.

5. *Think about and write down what you have found out/learned from your actions this week:*

Carry Forward

6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.*

Check Gantt chart with David (supervisor) to check it's valid. Up Date Gantt Chart

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 8th Nov
Description		
1. *This week I worked on:* Research into cognition in children and finished notes on research into memory.		
2. *Time Spent on above work -10 hours*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* I extended the research that I have been doing into memory and cognition to find more specialist books and journals to do more in-depth research into cognition in children.		
4. *Explain* ***why you worked in the manner described above****:* I worked on cognition in children as it was the natural progression for the development of the system and the research.		
5. *Think about and write down what you have found out/learned from your actions this week:* I have gained a more in-depth look at how children learn, along with what motivates the children, which I will be able to implement in my project.		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 15th Nov

Description

1. *This week I worked on:*

More research this week it was into cognition in computing, and how this affects users. Further to this I conducted some research that wasn't originally planned on the schedule and conducted research into cognition in children with learning difficulties, so I could develop a system that will be able to be used by these children

2. *Time Spent on above work – 12 hours*

Reflection

3. *Explain **how you did the work** listed in section 1:*

I made more notes

4. *Explain **why you worked in the manner described above**:*

I think I am making good progress with the research that I have conducted to far, I have also added another topic to the research chapter.

5. *Think about and write down what you have found out/learned from your actions this week:*

I need to further my knowledge of cognition in computing, this week I have only just started doing research into said topic, next week I will conduct more in-depth research

Carry Forward

6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.*

Up Date Gantt Chart

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 22nd Nov
Description		
1. *This week I worked on:* Further research into cognition in computing. I also planned the structure of the research chapter. *Ahead of schedule*		
2. *Time Spent on above work – 13 hours*		
Reflection		
3. *Explain **how you did the work** listed in section 1:* I made more notes on the research. I made a start with the research chapter by simply planning out the sections that I wanted in the chapter and also made notes on what I wanted in each section.		
4. *Explain **why you worked in the manner described above**:* I thought it was the best way to arrange the chapter before going into writing it, and it seemed feasible to do it now as I near the research so that I have a good place to start in a fought nights time when I come to write the chapter.		
5. *Think about and write down what you have found out/learned from your actions this week:* I think that I am progressing well with the research and I am finding out lots of useful information that I will be able to incorporate into the system.		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* FINISH research into cognition. Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 29th Nov
Description		
1. *This week I worked on:* Finishing research into cognition in computing.		
2. *Time Spent on above work - 10 hours*		
Reflection		
3. *Explain **how you did the work** listed in section 1:* I finished looking into cognition in computing, and gathered all of the notes that I have made on the topics together. This means that I am head of schedule and this will also mean at the start of next week I can start to write the chapter.		
4. *Explain **why you worked in the manner described above**:*		
5. *Think about and write down what you have found out/learned from your actions this week:* I found out more on cognition in computing and how this will tie in with the project.		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 6th Dec
Description		
1. *This week I worked on:* This week I made a start on the research chapter of the dissertation.		
2. *Time Spent on above work – 15 hours*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* I start by writing an introduction to the problem and then started to follow through the chapters that I needed to. This week I completed the introduction, current applications and memory.		
4. *Explain* ***why you worked in the manner described above****:*		
5. *Think about and write down what you have found out/learned from your actions this week:*		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 13th Dec
Description		
1. *This week I worked on:* Continued on with the research chapter		
2. *Time Spent on above work – 13 hours*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* I continued on the structure that I had been using. This week completing the sections on cognition, cognition in children, and made a start on cognition in computing.		
4. *Explain* ***why you worked in the manner described above****:*		
5. *Think about and write down what you have found out/learned from your actions this week:* It was essential to have the majority of the chapter done for my supervision session so I could check that things were heading in the right direction.		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* See David (Supervisor) on how the chapter is looking and reading in session on Tuesday, Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 20th Dec
Description		
1. *This week I worked on:* Finishing the research chapter with the amendments that the supervisor told me to make		
2. *Time Spent on above work – 10 hours*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* I read though the notes that I made in the supervision session and applied them to the research chapter before the hand in.		
4. *Explain* ***why you worked in the manner described above****:*		
5. *Think about and write down what you have found out/learned from your actions this week:* I worked this way because of a hand in to having the majority of the chapter and had it read through so that I could make any amendments before the hand in.		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 27th Dec
Description		
1. *This week I worked on:* Nothing (Christmas Holidays)		
2. *Time Spent on above work – 0 hours*		
Reflection		
3. *Explain **how you did the work** listed in section 1:*		
4. *Explain **why you worked in the manner described above**:*		
5. *Think about and write down what you have found out/learned from your actions this week:*		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.*		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 3rd Jan
Description		
1. *This week I worked on:* Nothing!		
2. *Time Spent on above work – 0 hours*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* I have been doing a lot of revision for an up and coming TCT		
4. *Explain* ***why you worked in the manner described above****:*		
5. *Think about and write down what you have found out/learned from your actions this week:*		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.*		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 10th Jan
Description		
1. *This week I worked on:* I worked on designs for the game, including menu systems and the game it's self.		
2. *Time Spent on above work – 5 hours*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* I need to do the designs, but with a TCT up and coming for another unit my production hasn't been much on the game as I have had to try and fit revision into the schedule as well.		
4. *Explain* ***why you worked in the manner described above****:*		
5. *Think about and write down what you have found out/learned from your actions this week:*		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 17th Jan
Description		
1. *This week I worked on:* Chapter 3 – Planning what need to be written Editing my Gantt chart to show how the development is going, whether it's on track or not.		
2. *Time Spent on above work - 8*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* For chapter 3 I planned what I wanted to have within the chapter, along with what methodology I was going to adhere to and how this will benefit the development of the system.		
4. *Explain* ***why you worked in the manner described above****:* I thought I was an idea to plan out what I wanted in the 3rd chapter, and this would allow me to put exactly what I want into the chapter and where it will in placed.		
5. *Think about and write down what you have found out/learned from your actions this week:*		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 24th Jan
Description		
1. *This week I worked on:* Chapter 1		
2. *Time Spent on above work – 5 hours*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* This week I have done more revision for the TCT in another unit.		
4. *Explain* ***why you worked in the manner described above****:*		
5. *Think about and write down what you have found out/learned from your actions this week:* I think that I should have been working on more of the project along side doing revision as I have fallen behind with the development of the system. I also need to manage my time better, as in the schedule I didn't plan for evens such as exams happening during the development of the system.		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 31st Jan

Description

1. *This week I worked on:*

Finishing Chapter 1 & 3

Development of the system

2. *Time Spent on above work – 12 hours*

Reflection

3. *Explain **how you did the work** listed in section 1:*

For the system I started the development of the menu system.

Chapters 1 & 3 of the dissertation are now completed.

Chapter 3 ahead of schedule.

4. *Explain **why you worked in the manner described above**:*

Chapters 1 & 3 were close to completion so I thought it would be the best idea to have them both completed and

5. *Think about and write down what you have found out/learned from your actions this week:*

After neglecting my project for the last 2 weeks due to revision for a Java TCT, I feel that I got back on the right tracks and began the development of my system. Although I am a little behind in the development believe that I will be able to make up time over the next week or so.

Carry Forward

6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.*

Email Andrew Smith regarding link database to flash element, Up Date Gantt Chart

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 7th Feb
Description		
1. *This week I worked on:* Development of the system		
2. *Time Spent on above work – 15 hours*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* I ensured that all of the flash elements were working and the game is ready to implement the questions and add the counter.		
4. *Explain* ***why you worked in the manner described above****:* I needed to ensure that aspects of the game are fully functional before continuing development of other sections of the game.		
5. *Think about and write down what you have found out/learned from your actions this week:*		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Complete the main element of the game (the goal and players), Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 14th Feb
Description		
1. *This week I worked on:* Meeting With Client. Development of the system		
2. *Time Spent on above work – 15 Hours*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* I need to meeting with meeting with my client to ensure that dates for the testing sessions were acceptable. After looking at dates I have had to move the second test session forward due to numeracy sessions not running in the later weeks of the development		
4. *Explain* ***why you worked in the manner described above****:* I needed to ensure that the dates for the sessions could be carried out as well as to ensure that I could have a group of children to test the game, and also to get feedback		
5. *Think about and write down what you have found out/learned from your actions this week:*		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Development of the questions, Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 21st Feb
Description		
1. *This week I worked on:* Development of Database of questions		
2. *Time Spent on above work – 15 hours*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* I started the development of the database, by first creating the database via SQL queries. Then questions were added by manual input. The reason for this was to get a good database of questions ready to work with the flash game.		
4. *Explain* ***why you worked in the manner described above****:* It was essential to get a robust database ready so it was decided to use the manual input		
5. *Think about and write down what you have found out/learned from your actions this week:*		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Finish database of questions, Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 28th Feb

Description

1. *This week I worked on:*

Further development of the database of questions.

2. *Time Spent on above work -*

Reflection

3. *Explain **how you did the work** listed in section 1:*

Following on from last week's development it was essential to further develop the database of questions. I worked on this by adding more questions to the database, by using both techniques shown.

4. *Explain **why you worked in the manner described above**:*

This will be essential to the running of the system, and needed to be developed to ensure that the database will link to the flash game, and display the questions in the game. The reason I used both manual input and SQL queries is to give myself a better grasp of both sides of the input.

5. *Think about and write down what you have found out/learned from your actions this week:*

I think that I have a far better grasp of SQL having used the code to enter questions into the database.

Carry Forward

6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.*

Up Date Gantt Chart

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 7th March
Description		
1. *This week I worked on:* Test session with users		
2. *Time Spent on above work – 10hrs*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* After a test session with the users I made a lot of notes, which included suggestions from the children. Following this meeting I wrote up the notes as part of chapter 7.		
4. *Explain* ***why you worked in the manner described above****:* I thought I would be best to write up the test sessions as soon as I had conducted them, this was so the meeting were fresh in my mind, this also meant that it was another section of the dissertation completed.		
5. *Think about and write down what you have found out/learned from your actions this week:* I found it very helpful to write up the session as soon as it was over as it allowed me to remember suggestions from the children and was able to start implementing them.		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 14th March

Description

1. *This week I worked on:*

2nd Test session with users

Meeting With Client

Changes that my client suggestion to include.

2. *Time Spent on above work – 20hrs*

Reflection

3. *Explain* ***how you did the work*** *listed in section 1:*

As last week, I wrote the test session as soon as i had it with the users. Again I made notes, which included suggestions from the children. Following this meeting I wrote up the notes as part of chapter 7.

Further to this I had a meeting with my client, where I a lot got ideas on the development of the system. I also wrote this session up in section 7, this is under section 7.2.2

4. *Explain* ***why you worked in the manner described above****:*

as last week, I thought I would be best to write up the test sessions as soon as I had conducted them, this was so the meeting were fresh in my mind, this also meant that it was another section of the dissertation completed.

5. *Think about and write down what you have found out/learned from your actions this week:*

As last week, I found it very helpful to write up the session as soon as it was over as it allowed me to remember suggestions from the children and was able to start implementing them.

Carry Forward

6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.*

Up Date Gantt Chart

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 21st March
Description		
1. *This week I worked on:* Changes to the system that were suggested in the test sessions in the previous weeks.		
2. *Time Spent on above work – 10 hrs*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* I read though the notes that I had made in the 2 test sessions and the meeting with my client and then started to implement the changes that were suggested.		
4. *Explain* ***why you worked in the manner described above****:* I started with further development, as they system needed to be fully working, as well working on the dissertation. So I have to fit both development as well as documentation into the time that I have allocated.		
5. *Think about and write down what you have found out/learned from your actions this week:* I have found that I need to do more documentation, so next week will be spent on the dissertation.		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Documentation. Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 28th March

Description

1. *This week I worked on:*

Further writing of the dissertation.

2. *Time Spent on above work – 12 hrs*

Reflection

3. *Explain* ***how you did the work*** *listed in section 1:*

I wrote more on the content, as well as ensuring I had the right chapter headings throughout the document.

4. *Explain* ***why you worked in the manner described above****:*

I worked on the dissertation, as it meant that there was more chapters finished, and it meant that there was more for the dissertation completed.

5. *Think about and write down what you have found out/learned from your actions this week:*

I have found out that i should check my dissertation to ensure its flowing as a document. So next week i plan to read thought the dissertation and made amendments to it.

Carry Forward

6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.*

Review Dissertation.

Up Date Gantt Chart

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 4th April
Description		
1. *This week I worked on:* A revision of the dissertation		
2. *Time Spent on above work – 7hrs*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* I read though the dissertation and it became apparent that I needed to edit parts as I had repeated myself. As well as needing to explain things in more detail.		
4. *Explain* ***why you worked in the manner described above****:* I thought it was best to have a read though now with having the majority of the dissertation written it was best to read though the document to ensure that it made sense and flowed well.		
5. *Think about and write down what you have found out/learned from your actions this week:* I found out that I have to read my work more often as I repeated a lot of things though the first 3 chapters so it was best to have read though it at this point in time.		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* Further writing of the dissertation. Up Date Gantt Chart		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 11th April

Description

1. *This week I worked on:*

More writing of the dissertation

Finished development of both the system and database.

2. *Time Spent on above work – 20hrs*

Reflection

3. *Explain* ***how you did the work*** *listed in section 1:*

After finishing the development of the system it meant that the following chapters can now be fully completed.

Project Development, Testing, Evaluation, and future development.

Although the project development and testing chapters had been started they can now be finished off with just a little addition.

4. *Explain* ***why you worked in the manner described above****:*

It was best to finish the development so that the remaining chapters could be finished over the next week.

5. *Think about and write down what you have found out/learned from your actions this week:*

Carry Forward

6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.*

Have a draft finished for 13th April! Read through and make adjustments to it.

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 18th April
Description		
1. *This week I worked on:* Completeing both the interactive game and finishing the disertation.		
2. *Time Spent on above work – 25 hrs*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* I finished both aspects off so that i could have a final evalution with my client for the game, as well as have a read throught the dissertation so that i could proof read it andmake ajustments to it		
4. *Explain* ***why you worked in the manner described above****:* With the deadline being to close it was essential to have everything finished.		
5. *Think about and write down what you have found out/learned from your actions this week:*		
Carry Forward		
5. *Highlight any questions, problems, tentative conclusions to follow up on next week or later* print bind and submit dissertaion and begin with the presentation of the work.		

Name: Paul Fairley	Programme: BSC Computing	Date: w/e 25th April
Description		
1. *This week I worked on:* The presentation		
2. *Time Spent on above work – 5hours*		
Reflection		
3. *Explain* ***how you did the work*** *listed in section 1:* Following the hand in of the dissertation i started on the presentation		
4. *Explain* ***why you worked in the manner described above****:*		
5. *Think about and write down what you have found out/learned from your actions this week:*		
Carry Forward		
6. *Highlight any questions, problems, tentative conclusions to follow up on next week or later.* This learning log was completed before the hand in and shows what is to be completed over the next few weeks		