MU303

Multimedia Learning Aids to Improve Cricket Coaching

By
Robert Dewell

Project Advisor David Liewe

Presented as part of the requirements for an award
Within the Undergraduate Modular Scheme at
The University of Gloucestershire

May 2004
Declaration

This dissertation is the product of my own work. I agree that it may be made available for reference at the discretion of the University of Gloucestershire.

Signed:_____________________

Robert Dewell

Date:____/____/_____
# Table of Contents

**Chapter 1: Introduction**
- 1.1 Overview .................................................................................................................. 1
- 1.2 Aims and Objectives ................................................................................................. 2

**Chapter 2: Literature Review**
- 2.1 History of Technology within Education ................................................................. 3
- 2.2 Benefits of Virtual Learning ...................................................................................... 4
- 2.3 Coaching in the Digital Age ...................................................................................... 6
- 2.4 Multimedia in Cricket ............................................................................................... 8
- 2.5 Multimedia in TV ..................................................................................................... 14
- 2.6 Visualisations ........................................................................................................... 16
- 2.7 Multimedia in Cricket Coaching ............................................................................. 17

**Chapter 3: Method**
- 3.1 Approach ................................................................................................................ 22
- 3.2 Research Hypothesis ............................................................................................... 24
- 3.3 Participants ................................................................................................................ 24
- 3.4 Materials .................................................................................................................. 26
  - 3.4.1 Interactive Coaching ............................................................................................ 26
  - 3.4.2 Coaching Video .................................................................................................. 29
  - 3.4.3 Equipment ......................................................................................................... 30
  - 3.4.4 Environment ...................................................................................................... 30
- 3.5 Questionnaires ......................................................................................................... 32
- 3.6 Procedure ................................................................................................................ 33
- 3.7 Ethical Issues ........................................................................................................... 35

**Chapter 4: Results**
- 4.1 Participant test results ............................................................................................ 37
- 4.2 Questionnaire results .............................................................................................. 38
- 4.3 Discussion ................................................................................................................. 42

**Chapter 5: Evaluation**

References ......................................................................................................................... 48
Appendices

Appendix A: Project Development Plan
Appendix B: Project Record Meetings
Appendix C: Testing Plan
Appendix D: Consent Forms
Appendix E: Pre Test Questionnaires
Appendix F: Post Test Questionnaires
Appendix G: Participant Test Scores
Appendix H: Further Results
Appendix I: Interactive Coaching Evaluation Questionnaires
Appendix J: Sky Sports Video Authorisation
Appendix K: Participant Stretching Leaflets
Appendix L: Cricketing Multimedia Evaluation Questionnaires
Appendix M: Research Proposal
Appendix N: Interactive Coaching Storyboards
Appendix O: Interactive Coaching
Appendix P: Coaching Video
Appendix Q: Participant Test Video
Abstract

This research aimed to explore the use of multimedia education in coaching beginner and intermediate cricketers. An interactive coaching simulation and coaching video were manufactured, tested against batting participants and rated by a cricket coach. The results show the different participants’ improvement scores after multimedia training and the collection of quantitative data regarding their performance. A further investigation showed a vast array of multimedia learning packages currently available which are discussed in detail. A worldwide evaluation by way of a five-point Likert scale was carried out on the interactive coaching produced by the researcher. This returned intriguing responses from ex international cricketers, coaches and multimedia designers, forming qualitative and quantitative data. Problematic areas of the interactive coaching are highlighted by the participant evaluation questionnaires and suggestions are made on further research.

Acknowledgements

The author would like to thank the England and Wales Cricket Board (ECB) and Gloucestershire County Cricket Club (GCCC) for their support, and above all, the test and questionnaire participants who provided their time and thoughts throughout this research. Thanks to Alison Pritchard for proof reading and to David Liewe, Kevin Hapeshi and Paul O’Brien for their advice and assistance.
Chapter 1: Introduction

1.1 Overview

It is believed by many that virtual learning or multimedia technology in education assists in learning and is more beneficial to teaching than conventional training methods such as text books and lectures (Mayer 2001; Schank 1997; Tyerman, 1993). These theories are based on their use in academic environments such as classroom lectures and seminars, but multimedia education in sports, in particular sport coaching, is still relatively new (Palmer, 2002).

Many sports, including cricket, have been affected since the recent digital revolution, and technology such as video has made a wide impact on the way sports are learnt. Former England cricket captain, David Gower feels that technology has supported learning by allowing action to be zoomed, replayed and slowed down. This gives viewers a higher understanding of the sport and helps to make successful players (Gower, 2002). Former Australian cricket captain Richie Benaud believes that the technology educates viewers and that multimedia-rich telecasts have helped the sport become more popular (Benaud, 2000). Multimedia technology has revolutionised the sport, but there is little evidence to substantiate its effectiveness when used as a tool for coaches (Kilb, Raz-Liebermann and Katz, 2001).

Over the last few years, more coaches have begun taking advantage of the multimedia technology available to educate students about good techniques and their own technical downfalls (Meyer, 2003). Multimedia training devices allow students to work alone in their own environment, which is one of the essential factors of virtual learning (Schank, 1997). An interactive coaching device that students can use without
the need of a coach could be very marketable within the cricket industry. With technological platforms such as the Internet and CD-ROMs, interactive learning could reach people who might otherwise have no means of obtaining such a training tool. This study aims to show how the benefits of interactive coaching can be applied globally.

1.2 Aims and Objectives

Technology used by coaches in a one-on-one training session has been accepted as a better form of coaching (Palmer, 2002), and this research aims to ascertain if interactive coaching that students can use alone in their own environment can be a successful means of training.

The aim is to produce an interactive coaching simulation and coaching video that can be tested on participants to understand its full potential. The testing can provide qualitative and quantitative data that, after data analysis, may show the benefits of this type of learning. The results shown are based upon cricket coaching, but the conclusions drawn could be applied to various other sports.
Chapter 2: Literature Review

2.1 History of Technology within Education

One of the first breakthroughs into the benefits of technology in education came in 1986 during a nationwide school project called The Domesday project. It used maps and photographs gathered by schools around the country and included multimedia rich images. This led to the introduction of IVIS (Interactive Video in Schools), which improved pupils enjoyment (Finney, 2003). However, the technology was not widely available to schools, and the IVIS programme lasted only eighteen months. The introduction was not welcomed by all, and Chandler (1983) believed that IT in learning would only force the educational practice to take a step backward. He believed that all the vital personal teaching provided by individuals would be lost and students would lose an important part of learning.

A further development came in 1994. It was called ILS (Integrated Learning Systems) and allowed students to work alone at the computer screen with images, text and sound. This has become one of the fastest markets for technology in schools’ and by 2000 ILSs continued to dominate the school technology market (King 2000). This growth of learning has been recognised by the England and Wales Cricket Board (ECB), and 2003 saw the introduction of ILS within physical education.

Around the same time as ILSs were introduced, Negroponte (1994) came to the conclusion that the digital age had radically changed the way people learned. Learning by doing had become the standard rather than the exception, and the enhancement of technology had allowed computer-based learning to blossom into media rich content. Many young athletes learn to play sports by watching matches...
(Hingham, 2000), and the use of multimedia technology can not only give further means of learning but also make learning fun.

Collins (1997) undertook a case study into the effects of multimedia in physical education that captured more than fifty video sequences of active sports including golf, tennis, football, gymnastics and weight lifting. The motion capture was used to study stress and strains of the body, and these videos were transferred into a program that had the capability to analyse quantitative data. The conclusions from the study showed that video capture gave students a better understanding of their problems and helped them overcome the issues. Overall, technology in education has evolved a long way, and Collins recognised the advantages of technology within physical education. The acceptance of technology in the national curriculum shows that technology has been assisting learning for many years (Collins, 1997).

2.2 Benefits of Virtual Learning

Multimedia has the capability to help education to be fun. Schank (1997: 8) believes this is because “people like the fact that multimedia is high tech, glitzy and fun to use.” Learning flourishes in a fun environment, and the digital advances over the years have made interactive teaching more joyful (Mayer, 1997). The benefit of learning a sport is that students want to learn, and when learning is accompanied with multimedia, the learning experience can be very effective. A benefit of interactive coaching is its potential to reach a variety of different users with different skills. Murray (1995) believes reaching all types of users is essential within sports coaching and that interactive coaching can achieve this kind of reach. The interactive coaching
used for testing in this study was designed for beginners and intermediate users, whereas a completed version would be designed to suit a wider variety of users.

Students who are willing to learn from a virtual training device will be more in control of their education as they will be able to interact with the program at their own pace and make their own choices in their own environment. This could give them the comfort of making their own mistakes in private, and Schank (1997) believes this will help users learn more effectively. Interactive coaching will give users the chance to interact with the lessons in their own manner, which may make them more comfortable and assist in their memory retention.

It is important to produce a virtual training package that will educate users rather than purely entertain them. Negroponte (1994) believes a good interactive training simulation needs to help participants experience an event and avoid evoking an unnatural response. It is important not to create a training package that is technologically rich but learning poor. The simulation needs to be fun to attract the user’s attention, but “just because it’s fun doesn’t mean it’s learning.” (Schank 1997: 157). The interactive coaching simulation will aim to stimulate users and still provide all the essential information required to educate.

Multimedia within training simulations are improving, and additional technological enhancements may provide the platform for designers to create more extensive and higher quality multimedia for training. Schank (1997) notes that multimedia training is beginning to grow all over the world, and that the growth of the Internet could expand virtual learning into a global industry. Countries with poor teaching facilities
can access global virtual training packages to aid their education (Lagha, Osterwalder and Pigneur, 2002). Virtual learning can appeal to people of all ages and abilities who might otherwise find it difficult to further their education. Learners can study at their own pace, go over materials many times and learn whenever is convenient for them (Porter, 1997). This is a great advantage to multimedia learning and shows that the potential market is expanding with technological improvements.

2.3 Coaching in the Digital Age

The recent digital revolution has widely changed the way sports coaching is delivered and “for coaches to continue to experience success, they have to remain current with the technology “(Morgan, 2003: 16). Jonas (1998) suggests audio aids and new media as essential areas of coaching in the digital age. The new technologies allow deeper analysis than ever before, and become a truly effective teaching tool by enabling coaches to tap into information regarding almost anything. It helps them exchange ideas all over the world, providing coaches with high-quality information (Kilb, Raz-Liebermann and Katz, 2001) that can then be passed on to students. The technology has improved communication, and education is benefiting from the growth of knowledge that is widely available. The standard of coaching has improved due to the technology, which is to the advantage of students. The technology is helping educate students in ways that was never previously available. Failure to use the technology could handicap any coach’s effectiveness (Palmer, 20002).

The introduction of digital cameras has given coaches the facility to scrutinise athletes’ performances in great detail. Digital photographs can provide a simple way to identity aspects of a technique, and video capture has the capability to slow the
action, pause the frame, and look carefully at the performance, which helps students think about improving their performance (Mullineaux, 2000). In the year 2000, The Sports Science Research Institute in Sheffield created a virtual image of a gymnast using as many as 3,000 virtual points. The virtual gymnast could be placed within a computerised arena, where the real gymnast could see how their technique could be improvement (Figure 1). Director of coaching at Teeside Tertiary College, Craig Burton, notes the benefits of the virtual gymnast as it allows athletes to view their performances from different directions. This helps coaches to identify and explain problems to students and ultimately help them improve their performances (Mullineaux, 2000).

The principle of the virtual gymnast could be applied to a variety of sports and would be extremely beneficial for both coaches and students. They would both be able to see aspects of performances or technique that are only visible using this technology.
2.4 Multimedia in Cricket

Cricket has become more popular due to the use of multimedia technology in telecasts (Benaud, 2000). It has been used to superimpose images on the screen, create virtual simulations of the action, digitally zoom into an area of choice and enhance and extract sounds from an on-field microphone.

One of the main ways multimedia has been used with cricket telecasts is a system known as Hawk-Eye, which was invented by Dr. Paul Hawkins. Hawk-Eye incorporates image analysis and missile-tracking technology. It consists of six fixed, 120Hz frame-rate, JAI (Jørgen Andersens Ingeniørfirma) monochrome cameras placed around the playing field at key vantage points. The synchronised cameras track the ball’s entire trajectory (Davis, 1997) (Figure 2). The Hawk-Eye system uses Matrox Imaging Library software to process the images and create a 3D simulation of the trajectory of the delivery. After a few seconds of calculations, the software creates a virtual simulation of the flight of the cricket ball and projects its further path (Figure 3). This type of 3D technology has aided the sport in a variety of ways. It has been a helpful innovation to commentators such as Richie Benaud, and Davis (1997) believes it has helped the sport to become more attractive to spectators. The technology has not only become a good marketing tool, but is also an educational tool according to former England cricket Captain David Gower, who believes that Hawk Eye is educating all of us (Gower 2002). He believes the quality of coaching, playing, and even watching is improving as a result.
Television broadcasts have been revolutionised with the arrival of virtual advertising (Mangla, 2003). Virtual advertisements are electronic insertions of images during the live broadcasts (Figure 4). The images are superimposed using software such as Maya, 3D Studio Max and Macromedia Shockwave. 3D graphics were also introduced into New Zealand telecasts by a company called Animation Research Ltd, which showed a 3D simulation of the field of play (Figure 5). Before a match, an aerial photograph of the ground and the surrounding area is taken. Pictures are also taken from the batsman’s view, and these are used to make a 3D model of the stadium using 3D Studio Max software. The players are also photographed and mapped onto a 3D model created on the screen. This type of technology has made the telecasts more appealing to watchers. Spectators might also be attracted to learning the sport using an equally appealing training simulation.
The ECB had suggested that the technology could make decisions for an umpire, but former International umpire Dickie Bird was not in agreement. In an interview with Rob French, he shares his view that technology is taking over an integral part of the game (Bird, 2003). Bird is not alone in his views, as Varma (2004) strongly believes that technology in cricket detracts from the charm of the game. Former Australian test bowler Dennis Lillee also criticised the growing use of technology in the game. Lillee (2003) believes the technology is not accurate enough to warrant its current place in the broadcast game but accepts its use as a guide to inexperienced viewers. The technology has been welcomed by people viewing the sport as an aid to their enjoyment and understanding, but they are opposed to its use directly in decision making. 3D technology is now a major part of the sports coverage, and Gower (2002) believes that it should be viewed purely as an enjoyment and educational tool. It is important that the technology available does not take over the way sports are played but instead be used as a means of education.

The technology has given various coaches more information that can then be relayed to students. Many international cricketers are using multimedia technology to improve their game. The technology is not used by all, however, as some players prefer to analyse the game in their minds (Tendulkar and Shetty, 1998). A downside
to learning from technology might be that it may stop students from playing naturally by encouraging them to try too hard to emulate what they are see on the screen. However, technology such as video replays of athletes in action has been proved to help improve the technique of those who use it (Palmer, 2002; Kilb, Raz-Liebermann and Katz, 2001).

Essex County Cricket Club successfully launched an Interactive Technology Suite at their indoor cricket school in 2002 (Figure 6). They have incorporated multiple cameras, computers and monitors in the suite, and these allow slow motion, image capture and onscreen editing. The Essex County Cricket Club’s Cricket School Assistant, Cassandra Wright believes that the technology has improved cricket coaching considerably. The majority of coaches have found the technology extremely useful, although some coaches who have been coaching the same way for so many years find it difficult to suddenly change (Lock, 2004). A major benefit of the technology suite at the indoor school is the fact that the footage is interactive. A student or coach can simply enter the technology suite and immediately examine the recordings. Overall, the ECB believe the Interactive Technology Suite at the indoor school in Essex has set a trend in cricket coaching that will lead to an increase of Interactive Technology Suites around the country (Lock, 2004).

Figure 6 – Essex Indoor Cricket School
Professor Adrian Lees, Director of the Research Institute for Sport and Exercise Sciences, used the latest computer simulations in an attempt to learn the batting technique of one of the famous pre-war cricketers, Sir Donald Bradman. Lees (2000: 4) commented: "our simulator system produces three-dimensional images that can be analysed at up to 240 frames per second as opposed to 25 frames per second via a video camera. Our preliminary study suggests that it will give cricket a level of information and knowledge that cannot be obtained in more conventional ways." The technology enabled variables to be taken for each shot that was recorded. This type of technology can be used to study the biomechanics of technique and enable coaches to break down technique into specific areas that are replayed to students.

Professor Lees was able to create a simulation in order to learn the technique of the cricketer. The virtual model of his technique can be studied and recreated for any new cricketer looking to emulate the simulation, and more and more coaches are beginning to realise the benefits of technology within sports coaching. It seems possible in the near future that coaches who are not up to date with the latest technology may not be able to provide the same coaching compared with coaches using visualisations (Meyers, 2003)

A similar biomechanics study led by Dr. David Lloyd took place at the University of Western Australia in March 2000. Sri Lankan cricketer, Mutiah Muralitharan was questioned by higher authorities about the legitimacy of his bowling action, and with only camera footage to establish if his action was legal; the authorities were unable to clarify the matter. Using a 50 Hz six-camera Vicon Motion analysis system (Oxford Metrics Ltd, Oxford, UK), in conjunction with special Vicon BodyBuilders® markers
strategically placed on the upper arm of the cricketer (Figure 7), the researchers were able to closely examine the action. From this, they were able to learn a great deal about the cricketer’s technique. This can now be used to educate sports fans and players around the world.

Figure 7 - Vicon BodyBuilders® Markers

The key factors from this study were the 3D readings that were recorded using the Vicon VX System and BodyBuilder® software. Replay technology has improved, and Lloyd and Besier (2002) view the introduction of a 3D kinematic model to examine sports biomechanics as an essential breakthrough that educates in a way never previously possible with 2D camera footage. A video camera operates at 25 frames per second, which would not be adequate to analyse the high speed of a cricket delivery. A more suitable method would be to use a high speed video camera (see www.peakperform.com) that can range from 100 to 500 frames per second. This rate of capture enables digitalising of the video.

Peak Performance Technologies, Inc., created a system that converts the high speed camera footage from a several cameras into a 3D kinematic computerised model.
This led to the increasing demand for coaches to become proficient at integrating the latest technological advancements in video, computers and gadgets into their daily coaching practice (Lloyd and Besier, 2002), which helps coaches provide enhanced and meaningful feedback to athletes about their technique and performance. Lloyd and Besier also note that success depends on the coaches’ ability to integrate the technology into the analysis process. It could be suggested that the most successful training devices entertain and teach students, provide essential information from video capture and are interactive, allowing students to learn in their own time and atmosphere.

### 2.5 Multimedia in TV

Multimedia technology has revolutionised sports other than cricket. Baseball coverage in America has introduced technology that replays the action five times slower than conventional slow motion replays, giving unprecedented detail of the bat making contact with the ball. The technology has not only made television coverage more attractive but, as claimed by the ESPN network broadcaster, educated viewers about the relationship between pitcher, catcher and batter (Kelner, 2000). The broadcaster believes the majority of TV producers consider the new technology as educational, rather than entertaining. This view isn’t shared by Kelner, who believes that some TV producers overuse the technology to an extent that repels viewers.

Sky Sports introduced a similar package called ‘Replay 2000’ (Figure 8). This technology took video footage, converted players into computer graphics and analysed incidents from different angles. The virtual reality software was acquired from the Israeli organisation called Orad, which developed the software for targeting
long-distance missiles during the Gulf War. Orad camera-tracking methods included infra-red detection, pattern recognition and opto-mechanical sensors that tracked specific objects. These could also be used to follow a cricket ball from the delivery.

Figure 8 – Replay 2000

Jeff Foulser, the Managing Director of the Channel 4 subsidiary Sunset + Vine, believes that this virtual technology has helped demystify cricket. This view is shared by Kelner (2000), who believes that the resurgence of cricket is connected with the Channel 4 multimedia rich coverage. Sunset + Vine are the largest producer of sport programs in the UK, and its cricket coverage for Channel 4 has won six prestigious broadcast awards (Lord, 2002). A media correspondent for the BBC agrees that Channel 4 has reinvented cricket coverage very successfully, giving it a multi-cultural edge to the chagrin of the BBC (Douglas, 2001). Overall Channel 4 has revolutionised the coverage (Hjerdin, 2002) and given viewers a great platform with which to learn and educate themselves about the sport.
2.6 Visualisations

Visualisations are an important part of virtual learning as the brain thinks in pictures to a large extent. This can help athletes from becoming tense and self-conscious (Frazer, 2003). Sports are full of visual references, which may aid the evolution of virtual learning within sports. The most important aspect of learning sports is to get students to watch matches and to talk about the sport because coaching by text books is not as effective as they are full of one-off references (Higham, 2000). This could be due to the fact that the brain is able to digest visual learning in a more logically structured manner compared with pure text (Brown and Cocking, 1998).

Visualisations could be a major factor in human learning because “we have the ability to scan images recalled from memory, zoom into them, acquire more detail and transform them in multiple ways” (Lennon, 1995: 28). Students are able to digest visualisations that relate to information in their memory, and graphics can simplify complex illustrations by removing unnecessary detail (Milton, 1992).

A sportsperson who has stored a mental visualisation of a coaching device may be able to refer back to this when it is later required. The full extent of the use of visualisations becomes clear when imagining cricketers during a game who remember they must maintain certain positions in their technique after storing images in their memory. Students may be able to absorb more data if they are interested in the subject, and visualisations are stimulating.
2.7 Multimedia in Cricket Coaching

The ECB recognised the need for interactive cricket coaching and duly released an educational CD-ROM called “Howzat!” to primary and secondary schools. The Howzat CD-ROM is low on technical coaching and is designed to teach the basics and help promote interest in the game. The CD-ROM is full of simulations from an overhead perspective that help explain the procedure for each game (Figure 9). Former Essex cricketer and ECB’s Director of Development, Keith Pont, realised that the sport needed a change to introduce new followers and saw technology as a platform to promote the game and educate viewers. The training CD-ROM teaches youngsters the basics of the sport and can help in other academic areas. It is designed to get children thinking about teamwork and problem-solving and is focused around cricket. A successful coaching device not only teaches athletes sport skills, but also teaches and models the skills needed for successful living (Martens, 1987). This is a valuable, but intended, theme for the Howzat! CD-ROM.

Figure 9 – Howzat simulation
The ECB’s Schools Development Manager, Peter Ackerley, advised that the training CD-ROM was passed to each school within the UK. Classes study the CD-ROM and then try to emulate the skills demonstrated. Moss (2002) believes the idea of teaching children the skills of the game in such an innovative way will make the game fun for students.

The Howzat! training CD-ROM was introduced into Compton High School in west London in 2002 due to the efforts of former deputy head and current cricket development officer for Middlesex Cricket Club, Phil Knappett. In an interview with Moss (2002), Knappett advised that the CD-ROM has proved an ideal way of marrying cricket with other parts of the curriculum. He believes that almost half of the children in the county will soon be playing the game. It appears that this type of virtual learning does not only aid education, but also helps make education more popular with school children. The combination of the two could have a major impact on sports coaching and on education.

The ECB have endorsed the Howzat! CD-ROM as the official training simulation in schooling, but the cricket coaching industry has a range of different interactive devices. Butts Primary School in Walsall designed a Macromedia Flash sports game called “Hitting the Target” (Figure 10) that helped children learn key Stage 2 mathematics. It is similar to Howzat! in the way that it attempts to teach academic skills, in this case mathematics, but uses cricket as a metaphor. This type of learning may help to interest students become more willing to learn and remember what they have learnt (Kuhlmann and Friedman, 2001).
Former Australian cricketer, Greg Chappell, has produced a free training simulation using Macromedia Flash titled “The Chappell Way” (Figure 11). This training package teaches technical information about key areas of the sport and uses animation, 2D simulations and video to achieve this. Television Company BBC produced a Macromedia Flash game called “Last Man Standing” (Figure 12) in which users interact with the game by controlling a batsman and learn the shots the batsman must play to specific deliveries. A similar Macromedia Flash game was produced by the new media design company, Bostock and Pollitt, for the NPower Cricket Series in 2001/2 (Figure 13). The programs are multimedia rich and possess information that will interest and educate users (Schank, 1990).
Whereas the previously mentioned programs are individually interactive, a program called “CanCoach” (Figure 14) allows coaches to plan a coaching session by selecting from a library of videos and images, creating diagrams and collecting data. Once the coach has planned the session, the student can run the application in their own surroundings. A similar program to CanCoach and a leading worldwide program for video coaching is the “Quintic CricketCoachMaster” (Figure 15). The software has an in-depth library about cricket batting skills and techniques along with video replays and suggested coaching. A facility to view captured video is also present, and users have the option to slow the motion, capture images and edit the captured video on screen. This area of the CD-ROM has made it an extremely popular tool (Palmer, 2002) as it gives users the option to analyse their technique in depth. Quintic (2004) believe that the use of video camera is now an essential tool to help improve sporting techniques, and more and more athletes and coaches are using video feedback as a coaching aid to help athletes understand the fundamentals of specific movements.

Figure 14 – CanCoach  
Figure 15 – Quintic CricketCoachMaster

On a recent visit to New South Wales in Australia, Kent County Cricket Club coach, Simon Willis, reported on the vast differences in cricket coaching. Willis (2004) describes their approach to cricket as “forward-looking” due to their use of computer performance analysis systems such as “SportsCode,” “Fairplay” and “E-Cricket.”
These systems work in a similar fashion to the Quintic CricketCoachMaster and the video reply will aid the improvement of any student (Ripley, 1999).

Digital video analysis is rapidly becoming the coaching tool of choice for sporting individuals and organisations around the world (Crampton, 2003). However, all multimedia education simulations include useful training techniques. This study aims to ascertain the best methods of educating and coaching cricketers using multimedia technology they can use in their own time and environment.

Overall, cricket has a number of multimedia training devices each with its own unique method, and this study aims to ascertain which areas of multimedia can most improve cricket coaching.
Chapter 3: Method

3.1 Approach

The emphasis of the testing will aim to establish whether the most suitable method of training for specific participants is interactive coaching or a coaching video. Subjects will bat once in a controlled environment, receive interactive coaching or watch the coaching video, and then bat for a second time. The batting sessions will be video recorded and scored to calculate which method of training produces better improvement scores.

An original suggestion was to rate the participants out of 1 to 3 on their footwork, timing, shot selection and shot performance, but after much consideration it was decided to rate the participants on an overall score of 0 to 3 for the entire shot. This method is adopted by ECB level 3 staff cricket coach Joe Skinner, who agreed to act as the “Test Scorer” and rate the participants’ video footage with this scoring method.

Alternative scoring methods such as “PGP (Player Game Percentage)” for baseball, “PriceWaterhouseCoopers (PWC) Rating” for cricket and “Eagle Star Rating” for rugby, are all practicable methods to score the data. The PGP method measures the true value of a player to his team by measuring contributions within the context of the game and the degree to which a player decreases or increases the team’s probability of victory (Bennett 2001). The PWC cricket rating system calculates game factors such as opposition skills and environment (Berkmann, 1990). In this respect, it is similar to the Eagle Rating system (Bracewell, 2001). In a conversation with Gregory Stauffer, baseball coach of Macomb College, USA, Gregory commented on a successful “Scout
Scoring System” that grades players on an assortment of areas to establish their overall skills level.

“They are graded on an assortment of areas including running, hitting, hitting for power, fielding and arm strength” – Gregory Stauffer, Baseball coach.

The PGP, PWC and Eagle Rating systems would be more suitable for an in-depth testing experiment that lasted for a longer period of time and involved competitive matches. Stauffer’s scoring system may record a large quantity of information that could obscure the data (Janowski, 2002), therefore the adopted method by Joe Skinner will be simplistic and will produce figures that can be used for data analysis.

It was important to select a qualified person as scorer who was independent from the study to ensure that their results were not biased in any way (Rudestam and Newton, 2001). It was decided that the test scorer would see the batting footage, without knowing any of the testing variables, therefore being able to make his own decisions, without any bias. Once the testing was completed the video footage was imported into Adobe Premiere, edited and exported onto VHS (Appendix Q).
3.2 Research Hypothesis

A one-tailed hypothesis.

**Research Hypothesis:** Cricketers will find interactive coaching significantly more effective as a training tool than the coaching video.

**Null Hypothesis:** There will be no significant differences between interactive coaching and the coaching video. Any differences found will be due to chance and random variability.

3.3 Participants

The original test plan included twenty participants, but after much deliberation it was decided to reduce the number. The testing involved filming cricket net sessions and calculating statistical scores for each subject. These statistical scores were then analysed. Due to the complexity of the testing method, twenty participants would take much time and money simply in organising and funding the testing environment. The participants were reduced to ten, enabling testing to be completed over one day. The larger number of participants would also mean testing over two days, which could change some other independent variables within the testing environment such as lighting or consistency and quality of cricket deliveries.

The interactive coaching simulation was designed for beginner and intermediate cricketers, and the participants were chosen to fit this category. The participants’ gender was not specified, and the age group was between 20 and 35 but the main
criterion for participation was cricket batting ability. Table 1 summarises the participants chosen for this study.

<table>
<thead>
<tr>
<th>Participant #</th>
<th>Cricket Ability</th>
<th>Age</th>
<th>Cricket Knowledge</th>
<th>Cricket Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intermediate</td>
<td>23</td>
<td>Good</td>
<td>6 years +</td>
</tr>
<tr>
<td>2</td>
<td>Beginner</td>
<td>21</td>
<td>Poor</td>
<td>0 - 2 years</td>
</tr>
<tr>
<td>3</td>
<td>Intermediate</td>
<td>24</td>
<td>Average</td>
<td>6 years +</td>
</tr>
<tr>
<td>4</td>
<td>Beginner</td>
<td>21</td>
<td>Average</td>
<td>3 - 5 years</td>
</tr>
<tr>
<td>5</td>
<td>Beginner</td>
<td>23</td>
<td>Poor</td>
<td>0 - 2 years</td>
</tr>
<tr>
<td>6</td>
<td>Beginner</td>
<td>33</td>
<td>Good</td>
<td>6 years +</td>
</tr>
<tr>
<td>7</td>
<td>Beginner</td>
<td>21</td>
<td>Poor</td>
<td>0 - 2 years</td>
</tr>
<tr>
<td>8</td>
<td>Beginner</td>
<td>23</td>
<td>Poor</td>
<td>0 - 2 years</td>
</tr>
<tr>
<td>9</td>
<td>Beginner</td>
<td>27</td>
<td>Poor</td>
<td>0 - 2 years</td>
</tr>
<tr>
<td>10</td>
<td>Beginner</td>
<td>21</td>
<td>Poor</td>
<td>0 - 2 years</td>
</tr>
</tbody>
</table>

Table 1 - Summary of participants

The participants were split into 2 groups of 5, which gave each participant sufficient testing and training, and less waiting during other participants’ testing. This quickened the testing process and kept the participants interested, which helped them record realistic results (Montada, 1998).

An interactive coaching device can be designed to suit a variety of users from beginners to advanced players. The prototype designed in this study was more suitable for beginner and intermediate players as these participants are more likely to show an improvement in a short space or time (Palmer, 2002).
3.4 Materials

3.4.1 Interactive Coaching

The interactive coaching simulation was designed to help establish the benefits of such a device in cricket coaching and was produced for delivery by CD-ROM due to the high content of media. The first step in designing multimedia is to sketch or storyboard some designs (Busby and Bousquet, 2001) and the interactive coaching storyboard show the basis for the final design (Appendix N). The first draft of the interactive coaching included a batsman figure in the 3D simulation (Figure 16). However, animating a batsman in 3D would take much time and it was decided to drop the inclusion of a batsman for the final 3D simulation (Figure 17). See Appendix O for the interactive coaching simulation.

The introduction animation to the simulation was designed to excite users and help to hold their attention, a necessary aid to learning (Schank, 1997). The introduction was created in 3d Studio Max and Adobe Premiere, and the interface was authored in Macromedia Flash. The option to skip the introduction animation is very important (Neilson, 2000), and the multimedia cricket coaching program includes such a control. The first screen explains the CD-ROM and how to navigate the application.
In a final version, this would be accompanied with an audio explanation as well. The background images were created in 3d Studio Max and Adobe Photoshop, allowing animation between each section of the simulation in an attempt to attract users and give each section an individual theme.

The coaching section gives examples of the most common shots played in a cricket match. A media panel and text panel give users the option to view the different media and still refer back to the text. Mayer (2001) believes that a successful interactive coaching device should include a variety of media sources such as audio, text and video and the prototype incorporates Mayer’s suggestions.

The information text is in a large, common font, and a final design would incorporate an increase-text-size option to aid accessibility (Neilson, 1997). The text is accompanied with sound and sound controls that were recorded in Sonic Sound Forge. The audio uses a unique dialect in an attempt to gain an unexpected response from the users to enhance memory retention (Ripley, 1999). The information panel includes a 2D diagram of the wicket that explains the cricket jargon to ensure that any users can fully understand the audio and text.

The media panel shows a 2D overview of the cricket field, consisting of a diagram and basic field positions to show beginners the path of the ball. Computer graphics can be stored in memory and revisited at a later time (Brown and Cocking, 1998), and this graphic shows users where they should attempt to place their shots.
The next tab on their media panel contains 3D simulations of a cricket shot from the front, back and side views of the wicket. The 3D simulations were created in 3d Studio Max and Adobe Premiere, however the Sorenson compression codec in Flash MX has resulted in a slight pixelated effect. A final version would need to be authored in Flash MX 2004 that comprises of Sorenson Spark which imports video to a high quality (Brynildse, 2002). Due to the time constraints, the 3D simulations do not include a batsman, which has always been an essential part of cricket learning (Bradman, 1948: Andrew, 1987). A final version would need to include this feature.

The final section to the media panel is the video section, which was captured from Sky Sports during a recent cricket match. The Executive Producer of Cricket at Sky Sports authorised the use of Sky Sports footage in this study (Appendix J). The video was streamed into Adobe Premiere and edited for playback in the interactive coaching simulation.

Once the first version of the interactive coaching simulation was complete, it was tested against trial participants to record their views before it was ready for participant testing. Table 2 shows the pre-testing feedback.
<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Cricket Ability</th>
<th>Multimedia Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td># 1</td>
<td>20 - 25</td>
<td>Beginner</td>
<td>Advanced</td>
</tr>
<tr>
<td>Feedback</td>
<td>Too many shots confuse.</td>
<td>Needs an explanatory introduction page.</td>
<td></td>
</tr>
<tr>
<td>Actions Taken</td>
<td>The shots were reduced to 6.</td>
<td>An explanatory introduction page was added.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Cricket Ability</th>
<th>Multimedia Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td># 2</td>
<td>36 - 40</td>
<td>Beginner</td>
<td>Advanced</td>
</tr>
<tr>
<td>Feedback</td>
<td>Change audio to actual person.</td>
<td>Increase the text size to make information clearer.</td>
<td></td>
</tr>
<tr>
<td>Actions Taken</td>
<td>The audio was recorded in person.</td>
<td>The text size was increased to aid accessibility</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Cricket Ability</th>
<th>Multimedia Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td># 3</td>
<td>26 - 30</td>
<td>Beginner</td>
<td>Advanced</td>
</tr>
<tr>
<td>Feedback</td>
<td>Don't like computerised audio.</td>
<td>Include menu button throughout shot pages.</td>
<td>Include date and copyright in credits page.</td>
</tr>
<tr>
<td>Actions Taken</td>
<td>The audio was recorded in person.</td>
<td>A menu button was added throughout the shot pages</td>
<td>A date and copyright sign were added to the credits.</td>
</tr>
</tbody>
</table>

Table 2 - Pre testing feedback

3.4.2 Coaching Video

The cricket coaching video was recorded with Gloucestershire County Cricket Club (GCCC) ECB level 3 staff cricket coach, Joe Skinner (Appendix P). The test was discussed in detail to establish the content of the cricket video, and it was decided that the coach would first explain the cricket shot and when it would be played. Second, the coach would play the shot in full speed and finally perform the shot in slow motion, explaining technical movements. It was agreed that only the main shots would be discussed on the video because too much information may confuse the users and lower their memory retention (Wheeler, 2003: Morrison and Tversky, 2000).
The camera footage was imported into Adobe Premiere, edited and exported as RAW footage. This footage was transferred onto VHS.

3.4.3 Equipment

In the testing stage, the interactive coaching simulation was run on a Toshiba Satellite Pro A10 Pentium 4 Notebook, with a Celeron 2.2 Ghz processor, 256MB RAM, 20GB hard disk space, a 14” TFT screen and Windows XP Pro operating system (Figure 18). The coaching video was played back on a Toshiba VHS player with a 17” TV screen (Figure 19).

3.4.4 Environment

The testing took place in the indoor cricket nets at Hardwick Sports Centre, Cheltenham. The structure was arranged to ensure that the participants were comfortable and not distracted so that true data would be recorded (Levine, 2004). The overhead plan (Figure 20) details the arrangement of the testing environment. The interactive coaching and coaching video were kept separate to ensure the participants could not watch the other training method.
A Sony digital camera was placed in a direct line from the stumps at the same viewpoint as a TV broadcast, which is the best area to make a judgement on any batsman’s ability (Palmer, 2002). The promotions area (Figure 21) comprised of cricket information supplied by GCCC to keep the participants interested and help market the club.
3.5 Questionnaires

This study employed questionnaires based upon background reading on the subject. This helped to prepare the questions and establish the desired feedback. A pilot questionnaire was sent to test participants and academic lectures for their feedback before the final design was complete.

A pre-testing questionnaire was given to all participants before the test to record their skills and characteristics (Appendix E). The data from this questionnaire could later be used for cross referencing against the data collected during the test. As in all the questionnaires, participants were advised that the information supplied was confidential and anonymous and that they could skip any questions they wished.

A post-testing questionnaire was given to the participants after the test to record their thoughts on the training (Appendix F). The survey collected information from open questions and five-point Likert rating scales that could later be used in comparison with the pre-testing questionnaires.

The aim of the “Interactive Coaching Evaluation Questionnaires” was to collect feedback from cricket and sport coaches, cricketers, and multimedia designers (Appendix I). This would gather feedback about the quality of coaching, feedback from the intended users and feedback on the design of the product. The questionnaire and CD-ROM were sent to organisations all over the world with a covering letter explaining the study and the confidentiality act. The questionnaire used a five-point Likert rating scale, which can collect quantitative data for analysis (Gillham, 2000). The main disadvantage to a five-point scale is that people tend to be more or less
positive when it is highly doubtful that they are really satisfied. Whatever box they tick, the question doesn’t record why they have selected that box (Gillham, 2000). To counteract this, open ended questions followed the five-point Likert scales to record the participants’ likes and dislikes.

3.6 Procedure

The testing procedure was planned in detail to ensure the experiment was uncomplicated, the participants were unperturbed, and that truthful data was recorded (Levine, 2004). The participants were split into two sets of five, and a detailed plan (Appendix C) was presented to each participant describing where they should be and at what time. The plan specified twenty-three minutes promotional time for each participant. This time specification was flexible and could be reduced if needed, leaving adequate contingency time (Nyman, 2002).

The researcher acted as the testing moderator and ball thrower, and an assistant moderator was employed to control the participants’ training sessions. The participants were able to approach the assistant with any questions or problems throughout the testing and training to ensure they did not get confused.

On arriving at the testing venue, the participants read and signed content forms (Appendix D) and were briefed for thirty minutes about the testing procedure. The moderator answered any questions to assure the participants’ understanding and explained that the participants were free to conclude the testing at any time they wish.
Once the participants had prepared for the testing by reading a muscle-stretching leaflet supplied by ECB (Appendix K) and were satisfied with the protective equipment, the batting session commenced. Participants each received ten practice balls to ensure they were fully equipped to begin the recorded batting test. After previous discussions with the test scorer, the researcher attempted to throw each ball within a four-foot area, three foot in front of the batsman. GCCC gave permission for use of their cricket bowling machine to ensure the deliveries kept the same speed and direction. Ultimately, however, a bowling machine would increase time and might be unnerving for a new cricketer (Palmer, 2002), so it was decided each ball would be manually thrown.

It was originally suggested the participants receive exactly twenty balls, but discussions with the test scorer resulted in the agreement that the participants receive approximately 25 deliveries. This gave the test scorer the opportunity to exclude any ball deemed too wide for a realistic score. Therefore an average score was calculated in the data analysis.

The participants’ first batting session lasted for approximately four minutes and about twenty-five deliveries. Following the first batting session, each participant trained for ten minutes on the interactive coaching or coaching video after a concise explanation from the assistant moderator. With the training complete, and after allowing time for the information to be absorbed (Ripley, 1999), each participant batted for a second time under the same conditions as the first innings.
At the end of the testing, the moderator and assistant moderator discussed independent and dependent variable differences and possible bias from the moderator and no matters arose.

3.7 Ethical Issues

The study was performed in compliance with the Research Ethics Handbook issued by the University of Gloucestershire in 2003 (https://intranet.glos.ac.uk/research/researchethicshb/). In accordance with the guidelines, an ethical plan was proposed and approved by an academic lecturer as suggested by Saunders, Lewis and Thornhill, (1997). Each questionnaire clarified the nature of the study, the confidentiality of the data recorded and assured the user that the questions were not mandatory.

Upon attending the testing procedure, participants were given consent forms to read and sign (Appendix D). The consent form gave the participants vital details about their involvement in the testing, which is a crucial aspect to human participation in any study (Montada, 1998: Saunders, Lewis and Thornhill, 1997). The consent form was important, considering the participants were involved in a sporting experiment that increased the risk of injury (Rudestam and Newton, 2001). The participants were informed that if they were harmed in any way, they would be cared for (Shapiro, 2001) by a certified medical officer available during the test.

The participants were required to sit for a maximum of ten minutes during the training sessions. Refreshments and rest rooms were easily accessible. Participants were advised they could break at any time, and the assistant moderator was easily available for questions throughout. All seating equipment was approved by the leisure centres
Human Resources, and the ergonomic design of the chair incorporated adjustable height, backrest, arms and tilt to cater for all the participants' comfort and ethical issues (Tam, 2003).

Participants listened to a brief by the moderator before taking the test. The brief mentioned their involvement and procedure. They were handed written instructions and advised that they could withdraw at any point without prejudice. The test was concluded with a debriefing explaining the data collected, and the participants were informed they could withdraw their data from the study at any point (Montata, 1998).
Chapter 4: Results

4.1 Participant test results

The test produced a variety of results used for data analysis. Table 3 shows the average score per shot for the first and second innings. The improvement score shows the difference between the two innings after the participant training on the interactive coaching (Int. Coach) or coaching video. The figures show a total average improvement score of 0.29 per shot for the interactive coaching and 0.26 for the coaching video. See Appendix G for the complete participant results rated by the test scored and Appendix H for further results.

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Training Method</th>
<th>Innings 1 - Average Shot Score</th>
<th>Innings 2 - Average Shot Score</th>
<th>Average Shot Score Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Int. Coach</td>
<td>0.48</td>
<td>1.20</td>
<td>0.72</td>
</tr>
<tr>
<td>5</td>
<td>Int. Coach</td>
<td>0.55</td>
<td>0.61</td>
<td>0.06</td>
</tr>
<tr>
<td>7</td>
<td>Int. Coach</td>
<td>0.29</td>
<td>0.30</td>
<td>0.01</td>
</tr>
<tr>
<td>4</td>
<td>Int. Coach</td>
<td>0.93</td>
<td>0.88</td>
<td>-0.04</td>
</tr>
<tr>
<td>1</td>
<td>Int. Coach</td>
<td>1.64</td>
<td>1.19</td>
<td>-0.45</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>3.89</strong></td>
<td><strong>4.18</strong></td>
<td><strong>0.29</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Training Method</th>
<th>Innings 1 - Average Shot Score</th>
<th>Innings 2 - Average Shot Score</th>
<th>Average Shot Score Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Video</td>
<td>0.41</td>
<td>0.58</td>
<td>0.17</td>
</tr>
<tr>
<td>6</td>
<td>Video</td>
<td>0.63</td>
<td>1.12</td>
<td>0.49</td>
</tr>
<tr>
<td>10</td>
<td>Video</td>
<td>0.27</td>
<td>0.43</td>
<td>0.16</td>
</tr>
<tr>
<td>8</td>
<td>Video</td>
<td>0.43</td>
<td>0.34</td>
<td>-0.08</td>
</tr>
<tr>
<td>3</td>
<td>Video</td>
<td>0.72</td>
<td>0.25</td>
<td>-0.47</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>2.47</strong></td>
<td><strong>2.73</strong></td>
<td><strong>0.26</strong></td>
</tr>
</tbody>
</table>

Table 3 - Average Shot Score Improvements

Table 4 shows the post-testing feedback from the participants on the training methods. The feedback was retrieved in a five-point Likert scale that rated the helpfulness of the training method, the participants’ improvement and their overall rating.
4.2 Questionnaire results

To establish whether interactive coaching could be an effective tool for cricket training, it was decided to collect feedback from a variety of sources within sports coaching and the multimedia industry (Appendix I). These questionnaire forms were sent to organisations all over the world by email and post and thirty-five responses were received. See Appendix H for further results.

<table>
<thead>
<tr>
<th>Likes</th>
<th>People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplistic and user friendly interface</td>
<td>12</td>
</tr>
<tr>
<td>Video media</td>
<td>11</td>
</tr>
<tr>
<td>3D simulations</td>
<td>11</td>
</tr>
<tr>
<td>Diagrams and field overview</td>
<td>3</td>
</tr>
<tr>
<td>Introduction animation</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dislikes</th>
<th>People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio accent</td>
<td>6</td>
</tr>
<tr>
<td>Pixelated video</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Improvements</th>
<th>People</th>
</tr>
</thead>
<tbody>
<tr>
<td>More technical information</td>
<td>9</td>
</tr>
<tr>
<td>Batsman figure in 3D simulation</td>
<td>8</td>
</tr>
<tr>
<td>Bowling and fielding coaching</td>
<td>7</td>
</tr>
<tr>
<td>More shots and sounds</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 4 – Participant Testing Feedback

Table 5 - Summary of Industry Feedback
Table 5 shows a concise summary of industry feedback of the interactive coaching simulation. This table illustrates that eleven out of the thirty-five responses liked the video media and 3d simulations, however six people commented on the pixelated video. The main area of improvement suggested by participants included more technical information. Nine participants made that suggestion.

“I would question it’s (interactive coaching) effectiveness as a training tool without more coaching information.” Rebecca Sutherland – Coaching Manager.

Whereas three people suggested the low technical information is suitable for beginners or children, a full coaching simulation would need an improvement in the technical education similar to the coaching video.

Eleven questionnaire participants gave positive feedback about the 3D simulation due to its visual stimulation and educational capability.

“I particularly like the way you represented the hit directions using three different learning mentalities.” Greg Chappell – Former Australian cricket captain.

Eight people strongly believed that a human figure is essential for coaching in the 3d simulations. This human figure was left out due to time constraints, and a final version would adopt a 3D simulation of a batsman.
“The simulations would be improved by the addition of a batsman.” Paul Grunill – BBC Cricket Editor.

Mayer (2001) believes that two or more sources of information aid learning, and the interactive coaching simulation includes text, audio, visual simulations which assisted the participants. One of them responded,

“The audio made me listen rather than skim read the text.” Lisa Merle – Essex Cricket Centre.

The interactive coaching evaluation questionnaires collected quantitative data in the form of five-point Likert scale questions. The participants rated various areas of the interactive coaching simulation as seen in table 6. The five-point Likert scale used varied from very poor (1), poor (2), satisfactory (3), good (4) and very good (5) (Rudestam and Newton, 2001).
Table 6 Interactive coaching simulation feedback

The results show the seven simulations areas scored approximately a rating of 4. The 3D simulation scored the lowest at 3.90, and this was mainly due to a low rating from participants with excellent cricket knowledge (Table 7). This is because experienced cricketers understand the importance of visualising a batsman when teaching or learning to play (Palmer, 2000).
4.3 Discussion

The test participants improved their ability after the interactive coaching by an average shot score of 0.29 which is 0.03 superior to the coaching video which scored an improvement score or 0.26 per shot. This shows the participants found the interactive coaching slightly more effective as a training tool compared with the coaching video. However, the scores are too close to suggest that one is significantly superior to the other (Table 8).

<table>
<thead>
<tr>
<th>Difference</th>
<th>Sample Diff.</th>
<th>Std. Err.</th>
<th>DF</th>
<th>T-Stat</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactive Coaching –</td>
<td>0.006</td>
<td>0.083162494</td>
<td>4</td>
<td>0.07214791</td>
<td>0.9459</td>
</tr>
<tr>
<td>Coaching Video</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8 - Paired T-test results

The quantitative results (Table 3) show little difference in the improvement scores, and the researcher believes that the testing was too brief for the results to be meaningful. It is recommended that testing take place over a full cricket season to
give the interactive coaching suitable time to have an effect (Ripley, 1999). The qualitative results from the post-test surveys (Appendix F) show that the average participant found the interactive coaching and coaching video equally effective as training tools. Further feedback showed that the participants enjoyed the media rich content of the interactive coaching. This will enhance its ability to teach (Schank, 1997). Other participants suggested that the coaching video was boring, needed more audio information, was too fast and could improve with the use of different camera angles. However, there is no evidence to show that interactive coaching is a more effective training tool than the coaching video, and the null hypothesis is accepted.

The interactive coaching has not proved more effective than the coaching video when comparing the results, but it has received significant feedback regarding its suitability as an effective training method. The participants that trained on the interactive coaching simulation noted that they enjoyed the training and felt at ease during their navigation of the program. A training device that creates this kind of user reaction has all the essentials for a successful training simulation (Schank, 1997). The coaching video, however, recorded feedback on its lack of interactivity and dullness. It therefore may not assist learning to the same standard as the interactive coaching (Porter, 1997). Despite the lack of evidence to accept the research hypothesis, the researcher believes the positive participant feedback on the interactive coaching suggests that testing over a long period of time will produce results that will accept the research hypothesis.

Although the testing compared interactive coaching to a coaching video, it is worth remembering that the interactive coaching can incorporate the video. It could be said
that this research compares interactivity to non-interactivity as a training aid. The overall aim was to learn the components of an ultimate training simulation and this was achieved. A plethora of multimedia education simulations have been studied and either incorporated into the interactive coaching or mentioned in the study. After further research, the inclusion of video reply in the interactive coaching is the main suggested area for further research.

Willis (2004) and Palmer (2002) suggest video replay as one of the most effective methods of coaching. The ability to view oneself on screen gives the mind all the essential imagery to understand how the body is working and will facilitate skills enhancement (Ripley, 1999). The interactive coaching shows TV footage of a cricket game. With Ripley’s theory in mind, an ultimate interactive coaching device could include an “import video” facility. This could be incorporated with speed and zoom controls, and the ability to edit screen shots with statistical lines. A further study could incorporate video reply controls to enable users to understand its usefulness.

Comparing different types of multimedia to ascertain the best training tool will result in finding the best methods of learning. Any multimedia training device can be adapted to include the latest multimedia training aid. Research of this kind helps to establish which methods of multimedia learning are most effective.
Chapter 5: Evaluation

Project management and planning was one of the most important parts of the project. It is essential to the success of any project to set a work plan detailing the deliverables and deadlines (England and Finney 2002). This was achieved in a Gantt chart (Appendix A), which was updated throughout the project. The final deadline was set four weeks before the actual submission date to allow for contingency time (Tinirello, 1999). The deadline proved realistic, and the majority of the project was completed by the designated time.

The literature review proved both interesting and exciting as the research involved liaison with organisations all over the world. A large number of multimedia training simulations were examined before selecting the most suitable ones for this study. The most relevant being the Howzat! CD-ROM. However, it was felt that it lacked technical coaching, which meant it was unsuitable for the participant testing. It was decided to produce an interactive coaching simulation for the participant testing. The simulation had all the basics needed for the testing, and the time constraints meant that only a prototype could be created.

The literature review evaluated various other multimedia sources available for cricket coaching, and an additional area of this study was planned to use participants to evaluate these programs. The participant feedback could then establish which areas of multimedia are effective for training. This could result in providing the best product for education. Questionnaires were designed (Appendix L) to test participants, but time constraints made this a low priority and this area of the study was abandoned.
The original testing method was to compare interactive coaching against a coaching book consisting of text, diagrams and images. After much deliberation with the project advisor, it was agreed to test the interactive coaching against a coaching video. Whereas comparing multimedia against text based learning had been previously researched, it was felt that interactive coaching compared to a coaching video was new and warranted further studies.

The project was ambitious as it included the production of an interactive coaching simulation and coaching video. These training devices needed thorough testing to ensure that they were suitable to test participants. The participant testing lasted for three hours and involved ten participants, two helpers, sports centre staff, a GCCC development officer and coach, and a first aid assistant. The arrangements for such a large test caused much planning along with time, effort and money to ensure it ran to schedule. Overall, it was felt that the testing was successful due to the time invested in planning the event in great detail (Appendix C).

Various statistics were studied which were suitable to analyse the data, and that review put a strain on the time allocated for the results. The paired T-test on the average improvement scores proved insignificant, and the Chi-squared statistic was selected as an alternative method. The Chi-squared statistic is more suitable for large sums of data (McGoven, 2003) and the original score sheets were analysed (Appendix H). However, the time constraints meant the researcher was unable to fully apply the Chi-squared analysis for the project.
Overall, the project was extremely engrossing, and the test feedback showed that it was fun for the participants. The information from the literature review and testing show all the essential components for successful coaching simulation. The interactive coaching raised genuine interest from a number of cricketing organisations and future conversations will establish whether a sponsored version with enhancements will be manufactured.
References


Lagha, B., Osterwalder, A. & Pigneur, Y. (2002). Towards a Virtual Coaching Service for SMEs (Small and Medium Sized Enterprises) in Developing Countries. University of Lausanne, Switzerland.


