National College of Ireland (NCI)

National College of Ireland
M.Sc. Learning Technologies
2004/2005

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Can video games or their features be used to improve learning and motivation?

Dissertation

National College of Ireland
The college for a learning society

I hereby certify that this material, which I now submit for assessment of the programme of study leading to the award of Master of Science in Learning Technologies is entirely my own work and has not been taken from the work of others save and to the extent that such work has been citied and acknowledged within the text of my work.

Signed: .....

Date:

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ABSTRACT

The subject of this dissertation was to identify what features of games can be used to improve motivation and learning in a training situation. In order to determine if the use of games as an intervention in a training situation would have any influence, a small scale experiment was set up to test this hypothesis.

The experiment consisted of providing one random sample group of trainees with the facility to play a commercially available video game which would allow them to use skills and knowledge associated with the operation of an All Terrain Vehicle (ATV) in a virtual but safe environment. Another random sample group was provided with a Web Based Training input which detailed the specific objectives and task manoeuvres required to operate an All Terrain Vehicle (ATV). In each case, the training interventions formed part of an overall training programme which was intended to achieve the desired result of training, assessment and certification/licensing of ATV operators for ESB Networks.

A third sample group of game players was surveyed to determine the most and least satisfactory aspects of computer and video games.

The methodology selected was primarily research of relevant literature, the use of a semi-structured interview schedule to gather information on the personal profiles, general IT skills and exposure to computer and video games, surveys from a game player sample group, the recording of test results and the observation of the course participants during practice sessions. The information gathered was both specific and measurable as the questions posed during the semi-structured interviews and surveys as well as the assessment items observed during practice sessions were constructed in a manner so as to

provide both qualitative and quantitative data for this research dissertation. The software application Statistical Analysis for Social Sciences (SPSS) was used to g, input and analyses the data.

Findings from the research and from the use of both the Video Game and Web Based Training input in the ATV Operator's Training Course indicated that there are less faults recorded in the observation and control skills areas demonstrated during practice by the sample group that played the video game, but that the results were not statistically significant.

However, analysis has shown that there is a significant difference in the level of motivational effect displayed as a result of each intervention on the sample groups, with the video game having a much more positive influence on the motivation levels of the ATV Operator Training Course participants.

The findings of this dissertation would indicate a positive role for the use of games as part of the training intervention and that their use can clearly influence both the motivation and learning outcomes for course participants.

ACKNOWLEDGEMENTS

I would like to thank all my colleagues in ESB Training and all the participants attending the All Terrain Vehicle (ATV) Operator Training Course, particularly the following individuals for their co-operation and assistance in conducting this research:

Paul Ennis - Manager, ESB Networks Training Centre.
William O'Dwyer - Manager, Personal and Organisational Development, ESB Training.
Pat Deasy and John Moran - Programme Leaders, ESB Training.

All the following individuals who actively participated in the training course, sample groups and also completed the interview schedules / questionnaires and surveys:

Eamon O'Meara; Joseph Slattery; Barry Commiskey; Francis McPhillips; Gerry O'Hora; Edward McAndrew; Eamonn Markey; William Moyles; John McNulty; John O'Hara; Matthew Kiernan; James Kinsella; Gerard McNicholas; Anthony Byrne; Des Downey; Kevin Linehan; Kevin Flynn; Edward Heelan; John Mannix; Michael Brennock; Pat O'Mahony; John Kirwan; John O'Regan; Denis O'Mahony; John Galvin; Barry O'Driscoll; Jim Corcoran; Padraig Crowley; James Coughlan; John Foxton; Anthony Martin; James McManus; Padraig Branley; Ray Brady; David Mulcahy; Daniel O'Shea; Brendan O'Sullivan; Connie Clear; John Cotter; Michael Healy; Joseph Byrne; Aedán McKinley; Seán Dowling; Stephan Cunningham; Ronan Healy; Luke Sweeney; Graham Hughes; Aaron Glennon; Sean Ross; Keith Doyle; Lisa Kurtz; Derek Mooney; Andrew Minihan; Ryan Foley; Niall Robinson; Eoin Cregg; Róisín Farrell; Roy Donovan; Anthony Stephens; Seán Brennan; Ciarán Shanley; and Liam Sweetman.

I would specifically like to thank Michael Treacy, who independently, tested and assessed the ATV Operator Training Course participants in their respective 'Sample Groups' with outstanding professionalism.

The staff of the National College of Ireland, in particular Stephan Sweibelzahl, Promad Pathak, and Eugene O'Loughlin for their academic support, guidance and encouragement.

Finally, I would like to thank my wife Catherine and sons Ryan, Scott and Alex for their patience, support and encouragement.

LIST OF FIGURES

1. INTRODUCTION

1.1 Dissertation Title

Can video games or their feature be used to improve motivation and learning?

1.2. Overall Aim of Dissertation

The overall aim of this dissertation is to identify features of computer and video games that can be utilised by instructional designers in the design and development of training interventions.

This dissertation will focus on:

(a) An analysis of the computer, Internet and video game playing usage statistics of randomised sample groups of learners attending as course participants on an All Terrain Vehicle (ATV) Operator Training Course and a randomised sample group of video and computer game players.

(b) The measurement of the effects of utilising a Video Game and Web Based Training on the motivational and learning outcomes of two sample groups attending an All Terrain Vehicle (ATV) Operator Training Course.

(c) The identification of a range of potential interventions or strategies that can be used by instructional designers to improve the design of training courses.

1.3. Dissertation Objectives

The objectives of this dissertation are to:

- Conduct a literature review and research the relevant theory relating to the use of games as a means to improve learning and motivation.

- Conduct an empirical research study by utilising a commercially available video game and a specifically designed Web Based Training (WBT) course element to analyse the effect of such interventions on the learning and motivational outcomes of sample groups of course participants.

- Analyse the research findings and present the data.

- Discuss the specific objectives, features and functions of both the Video Game and the Web Based Training.

- Discuss the outcomes of using Video Games and Web Based training with the relevant sample groups.

- Identify features of games that can be used to improve learning and motivation.

- Draw conclusions and make recommendations on the use of video games and Web Based Training.

- Discuss future areas for research relating to the use of video games and their role in improving motivation and learning

1.4. Dissertation Plan of Development

This dissertation is divided into six chapters:

Chapter 1: This introductory chapter provides an overview of the content of this dissertation and establishes the precise aims and objectives, establishes the reasons for the choice of topic and outlines the research process and provides essential background information on the rationale behind the use of Video Games and Web Based Training as intervention on an All terrain Vehicle (ATV) Operators Training Course

Chapter 2: This chapter reviews the relevant literature with a particular focus on the types of computer and video games; their users – the games generation as the new learners; motivation, motivational theories and their role in learning; and the implications for instructional design.

Chapter 3: This chapter describes the research methodology adopted for this dissertation. It describes the research approaches used and outlines the rationale for using semi-structured interview schedules, surveys, the observation of practice sessions, summative knowledge assessment tests, post-training knowledge assessment tests and practical assessment of the operation of an All Terrain Vehicle by each of the sample group participants.

Chapter 4: This chapter provides a detailed presentation of all the information and data gathered as a result of the empirical research. The main responses to the interview schedule / questionnaires are also discussed and summarised.

Chapter 5: This chapter discusses analyses the literature and empirical research findings from all the sample groups and determines what, if any are the implications of the use of video games to improve motivation and learning.

Chapter 6: This chapter outlines a future perspective on the use of computer and video games by learners, trainers and instructional designers.

1.5. Dissertation Map and Empirical Research Plan

The aim of this section is to map the main sequence of steps followed in this dissertation and shows the relationships between the stages of the process.

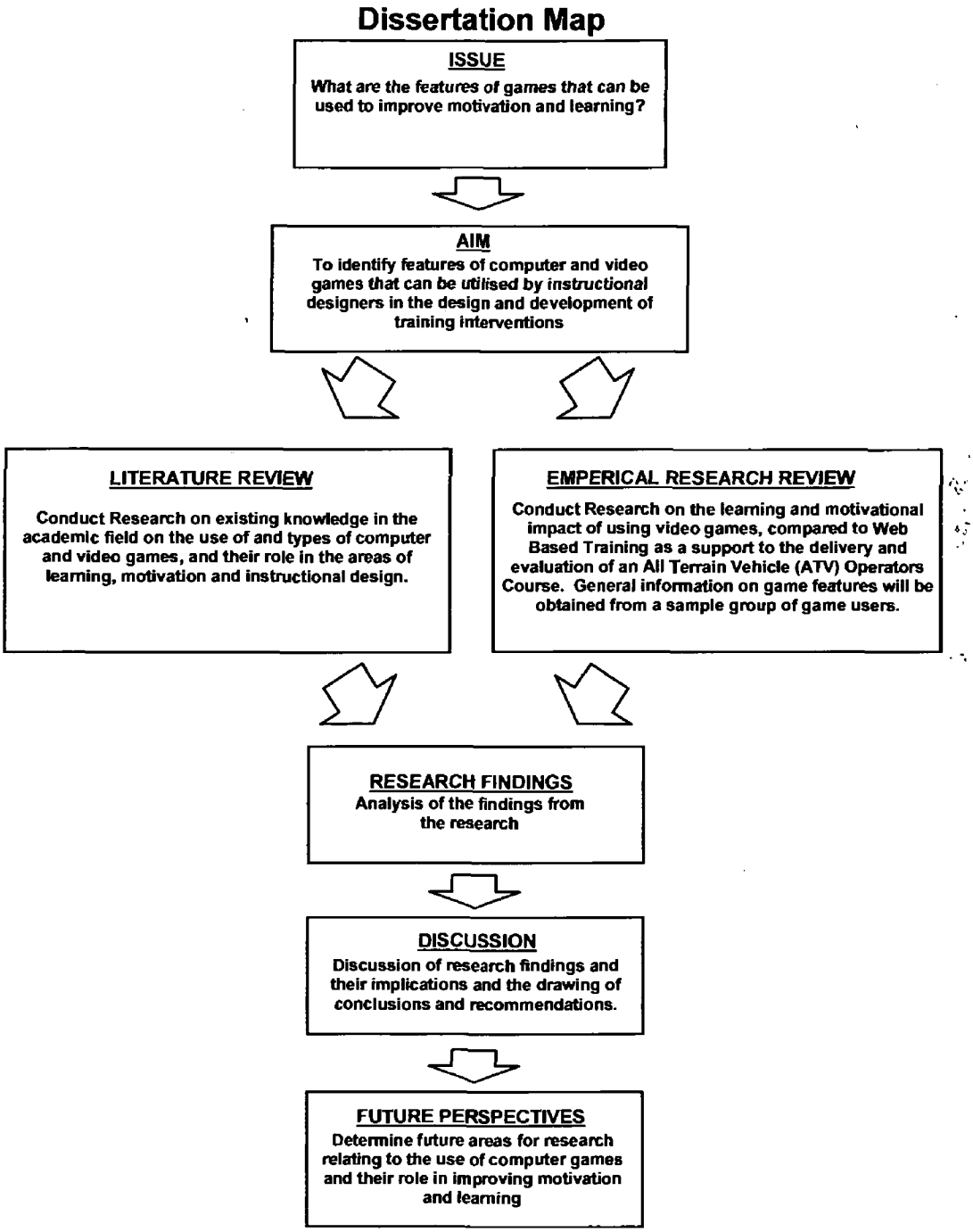


Figure 1.1 Dissertation Map. Source: Author

The sequence and position of the empirical research analysis points is outlined in the 'Empirical Research Plan' below and shows how the 'ATV Operator Training Course content outline has been structured to facilitate the various analyses to be conducted. It also shows the relationship between the sample groups within this research plan.

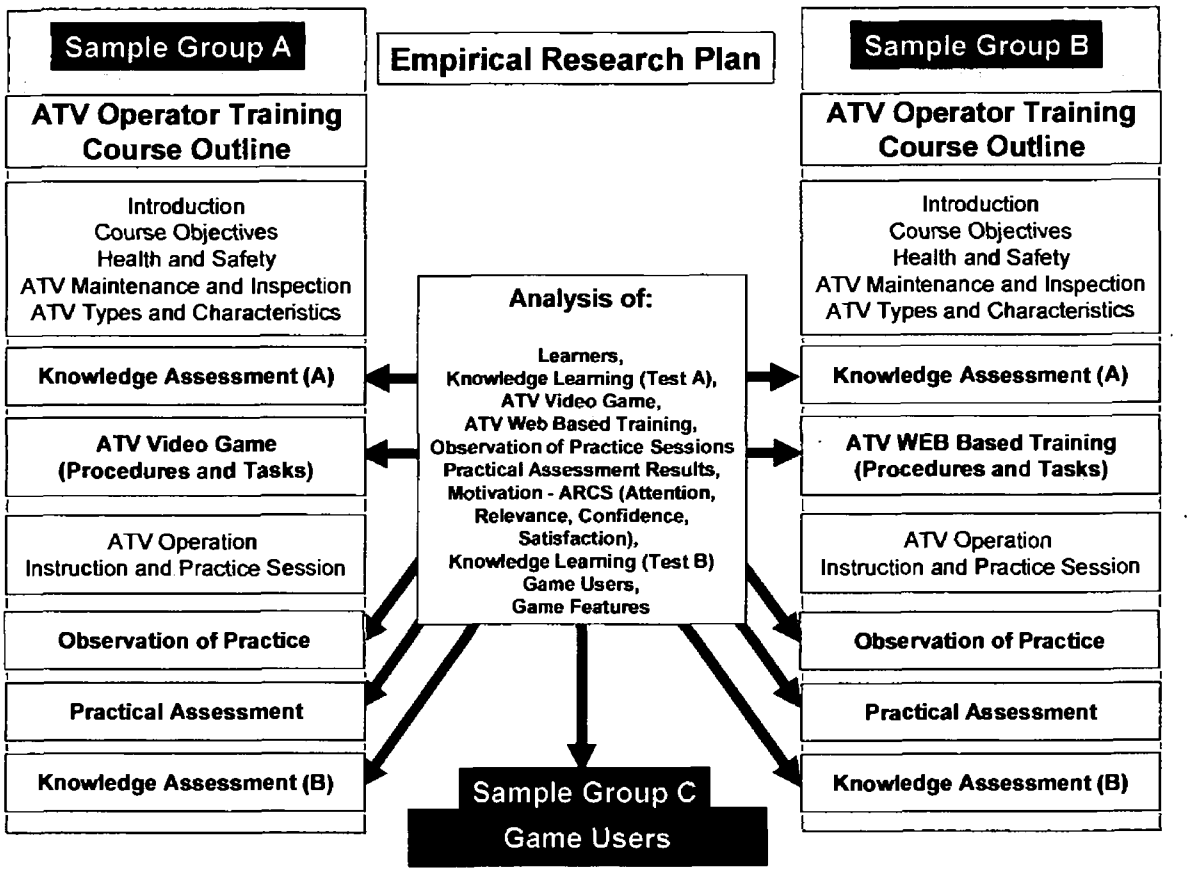


Figure 1.2. Empirical Research Plan. Source: Author

1.6. Reasons for Choice of Topic

In 2003, a 'Safe Driving Initiative' was launched by the Chief Executive of ESB in response to the large number and rising cost of Road Traffic Accidents (RTA's) involving ESB Staff and vehicles. The initiative would take the form of a complete review of all transportation issues within the company and provide all the necessary personnel, fleet equipment, operating and maintenance procedures and most importantly of all, the training necessary to ensure that the Safe Driving Initiative was fully implemented over a three year period.

A 'Safe Driving Bureau' was set up within the company with full responsibility for implementing this initiative. One of the first initiatives involved a review of the driving skills of all the staff who operate ESB vehicles and also of all staff who drive their own private vehicles both for the company and private use. As this initiative developed, specialist areas of vehicle operation, and mobile plant and equipment operation were identified as requiring specific attention.

Legislative requirements, under the Safety, Health and Welfare at Work Act and its Statutory Instruments, require ESB to ensure that all operators of such plant and equipment, be provided with all the necessary training and equipment to ensure they are competent to operate such plant and equipment. Certain areas, such as the operation of forklift trucks, for example, have training and certification programmes in place and operators of such vehicles or plant are trained and certified on a regular and ongoing basis.

However, it was recognised that there were specialist vehicles and plant and equipment in use in ESB which did not have any formal requirements for training and certification, but would be required under future legislative developments. This was highlighted specifically when a contractor, working with a contracting company on behalf of ESB, was fatally injured when operating an All Terrain Vehicle (ATV). All Terrain Vehicles or ATV's are also sometimes known as 'Quad Bikes'.

Further analysis into the operation of such vehicles within ESB, highlighted the large number of serious injuries that were occurring on a regular basis. There were also a significant number of 'near misses' or 'potential occurrences of accidents' associated with their operation.

The most appropriate action to take in response to this was to implement a training, assessment and certification programme to ensure that all staff who operate such vehicles would not only be competent to do so but would also be issued with an ATV Operators Licence. From this point onwards, only trained and licensed operators would be allowed to operate ATV's in ESB or for contractors working on behalf of ESB.

To assist the ESB and the Safe Driving Bureau in addressing this issue, ESB Training were contracted to design and deliver, assess and certify all the operators of All Terrain Vehicles (ATV's) in ESB. ESB Training is one the main training providers for ESB.

ESB Training, on behalf of their customers, undertook the task of designing the appropriate training solution.

1.7. Interest in Research Topic

As an Instructional Designer working on behalf of ESB Training, it was my personal responsibility to utilise all available resources, including subject matter experts to develop a suitable training programme to meet the needs of the stakeholders and customers and achieve all the learning objectives.

In developing the training course, it became evident that there would have to be certain elements included in the programme. There would have to be a 'health and safety' element, an 'operation and maintenance' element, as well as an outline of the different 'types of ATV' and their 'operational characteristics'. These elements would constitute the main knowledge elements of the training course. A classroom input would therefore have to be developed to deliver this aspect of the training course.

I t was at this point that I endeavoured to develop an alternative strategy for the delivery of this particular part of the course and I began to construct animated 'ATV Operating Procedures' which showed the specific procedures, tasks and manoeuvres associated with the operation of an All Terrain Vehicle (ATV). This would be delivered in the classroom via multimedia computer and digital projector to the class participants as part of the training course.

It was also an opportune time to develop some alternative delivery support strategies that could be associated with both the 'All Terrain Vehicle (ATV) Operator Training Course' and to form the basis of this dissertation as part of a M.Sc. in Learning Technologies with the National College of Ireland.

The use of video games as a tool to help promote learning lent itself very easily to the development of this particular training course as there are a number of video games available that are associated with the operation of ATV's or 'Quad Bikes'. The use of a video game, combined with the development of animated sequences to a training presentation, presented the opportunity to use an 'ATV' video game and to develop a 'Web Based Training' course element and to compare the potential to improve learning and motivation among training course participants.

It was important, however, not to interfere with the learning objectives of the training course. Therefore, this study was conducted in tandem with the actual delivery of the All Terrain Vehicle (ATV) Operator Training Course and with the cooperation of 'ESB Training' management, training staff, and the course participants who volunteered to assist in the completion of this study.

1.8. The ATV Operator Training Course

The All Terrain Vehicle (ATV) Operator course is a course designed to provide ATV Operators with the essential knowledge and skills to operate an ATV in a safe and correct manner. The specific course objectives state that the participants will be able to:

- Demonstrate the correct and safe operation of an All Terrain Vehicle (ATV) in compliance with the Manufacturer's Instructions and the operational requirements of ESB by completing a series of practical exercises.

- Successfully complete a knowledge and practical competency assessment on the operation of an ATV.

The Training Specification for this course is shown in Appendix 7.

As this course is normally run over two days, and as the majority of course participants have little or no experience of operating ATV, time for practice is made available and it is during this time that this research study was conducted.

The photos below show some of the participants on the ATV Operators Training Course in which this research study was conducted. They show the course participants both under instruction and practicing various tasks and manoeuvres.

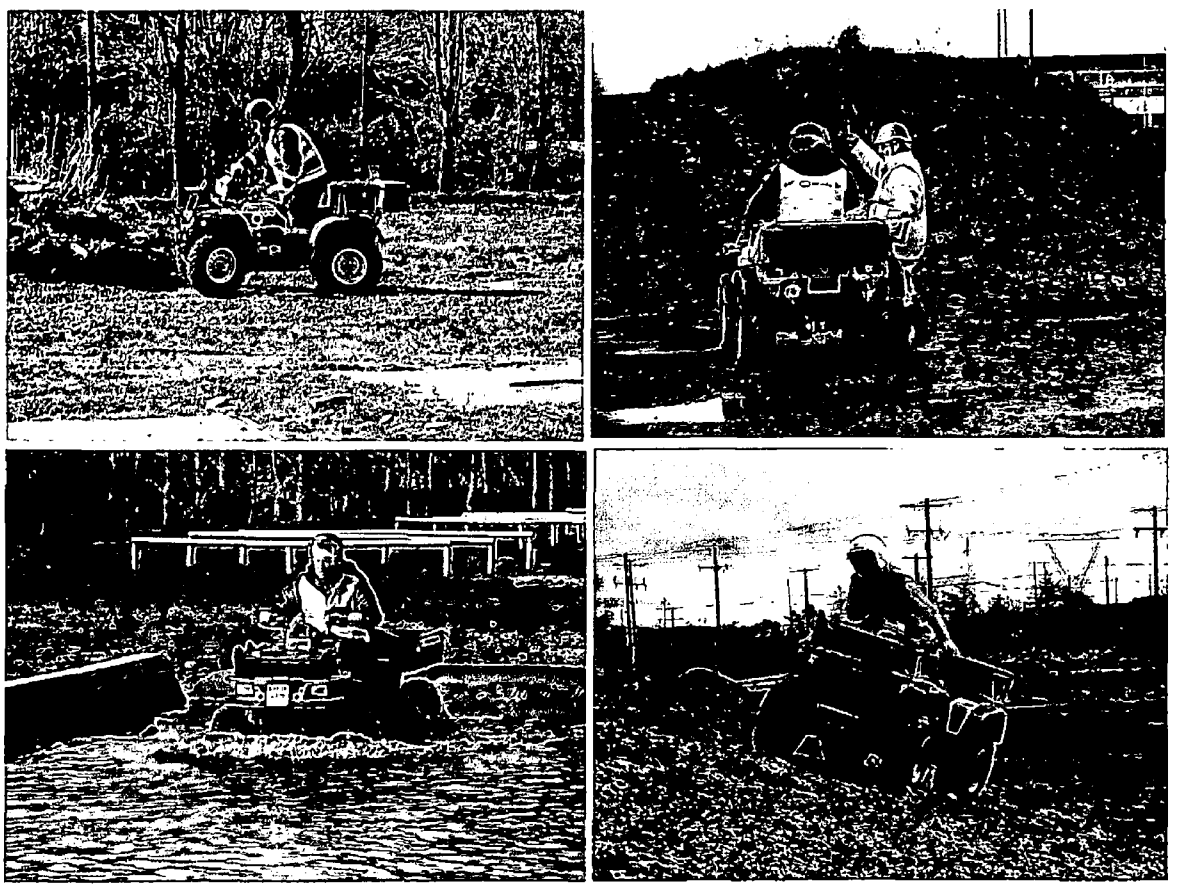


Figure 1.3. ATV Instruction and Practice Session.

1.9. The ATV Video Game

In order to facilitate this study, the volunteer participants from the All Terrain Vehicle (ATV) Operator Course were ramdonly assigned into two specific groups – 'Sample Group A' and 'Sample Group B'. Sample Group A were assigned as part of this study to complete an ATV video game which was to be played by the group using a Sony PlayStation® 2 video game console.

The video game itself was to be used in a specific manner and was specifically chosen as its virtual environment very closely matched that of the real 'ESB Training' All Terrain Vehicle practice area. As 'ESB Training' is involved in training for electrical utility type work, the practice are is located in an area full of 'high voltage' electrical transmission and distribution plant and equipment and this is also the case in the 'virtual environment' of the game.

The ATV video game itself involves the racing of ATV's and performing various stunts, jumps and even racing against locomotives. All are extremely dangerous, unsafe and absolutely against everything a course participant is required to do as part of their responsibility and job. Notwithstanding this, there is a facility to practice in an open virtual environment and operate the ATV with all its capabilities and flaws still intact, where the virtues and manoeuvres of 'safe' operation of an ATV can be performed.

The main objective of the ATV training course is the safe and correct operation of an ATV, therefore the completion of set tasks and manouerves were to be completed by the Sample Group. A list of these tasks and manoeuvres was provided to the participants.

When the tasks and manouevres were completed, participants were able to 'play' and have 'fun' with the game as a normal game player. In the virtual environment of the video game, game players can attempt dangerous manoeuvres without serious consequence or real injury (except to their pride).

The Vehicle in the ATV was controlled by a standard Playstation® 2 Dual Shock™ controller which allowed for acceleration control and steering manoeuvrability, not unlike a real ATV. Feedback was provided visually through the TV monitor, the vibration in the controller and the engine sound and that of the rider when he or she fell off was provided through speakers on the television.

The controls themselves were very easy to operate and all sample group participants were able to master them within minutes, including those participants who had never played a video games or even used a computer before.

Figure 1.4 below shows some screen shots from the video game and as can be seen, the virtual environment closely represents the real ATV practice course area.

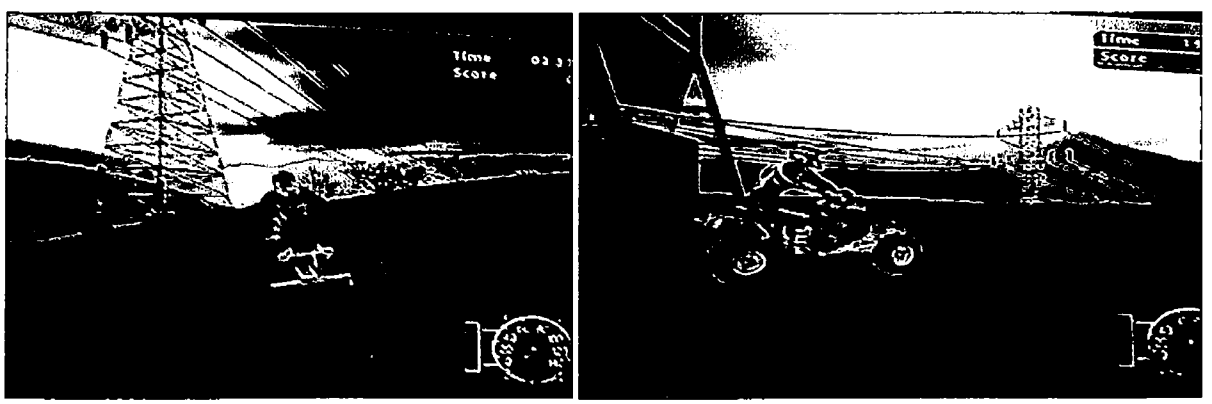


Figure 1.4. Screen Shots of ATV Video Game

1.10. The Web Based Training

An 'ATV Web-Based-Training' (WBT) element was designed as part of this research study and was also to be completed by the ATV Operator Training Course participants assigned to Sample Group B, at the specific point in the course where the participants had completed their knowledge assessments and before they engaged in the instruction and practice on an actual All Terrain Vehicle (ATV).

The WBT course provided the Sample Group B participants with all the objectives and procedures to be completed using an actual ATV and instructions on how to complete each manoeuvre safely and correctly. An example of one of the pages is shown below:

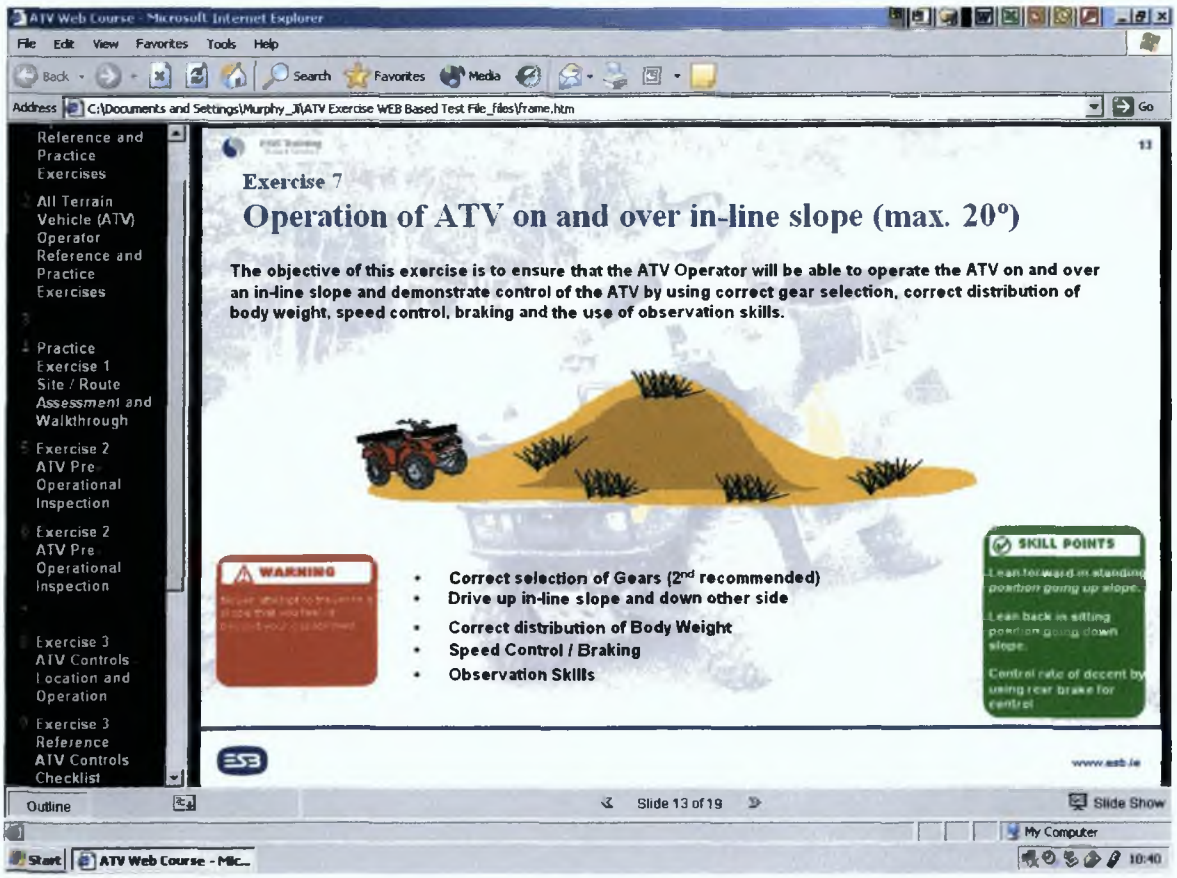


Figure 1.5. ATV Web Based Training Course screen shot.

Each page of the ATV WBT course was constructed with specific elements such as an animation showing the specific manoeuvre being undertaken, the highlighting of procedural steps, and warnings and skill points associated with each of the manoeuvres.

The figure below show a number of Sample Group B participants working through the ATV Web Based Training (WBT) course.

Figure 1.6. Sample Group B participants, using Web Based Training input on ATV Course

The ATV Web Based Training course described how to complete each of the following tasks, procedures and manoeuvres:

- Exercise 1 – Site / Route Assessment and Walkthrough.
- Exercise 2 – Pre-Operational Inspection.
- Exercise 3 – Location and Operation of ATV Controls.
- Exercise 4 – Operating ATV in Forward and Reverse (10 metres).
- Exercise 5 – Steering and Turning of ATV (50 metres).

- Exercise 6 – Operation of ATV on level ground (200 metres).
- Exercise 7 – Operation of ATV on and over in-line slope (max. 20° incline).
- Exercise 8 – Operation of ATV on in-line slope, stopping, reversing back down slope.
- Exercise 9 – Operation of ATV on in-line slope, stopping and 'walking' ATV over slope.
- Exercise 10 – Manoeuvring ATV across slope (max. 10° incline).
- Exercise 11 – Operation of ATV on rough terrain, including drain.
- Exercise 12 – Operation of ATV through water or soft ground hazard.
- Exercise 13 – Loading and Unloading and Use of Trailer with ATV.

Each of the exercises above has to be completed using a real ATV as part of the ATV Operator Course. Each of the exercises was also carried out by Sample Group A within the context of the ATV Video Game with the exception of any tasks that required 'walking', for example 'walk ATV over slope' as this could not be accommodated as part of this commercial video game.

2. LITERATURE REVIEW

2.1. Introduction

The purpose of this chapter is to review the relevant literature with a particular focus on the types of computer and video games; their users – the games generation as the new learners; motivation, motivational theories and their role in learning, and the implications for instructional design.

2.2. Computer and Video Games

Today there are many different devices on which games can be played. 'Personal Computers or PC's', 'Arcade Games', 'Video Games Consoles', 'Internet Games' and even 'Mobile Phones or Handheld Consoles' are examples of such devices. With the ongoing developments in technology, there is now a very thin line, if any at all, between the types or genres of games played on any of these devices.

2.2.1. Video Game Definitions

There is some terminology associated with computer and video game and how they are played by the user. This terminology and the differences between games and game platforms can be described by the definitions below

A **Game** is a recreational activity involving one or more players. This can be defined as a goal that the players try to reach or a set of rules that determine what a player can or cannot do. Games are primarily played for entertainment or enjoyment but may also serve in an educational or simulation role. Games can be played by one or more players

and most often involves some form of competition. In the case of computer or video games, the computer can act as the other player or competitor.

Game play is a term used to describe all the user's experiences during their interaction with a game system or platform. It can be defined as what the player or user does and how well they enjoy the experience. Game play can also be competitive, cooperative or individualistic (Becta, 2001).

Computer Games are sometimes referred to a Personal Computer games or PC games as they are played on a Personal Computer with a standard interface device such as a keyboard and mouse. Video feedback is received by the user via a computer monitor with sound through speakers or headphones.

Console Games are commonly referred to as 'video games'. They are played on a computer that is specially made for game play called a 'video games console'. The player interacts with the game through a controller, which is a handheld device with buttons, analog joysticks or pads. Video and sound are received by the user through a standard television set.

Arcade games are coin operated games on a standalone device and are usually available in commercial venues. They are programmes, equipped and decorated for a specific game, consisting of a video display, a set of controls and a coin slot. Controls range from joysticks and buttons to light guns or pads on the ground to sense pressure.

Internet games are those games that require a connection to the Internet in order to play them. Internet gaming was originally an offshoot of personal computer gaming but can be considered a platform in itself due to its growing scope and the inclusion of internet or on-line capabilities in modern consoles.

A **handheld game console** is a lightweight, portable, electronic device for playing video games. However, unlike a video games console, the controls screen and speakers are all part of a single unit. Alongside specifically manufactured handheld games consoles is the development of integrated technologies such as the incorporation of games into mobile phones.

'Computer Games' and 'Video Games' are umbrella terms used to describe interactive game software. For the purpose of this dissertation, the term **'Video Game'** is used to describe both 'Computer and Video Games'.
(source: http://en.wikipedia.org/wiki/Computer_games).

2.2.2. Video Game Statistics

Video games are widely available and played, to the point that almost every major movie released comes with an associated computer game, every mobile phone comes with its own built in game. There are shops dedicated to the sales of video games, each game style, type and operating platform with its dedicated followers among the 'Games Generation'. The internet now enables computer game players to play, challenge and interact with other on a worldwide basis, 24 hours a day 365 days a year. There are currently more than 145 million Americans who play interactive games on a regular basis (ISDA, 2004).

Some interesting facts are now emerging for the use of games and the following statistics from the U.S. show (the U.S. statistics are relevant in that they provide comparative data with results from previous years and reflect worldwide trends in the use of computer and video games): (Source: Entertainment Software Association. http://www.theesa.com)

1. U.S. computer and video game software sales grew four percent in 2004 to $7.3 billion - more than doubling the industry software sales since 1996.

2. Seventy-five percent of American heads of households play computer and video games.

3. In 2004, more than 248 million computer and video games were sold, almost two games for every household in America.

4. The average game *player* is 29 years old and has been playing games for 9.5 years.

5. The average game *buyer* is 37 years old. In 2005, 95 percent of computer game buyers and 84 percent of console game buyers were over the age of 18.

6. Eighty-three percent of all games sold in 2004 were rated "E" for Everyone or "T" for Teen. For more information on ratings, please see www.esrb.org.

7. Eighty-seven percent of game players under the age of 18 report that they get their parents' permission when renting or buying games, and 92 percent say their parents are present when they buy games.

8. Forty-three percent of all game players are women. In fact, women over the age of 18 represent a greater portion of the game-playing population (28 percent) than boys from ages 6 to 17 (21 percent).

9. In 2004, 19 percent of Americans over the age of 50 played video games, an increase from nine percent in 1999.

10. Forty-two percent of game players say they play games online one or more hours per week. In addition, 34 percent of heads of households play games on a wireless device, such as a mobile phone or PDA, up from 20 percent in 2002.

2.2.3. Video Game Structure

As can be seen the video game industry is one of the fastest growing forms of entertainment. Each year hundreds of major software applications are produced by hundreds of development houses and published by some of the biggest names in the computer and electronics industries. The business of making video games is big business. Video game developers realise that they need to learn how to design video games for their users and therefore understand and quantify the responses of those users to the video games.

The goals of video game applications are different from traditional software applications in that they are meant to be enjoyed. Producing an enjoyable entertainment experience is not about building the most productive and efficient tool. By contrast, it can become the exact opposite.

Video game players like to feel a sense of difficulty and challenge which is then ideally followed by a sense of overcoming and success (Keeker, Pagulayan, Sykes, Lazzaro, 2004). A game is recognised as organised play that gives us enjoyment and pleasure (Prensky, 2001).

Video games can be viewed as simulations of some form or other and provide a medium that engages people for long periods of time (Kirriemuir, 2002). Realism based simulations include car racing games, business simulations, sports, combat and civilisation development games. Other abstract simulations can involve adventure, fantasy, and even space battle games that include realistic graphics and physics based effects.

Within this simulated world of the video game, the video game user suspends belief because they are immersed in the imaginary world of the game (Fabricatore, 2000). This imaginary world is what distinguishes video games from other types of games.

Therefore, video games always include an interactive virtual playing environment and in video games the game player always has to struggle against some form of opposition (Fabricatore, 2000).

What is captivating for video game players about games tends to be their structure rather than their content. Structure involves dynamic visuals, interaction and the presence of a goal and rules that govern play (Becta, 2001).

Therefore, highly engaging games have a basic structure that consists of the following components. And, as there are thousands, if not millions of games, they all contain most if not all, of these powerful factors (Prensky 2001):

- **Rules** – Rules impose limits and force everyone to take the specific paths to reach goals and ensure everyone takes the same path. Rules let you know what is in and out of bounds.

- **Goals or Objectives** – As a goal orientated species, achieving a goal is what motivates us. It enables us to derive strategies for achieving them and to enjoy the process. Rules, of course make this harder, by limiting the strategies at our disposal. Goals are what push us to achieve and win.

- **Outcomes and Feedback** – Outcomes and feedback are how we measure our progress against the goals. Winning or losing are outcomes that have strong emotional and ego-gratification implications. They are a big part of the attraction of video games. Feedback can take many forms but comes when something in the game changes in response to what you do. It can be both positive and negative and can be shown numerically through a score or graphically by showing your position in a race or even orally by commentary from the characters in a video game. Outcome and feedback are one of the elements of the interaction between the video game player and the video game computer.

- **Conflict / Competition / Challenge / Opposition** – These represent all the problems that the video game player is trying to solve. The conflict or challenge does not necessarily have to be against other opponents or artificial intelligence (AI) and can involve cooperation. It can take the form of puzzles or anything that stands in the way of progress. A key component in video game design is to balance the level of conflict / competition / challenge and opposition in sync with the video game players' skills and progress. It has been noted that children particularly value a challenge in video games and can show surprising perseverance (Greenfield, 1984). Therefore multiple levels within video games are a popular feature.

  In the context of 'conflict / competition / challenge and opposition', fantasy and simulation games offer a vicarious experience a risk of injury or death without the real physical danger (Chandler, 1994). This is certainly true physically but it does not apply to the player's emotions which are very real indeed. (Prensky, 2001)

- **Interaction** – Interaction consists of two aspects – interaction between the video game player and the computer on which the game is played and this displays itself in terms of outcomes and feedback as well as interaction with other video game players. The development of video games has now moved beyond the simple multiplayer mode where video games players could play a game together on a single games console using multiple controllers or input devices, to a true global interactive event through

playing games online against other opponents via the Internet. The development of social groupings among video game players now forms part of the interaction. However, some of these social groups may never actually meet face to face.

- **Representation or story** – This means that the game is about something. The something can be abstract or concrete or direct or indirect. It can be about conflict, recognising shapes, narrative or story elements. Some theorists regard representation as the essence of the game. Modern video games are becoming more detailed in their representation and narrative and storyline are becoming bigger elements of the video game design.

Furthermore, video are generally recognised as falling into one of 'eight' genres (Prensky; 2001). Many games cross over between genres and contain elements within their design, of more than one genre. It would not be unusual for a video game player to have difficulty in deciding whether a video game belongs to one genre or another. The genres are summarised below:

- **Action Games** – this would include shoot-em-up games, arcade games and platform jumping games.

- **Adventure Games** – these are generally games where you find your way around unknown worlds, collect objects and solve puzzles.

- **Fighting Games** – usually represent a particular sport, fighting or combat style, such as wrestling, martial arts or boxing. New developments in technology and

video game design enable the use of a camera that allows the video game player to interact with game based opponents using their own physical movements and personal image on the screen.

- **Puzzle Games** – usually involve solving problems which are typically visual or involving shapes, letters or words.

- **Role Playing Games (RPG)** – normally the video game player adopts the role of a character, typically a fantasy or mediaeval type character. The characters may not even be human. Completing quests, collecting equipment or weapons or special power form part of the action and fighting

- **Simulation Games** - these games normally involve driving games or flight simulator. Video Games can be associated with fashion trends such as car customisation.

- **Sports Games** – these games usually involve control over a sports play or players. They tend not to focus on game play but rather on the content. Football games such as soccer and rugby are typical examples of this type of game. The level of detail in the graphics is extremely high to the point were the image produced is almost that of a real game seen on television.

- **Strategy Games** – these games are typically about being in control of armies of civilisations and making them evolve the way you want.

As has been mentioned, games are played to win or achieve a goal and it is the playing of the game that provides the entertainment. The video game players are only really satisfied when challenges have been both encountered and conquered. Research by Becta (2001) identified several features of video games that contribute to the engagement of a video game player and categorised them into three aspects – Technological, Narrative and Personal.

Aspects of Games		
Technological	**Narrative**	**Personal**
Graphics	Novelty	Logic
Sound	Story line	Memory
Interactivity	Curiosity	Reflexes
	Complexity	Mathematical Skills
	Fantasy	Challenge
		Problem Solving
		Visualisation

Figure 2.1. Aspects of Video Games. (Becta, 2001)

It can be seen that some of these aspects of video games have the potential and are incorporated into educational software. For example, visualisation is a key cognitive strategy and problem solving is a critical developmental skill.

2.2.4. Video Games in Education

At this point, it is once again important to draw a distinction between the different uses of computer or video games. Computer and video games have been used in education for many years and have been used in school curricula to develop users' reading, numeric and problem solving skills. These particular types of games have been primarily PC based and have in general come under the name of 'edutainment' or 'play and learn'.

Historically, computers have been used in education primarily as tools for supporting drill and practice for factual recall (Jonassen, 1988).

This type of computer or video does not deliver knowledge in a form that is easily measured or evaluated by fixed standards. It is more appropriate to speak of such games developing general skills such as level-headedness, analysis and the ability to understand and interact with a rapidly changing environment. Through interaction with the interface the player explores the system, drawing upon a mixture of creativity, analysis and knowledge of other games (Game Research, 2004).

The 'Play and Learn' combination has been very fashionable, but rarely does the design and production of such 'edutainment' have roots in research that evaluates the potential for learning, which is after all, the intended goal.

The impression you can get from the analysis of many 'edutainment' products is that the designers primarily focus on how well the application facilitates the learning tasks (Fabricatore, 2000). Consequently, these games are considered as mere tools to make the learning easier and to ensure that the game provides a motivating environment to make the learning more amenable to the game player. The game helps the learner while they are facing cognitive tasks. The game gives both positive and negative feedback to the player to increase the effectiveness of the game but the gaming elements do not interfere with the learning tasks themselves. In other words, the game player will not face any challenge from the game itself but only face specific learning challenges. There is no struggle between the game and the gamer.

This is the barrier that prevents the true exploitation of the didactic potential of true videogames.

The true video games that are the focus of this research are the 'commercial' video games that are produced for use on both the personal computer and for video games consoles.

As can be seen there is a huge industry involved in the production of entertainment in the form of games, but commercial games have been ignored as a potential for learning (Games Research, 2004).

According to the Games-to-Teach Project (a partnership between MIT and Microsoft in 2002) over the past five years, interactive digital entertainment - computer and video games, have made significant strides in developing immersive worlds, interactive story, massively multiplayer online communities, and tackling broader range of themes and human experience.

Few, if any examples exist of how this medium might be used to support learning. Traditional "edutainment" is based on limited pedagogical models, and does not take advantage of the games' potential to simulate phenomena, engage the player through story, express ideas creatively, or collaborate with other players (Games-to-Teach Project, 2002).

However, videogames have begun to mature as an entertainment form. The tremendous advances in technology are allowing designers to develop rich digital worlds with incredible sound and graphics. The traditional 'drill and practice' type video games that

have been used in education still have an extremely important role in education and learning but the potential to use other forms of 'commercial' video games remains largely untapped. There has been increasing use of both strategy and simulation type video games to support learning. Computerised simulations, or 'edutainment' video games can be powerful tools for learning (Squire, 2003). They allow learners to:

- manipulate otherwise unalterable variables,
- view phenomena from new perspectives,
- observes systems behaviours over time, for example SimCity or Civilisation are typical examples of this type of video game,
- Pose hypothetical questions to a system, as in 'what if?',
- Visualise a system in three dimensions,
- Compare simulations with their understanding of a system.

There have been a lot of studies carried out to assess the knowledge acquired via the use of video games in primary and secondary teaching. A 'Report on the educational use of games' (McFarlane, Sparrowhawk, Heald, 2002) outlined areas that video games contribute to learning and they are shown in Figure 2.2 below:

Digital Literacy	**Comprehension Skills**
Recognition of computer terms	Comprehension of words
Recognition of computing operations	Comprehension of procedures
	Comprehension of the game's instruction
Skills Developed via the Game	**Academic Skills**
Problem Solving strategies	Improvement in results in mathematics and language

Figure 2.2. Areas in which 'Video Games' may contribute to learning

(McFarlane et al, 2002)

Other studies found benefits in the use of simulation games. Simulation games enable engagement in learning activities otherwise too costly to resource or too dangerous, difficult of impractical to implement in the classroom (Berson, 1996).

Simulations and drill and practice games are used in the military, schools and industry for learning (Thiagarajan, 1998). In the military, commercial video games have been used to measure learners' eye-to-hand capabilities, and simulators have been used to train pilots. This simulator technology has been sold to commercial developers to be implemented into tank and flight simulator games

Overall, research by Greenfield (1984) has found that playing video games:

- augments skills in reading visual images as representations of three dimensional space;
- enhances and is a causal factor in other thinking skills such as mental paper folding (picturing results) and is this is a cumulative skill;
- enhances the skills of rule discovery through observation, trial and error and hypothesis testing.
- transfer to and lead to greater comprehension of scientific simulations;
- enhances skills at 'divided attention' tasks such as monitoring multiple locations simultaneously. They get faster at responding to expected and unexpected stimuli.

There are skills available to video game player that could be taken advantage of, help motivate and be applied to learning situations.

2.3. The New Learners

"When you think of computer games, there's lots of engagement, but little content. When you think of business there's lots of content but little engagement. Put the two together and you have a way to learn business through computers that makes sense for ***this generation****"* (Prensky, 2001).

This view may be of importance to the business community in their desire to have existing and potential employees both motivated and able to learn all the required skills and knowledge in order to enable them to achieve their business goals.

It is useful to think of ***'this generation'*** as all those individuals, who are currently in full time education or in the workplace who have been exposed to millions of digital and video images (MTV-100 images per minute), ultra fast video games and action movies and are also exposed to computerised technology in some shape or form in nearly every aspect of their lives. The minds of this generation have adapted to greater and greater speeds. Note how computer users still complain of the slow operational speeds of their computers when it comes to opening, saving, closing of application files even though processing speeds are even increasing.

If computers are still on the road to attaining the operational speed of the human mind, then as learners, this generation would expect their learning to be made available at a much higher operating speed than the current delivery systems in place. However, speed is not the only challenge, but also the way in which it is delivered or even accessed.

In the year 2000, the average age of the workforce in corporate America was 39 years (information available on the Internet, but is unsourced) and if true would have implications for how instructional designers apply their craft to take account of the ongoing cognitive style changes that have been observed in what are termed this ***'Games Generation'*** (Prensky, 2001).

These cognitive style changes are listed below as having presented major challenges for education, training and business in general:

- **Twitch-Speed vs. Conventional Speed**- a term Prensky (2001) uses to describe the experience of this generation in processing information and how they are better at it than previous generations. This manifests itself in terms of the need for a faster pace of development in all aspects of business and human development. Training and other experiences need to exploit this and the use of video games is one way of doing this.

- **Processing – parallel vs. linear** – the human mind can actually do more than one thing at a time. Greenfield (1984) has concluded that parallel processing is a key cognitive requirement of video game playing.

- **Graphics first vs. text first** – since childhood, many of today's generation have been exposed to sophisticated graphical images on TV, video and computer games. Graphics allow for large amounts of information to be delivered at once. But there are issues associated with regard to textual literacy and depth of information.

- **Random Access vs. Step-by-Step** – A less sequential presentation of information has increased the awareness and ability of 'this generation' to make connections and free them from a single path of thought. However, this may cause difficulties in maintaining a linear train of thought or do some types of deep logical thinking. But this loss of linearity has been made up for by a greater ability to perceive and think in structures and patterns.

- **Connected vs. standalone** – As we now live in a connected asynchronous and synchronous world, people can e-mail, broadcast messages, telephone, use newsgroups or bulletin boards, e-learn, or play multiplayer video games online, 24 hours a day 7 day a week 365 days a year. The challenge is to take advantage of this connectedness.

- **Active vs. Passive** – Passive situations such as lectures, corporate classroom or traditional meetings are much less tolerated. Chatting, posting and surfing for information or 'just doing it' are now part of the experience. Where 'designing for manufacture' was an important part of making a product, 'designing for doing' or 'designing for learning' to allow people to be more active and have control over what they do, may be the way to go.

- **Play vs. Work** – To this generation play is work. They are an intellectual problem solving oriented generation. There is now an increasing emphasis on problem based teaching and they now have an approach to things that are similar in many ways to a computer game: performance and constant revision of the action, without any planning of the process (Gros, 2003).

'Trial and error' is used a great deal and may require strategies to counterbalance this in order to encourage thinking, planning and problem solving to counteract

- **Fantasy vs. Reality** – In a review of many of the most successful video games movies and novels read by adolescents, fantasy is a key element for adolescents (Tapscott, 1998). It has certainly been encouraged by technology but some sociologist would say that all or some of this fantasy is due to a desire to escape realities of today's life. Imagination and fantasy are there to be exploited for the benefit of business, managers, educators and learners.

Some people distinguish between the genders in this particular area, claiming that many of these fantasies are more 'male' oriented. But in the domain of video games, there is a preference for adventure or simulation type video games among females with action and sports games appealing to males.

- **Technology-as-friendly vs. technology-as-foe** – All technology is general viewed as positive among this 'games generation' as many have grown up with ICT. The challenge is to address their needs and continually seek ways to communicate, transfer needed information and build desired skills using the media they willing engage with, such as computers and video games.

2.4. Games, Motivation and Learning

In the context of the use of computer and video games for learning, one might ask is the learning the game itself any different from the learning of any type of subject matter. An interesting fact is that good video games sell millions of copies and in fact the computer gaming industry now makes more money than the film industry.

2.4.1. Learning a Video Game

A good game is long, hard and challenging and if you cannot play a game if you cannot learn it (Gee, 2003). If no one plays a game then it does not sell and the company business could face financial difficulty. Designers could then make the games shorter and simpler to facilitate learning. This is often what schools do. But this is not the case, as game designers make the games even longer and more challenging. They introduce new things into new ones - and still manage to get them learned.

It is possible to see a Darwinian thing going on here. If a game, for whatever reason, has 'good principles' of learning built into its design, that is, it facilitates learning in good ways – then it gets played and sells a lot of copies (Gee, 2003).

The principles of learning are incorporated into the design of video games but not for the express purpose of learning content in the traditional sense of education or training, but to facilitate the player in utilising the product to achieve the goals and objectives of the game. As has been discussed, this may not be about building the most efficient or productive tool, as video game players like to feel a sense of difficulty and challenge (Keeker et al., 2004)

Gee (2003), in an article titled *'From Video Games, Learning about Learning'*, states that it would be intriguing to investigate these principles of learning and poses the following questions:

- How are good video games designed to enhance getting themselves learned?
- What we are looking for is; what is the theory of learning built into good video games?
- Could this theory be used to develop features that can be used to achieve other learning goals?

In order to examine what features of computer games are relevant to this study it is necessary to identify what is meant by learning and motivation.

2.4.2. Learning – Designs and Philosophies

There are many theories associated with learning with varying degrees of relevance and applicability to different learning situations and outcomes.

Terms such as 'Behaviourism', 'Cognitivism', 'Constructivism' and 'Constructionism' all relate to 'Learning Theories' each of which are or have been appropriate to use or are applicable to a range of situations. However, when determining what can achieve the best learning and motivational outcomes in the context of video games the 'constructivist' and 'constructionist' theories would seem the most appropriate when used for learning.

Many educators and educational psychologists have applied constructivism to the design of learning environments. The following design principles have been isolated from these applications:

- Create real world environments that employ the context in which the learning is relevant.
- Focus on realistic approached to solve real world problems.
- The instructor is the coach and analyzer of the strategies used to solve these problems.
- Stress conceptual interrelatedness, providing multiple representations or perspectives on the content.
- Instructional goals and objectives should be negotiated and not imposed.
- Evaluation should serve as a self analysis tool.
- Provide tools and environments that help learners interpret the multiple perspectives of the world.
- Learning should be internally controlled and mediated by the learner.

(Jonassen, 1991)

In the context of video games, an instructional strategy would have to be applied that would best reflect this constructivist approach. However, the following implications for constructivism in instructional design and the principles for how knowledge construction can be facilitated are outlined below:

- Provide multiple representations of reality.
- Represent the natural complexity of the real world.
- Focus on knowledge construction, not reconstruction.

- Present authentic tasks (contextualizing not abstracting instruction).
- Provide real world, case based learning environments, rather than pre-determined instructional sequences.
- Foster reflective practice.
- Enable context and content knowledge construction.
- Support collaborative construction of knowledge through social negotiation.

(Jonassen, 1994)

The last point here is relevant when it comes to multiple players completing a game and when peer groups of players compare and exchange ideas, tips and cheats for games; they learn new strategies and also motivate each other.

There are even philosophies of learning. The two most common metaphors used are 'Pedagogy' and 'Andragogy'. Pedagogy is described as a teacher or trainer centred approach to learning. On the other hand, 'Andragogy' is described as the art and science of helping adults learn. These adults now increasingly belong to 'this games generation' as described by Prensky (2001).

This philosophy of 'Andragogy' suggests that educators should:

- Set a cooperative learning climate.
- Create mechanisms for mutual planning.
- Arrange for a diagnosis of learner needs and interests.

- Enable the formulation of learning objectives based on the diagnosed needs and interests.
- Design sequential activities for achieving the objectives.
- Execute the design by selecting methods, materials, and resources; and
- Evaluate the quality of the learning experience while re-diagnosing needs for further learning.

(Knowles, Swanson, Holton III., 1998)

Andragogy has come to be understood as an alternative to pedagogy; a learner-focused approach for people of all ages. This would then appear to be the more appropriate learning philosophy to be applied to the use of games or video games for learning.

Other key factors associated with learning are the 'laws of learning'. Many classical psychologists (from Aristotle to Thorndike to Guthrie) have identified these as having an effect on the learning process, for example:

The 'law of effect' states that a satisfying state of affairs following the response strengthens the connection between the stimulus and the behaviour, whereas an annoying state weakens the connection.

The 'law of exercise' describes the conditions implied in the saying, 'practice makes perfect'. Repetition of the experience increases the probability of a correct response. Interestingly enough, this law was withdrawn by Thorndike after the 1930's as he not conclude that humans could learn by repetition, but it is clearly a strategy used to learn or remember certain types of knowledge and skills.

The 'law of readiness' describes the conditions that govern the states referred to as 'satisfying' or 'annoying' The execution of an action in response to a strong impulse is satisfying, whereas the blocking of that action or forcing it under other conditions is annoying.

The 'law of intensity' states that the rate of learning is more rapid when material is organized into meaningful relationships.

The 'law of contiguity' states that a combination of stimuli which has accompanied a movement will on its recurrence tend to be followed by that movement (Guthrie, 1952). In other words, he believed that learning was series of stimuli – response movements that developed into an act and that learning was incremental.

All of the above are relevant when a game player is learning a new game. They are also relevant when individuals are playing games on a computer or a games console for whatever purpose. The use of hand held control devices that enable a game player to interact with the game can require the use of complex sequences of control inputs which become automatic responses after a period of practice time.

Specific movements or actions can also be used to gain satisfactory rewards or outcomes within the game environment. In essence, the act of interaction may in itself be used as one of the motivating factors employed if new learning was required through the use of video games.

Other authors have written extensively on how learning can be supported by technology. Four broad principles can offer a framework for thinking about how technology can support learning (Driscoll, 2002):

- Learning occurs in context
- Learning is active
- Learning is social
- Learning is reflective

There are many aspects of games that present challenges to the player, such as problem solving, keeping scores, gathering and collecting items, creating and destroying items, characters or scenes and competition between the game player and the computer or against other game users. Computer simulations and computer based micro-worlds also offer appropriate contexts for learners/ users to explore and come to understand complex phenomena in a variety of subject areas (Rieber, 1996).

2.4.2. Motivation and Games

One of the most striking features of video games is there ability to motivate. There is a wide range of game motivators such as the storyline itself, role playing, controlling various characters and their traits. Even the graphics, sound and clips from films can enhance the experience and motivate the user. They can induce conditions within the user such as satisfaction, desire, anger, absorption, interest, excitement, and pride in achievement. This may be even considered as 'fun'.

Fun and motivation can even be considered to be part of the same effect (Becta 2001). The harnessing and provoking some of these emotions are what have the potential to benefit learning and education.

Figure 2.3 below highlights some of the features that contribute to motivation.

Motivation	
What indicates motivation?	• Independent work • Self-directed problem posing • Persistence • Pleasure in learning • Active participation
What generates motivation?	• Intrinsic and prompt feedback • Challenging but achievable goals • A mix of uncertainty and open-endedness
What can motivation usefully support?	• Collaborative interaction • Peer scaffolding of learning • Creative competition or cooperation • Equal opportunities
What does sustained motivation rely on?	• A version of reality • Relevance to the user • Recognisable and desirable roles for the player
What are the problems with motivation?	• Motivation may lead to obsession • Motivation may cause transfer of fantasy into reality • Motivation may induce egotism

Figure 2.3. Features that contribute to motivation (Becta, 2001)

There are various theories associated with 'motivation' that are appropriate to the use of video games for learning, namely, 'Motivation Theory' in terms of 'Goals', 'Self-Efficacy', 'Attribution Theory', 'Self Regulation and Volition', and Intrinsic Motivation (Wang, 2001).

In Goal Theory, long term goals keep directed behaviour towards an ultimate target, while short term goals are the stepping stones to the long term goals. (Alderman, 1999). In a typical '1st Person Shooter' or 'Action' type computer game, in order to defeat an

enemy (a long term goal), weapons must be collected and upgraded (short term goals or missions).

Another area is Self-Efficacy. Self-Efficacy affects some of the factors that predict motivation. Self-Efficacy is a self-judgement of one's ability to perform a task in a specific domain (Bandura, 1997).

Motivation is clearly one of the key components of a successful computer or video game as it is equally a very important component of a successful learning outcome.

Extrinsic motivation occurs when learners engage in activities for the purpose of attaining rewards, such as praise or high grades (Alderman, 1999)

Intrinsic Motivation is another area where people often choose to invest considerable time in activities without apparent reward. They engage in activities for their own sake with the only tangible benefits being outcomes such as pleasure, learning, satisfaction, interest or challenge (Wang, 2001).

The area of intrinsic motivation may be of particular importance to instructional designers as there are various strategies proposed to enhance this type of motivation.

There are four suggested methods for enhancing intrinsic motivation (Lepper et al, 1989)

- Challenge, Curiosity, Control and Fantasy

These methods are clearly associated with the aspects of video games that are responsible for engagement *(see Figure 2.1. Aspects of Video Games – Becta, 2001).*

2.5. Implication of Games and Motivation on ID

Instructional Designers face the challenge of devising and designing learning and motivational strategies that achieve desired learning outcomes. The learning and motivational strategies have to be applied to a wide range of task/domain types and facilitate a variety of learner characteristics. Most strategies are applied without any guarantee of success or with a specific match to individual learner characteristics.

Video games, if they are well constructed contain many features, characteristics and challenges that are highly motivating to the user. They are also a very popular and influential medium for a combination of many factors. Primarily, however, video games elicit powerful emotional reactions in their players, such as fear, power, aggression wonder or joy. Game designers create these emotions by balancing a number of game components such as character traits, game rewards, obstacles, game narrative, competition with other humans, and opportunities for collaboration with other players. Understanding the dynamics behind these design considerations might be useful for instructional technologists who design interactive digital learning environments (Squire, 2003).

To facilitate the Instructional Design process, a number of practitioners in the field have developed systems that lend themselves to the development and delivery of both learning and motivational requirements of training courses and could also be used for the development of video games for learning. The systems employed are wide and varied and each is suited to its own specific learning theory, instructional delivery method and the target audience requirements.

"Instruction is the delivery of information and activities that facilitate learners' attainment of intended, specific learning goals." And "instructional design refers to the systematic process of translating principles of learning and instruction into plans for instructional materials and activities" (Smith, Ragan, 1993). Whether it is the design of specific learning goals or of video games that either fulfil the learning goal or support the learning goal, there is a requirement to use some sort of system or practice to achieve this objective.

However, in an article written in Training Magazine in April 2000, titled *'Attack on ISD'* (Gordon, Zemke, 2000), Sivasailam "Thagi" Thiagaragan wrote, *"Nine times out of ten, if you see a great training programme, you'll find it wasn't created by someone schooled in ISD and followed that process"*. 'ISD' stands for 'Instructional Systems Design' and describes a systems approach to the design of training instruction. It is primarily based on analysing the performance requirements and responding to identified training needs. ISD is sometimes called ADDIE which stands for 'Analysis, Design, Development, Implement, and Evaluate'.

Others would conclude that instructional design is not always necessary but that creativity is the key to ensuring success.

"Designing effective training does not, I believe, require any formal instruction or specialised knowledge. Rather, it takes a thoughtful and creative approach to reaching the desired outcomes" (Prensky, 2001).

However, some of the theories, systems, models and processes involved in instructional design and how they can be applied to the goal of achieving successful learning outcomes are outlined below.

2.5.1. Gagné's Nine Steps of Instruction

Gagné, Briggs,Wager (1992) described a number steps that can be used to create components of instruction that correlate to the cognitive learning process. A total of nine steps were required and they are listed below.

1. **Gain Attention** — Here a problem or a new situation is presented to grab the learner's attention so that they will actively watch and listen. Devices such as story telling, demonstrations, showing why something is important or even doing something obviously wrong, can be used. Its relation to the learning process is the *'reception of patterns of neural impulses'*.

2. **Informing Learner of Objective** — This allows the learner to organise their thoughts about what they are about to see, hear and do. Its relation to the learning process is the *'activating of a process of executive control'*.

3. **Stimulate recall of prerequisite learning** — This allows the learner to build on their previous or existing knowledge and skills in order to help learning and remembering. Its relation to the learning process is the *'retrieval of prior learning to working memory'*.

4. **Presenting the stimulus material** — This involves presenting the learning material in chunks or 'sequenced learning events'. This allows for feedback on individualised tasks and the correction of any problems encountered. From an instructional design perspective, it is the structure for the lessons. Its relation to the learning process is the *'emphasising of features for selective perception'*.

5. **Providing learning guidance** — This is not the lesson content but instructions on how to learn it. This allows for the presentation of material through different media to facilitate learner characteristics and styles. Its relation to the learning process is *'semantic encoding, and clues for retrieval'*.

6. **Elicit performance** — This is practice by the learner of the newly acquired knowledge, skills and attitudes. Its relation to the learning process is *'activating response organisation'*.

7. **Provide feedback** — This is about analysing the learner's behaviour and showing the correctness of the learner's behaviour. Feedback needs to be specific and constructive. It relation to the learning process is *'establishing reinforcement'*.

8. **Assess the performance** — This is to test if the lesson has been learned. Can also be used to give general progress information through both formative and summative testing. Its relation to the learning process is *'activating retrieval, thus making reinforcement possible'*.

9. **Enhance retention and transfer** — Relate the lesson to similar situations, link to the real world, provide for additional practice, use skills and knowledge back on the job as soon as possible. Its relation to the learning process is *'providing cues and strategies for retrieval'*.

It can be seen that a lot of the content of Gagné's nine events can be seen in the construction of successful video games.

2.5.2. Keller's ARCS Model of Motivational Design

Motivation is the most overlooked aspect of instructional strategy, and perhaps the most critical element needed for employee-learners. Even the most elegantly design training program will fail if the students are not motivated to learn (Kruse, 2004).

John Keller synthesised existing research on psychological motivation and created the ARCS Model (Keller, 1987). ARCS stands for Attention (A), Relevance (R), Confidence (C) and Satisfaction (S). The model contains strategies that can help to maintain each motivational element. Each factor is outlined with some strategies that can be used (Keller, Suzuki, 1988)

The Attention Factor – this is the first and single most important element as a learner's attention has to be aroused and sustained. This category also relates to curiosity and sensation seeking.

Strategies would include:

- ***Perceptual Arousal*** – the learner's attention is gained and maintained by using novel, incongruous or conflicting events in instruction

- ***Inquiry Arousal*** – the information seeking behaviour is aroused by having the learner pose or generate questions or solve problems.

- ***Variability*** – the learner's interest is maintained by varying the elements of instruction.

The Relevance Factor – Attention and motivation will not be maintained unless the learner believes that the training is relevant to their interests and goals.

Strategies would include:

- ***Familiarity*** – the learners own experiences and values are used with concrete examples and concepts to help them learn new knowledge and skills.

- ***Goal Orientation*** – Concrete statements and examples that present the objectives and usefulness of the instruction for the learner's present and future goals

- ***Motive watching or needs matching*** – use strategies that match the motive profiles of the learners and capitalise on the dynamics of achievement, risk taking, power and affiliation among the learners.

The Confidence Factor – Learners have to know that they will probably be successful at completing a given task.

Strategies would include:

- ***Learning requirements*** – The learners are helped to estimate the probability of success by the presentation of performance requirements and evaluation criteria.

- ***Opportunities for Success*** - Provide challenge levels that allow meaningful success experience under both learning and performance conditions.

- **Personal Control** – provide feedback and opportunities for control or choice that support the internal attributes for success.

The Satisfaction Factor – If the outcomes of a learner's effort are consistent with their expectation and they feel personally good about those outcomes, then they will remain motivated.

Strategies would include:

- ***Natural Consequences*** – provide opportunities to use newly acquired knowledge or skills in a real or simulated setting.

- **Positive Consequences** – Provide feedback and reinforcements that will sustain the required behaviour.

- **Equity** – Maintain consistent standards and consequences for task accomplishment.

John Keller was one of the first to assume that instructional designers should assume responsibility for motivation. His major contribution was not to focus on the learner's ability but on their motivation.

2.5.3. Rapid Instruction Design – by Sivasailam "Thagi" Thiagaragan

The Rapid Instruction Design system (Thiagarajan, 1999) was developed by Sivasailam "Thagi" Thiagaragan and is based on the just-in-time principle. But "Thiagi" , who is actively involved in the use of 'games for learning', points out that in using a rapid instructional design system there are some trade-offs required.

One trade-off is that you select the optimum allocation of resources between design and delivery and among the three components of effective instruction as outlined below. You apply shortcuts, combinations and deletions to the instructional design process. You use templates and shells and appropriate equipment to speed up the process. You make more effective use of human resources. And finally, you reduce self doubt and guilt by positively associating cheaper and faster instructional design with better learning effect.

The components of effective instruction are:

1. Presentation to learners of new information related to the instructional objectives.
2. Activities by learners that require them to process the information and to provide a response.
3. Feedback to learners to provide reinforcement for desirable responses and remediation for undesirable ones.

He points out that s out that you should not ignore any of the three points, although you may design for them independently and that as long as you integrate them into the final package, you produce effective instruction faster and cheaper.

There are ten strategies associated with this rapid instructional design model and they can be summarised as follows:

Strategy 1. Speed up the Process

Strategy 2. Use a partial process

Strategy 3. Incorporate existing instructional materials

Strategy 4. Incorporate existing non-instructional materials

Strategy 5. Use templates

Strategy 6. Use computers and recording devices

Strategy 7. Involve more people

Strategy 8. Make efficient use of subject matter experts

Strategy 9. Involve trainees in speeding up instruction

Strategy 10. Use performance support systems

This Rapid Instructional Design, Gagné's Nine Steps and Keller's ARCS Motivational Model illustrate the broad range of systems and process and consideration that need to be taken into account when designing for a learning outcome – and this is just three of them.

However, they are representative of the combination of instructional systems employed in the design, delivery and evaluation of training courses, including the training package that forms part of this research study. Each system or model can find some part of itself woven somewhere into the fabric of an instructional package, whether it is for education, training or even the design of video games for learning. Each required motivation, each requires structure and each requires a cost effective system for development.

2.5.4. e-Learning and video games

Learners are increasing being exposed to new methods and ways of learning and in recent times there have been technological advances that have allowed existing learning and training delivery methods to become more easily accessed by and designed for today's learners. Even technologies such as computer or web based training (WBT), which initially proved to be both expensive and inflexible have benefited from these technological advances. One of these developments is the use of e-Learning.

e-Learning refers to the use of Internet technologies to deliver a broad array of solutions that enhance knowledge and can be defined as covering a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio and videotape, satellite broadcast, interactive TV, CD-ROM, and more (Learning Circuits, 2005).

Increasingly, specific definitions of the terminology used to describe how learning and performance are supported by digital technology are becoming more difficult to differentiate.

For example, Web based learning or training can be defined as the delivery of educational content via a Web browser over the public Internet, a private intranet, or an extranet. Web-based training often provides links to other learning resources such as references, email, bulletin boards, and discussion groups. WBT also may include a facilitator who can provide course guidelines, manage discussion boards, deliver lectures, and so forth.

When used with a facilitator, WBT offers some advantages of instructor-led training while also retaining the advantages of computer-based training (Rosenberg, 2001).

This 'blended' approach to learning is probably more reflective of the true description and on-going evolvement of e-Learning. As such WBT can be considered as forming part of an e-Learning strategy as well as a learning strategy in itself. Equally video games, as they are digital technology based are by definition suitably placed to fulfil this form of learning support role.

Furthermore, the latest technologies from games are beginning to find themselves incorporated into online courses and e-learning technology based simulations. There are two common types of game-based e-Learning: branching, where users are presented with information and then engage in a simple game of matching question and answer, and simulations, which offer a 3D experience and resemble a modified video game (Becta, 2005).

3. RESEARCH METHOD

3.1. Introduction

This chapter describes the research methodology adopted for this dissertation. It describes the research approaches used and outlines the rationale for using a semi-structured interview schedules / questionnaires, surveys, the observation of practice sessions, summative knowledge assessment tests, post-training knowledge assessment tests and practical assessment of the operation of an All Terrain Vehicle by each of the sample group participants.

3.2. Research Question

From the literature review, it has been established that video games are clearly a commercially successful form of entertainment and that they have also been used commercially to some extent in the field of learning. As there are a wide range of theories, learning strategies and systems to develop learning outcomes, it is clear that from both a video games perspective and from a learning perspective that motivation is one of the key factors in determining a successful learning outcome from any learning event.

Therefore, anyone who finds themselves in the role of instructional design, must be able to rise to the challenge of utilising these learning and motivational strategies, as well as their creativity and imagination to achieve the desired learning and motivational outcomes.

These findings or results from the literature research combined with both the aims and objectives of this dissertation enable the research question to be stated as follows: *'Can video games or their features be used to improve motivation and learning outcomes?*

3.2.1. Research Hypotheses

In order to achieve the objectives of this dissertation and to answer the research question, there is a need to test two specific hypotheses:

Firstly:

'The use of video games will improve learning outcomes'

This hypothesis is of interest because if video games can be used to improve learning outcomes, their inherent ability to engage their users can be used to create more effective and efficient learning events and deliver knowledge and skills in a format that is more acceptable and beneficial to today's learners.

Secondly:

'The use of video games will improve motivational outcomes'

This hypothesis is of interest also because motivation is a key component of any learning experience for a learner. Motivation can be seen as the engine of learning as it drives learners to achieve their goals.

If any or both of these hypotheses are acceptable, then video games or their features can be used to design learning solutions that can benefit learners.

In specifying the two hypothesis as outlined above, the use of e-learning, specifically in the form of the ATV Web Based Training by one of the groups is used as a means to ensure the same learning content is delivered to both sample groups to support the testing of the hypotheses.

3.3. Research Method

There are three phases involved in the completion of this research and each involves the collection of both quantitative and qualitative data.

There are three phases involved in the completion of this research.

Phase 1 involves the exploration of what features of video games motivate video game players.

- This involves a process of conducting a small number in semi-structured interviews with experienced video game players and conducting a limited survey among video game players to identify what aspects of video games they find most satisfying and least satisfying about their favourite games, what motivates them to keep playing. It also looks at their general profile and their use of ICT for education and learning.

Phase 1 is to be completed in parallel with the other two phases as outlined below and the video game users or players form 'Sample Group C' for this research study.

Phase 2 involves the implementation of a small scale experiment with groups of learners or course participants on the 'All Terrain Vehicle (ATV) Operator Training Course'

which is delivered by 'ESB Training' – one of the businesses in the Electricity Supply Board in Ireland, responsible for the design, delivery and evaluation of a wide range of in-company training courses.

This ATV Training Course consists of a face-to-face training element with practical skills and knowledge learning elements that use real ATV's or All Terrain Vehicles on a pre-designed obstacle and multi-terrain course (see ATV Training Specification in Appendix 7). To facilitate the experiment, the course participants are randomly selected and divided into two groups – 'Sample Group A' and 'Sample Group B'.
The experiment consists of:

- The use of a video game console and a commercially available video game, the playing of which will enable the course participants to practice a series of manoeuvres using an ATV in a virtual environment, prior to completing practical training, practice and then assessment in the operation of an ATV. Sample Group A use the ATV Video Game.

- the use of a Web Based Training element which describes the objectives and procedures to be completed using an actual ATV and the instructions on how to complete each manoeuvre safely and correctly. Sample Group B use the ATV Web Based Training.

On completion of each of their respective experimental inputs each Sample Group are given the opportunity to complete a semi-structured interview / questionnaire to elicit information about their use of ICT and provide feedback on their experiences of using either the ATV Video Game or the ATV Web Based Training, if either training approach

has helped them and how they feel about completing the practical assessment elements of the course.

Phase 3 involves the evaluation of both the experimental studies and the analysis of all the data gathered to determine if video games have any effect on the motivational or learning outcomes of the learners.

3.4. Research Instruments

To meet the aims of the research question, the following research instruments were chosen to reflect both the quantitative and the qualitative nature of the data and information that needed to be gathered:

3.4.1. The Semi-Structured Interview Schedule / Questionnaire

A semi-structured interview schedule questionnaire was developed to gather a wide range of information and data from the sample groups attending the All Terrain Vehicle (ATV) Operator Training Course. As One group of course participants would use a video game as part of the training and the other group would use a Web Based Training programme, there would be a requirement for two specific sample groups requiring analysis.

To ensure that the information gathered was reflective of both sample groups experiences of using both the Video Game and the Web Based Training intervention and to make comparisons between the groups, the interview schedule for both Sample Group A and Sample Group B would be identical.

The format of the interview schedule was a questionnaire with 15 questions arranged under the following headings:

1.	General Information	(2 questions)
2.	General Computer Use	(5 questions)
3.	Use of Computer for Learning and Education.	(2 questions)
4.	Computer and Video Games	(4 questions)
5.	All Terrain Vehicle Operator Training Course.	(1 questions)
6.	Motivational Analysis (based on ARCS model)	(1 question)
	(This question was subdivided into four categories and thirteen elements).	

In preparing the interview schedule it was necessary to prepare a draft questionnaire and pilot it with group of ATV course participants and an ATV Course instructor. Feedback from this pilot of the draft questionnaire enabled the preparation of the final 'Semi-Structured Interview / Questionnaire' which is shown in Appendix 1.

3.4.2. The 'Game User Survey'

The purpose of conducting analysis with a third group (Sample Group C) was to try to identify from a group of experienced game players what were the features of video games that were the most satisfying or interesting to them and what were the features of games that were the least satisfying or interesting.

To enable comparisons to the primary sample groups in terms of their experiences in using either a Video Game or Web Based Training, a draft survey was prepared which was similarly structured to the Semi-Structured Interview Questionnaire provided for

Sample Groups A and B. It would allow for direct comparisons between all three groups to a certain point but would also allow for more detailed and specific video game related information.

Initial pilots of this survey proved difficult to construct as game players had such a varied range of genres of games available to play and a wide ranging level of expertise from both a computer usage and video game playing perspective. However, the final version was developed and is shown in Appendix 2.

3.4.3. The 'Knowledge Assessment Tests'

The 'Knowledge Assessment Tests' (see Appendix 5) take the form of multiple choice questions based on the knowledge content element of the All Terrain Vehicle (ATV) Operator Training Course. Knowledge Test (A) is completed at the end of the classroom input of the ATV Operator Training Course.

The objective of these tests is to assess the course participants to determine if the possess the required level of knowledge in order to be deemed competent to operate an 'All Terrain Vehicle' or ATV. The questions are all multiple choice with each of the twenty questions provided with four possible answers from which the candidate selects their most appropriate choice. All the questions are based on the health and safety aspects and the maintenance and operational aspects of ATV's.

The minimum pass marking is 80% or 16 out of 20 questions correct. For the purposes of this study course participants in Sample Group A and Sample Group B were asked to complete a second Knowledge Assessment Test (B) at a period of five to nine days after

completion of the initial training. This would facilitate the measuring of retention and transfer of knowledge back out on the job.

3.4.4. The 'ATV Practical Assessment'

The ATV Practical Assessment is carried out on the basis of observation of performance of an ATV Operator candidate from the ATV Operator Training Course. The assessment is conducted in a specifically designed obstacle course in which the candidate must carry out a series of tasks and manoeuvres using an ATV in a safe and correct manner.

The assessor utilises a marking sheet (see Appendix 4) in which the candidate for assessment is initially awarded 100 points. The candidate must complete the course without faults to maintain this 100 point score. If a fault is committed by the candidate, the candidate is awarded 'fault points' for each fault committed. The faults points associated with each type of fault are weighted according to their severity and implications on the safe and correct use of an ATV. A candidate must not accumulate more than 20 award points is they are to pass the Practical Assessment.

Assessment in the operation of an ATV is carried out over seven areas of use:

- Safety; Observations; Steering and Riding; Incline Riding; Wet Ground / Bog land Riding; Loads and Unloading; and Parking.

It is the combination or Knowledge Test score and Practical Assessment score that are used to deem an individual to be 'competent' to operate an ATV and to be awarded an ATV Operator's Licence.

3.4.5. The 'ATV Practice Observation'

An observation of both Sample Group A and Sample Group B participants during the practice session was conducted as part of this research study. Each participant was observed after about twenty minutes of practice while they operated and manoeuvred the ATV around the 'ATV practice course area'. They were observed and marked using the exact same criteria used for formal practical assessment (see Appendix 3). This observation was carried out as part of this research study and was not conducted by the independent ATV Operator Assessor.

3.5. Ethical Considerations

The need for ethical consideration applies to the conduct of the research as a whole, but applies in particular to the issues of information gained in interviews questionnaires and the publication of test results.

This is a very important aspect of the research for this dissertation and it was therefore, at the initial stages of preparing for this work that the author brought the matter to the attention of management in ESB Training and all those involved in the delivery and management of the All Terrain Vehicle (ATV) Operator training Course.

However, having paid due consideration to all the aspects involved, it was felt that all communications, both verbal and written, in relation to this dissertation, should be carried out on an informal one-to-one basis.

Permission to carry out the research for the dissertation itself and for the use of this approach was then formally granted by 'ESB Training' management.

All those who participated in this research including all participants in Sample Group A, Sample Group B and Sample Group C were informed of the purpose of the research, and participated on a voluntary basis.

The author therefore, personally guaranteed that all information would be treated with the strictest confidentiality. All the participants involved in the research would be guaranteed anonymity and would only be acknowledged with their express permission. Participants would not be quoted directly without their express and specific permission. All the information and data gathered for this dissertation, is for the purpose of this study only.

3.6. Target Population

The target population for research study were drawn from two distinct groups.
One target group were the participants who attended the All Terrain Vehicle (ATV) Operator Training Course in ESB Training at their training centre in Portlaoise, Co Laois, Ireland, and are by definition, the only group who could partake in the experimental aspects of this dissertation. They are all staff currently employed by 'ESB Networks'.

The second target group were video game players. The 'Game User Survey' (see Appendix 2) was distributed in video game shops, local sports clubs and by word of mouth to any one who wished to participate. At the time of final printing of this dissertation, some surveys are still being returned. Although too late for analysis, the information is available for further study if required.

3.7. Interview Schedule / Questionnaire Procedures

All interviews were conducted on an informal basis with the intention of creating as little impact as possible on the delivery of the ATV Operator Training Course. To facilitate this intent, the author provided the potential interviewee with a copy of the interview schedule / questionnaire and a brief run-through of the questions before the actual ATV Operator Training Course began. The potential interviewee (if they agreed to become a Sample Group participant) was then asked to make themselves available at the end of the ATV Video Game or Web Based Training session at their convenience for interview and completion of the interview schedule / questionnaire.

3.8. Recording the Information

All the information obtained during the interviews was recorded by the author on copies of the interview schedule / questionnaires which had space for recording the Sample Group participant's replies.

These interview schedule / questionnaires were pre-prepared with the facility to enter the name of the interviewee, if required. The key points / answers of the participant's replies to questions were then inserted into the blank spaces provided during the interview. On completion of the interview, the completed questionnaire was filed and the replies to each question recorded.

To enable analysis of the replies to questions and to maintain the anonymity and confidentiality of the sample group participants, the names were removed before filing and analysis.

4. RESEARCH FINDINGS

4.1. Introduction

This chapter provides a detailed presentation of all the information and data gathered as a result of the empirical field research. The research was conducted over a number of phases with three sample groups:

- Sample Group A - played a commercially available video game as a learning support to the ATV Operators Training Course
- Sample Group B - completed a Web Based Training Input as a learning support to the ATV Operators Training Course.
- Sample Group C - are regular game players who completed a Game User Survey.

The main responses to the semi-structured interview schedules, surveys, observations and recorded test results are also discussed and summarised.

4.2. Presentation of Findings

The semi-structured interview schedules and surveys were designed to obtain information and data that was relevant to all three sample groups (see Appendices A and B). This enables the findings common to each group to be presented simultaneously were appropriate. Data and information specifically relevant to each individual group is presented separately. Statistical analysis of Sample Group A's and Sample Group B's performance in tests, observations and of their motivation and learning is also presented.

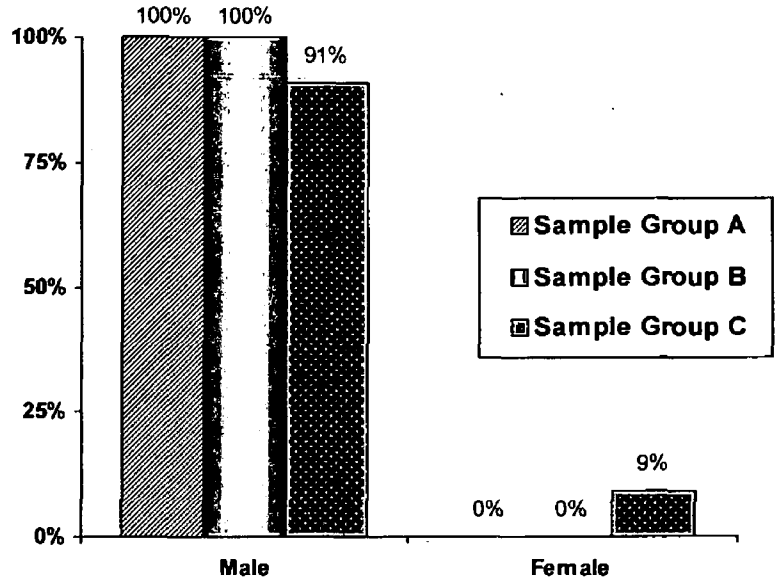
4.3. Interview Schedule and Survey Findings

The findings from the semi-structured interview schedules and game user surveys from Sample Group A, Sample Group B and Sample Group C are shown below.

General Information on Sample Groups

Gender:

(Q.1. Sample Groups A, B and C)



Gender		
Male = 0	Mean	0.032258065
Female = 1	Median	0
	Mode	0
	Variance	0.031729244
	Standard Deviation	0.178127044
	Confidence Interval	0.044338586
	N	62

Figure 4.1. Sample Groups Gender Profile

It can be seen from the results in Figure 4.1 that the participants are predominantly male in all three sample groups. Group A and Group B are constituted from the ATV Operator Training Course participants.

These participants are drawn from the Network Technician (NT) category of workers in ESB Networks. ESB Networks is an independent subsidiary of ESB (Electricity Supply Board) and is primarily responsible for the construction and maintenance of the electricity distribution network in Ireland. This is a traditionally male dominated workforce with less than 2% of the NT category represented by female workers. As such it is generally representative of the general workforce in this area of the business with the female representatives of the workforce attending this training course at a future date.

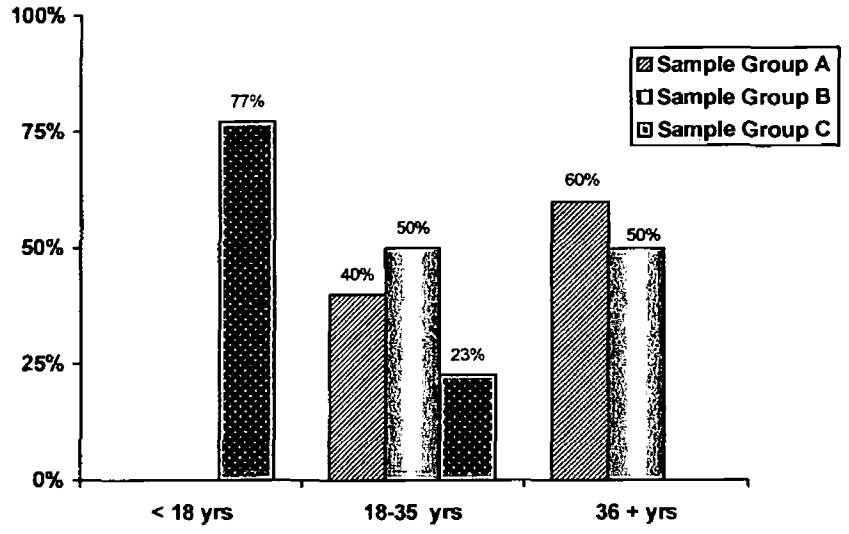
Sample Group C participants are represented by 91 % male and 9 % female respondents respectively. This was self-directed participation by the respondents as the Group C – 'Game User Survey' was made freely available to all who wished to participate in the survey (see Appendix 2). The low number of female respondents have therefore not provided any facility to make a determination on the relevance of gender to this research study. Also, a motivational incentive was also provided in the form of a €50 voucher for a games store which would be chosen randomly from all the completed surveys. This voucher was presented to a Group C respondent on 21st April 2005.

Figure 4.2. Sample Group C respondent receiving games voucher

(name acknowledged by author)

Age Profile of Sample Groups:

(Q.2. Sample groups A, B and C)



Age	Mean	2.080645161
<18 = 1	Median	2
18-35 = 2	Mode	2
36> = 3	Variance	0.632734003
	Standard Deviation	0.795445789
	Confidence Interval	0.197999853
	N	62

Figure 4.3. Age Profile of Sample Groups

Figure 4.3 shows that the age profile is divided into three categories, under 18 years of age (< 18 yrs), between the ages of 18 and 35 yrs (18-35yrs) and over 36 years of age (36 + yrs). It can be seen that Sample Group A is constituted of 40 % of respondents between the ages of 18 and 35 with 60 % of the respondents over the age of 36 years. Sample Group B are equally divided at 50 % between 18 and 35 years and 50% over the age of 36 years.

With limited recruitment and workforce reduction an ongoing process within ESB at this time, this is representative of the current workforce average age profile currently at around 49 years of age.

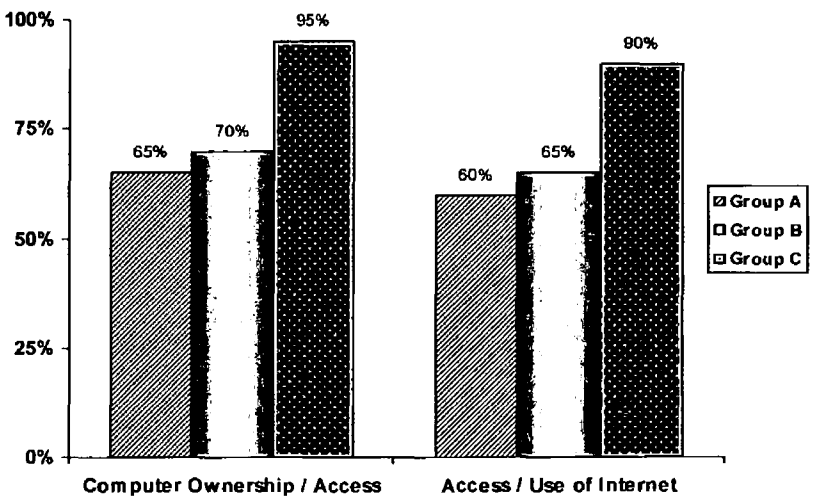
However, the operation of All Terrain Vehicles (ATV's) is generally considered to be physically demanding and would tend to attract the age profiles as outlined in the graph above to their use as a work tool in ESB Networks.

Sample Group C is represented by 77% under the age of 18 years and 23 % between the ages of 18 and 35 years. As this survey was completed by a self-directed process, and 22 of the 56 surveys handed out to what appeared to be a balanced age profile of potential respondents, it represents a return of 40% on the surveys over a five week period.

Computer Use:

Computer ownership/access and internet usage profile of groups

(Q.3. and Q.4. Sample Groups A, B and C)



Computer Own / Access		
No = 0	Mean	0.741935484
Yes = 1	Median	1
	Mode	1
	Variance	0.194606029
	Standard Deviation	0.441141733
	Confidence Interval	0.109807025

Access to Internet		
No = 0	Mean	0.709677419
Yes = 1	Median	1
	Mode	1
	Variance	0.209413009
	Standard Deviation	0.457616862
	Confidence Interval	0.113907891

Figure 4.4. Computer and Internet Access by Sample Groups

It can be seen from the graph in figure 4.4., that there is a consistency between the results for computer ownership/access and internet access between both Sample Group A and Sample Group B.

65% of Sample Group A own or has access to a computer and 60% of Sample Group A has access to the Internet. It was indicated that ownership was sometimes within the family and that the respondents were not always the primary user. Access was also clarified as having access to use of a work computer.

Sample Group B results were slightly higher in that 70% of the respondents own or have access to a computer and that 65% have access to the Internet. Both Sample Group A and Sample Group B would therefore appear to have similar results

However, there is a significant jump in the level of ownership and access to computers and the Internet with Sample Group C, with 95% of respondents indicating they owned or had access to a computer and 90% indicating they had access to the Internet. As Sample Group C is by self-direction and definition, consisting of computer and video game users, this would on the surface appear to be consistent with expectations from such a group.

Computer usage by Sample Groups:

(Q.5. Sample Groups A, B and C)

The graph in Figure 4.5 below shows a breakdown of the results obtained from analysing the data for Computer usage by each Sample Group. Each of the Sample Group's data was compiled on an individual group basis and then on a combined Sample Group A, B and C basis.

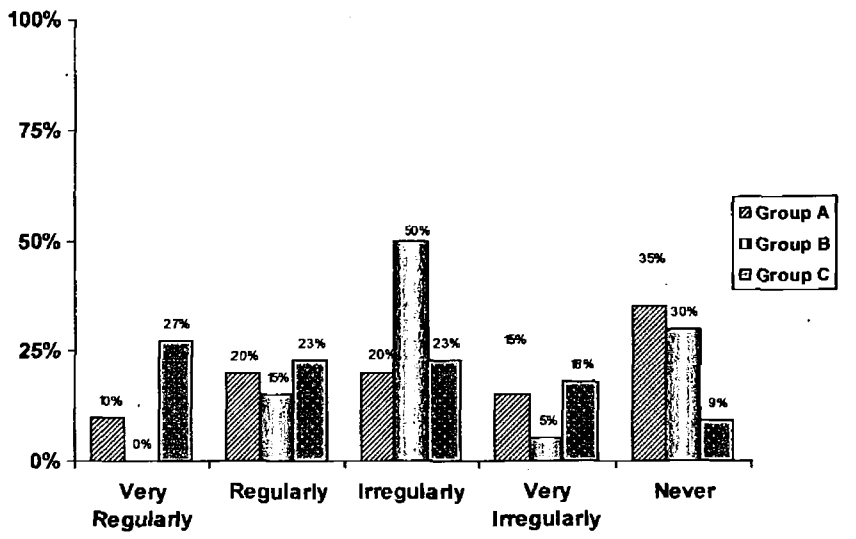
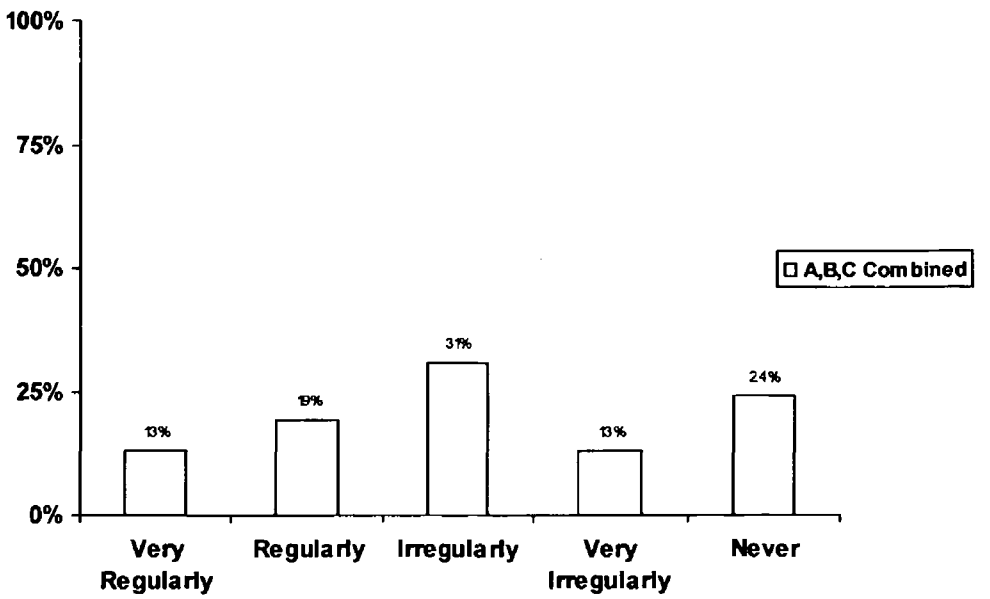


Figure 4.5. Computer Usage by each Sample Group

It can be seen that Sample Group A usage figures are as follows with 10% using a computer very regularly, 20% regularly, and 20% irregularly, 5% very irregularly and significantly, 35% of Sample Group A never use a computer at any time

Sample Group B's results indicate that 0% of respondents use a computer very regularly, 15% regularly, but 50% use a computer irregularly. Only 5% of respondent use a computer very irregularly. However, 30% of respondents represent a significant number of respondents in this group who never use a computer.

Sample Group C's results would indicate that they are fairly evenly represented in all the categories, with 27% using a computer fairly regularly, 23% regularly, 23% irregularly, 18% very irregularly with 9% never using a computer at all. As game players this would indicate that they exclusively use video game console based platforms to play games. Specific analysis of platforms used to play video games is analysed further in this study.



Use of Computer		
V. Regularly = 5	Mean	2.838709677
Regularly = 4	Median	3
Irregularly = 3	Mode	3
V. Irregularly = 2	Variance	1.809824537
Never = 1	Standard Deviation	1.345222858
	Confidence Interval	0.113907881
	Frequency Groups A,B and C	8,12,19,8,15,0
	Frequency Group A	2,4,4,3,7,0
	Frequency Group B	0,3,10,1,6,0
	Frequency Group C	6,5,5,4,2,0

Figure 4.6. Computer Usage by combined Sample Groups

When all the results from each of the Sample Groups are combined, a picture emerges of the computer usage by the total sample and is shown in Figure 4.6 above. It is significant that a total of 37% never or very irregularly use a computer and that 31% use a computer irregularly. This will have a direct influence on the samples Group's statistics for Internet usage as can be seen in the following subsequent findings.

Internet usage by Sample Groups

(Q.6. Sample Groups A, B and C)

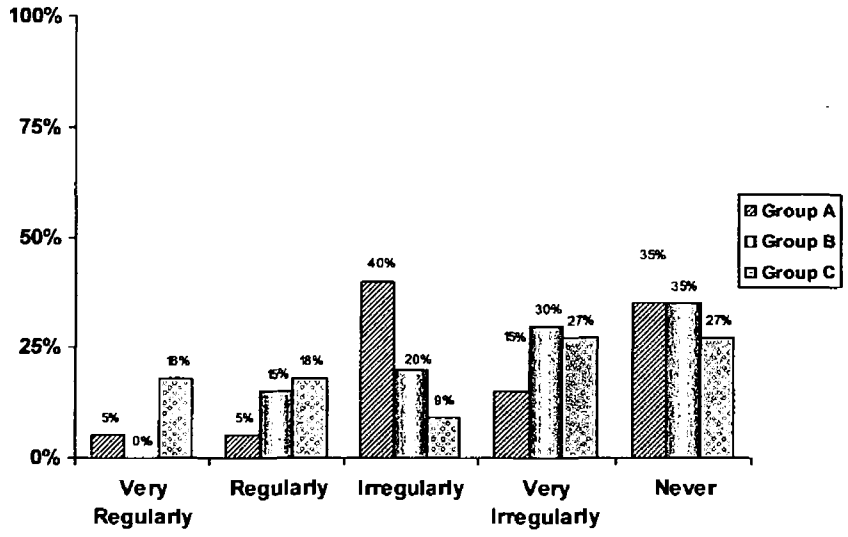
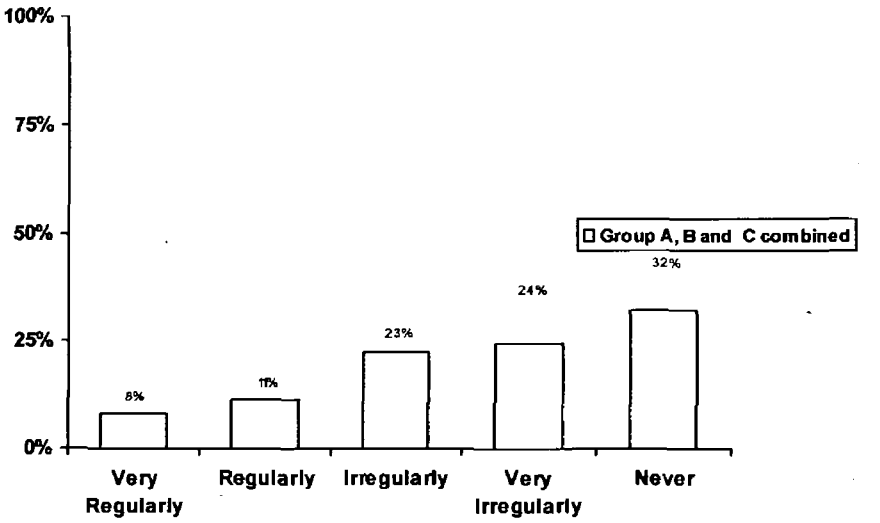


Figure 4.7. Internet Access by each Sample Group

The graph in Figure 4.7 above shows that Sample Groups A respondents indicated that 5% of them access the Internet of a very regular basis, 5% regularly, 40% irregularly and 15% very irregularly. However, 35% indicated that they never access the Internet at all. This can be directly related to the findings for computer usage in general from the Computer usage statistics for each of the Sample Groups. Analysis of the raw statistical data (see Appendix 6) also shows that those respondents who do not use a computer do not use or access the internet the Internet either.

The graph also shows that 0% of Sample Group B access the Internet very regularly, 15% regularly, 20% irregularly and 30% very irregularly. A similar figure of 35% for Sample Group B, never access the Internet. As with Sample Group A, the raw statistical data indicates that those who do not use a computer also do not access the Internet.

A total of 18% of the respondents from Sample Group C, access the Internet very regularly, 18% regularly, 9% irregularly and 27% very irregularly. A significant number of respondents, namely 27% never access the Internet. With 77% of Sample Group C under the age of eighteen, it is reasonable to suggest that there may be access control issues associated with this group.



Use of Computer		
V. Regularly = 5	Mean	2.403225806
Regularly = 4	Median	2
Irregularly = 3	Mode	1
V. Irregularly = 2	Variance	1.654415653
Never = 1	Standard Deviation	1.2862409
	Confidence Interval	0.320165326
	Frequency Groups A,B and C	5,7,14,15,20,0
	Frequency Group A	1,1,8,3,7,0
	Frequency Group B	0,3,4,6,7,0
	Frequency Group C	4,4,2,6,6,0

Figure 4.8. Combined Internet Usage by Sample Groups

Figure 4.8 above shows the combined results for Internet usage by all the Sample Groups would indicate that 19% (8% + 11%) in total could be considered as regular users of the Internet, with 47% being irregular user and a total of 32% never using or accessing the Internet.

Main uses for Computers by Sample Groups

(Q.7. Sample Groups A, B and C)

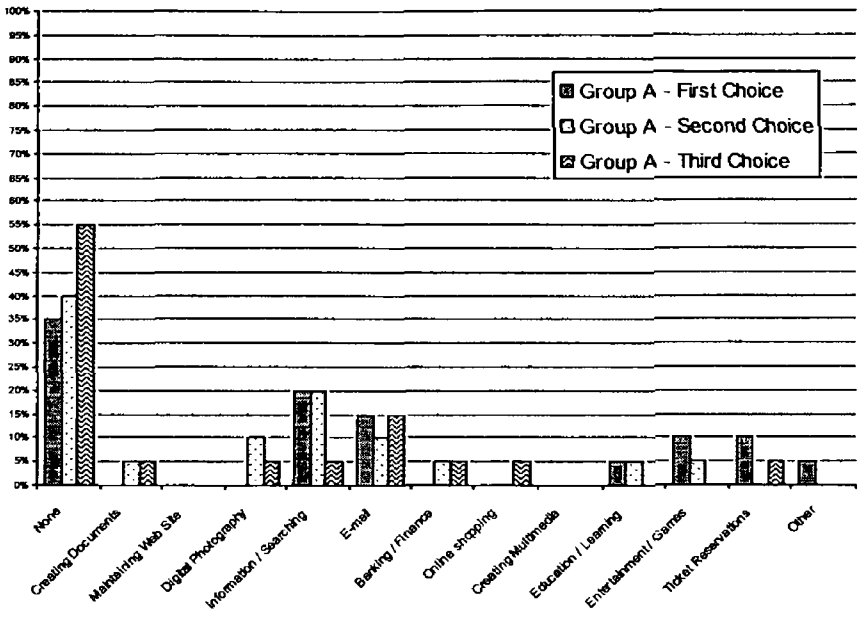


Figure 4.9. Main uses for computer by Sample Group A

The graph in Figure 4.9 illustrates the top three main uses for computers by Sample Group A. An important consideration is that that those respondents that do not use a computer or access the Internet have indicated 'None' in the above graph. It would therefore follow that the first, second and third choices for all of these respondents would be in the 'None' category. However, if a respondent uses a computer for less that three specific tasks, as indicated above, then there would be a corresponding increase in the level of 'None' responses. This is shown on the graph and the corresponding data can be referenced in the Raw Statistical Data section of this dissertation (see Appendix 6)

There is a significant spread of uses for computers among the Sample Group, but they can be categorised into three main application areas, namely 'Desktop' applications 'Online' applications and 'Entertainment' applications.

For Sample Group A, the main focus in on the 'On-line' application area with the main area of use relating to 'Information / Searching', 'e-mail' with some respondents using the computer/Internet use for banking and financial transactions. The next main area is 'Entertainment' where the respondents used their computers for playing music CD's, DVD's and in some cases downloading music from an on-line source There was also some use for education and learning but this was very limited.. The third area were the computer is used for is creating documents and managing digital photography. Overall, it can be seen that there is limited use of computers by the sample group as a whole.

Many of the respondents tend to use computers in a limited fashion with just under 50% of the respondents using their computer for two or more tasks.

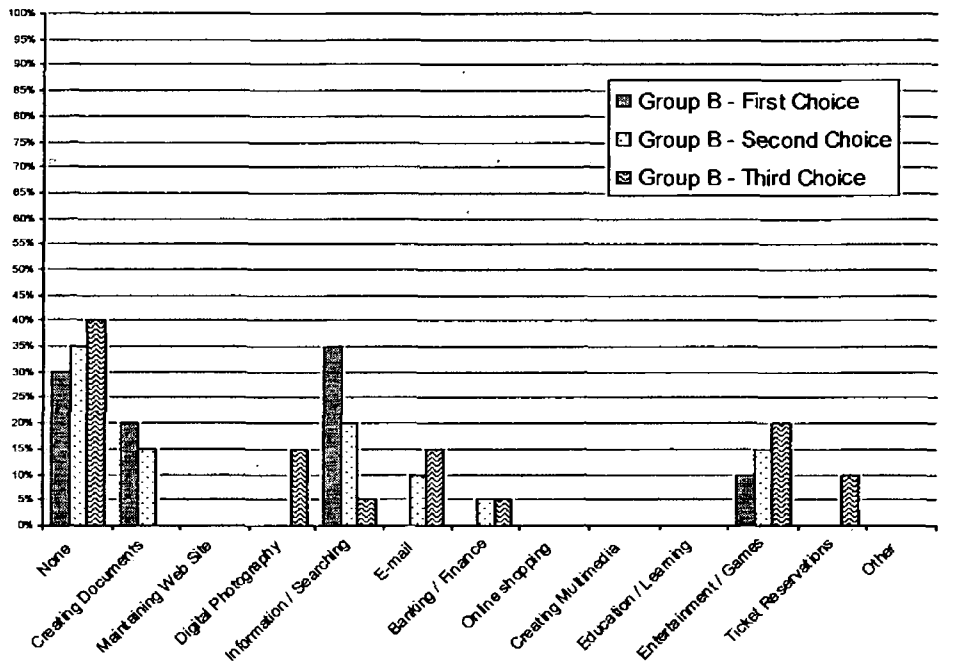


Figure 4.10. Main uses for computer by Sample Group B

The graph in Figure 4.10 above illustrates the top three main uses for computers by Sample Group B. Similarly, as with Sample Group A, an important consideration is that

that those respondents that do not use a computer or access the Internet have also indicated 'None' in the above graph. As is the case with the previous sample group, there is a follow-on result for second and third choices for their use of computers. This is shown on the graph and the corresponding data can be referenced in the Raw Statistical Data section of this dissertation (see Appendix 6). However, the level of general computer use is higher in Sample Group B than in Sample Group A, and this is reflected in the lower results in the 'None' category.

There is also a significant spread of uses for computers among Sample Group B, and they can be categorised into three main application areas, namely 'Desktop' applications 'Online' applications and 'Entertainment' applications.

It can be seen that there is a greater use of computers among the Sample Group B respondents in the 'Online' area, particularly in the area on 'Information / Searching'. There is also a marked increase in the 'Desktop' area where there is more use of the computer for 'creating documents' and 'digital photography'. The 'Entertainment' area is also increased but with corresponding level of use as second and third choice areas of usage.

Although there is a more positive response for usage of computers, only 65% of respondents used there computers in two or more task areas.

An analysis of Sample Group C's results for main computer usage areas is shown in the graph below.

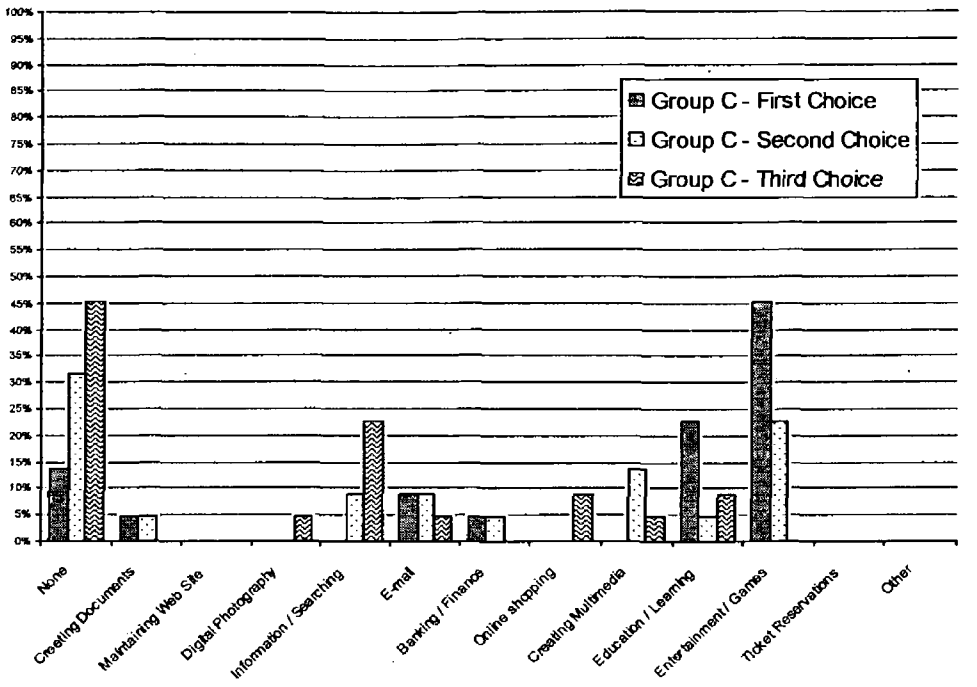
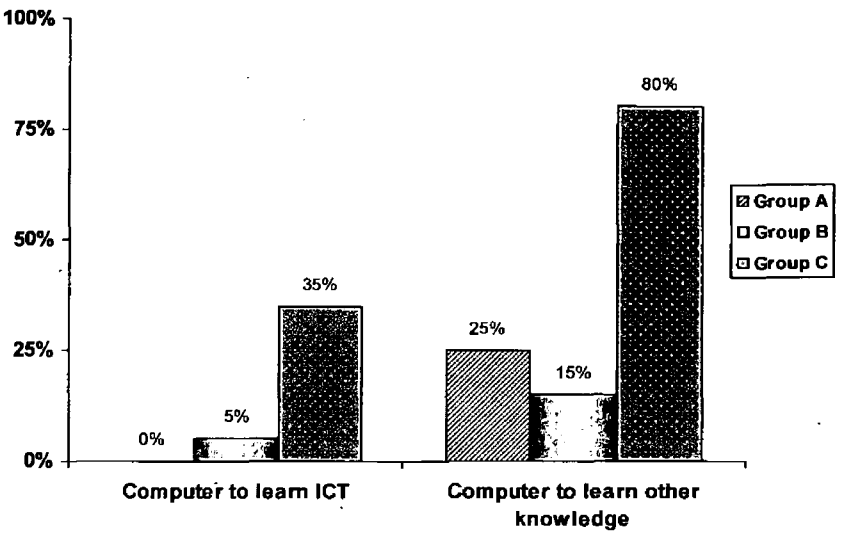


Figure 4.11. Main uses for computer by Sample Group C

It can be clearly seen that there is a significant increase in the use of computers for 'Entertainment' purposes among this group. Playing games and music are clear areas of interest among this Sample Group. There is also a significant increase in the level of use for computers in Education and Learning. Although 24% never access the Internet, there is significant use of computers in the 'On-line' areas of use such as Information / searching', 'e-mail' and 'education / learning'. There is less use of computers for 'Creating Documents' but increased use for 'Creating Multimedia', such as graphics, etc.

Use of Computer for Learning and Education:

(Q.8. and Q.9. Sample Group A, B and C)



Computer to learn ICT No = 0 Yes = 1		
	Mean	0.161290323
	Median	0
	Mode	0
	Variance	0.13749339
	Standard Deviation	0.370801011
	Confidence Interval	0.034224239
	N =	62

Computer to learn other Knowledge No = 0 Yes = 1		
	Mean	0.387096774
	Median	0
	Mode	0
	Variance	0.241142253
	Standard Deviation	0.491062372
	Confidence Interval	0.06002405
	N =	62

Figure 4.12. Using Computer to learn ICT or other knowledge

The graph above shows extremely limited use of computers to learn any Communications and Information Technology (ICT) related subjects with Sample Group A indicated 0% and Sample Group B indicating only 5% of respondents doing so. Specific analysis of the Interview Schedule responses (see Appendix 6) for Group B, showed that the areas of interest were in *'Computer Repair'* and *'Digital Photo Image Software Applications'*.

Sample Group C indicated that shows 35% of the respondents use a computer to learn ICT related subjects. Examples of uses ranged from 'Word Processing Software Applications' to 'Computer Programming Languages', 'Typing Skills' and other unspecified 'Software Applications'.

When analysing the responses for each sample group with regard to the use of computers to learn other subject areas, the graph shows that there is much greater use of computers to learn other subjects particularly by Sample Group C.

25% of Sample Group A indicated that they used the computer to learn about work related subjects and other subjects such as 'Holiday Destinations' or 'Car Maintenance'. 15% of Sample Group B utilised a computer to learn and educate themselves in such subject areas as 'Driving Test Theory', 'Car Mechanics' and 'Work Related Subjects' such as maintenance procedures for plant and equipment.

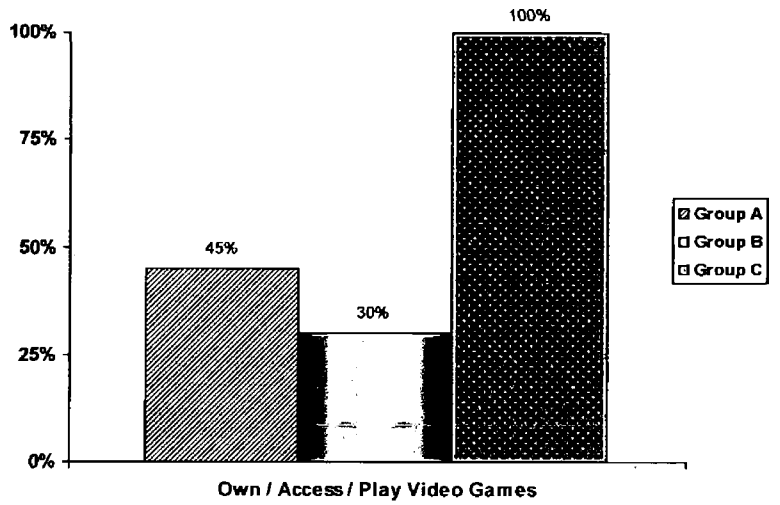
80% of Sample Group C respondents indicated that they used a computer to learn and educate themselves in other subject areas. This is a substantial figure and as the age profile of this sample group is primarily in the 'under 18 years of age' bracket, (see Figure 4.3.) 'education' related subject areas are mainly responsible for this.

Subject areas ranged from 'School Education Subjects', 'School Projects', 'Music', 'Mathematics', 'Languages', 'Cookery', 'Cars and Motoring', 'Health', to 'History' and 'Astronomy', with one respondent indicating that they used the computer to learn about 'Gameplay'.

'Gameplay' is a term used to describe how a computer or video game is navigated through by a game player and it sometimes describes various tricks, cheats and instructions on how to unlock hidden areas of games. It also provides on-line links to interest groups in particular games or game genres.

Video Games:

(Q10. Sample Groups A, B and C)



Own / Access / Play Video Games		
No = 0	Mean	0.596774194
Yes = 1	Median	1
	Mode	1
	Variance	0.244579588
	Standard Deviation	0.494549884
	Confidence Interval	0.123101142
	N =	62

Figure 4.13. Own / Access / Play Video Games by Sample Groups

The graph shown in Figure 4.13 shows the level of ownership, access and playing of video games by Sample Groups A, B and C. Sample Group A, were the participants on the ATV Operators Training Course who played the ATV Video Game, indicated that 45% of the group's respondents were in some way engaged in the use of video games before attending the course. 30% of Sample Group B, as the group who used the Web Based Training or WBT, owned, had access to or played video games. As would be expected from a survey of game users, 100% of Sample Group C indicated that the play games.

The graph shown below in Figure 4.14 show the actual number of respondents from Sample Group A who play video games and the type of platform or system used.

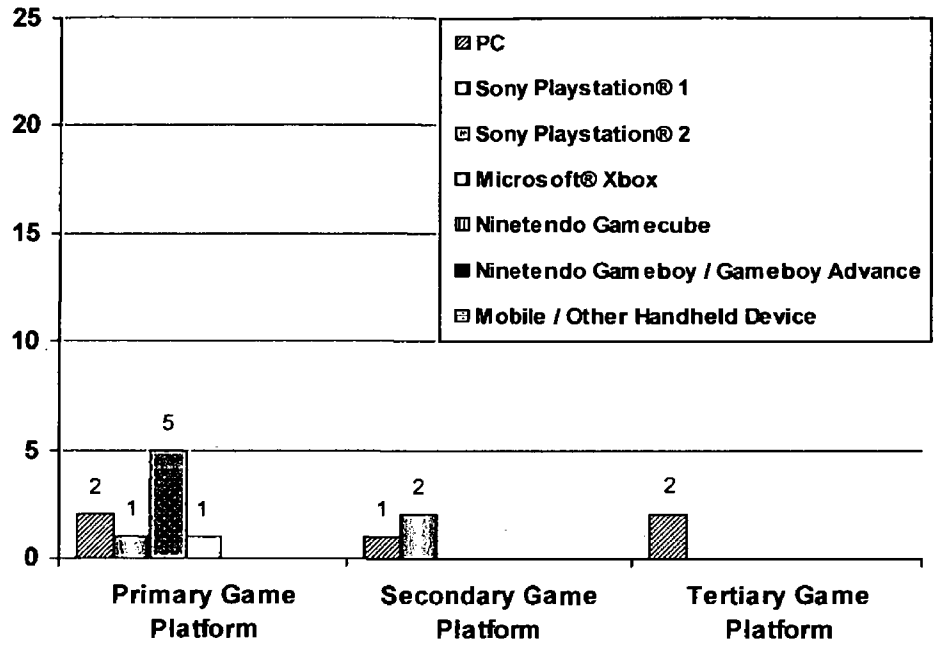


Figure 4.14. Game Platforms used by Sample Group A

Of the 20 respondents from Sample Group A, 5 respondents played games on the Sony PlayStation® 2 platform, 2 respondents played using a PC; one respondent used a Sony PlayStation® 1 and one respondent played video games using a Microsoft® X-Box. Of the nine respondents (which represented the 45% of Sample Group A who played video games, 3 of these individual respondents used a second game playing platform system with one respondent using three platform. In all these cases, upgrading of their platform or system, for example, from a Sony PlayStation® 1 to a Sony PlayStation® 2 is the main reason for using more that one game playing platform.

Further analysis of this group identified that the main types of games played by this group were divided into the following genres:

Video Game Genre	Video Game Title	Respondent's Comments
Sport	FIFA 2004	Great to play with family
	FIFA Soccer	Great graphics, easy controls
Fighting	Any wrestling/fighting game	Love to play all fighting games
Simulation (Driving)	Gran Tourismo 4	Any car racing games
	Colm McRea 3	
Action	Halo	Great graphics
	Splinter Cell	Realism
Role Playing Game (RPG)	Fable	Slow playing
	Lord of the Rings	Graphics, storyline

Figure 4.15 Samples Group A – Game Genres, Titles and Comments

The table in Fig 4.15 outlines the main games and genres of video games played by this group. The comments don't describe any specific traits other than graphics and realism would appear to be important to these game players. There is also an element of social interaction to game playing as there was an interest shown in playing video games with family members.

There is also a link to the general hobbies/interests of individual group members, for example, one respondent indicated that they had a great interest in the books and movies associated with the Lord of the Rings by J.R.R Tolkien. It would there be only natural, in their opinion, that this interest would be supplemented with a desire to own other media associated with this, including DVD movies and video games. Similarly, a deep interest in soccer would encourage the ownership of a sports genre type video game, such as 'FIFA 2004'. This particular element of video game playing was one of the main motives for choosing any particular video game genre.

The graph shown below in Figure 4.16 shows the number of respondents from Sample Group B who play video games and the types of games platforms used

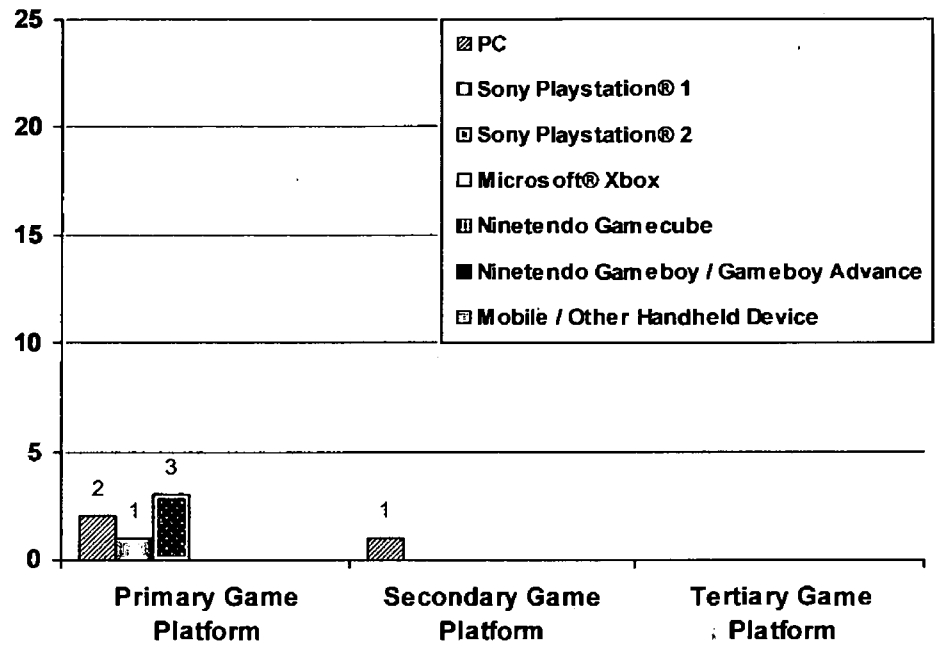


Figure 4.16. Game Platforms used by Sample Group B

As can be seen from this graph, only a very limited number of respondents actually own or have access to a video game playing system or platform.

Of the 20 respondents from this group, a total of 6 or 30% use a video game platform. Two respondents use a personal computer or PC, one uses a Sony PlayStation® 1 and three respondents use a PlayStation® 2 console as the video game playing platform. Only one respondent from Sample Group B uses a personal computer as their second system for playing video games.

The main video games and game genres are outlined in the table in figure 4.17.

Video Game Genre	Video Game Title	Respondent's Comments
Sport	Superbikes	Very realistic
	FIFA Soccer	Great graphics, easy controls
	FIFA 2004	Anything to do with football is great
Simulation (Driving)	Need for Speed	Great selection of cars
	Gran Turismo	Bad soundtrack
	Colm McRea (PS1)	
Action	Wolfenstein	Shoot-em up

Figure 4.17 Sample Group B – Game Genres, Titles and Comments

Sport and driving simulations games are the popular choices for video games among Sample Group B respondents. The comments would indicate that graphics are important when it comes to video game design as is the soundtrack. The soundtrack relates to the music selection available as part of the video game. The soundtrack, as with any music selection can appeal or not to a wide variety of individual tastes.

It can be from Figures 4.13, 4.14 and 4.16 that video game players represent approximately one third of the total number of individuals from both Sample Group A and B. Feedback from these groups and particularly the video game players, would indicate the level of video game playing expertise among the groups is fairly low and that not even one of the respondents from these sample groups would consider themselves as being either an expert or 'regular' video game player.

Sample Group C however, is specifically drawn from individuals who have selected themselves as video game players or 'game users'. Sample Group C are the respondents who completed the Game User Survey as shown in Appendix 3.

The graph shown in Figure 4.18 shows a breakdown of the video game platforms and systems used by Sample Group C.

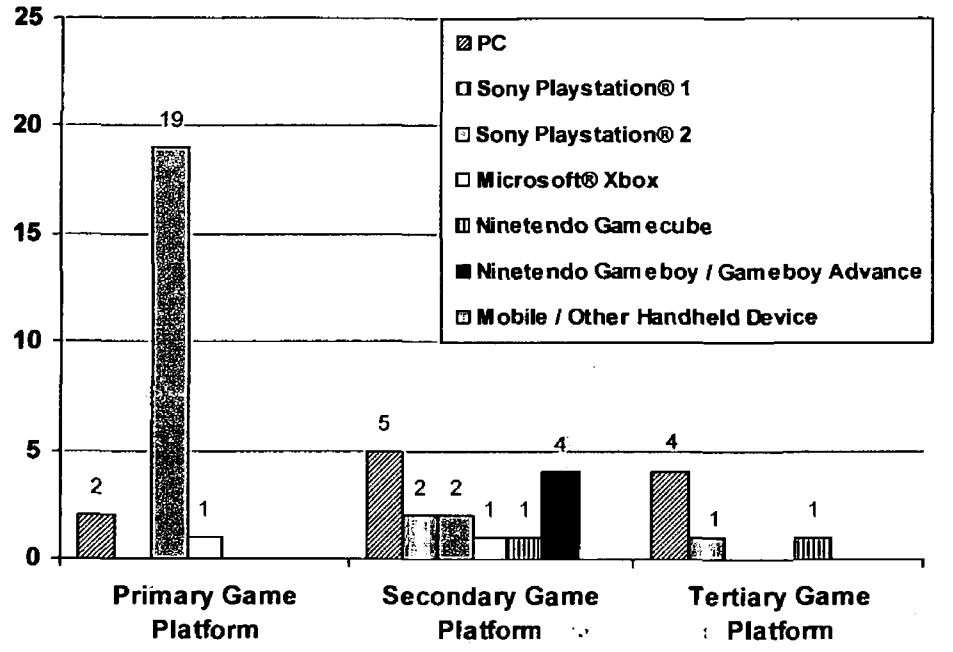


Figure 4.18. Game Platforms used by Sample Group C

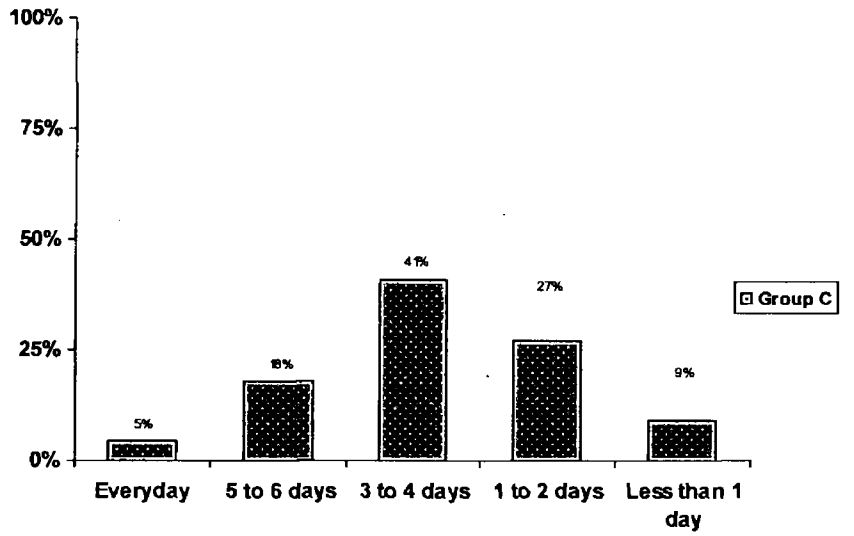
Given that all of Sample Group C own or have access to a video game platform or system, it can be seen that among this group that approximately 75% use a second platform and that 25% of the respondents own or have access to a third video game platform or system. In many cases, as can be seen from the numbers of respondents who use the Sony PlayStation® 1 platform (3 in total) that upgrading of existing platforms and systems is not a relevant issue for this group as a whole. Therefore, the majority of this group own or access second and third systems and platforms by choice.

It can also be seen very clearly that the main video game platform used by this group is the Sony PlayStation® 2 console with 19 of the 22 respondents using this platform as the

main video game playing platform. However, it can be seen that two of the remaining three respondents use the Sony PlayStation® 2 as their second choice. This would indicate that over 95% of the respondents use the PlayStation® 2 for playing video games.

The personal computer follows are the next most popular choice with a fairly small number of users of for each of the other platforms and systems ranging from the 'Ninetendo Gameboy Advance', 'Microsoft® X-Box', 'Sony PlayStation® 1', the 'Ninetendo Gamecube', to the playing of games on mobile phones.

The graph shown in Figure 4.19 below also shows how often Sample Group C respondents play video games.



Play Games How Often?		
	Mean	2.818181818
	Median	3
Everyday = 5	Mode	3
5 to 6 days per week = 4	Variance	1.012987013
3 to 4 days per week = 3	Standard Deviation	1.006472559
1 to 2 days per week = 2	Confidence Interval	0.420570129
Less than 1 day per week = 1	N =	22

Figure 4.19. How regularly video games played by Sample Group C

It can be seen that 64% of the respondents actually play video games more that 3 days per week. This represents a considerable slice of the available leisure time available to this group. This is particularly relevant when the age profile if this group is taken into consideration (see Figure 4.3) as 77% of this group are under eighteen years of age. No study was conducted as to the occupations or roles of this group, but it is likely that the majority of the 77% are in second level education.

Game Titles and Genres

(Q.12, 13, 14, 15 and 16 – Game User survey)

The following is an analysis of the responses to a number of questions from the Game User Survey.

The respondents were asked to identify their most recently played or favourite video games and to classify them into the appropriate genre category form the list provided in the survey. This list as is shown below categorises the games into eight different genres. However it must be pointed out that most modern video games fall into a number of categories as various genres can be incorporated into a single video game. As such the Sample Group C respondents, who completed this part of the survey, have classified their choice of video game into their own interpretation of a particular genre. For clarification purposes, the video games are listed by selected genre, video game title and the most and least satisfying characteristics of each video game.

Also, where a number of respondents have chosen the same video game, the identified characteristics are combined into a single list of features.

Game Genre	Game Title	Format	Most Satisfying Features	Least Satisfying Features
Action	Enter the Matrix	PS2	• Graphics, • Lots of levels, • Beating up enemies	• Can be too difficult, • The 'agents' are boring
	Sonic Heros	Game-cube	• Colour and Graphics, • Lots of games, • Good music	• Unable to save game data, • Can get annoying at times, • Can become boring
	Dynasty Warriors 4	PS2	• Based on real historical period in ancient china, • 40 playable characters, • Control of large armies	• Repetitive after a while, • You can beat game using only one button, • Poor in multiplayer mode
	Metal Gear Solid 3	PS2	• Graphics, • Special moves or drawing weapon from holster, • Storyline • The character 'Solid Snake', • Choice of weapons	• Game too short, • Lack of A.I. interaction, • Repetitive statements from character • Difficult to aim weapons, • Vision isn't great, • No vehicles to drive
	Killzone	PS2	• Lots of tasks to do, • Never get bored	• Difficult to find your way around •
	Halo 2	X-Box	• Being one of a team, • Choice of characters, weapons, vehicles • Killing enemies	• Nothing
	Tony Hawks Underground	PS2	• Performing tricks, creating a park, • Characters	• Fall off skateboard very easily, • Music soundtrack
	Simpsons – Hit and Run	PS2	• Great fun, • Good storyline and jokes, • Drive lots of vehicles	• Poor graphics, • Items disappear when you destroy them.
	Tony Hawks – Pro Skater	PS2	• You can create your own skater character, • Great challenges, • Brilliant graphics	• You fall off too much, • Items disappear when you destroy them.
	Grand Theft Auto – Vice City	PS2	• Graphics are good, resembles real life, • Cars are cool	• Bad language means its difficult to play when young children are around
	Grand Theft Auto III	PS2	• Attention to detail, freedom of movement, • Choice of weapons • You can steal any type of vehicle, • Challenging	• Frustration when you can't complete a mission, • Short game, • Repetitive, Bad language and soundtrack
	Grand Theft Auto – San Andreas	PS2	• Always keeps your interest, never boring, great storyline	• Software bugs - stuck between walls and fences

Figure 4.20. Most and least satisfying features of 'Action Games'

It can be seen from the table shown above in Figure 4.20 that there are a number of interesting features commented on by the respondents.

Firstly, most of the action games selected tend to have an element of anti-social or negative behaviour as the basis for their storyline, for example, car theft, property destruction, killing enemies. This enables the video game player to act out roles not normally allowable within the accepted norms of society.

Secondly, there are a number of clearly identifiable traits associated with satisfaction among game players, namely; the quality of graphics; the amount of choice available to the game player - whether it is to choose weapons, cars or characters; there are lots of tasks and levels to complete: and finally the storyline of the videogame is clearly the main reason game players are attracted to a video game.

Thirdly, there are also a number of clearly identifiable traits associated with dissatisfaction among game players, such as: boring storyline; too difficult to play, bad soundtrack, music and commentary, repetition, lack of choice and software glitches.

The next set of video games selected by the Sample Group C respondents are the 'Adventure Games'. Once again, some of these games could be classified under different genres or could be constructed from elements associated with a number of genres.

The table in Figure 4.21 below identifies the most and least satisfying features associated with this type of video game.

Game Genre	Game Title	Format	Most Satisfying Features	Least Satisfying Features
Adventure	Spiderman 2	PS2	• Excellent graphics, • Can use web on Buildings, • Realistic and challenging enemies	• Game too easy, some enemies defeated too easily, • Cannot change character
	Prince of Persia	PS2	• Music, • Choice and use of weapons, • Monster characters	• Difficult to play, • Too much talking, • The 'fortune teller' character
	Lord of the Rings – Return of the King ** Gandalf and Frodo are game character names attributed with personality and character traits.*	PS2	• Good choice of characters and weapons, • Difficult to play, • Gandalf* is the best character	• Very annoying when completed, • Frodo* is a very weak character • When you lose or get killed you have to start again,
	Ratchet and Clank 2	PS2	• Storyline excellent, • Lots of puzzles to solve, races, • Battle arena is cool	• Some enemies are too easy to beat, • Annoying when game is completed
	Ratchet and Clank 3	PS2	• Weapon selection and upgrades, • Soundtrack, • Suits of armour	• Very quick to complete, • Too easy to get weapon upgrades, • Trophies and skill points too difficult
	Tomb Raider II	PC	• Action packed, challenging • Discover different worlds	• Bad graphics, • Difficult to move up through the levels

Figure 4.21. Most and Least Satisfying Features of 'Adventure Games'.

The following set of games as shown in Figure 4.22 below have been classified under the 'Fighting' category of games as it is representative of all video games that involve combat between opponents. Wrestling, martial arts and boxing type video games would fall into this category.

This type of game is usually set within a specific storyline or utilises a range of characters associated with movies, TV shows or tournaments.

Game Genre	Game Title	Format	Most Satisfying Features	Least Satisfying Features
Fighting	Smackdown vs. Raw	PS2	• Graphics, • Interesting levels, • Music soundtrack • Beating people up, • Using chairs, hammers, ladders as weapons • Great moves • Great fun, • Unlock new characters	• Season too easy, • Status Points, • Referee gets in the way • Very slow to load, • Commentary can be very annoying, • Using 'Cheat Disk' wreaks the game, • Bad storyline
	Tekken 4	PS2	• Lots of characters to choose from, • Great moves such as throwing opponent into the air, • Storyline	• Some fighting moves too difficult, • Some characters are boring
	WWE Smackdown -- Shut your Mouth	PS2	• Great fun, • Great graphics	• Can be boring
	Dragonball Z Budokai 3	PS2	• Good story, • You have to beat game 100%, • Characters are interesting, • Great graphic	• Some characters are hard to unlock
	Mortal Kombat: Deception	PS2	• Many different fighting styles, • Interactive surroundings such as booby traps and weapons, • Plenty of gore and violence	• Not many characters, • Combo moves too complicated, • After beating up an opponent a number of times, you think 'why bother?'
	Super Smash Bros Melee	Game-cube	• Selection of characters, storyline, • Nearly all Nintendo characters available	• Nothing

Figure 4.22. Most and Least Satisfying Features of 'Fighting Games'.

As can be seen in the figure above, graphics, characters and the ability to complete a wide range of combat moves and styles are clearly the attraction of this type of video game. Again the ability of the game player to unlock new features or characters would in itself form part of the game challenge. Also the storyline, which defines the reasons for the characters, their features and qualities and the reasons why they are to be engaged in

some form of combat, is seen as particularly important. The music soundtrack is also seen as very relevant as a satisfying feature. Music soundtracks associated with this type of video game genre did not elicit any negative responses at all.

However, making the game too complicated by creating control sequences that are too difficult to master or characters that are uninteresting or too easy too beat would appear to be the main areas of dissatisfaction with this type of game. Interestingly, violence did not appear to be an issue with the majority of the respondents and this genre of game would appear to be 'fun' to play. Only one respondent referred to 'violence and gore' as a satisfying feature of a game.

It can be seen that a lot of the commentary was in relation to the 'Smackdown vs. Raw' video game, which by far the most popular choice of game in this genre. This particular game is very reflective of the actual performances and actions and characterisations of the 'Wrestling Entertainment' industry, in that it glamorises the characters and generates lots of excitement among the game players. Any violence is not seen as realistic and 'beating up' is seen as just another challenge.

However, from the responses from the sample group, it would appear that video games in this genre has a limited life span, in that once a combat match or challenge is completed, there is no desire to repeat the experience, so this type of game is usually only completed once and played on an ongoing basis.

The next genre of video game is categorised as 'Puzzle' type of games. However, nearly all genres of game have a puzzle element built in to them at some level.

Examples would be 'remembering sequences or letter, numbers or shapes, placing objects in the correct order, deciphering clues, navigating mazes, etc. The table shown below in Figure 4.23 describes the most and least satisfying features of this genre.

Game Genre	Game Title	Format	Most Satisfying Features	Least Satisfying Features
Puzzle	Who wants to be a Millionaire	PC	•Educational, •Very realistic (feels like your on TV)	• Can be difficult for younger user, • Can become boring

Figure 4.23. Most and Least Satisfying Features of 'Puzzle Games'.

The responses indicate that realism is one of the important satisfying features, but as the game is based on general knowledge, it is educational to a certain extent. The response also shows that this particular game, 'Who wants to be a Millionaire', could present difficulties for players who don't have a broad level of general knowledge, such as younger players. This would therefore be a good example of a game that designed and developed for a very specific audience or group of game players.

The next genre of games is known as Role Playing Games or the 'RPG' genre of video games. Role Playing games are usually categorised as video games where the game player adopts the role of a specific medieval or fantasy character. However, as with other types of games there is generally a cross over of genres and it is typical to find most games of this nature could also be categorised under the action or adventure category also.

The following list of games are categorised by the Sample Group C respondents as belonging to the 'Role Playing Game' genre.

Game Genre	Game Title	Format	Most Satisfying Features	Least Satisfying Features
Role Playing Games (RPG)	X-Men Legends	PS2	• Difficult to beat, • Great graphics, • Good choice of characters • Storyline, • Value for money	• The Suits • The Music • The Sentinels
	Final Fantasy VII	PS1	• Deep and interesting plot with many twists, • Great characters-moves-items, • Music score, • Graphics	• Some boss battles are a bit too difficult, • Game supplied on three disks, • Bad graphics on occasions
	Lord of the Rings – the Third Age	PS2	• New characters within same storyline, • New journeys and locations, • Different gameplay from previous games	• Repetitive strategies used to defeat enemies, • Can be slow, • Difficult to complete without reference book
	Lord of the Rings – Return of the King	PS2	• Fighting and killing enemies, • Choice of weapons	• When you lose or get killed you have to start again, • Difficult to play
	Dance Mat	PS2	• Choice of songs, • Lyrics shown on screen, • Choice of difficulty level	• Some songs are not good.

Figure 4.24. Most and Least Satisfying Features of 'Role Playing Games (RPG)'.

Once again, the graphics, storyline and characters available contribute to the satisfaction level of game players playing this genre of video games. In particular, the storyline is mentioned a number of times as being deep and interesting and playing a part in the telling of this storyline is one of the key satisfying features. The games listed by the respondents contain deeply developed characters such as those from 'Lord of the Rings' which provide a vast amount of literature on which to design their character traits and abilities and the virtual world and environments in which they travel.

One game stands out from the list in that it has no relationship to the other types of games listed. 'Dance Mat' is a game where an individual player can adopt the role of a dancer.

Its unique categorisation is fundamentally correct in that the game player does adopt a role, but the role is outside the virtual video game world and in the real world. The game is utilised as a guide or director of the video game player's actions. Feedback from the video game player's actions is fed back to the game through a 'dance mat' which is essentially a number of switches placed on a floor space. These switches are opened and closed by the foot movements of the game player, allowing the game to set or guide the 'dancer' or game player into the next position.

This type of game utilises the physical position of the game player in it operation and there are now serious developments in this field of game design, with the introduction of web cameras to bring both the game players image and physical movements into the virtual environment of the game.

The next genre is games classified under the 'Simulation' category. In this case 'Simulation' can take the form of driving or flight simulator type video games. Figure 4.25 below describe the most and least satisfying features of this type of video game.

It can be seen that a lot of emphasis in the games selected by the respondents are very closely related to the phenomenon of car customisation and street racing in the real world. A lot of effort in the game is focused on selecting, customising and racing cars. Graphics play an extremely important element is the success of this game format as is the challenge of racing the chosen cars against competitors. The recreations of both visual and audio realism are crucial design factors for this genre of game.

One point noted that the game commentary tended to mock the player and that this was a very annoying element of the video game.

Game Genre	Game Title	Format	Most Satisfying Features	Least Satisfying Features
Simulation	Need for Speed - Underground 2	PS2	• Driving around streets, • Racing other cars, • Different types of races, • Customising your car • Choice of cars, • Amount of tracks and you have to drive around to find races • Challenging game, • Great for car enthusiasts, • Very realistic	• Can't save cars or its just difficult to figure it out • Not many changes from previous version - 'Need for Speed Underground' • Tedious if your not a car lover, • Stages appear repetitive
	Midnight Club II	PS2	• Car options, • Multiple mode choices, • Graphics	• Repetitive statements, • Constantly being mocked by game, • Maps too small
	Gran Turismo 4	PS2	• Cars are very realistic, • Brilliant graphics, • Lots of cars to choose from	• Can get too difficult
	Need for Speed - Underground	PS2	• Different race formats, • Tuning the cars to get best performance, • Very good graphics	• Not much
	Moto GP	PS2	• Realistic performance of bikes, • Great graphics, • Playback is as realistic as TV broadcast	• The more you progress, the easier it is to fall off

Figure 4.25. Most and Least Satisfying Features of 'Simulation Games'.

The selection of games shown in Figure 4.26 belong to the 'Sports' genre of video game. Realism and graphics are keys elements in the design of this type of game. As movement of the human body expressed through the motion and skills of football players, the ability of this type of game to allow the video game player to reproduce and demonstrate football movements and skills is the main focus of the gameplay.

Game Genre	Game Title	Format	Most Satisfying Features	Least Satisfying Features
Sport	FIFA Street	PS2	• Great graphics, • Easy to learn, • Great skills and players • Player characteristics • Great tricks , • Good choice of streets to play in	• Music • Pitches are too small
	FIFA Football 2004	PS2	• Exciting, interesting, • Great if your bored	• Hard on the eyes, • Becomes less and less exciting after you complete the game • Boring after a while
	Pro Evolution Soccer 4	PS2	• Good detail, • Realistic, • Addictive	• Commentators can be irritating, • Lack of real player names
	FIFA 2005	PS2	• Very realistic, • Good gameplay, • Good special effects • Like a real football game, • Manchester United is included, • You can change team players	• Too easy, • Can become tedious
	Rugby 2004	PS2	• Graphics show great view of tackles, great when you score a try or are in a scrum	• Nothing
	Rugby 2005	PS2	• Attention to detail, • Fast gameplay, • Good for learning rugby rules	• Have to pass a training exercise at beginning, • Hard to follow instructions, • Off-side rule is bad.

Figure 4.26. Most and Least Satisfying Features of 'Sports Games'.

As can be seen there are few negative comments generally associated with this genre of game. They are normally chosen by enthusiasts of particular sports and the technical aspects of the game tend to receive the most attention, for example, pitches or commentary and player names. The two main sports represented are soccer and rugby.

The final game genre is the 'Strategy Genre'. Figure 4.27 below outline s the most and least satisfying features associated with this genre of video game.

Game Genre	Game Title	Format	Most Satisfying Features	Least Satisfying Features
Strategy	SIMS	PC	• Creating the ideal world, • Designing your own people	• You have to have version 1 to download additional versions
	Age of Empires	PC	• Interaction between people, religions, armies, • The challenges of survival, • Hours of distraction • Clever strategies, • Lots of history, • A game that makes you think	• At point of no return it takes too long to be destroyed, defeated. • Difficult to know where you went wrong • Graphics could be better, • More historical figures would be good
	Empire Earth	PC	• Great battles, you can build armies and plan your next moves	• Takes too long to build some buildings, • Time limit can be a nuisance
	Tony Hawks U.G. 2	PS2	• Unusual and cool characters, • Levels recreate actual places, • Creating a park • A long game, very good graphics	• Poor graphics, • Poor soundtrack, • Difficult navigation • Too many players and unplayable after completing game

Figure 4.27. Most and Least Satisfying Features of 'Strategy Games'.

As can be seen, the main platform used for strategy type games is the personal computer. This type of game requires considerably more processing power and memory in order to enable the game player to develop their strategy. This type of game requires a lot of creativity on behalf of the games player and can take a considerable amount of time to play. The graphic however, are not as well developed as other game format. Sound also takes a back seat in this game genre. However, as can be seen with 'Tony Hawks – Underground 2', there are much improved graphic and characters, but some players would still consider them poor, but its main fault is that once a player completes the

game, it can no longer be played, except completely from the very beginning. However, expect more examples of this particular genre of game to move to the console platforms as systems improve.

4.4. Sample Group Motivation - Findings

Motivational Analysis

(Q.15 - Sample Group A and B)

The respondents from the Sample Groups A and B that attended the All Terrain Vehicle (ATV) Operator Training were required to complete, as part of the interview schedule/questionnaire, a specific question that was designed to elicit information on their level of motivation.

This question was constructed to allow each of the respondents, whether they had played the ATV video game or used the Web Based Training as part of the ATV Operator Training course, to rate a series of statements and to indicate which best represented their opinion.

The statements were constructed on an adaptation of the ARCS Motivation Model (Keller, 1979, 1983). ARCS stands for 'Attention', 'Relevance', 'Confidence' and 'Satisfaction' and the statements to rate fall under these four scales.

The series of statements under each scale can be summarised as follows and is shown in Figure 4.28.

Attention	Gain Attention; Real Virtual Environment; Solve Problems; Understand ATV Manoeuvres
Relevance	Realistic Examples; Clear Objectives; Motivated me to learn
Confidence	Feel Confident; Build up skills; Self-paced learning
Satisfaction	Use skills in a virtual environment; Provide Feedback; Presented Consistent Standards

Figure 4.28. ARCS Motivational Scales.

The full statement associated with each category can be seen in the Semi-Structured Interview / Questionnaire in Appendix 1.

An analysis of the responses from both Sample Group A and Sample Group B provided some interesting results. However, by presenting the results in a format that compares only the ARCS scales and combines the total responses for each individual statement under each of the A, R, C and S categories as outlined above, an overall picture emerges as the motivational effect of the ATV Video Game played by Sample Group A and the Web Based Training undertaken by Sample Group B.

The graph in Figure 4.29 below compares the overall mean of the responses under each scale and for each group.

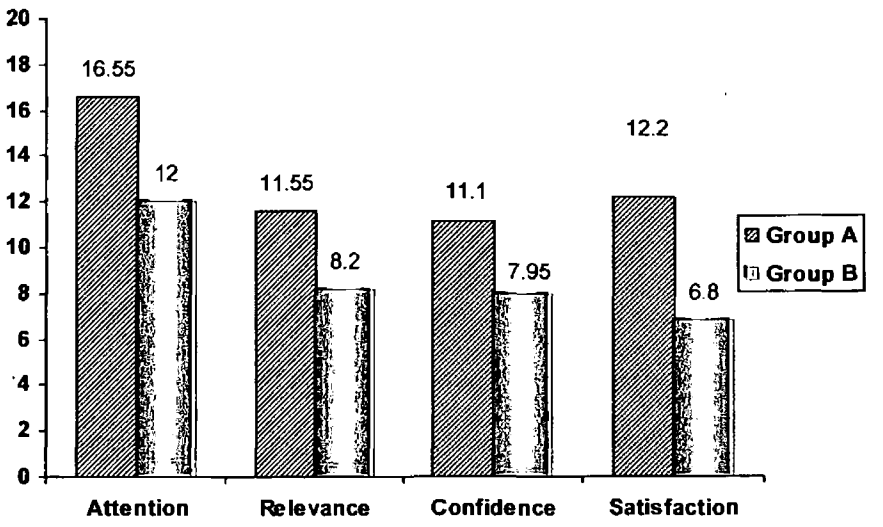


Figure 4.29. Mean Values of ARCS Motivational Scales

As can be seen from the graph, there is a significant difference between the means for each of the Sample Group under each of the four ARCS scales. This clearly shows that overall, Sample Group A, the group who used the ATV Video Game, were significantly more motivated across all four categories than Sample Group B. Sample Group B is the group who used the Web Based Training input on All Terrain Vehicles or ATV's.

4.4.1. T-Test Results for Motivation

A t-test was used to analyse the results from the data gathered from the research experiment, as this type of analysis is appropriate whenever you want to compare the means of two groups. The t-test assesses whether the means of two groups are *statistically* different from each other. In examining the overall results over the four ARCS categories, the table shown in Figure 4.30 below outlines the 't-test Group Statistics' for this analysis

and specifies the sample Group (A or B) the number of respondents in each sample group (N), the Mean values (as shown in Figure 4.29), degrees of freedom 'df' (calculated as the total number from the sample groups minus two), the significance (2-tailed) and effect size 'd'.

T-Test Group Statistics							
	Group	N	Mean	Std. Error Mean	df	Significance	effect Size 'd'
Attention	A	20	16.55	0.26631	38	0.000	**2.85**
	B	20	12	0.44721			
Relevance	A	20	11.55	0.2348	38	0.000	**2.4**
	B	20	8.2	0.38798			
Confidence	A	20	11.1	0.37627	38	0.000	**1.52**
	B	20	7.95	0.55000			
Satisfaction	A	20	12.2	0.28654	38	0.000	**4.15**
	B	20	6.8	0.29558			

Figure 4.30. t-test Group Statistics for overall ARCS motivational Analysis

It can be seen from the data above that when a t-test was conducted on the four ARCS scales a specific test was carried out to calculate the effect size 'd' in each of the four scales.

Given that a typical value of 0.2 for 'd' would be considered as a small effect and that a figure of 0.8 would be considered as a big effect, the figures of 2.85 for 'Attention, 2.4 for 'Relevance', 1.52 for 'Confidence' and a huge figure of 4.15 for 'Satisfaction' would indicate that the use of an 'ATV Video Game' has had a significantly higher effect on the level of motivation of Sample Group A than the use of Web Based Training has on the motivation level of Sample Group B.

Figure 4.31 below shows the 'Independent Samples Tests' which includes a 'Levene's Test for Equality of Variances' and a 't–test for Equality of Means' specifically for the four ARCS scales.

Independent Samples Test									
Equal Variances Assumed	Levene's Test for Equality of Variance		t-test for Equality of Means						
	F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Attention	2.804	.102	8.742	38	.000	4.55000	.52050	3.49630	5.60370
Relevance	3.416	.072	7.387	38	.000	3.35000	.45350	2.43195	4.26805
Confidence	6.330	.016	4.727	38	.000	3.15000	.66639	1.80096	4.49904
Satisfaction	.919	.344	13.117	38	.000	5.40000	.41167	4.56661	6.2339

Figure 4.31. Independent Samples Tests on Four ARCS Scales

Analysis of the above statistics, show that for 'Attention' the t-test result was 8.742 and the significance result 0.000. This indicates that the t-value is significant as the result of the significance test was less than 0.05 ($t=8.742$, $p<0.05$)

The t-test result for 'Relevance' was 7.387 and the significance result was 0.000. This also indicates that the t-value is significant as the significance test result was less than 0.05 ($t=7.387$, $p<0.05$).

The t-test result for 'Confidence' was 4.727 and the significance result was 0.000. This indicates that the t-value is significant as the significance test result was less than 0.05 ($t=4.727$, $p<0.05$).

The t-test result for 'Satisfaction' was 13.117 and the significance result was also 0.000. This indicated that the t-value in this case also is significant as the significance test result was less than 0.05 ($t=13.117$, $p<0.05$)

In all four of the ARCS scales the t-values are more than sufficiently different from zero to consider that these test results are statistically significant.

Figure 4.32 below outlines the statistics used to conduct a t-test on each of the ARCS variables independently and lists the Mean, Standard Deviation and the Standard Error Mean for each Sample Groups' responses.

	Group	N	Mean	Std. Deviation	Std. Error Mean
Gain Attention (Attention)	A	20	4.30	.571	.128
	B	20	3.90	.553	.124
Real Virtual Environment (Attention)	A	20	4.25	.550	.123
	B	20	2.30	.865	.193
Solve Problems (Attention)	A	20	3.95	.394	.088
	B	20	2.35	.875	.196
Understand ATV Manoeuvres (Attention)	A	20	4.05	.510	.114
	B	20	3.45	.686	.153
Realistic Examples (Relevance)	A	20	3.70	.470	.105
	B	20	2.45	.999	.223
Clear Objectives (Relevance)	A	20	3.75	.786	.176
	B	20	3.05	.686	.153
Motivated me to Learn (Relevance)	A	20	4.10	.553	.124
	B	20	2.70	.733	.164
Feel Confident (Confidence)	A	20	3.75	.851	.190
	B	20	1.95	.999	.223
Build up Skills (Confidence)	A	20	3.55	.887	.198
	B	20	2.55	1.276	.285
Self-Paced Learning (Confidence)	A	20	3.80	.696	.156
	B	20	3.45	.686	.153
Use Skills in a Real and Virtual Environment (Satisfaction)	A	20	3.75	.851	.190
	B	20	1.80	.768	.172
Provide Feedback (Satisfaction)	A	20	4.30	.470	.105
	B	20	1.55	.605	.135
Consistent standards of Performance (Satisfaction)	A	20	4.15	.366	.082
	B	20	3.45	.686	.153

Figure 4.32. t-test Group Statistics for individual ARCS variables.

Figure 4.33 below shows a graphical representation of the mean results for each Sample Group for each ARCS variable.

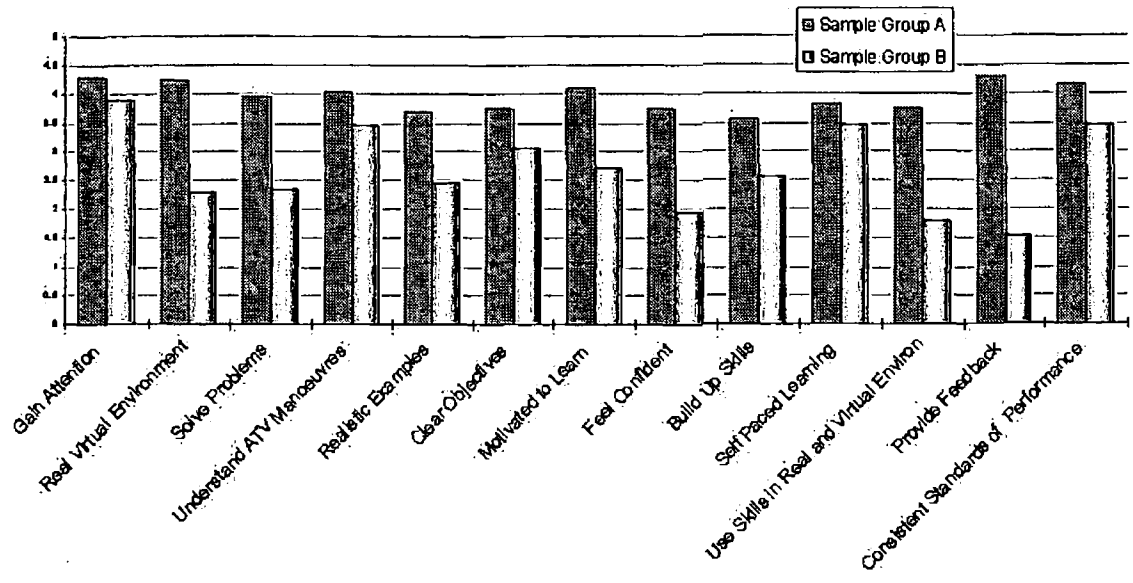


Figure 4.33. Comparison of Mean Values for ARCS

It can be seen quite clearly in the graph, from the Mean values, that Sample Group A, the group who played the ATV Video Game, rated their responses to the statements provided for each of the ARCS categories in the Interview Schedule/Questionnaire (see Appendix 1) towards the 'Strongly Agree / Agree attributes of the 'agreement' variable for this question .

In all cases the ratings of Sample Group A were higher, but it can also be seen that specific comparisons of Mean values, for example, with the 'Gain Attention' category, the 'Understand ATV Manoeuvres' category, the 'Clear Objectives' category and the 'Self-Paced Learning' category clearly show low values of 'Mean Difference' (see Figure 4.34) which would indicate similar responses from both Sample Group A and Sample Group B in these cases.

However, the aims and objectives of the Web Based Learning input, which was utilised by Sample Group B, are specifically designed to address these particular aspects of ATV Operator training.

Figure 4.34 below shows the 'Independent Samples Tests' which includes a 'Levene's Test for Equality of Variances' and a 't–test for Equality of Means' specifically for all of the ARCS categories under the four ARCS scales.

Independent Samples Test									
Equal Variances Assumed	Levene's Test for Equality of Variance		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Gain Attention	1.394	.245	2.251	38	.030	.400	.178	.040	.760
Real Virtual Environment	2.040	.161	8.510	38	.000	1.950	.229	1.486	2.414
Solve Problems	13.093	.001	7.456	38	.000	1.600	.215	1.166	2.034
Understand ATV Manoeuvres	7.853	.008	3.317	38	.003	.600	.191	.213	.987
Realistic Examples	13.585	.001	5.064	38	.000	1.250	.247	.750	1.750
Clear Objectives	.021	.885	2.999	38	.005	.700	.233	.228	1.172
Motivated me to Learn	3.119	.085	6.823	38	.000	1.400	.205	.985	1.815
Feel Confident	.895	.350	6.136	38	.000	1.800	.293	1.206	2.394
Build up Skills	8.163	.007	2.877	38	.007	1.000	.348	.296	1.704
Self-Paced Learning	.169	.683	1.601	38	.118	.350	.219	-0.092	.792
Use Skills in a Real and Virtual Environment	.007	.933	7.610	38	.000	1.950	.256	1.431	2.469
Provide Feedback	4.085	.050	16.054	38	.000	2.750	.171	2.403	3.097
Consistent standards of Performance	16.169	.000	4.024	38	.000	.700	.174	.348	1.052

Figure 4.34. Independent Samples Tests for all ARCS Categories

The t-test result for 'Gain Attention' was 2.251 and the significance result was also 0.030. This indicates that the t-value in this case also is significant as the significance test result was less than 0.05 ($t=2.251$, $p<0.05$). The ATV Video Game did get the respondents' attention.

The t-test result for a 'Real Virtual Environment' was 8.510 and the significance result was 0.000. This indicates that the t-value in this case is significant as the significance result was less than 0.05 ($t=8.510$, $p<0.05$). This would verify that the environment presented in the ATV Video Game was representative of the real environment in which the respondents would be expected to operate a real All Terrain Vehicle (ATV).

The Web Based Training input was clearly not viewed as representative of a 'real environment' although the graphics used were reported as being effective in describing different types of terrain. Examples of the type of graphics used are shown in the ATV Training Course Specification shown in Appendix 7. This is supported by the large mean difference figure of 1.950.

The t-test result for 'Solve Problems' was 7.456 and the significance result was 0.000. This indicates that the t-value is significant as the significance result was less than 0.05 ($t=7.456$, $p<0.05$). The ATV Video Games was able to facilitate the respondents' requirements to complete specific tasks and tackle problems such as climbing hills or avoiding obstacles.

The t-test result for 'Understand ATV Manoeuvres' was 3.317 and the significance result was 0.003. This indicates that the t-value is significant as the significance result was less

than 0.05 ($t=3.317$, $p<0.05$). As the tasks and manoeuvres are outlined in the ATV Operator Course training material, the ability of the respondents to describe the procedures and requirements for completion of each of the manoeuvres is actively supported by practice within the video game environment.

The t-test result for 'Realistic Examples' was 5.064 and the significance result was 0.000. This indicates that the t-value is significant as the significance result was less than 0.05 ($t=5.604$, $p<0.05$). This analysis result is from the 'Relevance' category of the ARCS scales and would therefore indicate that the ATV Video Game, as distinct from the Web Based Training, provided relevant examples of control and manoeuvres with an ATV to the respondents irrespective of their level of experience in the operation of an ATV. In simple terms a novice video game player or novice ATV operator could use the game just as much as an experienced video game player or experienced ATV operators.

The t-test results for 'Clear Objectives' was 2.999 and the significance result was 0.005. This indicates that the t-value is significant as the significance result is less than 0.05 ($t=2.999$, $p<0.05$). This indicates that the ATV Video Game with its instructions did provide clear statements and objectives for the completion of tasks, procedures and manoeuvres by the respondents. However, the Web Based Training clearly also proved to be 'relevant' in this case and this is born out by the low Mean Difference value of 0.700.

The t-test result for 'Motivated me to Learn' was 6.823 and the significance result was 0.000. This indicates that the t-value is significant as the significance result was less than 0.05 ($t=6.823$, $p<0.05$). The ATV Video Game proved to be very popular among the

respondents and all respondents viewed this type of input as being great fun. It was also indicated by the respondents that it did motivate them to take a much more active participation in the course.

The t-test result for 'Feel Confident' which was the first of the 'Confidence' categories of the 'ARCS Model', was 6.136 and the significance result was 0.000. This indicates that the t-value is significant as the significance result was less than 0.05 ($t=6.136$, $p<0.05$) There was a clearly held perception among the Sample Group (A) respondents who completed the video game, that once they completed the manoeuvres with the video game environment, they would require less practice time on an actual ATV in order to learn the actual tasks and manoeuvres required for assessment in the ATV Operator Training Course.

The t-test result for 'Build up Skills' was 2.877 and the significance result was 0.007. This indicates that the t-value is significant as the significance result is less than 0.05 ($t=2.877$, $p<0.05$). The ATV Video Game has the ability to build up the 'virtual' skills of the respondents whereas the Web Based Training input would have a corresponding 'build up knowledge' attribute associated with it. However, from a motivational perspective, the use of a video game has merit in this area of training.

The t-test result for 'Self-Paced Learning' was 1.601 and the significance result was 0.118. This indicates that the t-value is **not significant** as the significance result is greater than 0.05 ($t=1.601$, $p>0.05$).

The '95% Confidence Interval of the Difference', with the lower limit being negative but of a small decrease and the upper limit of a small increase would indicate that the use of a Video Game had little or no effect on this motivational category. Therefore, the statistical results do not scientifically support the hypothesis that this aspect of motivation is improved by the use of video games.

However, Web Based Training, by definition is about placing the control of the pace of an individual's learning in their own hands but this aspect of the experiment may have been influenced by the time constraints in which to complete the ATV Video Game aspect and the Web Based aspect of the research as part of an actual All Terrain vehicle (ATV) Operator Course.

The t-test result for the 'Use of Skills in a Real and Virtual Environment' was 7.610 and the significance result was 0.000. This indicates that the t-value is significant as the significance result is less than 0.05 ($t=7.610$, $p<0.05$). The 'satisfaction' level among the respondents was clearly evident during the playing of the ATV Video games, for example, leaning back while descending a hill in the virtual environment was replicated exactly in the real environment.

The t-test result for 'Provide Feedback' was 16.054 and the significance result was 0.000. This indicates that the t-value is significant as the significance result was less than 0.05 ($t=16.054$, $p<0.05$). This particularly significant result was most likely attributed to specific aspects of the ATV Video Game whereby inappropriate or unsafe manoeuvres on the ATV resulted in the ATV rider falling off and sustaining virtual injuries.

This aspect also delivered a high entertainment value. In some cases, respondents attempted to recreate scenarios where a 'virtual accident' would occur. The feedback provided by the game was fairly realistic in terms of the moans and groans from the ATV Video Game's ATV rider.

The t-test result for the 'Consistent Standards of Performance' was 4.024 and the significance result was 0.000. This indicates the t-value is significant as the significance result is less than 0.05 ($t=4.024$, $p<0.05$). Consistent standards of performance would be considered as being that in all cases and under all conditions within the Video Game, that if a respondent completed a manoeuvre that was improper, the consequences would always be the same. An example of this would be where if the ATV was driven up a hill at speed with the ATV Rider leaning back – then the ATV rider would fall off.

4.5. Sample Group Learning - Findings

The respondents from the randomised sample groups that attended the All Terrain Vehicle (ATV) Operator Training Course underwent the exact same set of knowledge assessment tests, post training knowledge assessment tests, observational tests and practical assessment tests as part of the training course. The Knowledge Assessment Test (see Appendix 5) and the Practical Assessment (see Appendix 4) are the assessment criteria formally set out to test the course participants' level of competence.

On successful completion of the training course and achievement of the required test result, the course participants' are deemed to the competent operators of All Terrain

Vehicles (ATV's) and are awarded an ATV Operators Licence. This 'Licence' is valid for three years from the date of issue, whereupon the operator must undergo re-assessment and if once again successful, be re-issued with a new ATV Operator Licence.

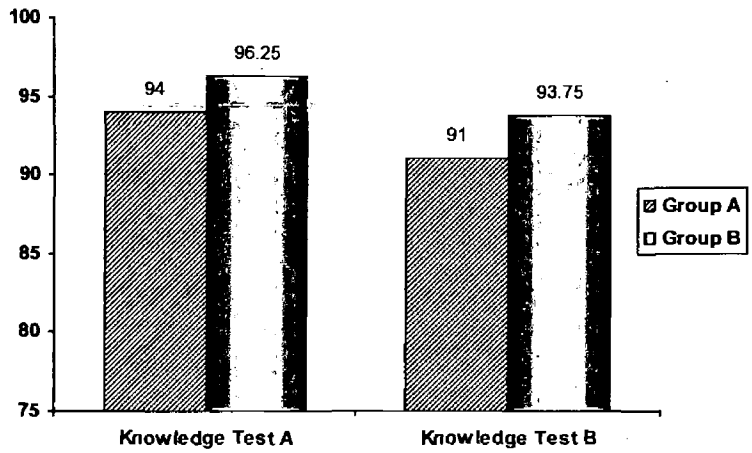
In addition to these formal assessment procedures, a number of other tests and observations were conducted as part of this research dissertation. They were conducted on two specific groups of voluntary participants from the ATV Operator Training Course. Sample Group A were the course participants who volunteered to use an ATV Video Game as part of the training course and Sample Group B were the group who volunteered to use the Web Based Training as part of the same ATV training course.

4.5.1. Knowledge Assessment

Figure 4.35 below shows a comparison between the mean or average results from both Sample Group A and Sample Group B in relation to the 'Knowledge Assessment' tests that were conducted as part of the ATV Operator Training Course.

Knowledge Test (A) was the formal assessment test paper used to assess the knowledge of all course participants from both Sample Group A and Sample group B. This test is normally conducted after the initial presentation of all the knowledge related elements of the training course, such as 'Health and Safety', 'ATV Operation and Maintenance Procedures', etc. The test is therefore, usually conducted after the first half day of the two day course delivery and before the course participants actually get to practice on and operate an actual ATV.

Knowledge Assessment test (B) was conducted approximately 5 to 9 days after the training course. All respondents were given the test paper on completion of the ATV training course but there was considerable difficulty in arranging prompt return of the completed papers. Therefore, a number of tests had to be completed outside normal working hours with the responses corrected and a final result recorded.



Group A		Group B	
Knowledge Test A Results		Knowledge Test A Results	
Mean	94	Mean	96.25
Median	95	Median	95
Mode	90	Mode	100
Variance	25.26315789	Variance	18.08210526
Standard Deviation	5.0262489	Standard Deviation	4.253481548
Confidence Interval	2.202808008	Confidence Interval	1.864135057
N =	20	N =	20

Group A		Group B	
Knowledge Test B Results		Knowledge Test B Results	
Mean	91	Mean	93.75
Median	90	Median	95
Mode	90	Mode	95
Variance	22.63157895	Variance	15.46052632
Standard Deviation	4.757265911	Standard Deviation	3.931987578
Confidence Interval	2.084924128	Confidence Interval	1.723238818
N =	20	N =	20

Figure 4.35. Comparison of Means of 'Knowledge Tests' results.

It can be seen clearly from the results that both Sample Group A and Sample Group B both scored highly with all Sample Group respondents scoring above the minimum pass mark of 80 points or 80%. This result was achieved by all groups for both the Knowledge Test (A) and the Knowledge Test (B).

Examples of the Knowledge Assessment Tests, with answers, can be seen in Appendix 5

4.5.2. ATV Practice Observation

In order to provide a consistent approach to the observation of the practice sessions undertaken by the ATV course participant, the same marking schedule and assessment criteria were used for both the 'ATV Practice Observations' (see Appendix 3) and the 'ATV Practical Assessment' (see Appendix 4).

In both cases, the assessment marking took the form of deducting points per fault committed by the course participant. The assessment items were weighted in accordance with their critical importance, for example, an individual who did not secure their motorcycle helmet properly would be deducted 5 points or an incorrect riding position would also incur a 5 point deduction or penalty. All safety critical points incurred the maximum penalties. A maximum total of 20 points can be deducted from a total score before an individual is deemed as 'not having reached the minimum standard of operation of an ATV'.

The combined result from both the 'Knowledge Assessments' and the 'Practical Assessment', with a minimum results of 80% in each test is required for the course participant to be deemed competent to operate an All Terrain Vehicle.

As part of this research a small scale experiment was conducted using two sample groups; Sample Group A, who played an ATV Video Game and Sample Group B who utilised a Web Based Training input on ATV tasks and manoeuvres. Both Sample Groups were then required to be observed both during the practice sessions and the 'Practical Assessment'.

The 'ATV Observation Practice' and the 'Practical Assessment' were scored under the following seven assessment point areas:

- Safety
- Observations
- Steering and Riding
- Incline Riding
- Wet Ground / Bogland Riding
- Loads and Loading
- Parking

In both cases, for the purposes of research, the number of faults that occurred in each area was recorded rather than the overall scores.

The t-test group statistics for the 'ATV Practice Observation' are shown in Figure 4.36 below.

	Group	N	Mean	Std. Deviation	Std. Error Mean
Safety	A	20	.15	.366	.082
	B	20	.20	.894	.200
Observations	A	20	4.20	1.881	.421
	B	20	6.90	2.447	.547
Steering and Riding	A	20	3.90	2.404	.538
	B	20	4.70	2.658	.594
Incline Riding	A	20	.20	.410	.092
	B	20	.50	.513	.115
Wet Ground / Bogland Riding	A	20	.05	.224	.050
	B	20	.00	.000	.000
Loads and Loading	A	20	.00	.000 (no t-test)	.000
	B	20	.00	.000 (no t-test)	.000
Parking	A	20	.15	.489	.109
	B	20	.15	.489	.109
ATV Practice Observation Score	A	20	86.35	5.528	1.236
	B	20	79.25	9.227	2.063

Figure 4.36. t-test Group Statistics for ATV Practice Observation.

Figure 4.37 below shows the 'Independent Samples Tests' which includes a 'Levene's Test for Equality of Variances' and a 't–test for Equality of Means' for each of the 'ATV Practice Observation' assessment point areas.

Independent Samples Test									
Equal Variances Assumed	Levene's Test for Equality of Variance		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Safety	.438	.512	-0.231	38	.818	-0.050	.216	-0.488	.388
Observations	3.011	.091	-3.912	38	.000	-2.700	.690	-4.097	-1.303
Steering and Riding	0.71	.792	-0.998	38	.324	-0.800	.801	-2.422	.822
Incline Riding	10.687	.002	-2.042	38	.048	-0.300	.147	-0.597	-0.003
Wet Ground / Bogland Riding	4.457	.041	1.000	38	.324	.050	.050	-0.051	.151
Loads and Loading	-	-	-	-	-	-	-	-	-
Parking	.000	1.000	.000	38	1.000	.000	.155	-0.313	.313
ATV Practice Observation Score	5.293	.027	2.952	38	.005	7.100	2.405	2.231	11.969

Figure 4.37. Independent Samples Tests for ATV Practice Observation

In analysing the statistics above it should be noted that a t-test could not be carried out on the 'Loads and Loading' assessment point area as the Standard Deviations of both Sample Group A and Sample Group B results are zero because no fault points were observed in this area among either sample group.

The t-test result for 'Safety' was -0.231 and the significance result was 0.818. Also the '95% Confidence Interval of the Difference' is a negative number at the lower level which indicate that the t-value is **not significant** as the significance result is greater than 0.05 ($t=-0.231$, $p>0.05$). The data does not support a conclusion as to the effect of either the ATV Video Game of the Web Based Training on learning performance.

The t-test results for 'Observations' was -3.912 and the significance result was 0.000. In reviewing the Mean values for the number of faults observed by both group, Sample Group B scored more faults in the 'Observation' category. However, the t-value is significant (although negative because of Sample B fault results) and the significance result was less than 0.05 ($t=-3.912$, $p<0.05$), but the '95% Confidence Interval of the Difference' show differences that would require further experimentation to obtain a clearer conclusion as to the effected of the Video Game or the Web Based Training on the learning of skills.

The t-test result for 'Steering and Riding' was -0.998 and the significance result was 0.324. This would indicate that the t-value is **not significant** as the significance result was greater than 0.05 ($t=-0.998$, $p>0.05$) and this is supported by the negative value at the lower end of the '95% Confidence Interval of the Difference'.

The t-test result for 'Incline Riding' was -2.042 and the significance result was 0.048. This would indicate that the t-value is significant as the significance result was less but very close to 0.05 ($t=-2.042$, $p<0.05$). However, interpretation of the '95% Confidence Interval of the Difference' would show that the differences are trivial and would lead to a conclusion that the use of a Video Game or Web Based Training had little or no effect.

The t-test result for 'Wet Ground / Bog Land Riding' was 1.000 with a significance result of 0.324. This would indicate that the t-value is **not significant** as the significance result is greater than 0.05 (t=1.000, p>0.05). This is also supported by the negative result at the lower end of the '95% Confidence Interval of the Difference'.

A t-test could not be conducted for 'Loads and Loading'.

The t-test result for 'Parking' was 0.000 with a significance result of 1.000. This would indicate that the t-value is **not significant** as the significance result is greater than 0.05 (t=0.000, p>0.05). A negative result of -0.313 at the lower end off the 95% Confidence Interval of the Difference' would also support this.

Finally, when a t-test was calculated for the combined 'ATV Practice Observation Score' by both Sample Group A and Sample Group B, the t-test result was 2.952 with a significance result of 0.005. This would indicate that the t-value is significant as the significance result was less than 0.05 (t=2.952, p<0.05). However, given the results of the t-tests for the individual components of the scores and that the '95% Confidence Interval of the Difference' results range from a low figure at the lower end (2.231) to a much larger figure (11.969) at the upper end, the data does not support a strong conclusion as to the effect of either a Video Game or Web Based training on the learning of the Sample Group respondents.

4.5.3. ATV Practical Assessment

The ATV Practical Assessment utilised the same assessment criteria that was used for the ATV Practice Observation. The t-test group statistics for the 'ATV Practical Assessment' are shown in Figure 4.38 below.

	Group	N	Mean	Std. Deviation	Std. Error Mean
Safety	A	20	.05	.224	.050
	B	20	.00	.000	.000
Observations	A	20	2.60	2.062	.461
	B	20	3.15	3.031	.678
Steering and Riding	A	20	2.45	2.259	.505
	B	20	2.05	1.932	.432
Incline Riding	A	20	.20	.410	.092
	B	20	.10	.308	.069
Wet Ground / Bog land Riding	A	20	.10	.308	.069
	B	20	.00	.000	.000
Loads and Loading	A	20	.00	.000 (no t-test)	.000
	B	20	.00	.000 (no t-test)	.000
Parking	A	20	.00	.000 (no t-test)	.000
	B	20	.00	.000 (no t-test)	.000

Figure 4.38. t-test Group Statistics for ATV Practical Assessment.

As can be seen in Figure 4.38 above, a t-test could not be performed on either the 'Loads and Loading' or 'Parking' assessment point area as the Standard Deviations results of both Sample Group A and Sample Group B are zero as no fault points were observed in this area.

Figure 4.39 below shows the 'Independent Samples Tests' which includes a 'Levene's Test for Equality of Variances' and a 't–test for Equality of Means' for each of the 'ATV Practical Assessment', assessment point areas.

Independent Samples Test									
Equal Variances Assumed	Levene's Test for Equality of Variance		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Safety	4.457	.041	1.000	38	.324	.050	.050	-0.051	.151
Observations	6.163	.018	-0.671	38	.506	-0.550	.820	-2.209	1.109
Steering and Riding	.369	.547	.602	38	.551	.400	.665	-0.946	1.746
Incline Riding	3.233	.080	.872	38	.389	.100	.115	-0.132	.332
Wet Ground / Bog land Riding	10.688	.002	1.453	38	.154	.100	.069	-0.039	.239
Loads and Loading	-	-	-	-	-	-	-	-	-
Parking	-	-	-	-	-	-	-	-	-

Figure 4.39. Independent Samples Tests for ATV Practical Assessment

The t-test result for 'Safety' was 1.000 with a significance result of 0.324. This would indicate that the t-value is **not significant** as the significance result is greater than 0.05 ($t=1.000$, $p>0.05$). This is also supported by the negative result at the lower level of the '95% Confidence Interval of the Difference' (-0.051).

The t-test result for 'Observations' was -0.671 with a significance results of 0.506. This indicates that the t-value is **not significant** as the significance results is greater than 0.05 ($t=-0.671$, $p>0.05$). There is also a negative result of -2.209 at the lower level of the '95% Confidence Interval of the Difference' which indicates a p-value of greater than 0.05. The negative t-value is obtained as a result of Sample Group B acquiring more fault points overall in this assessment area.

The t-test result for 'Steering and Riding' was 0.602 with a significance result of 0.551. This would indicate again that the t-value is **not significant** as the significance result is greater than 0.05 ($t=0.602$, $p>0.05$). Once again this is supported by a negative value of -0.945 at the lower level of the '95% Confidence Interval of the Difference'.

The t-test result for 'Incline Riding' was 0.872 with a significance result of 0.389. This also indicates that the t-value is **not significant** as the significance result is greater than 0.05 ($t=0.872$, $p>0.05$). The negative value of -0.132 at the lower level of the '95% Confidence Interval of the Difference' also supports this conclusion.

The final t-test result for the ATV Practical Assessment was 1.453 for 'Wet Ground / Bog land Riding' with a significance result of 0.154. This would indicate that the t-value is **not significant** as the significance value is greater than 0.05 ($t=1.453$, $p>0.05$). The negative result of -0.039 at the lower level of the '95% Confidence Interval of the Difference' with a positive result of 0.239 at the upper level only occurs when the p-value is greater than 0.05.

Therefore, for all cases of the ATV Practical Assessment, as the p-values are greater than 0.05, the data does not provide any evidence or show any statistical difference between the two sample groups (A and B) in terms of skills learning. However, in interpreting the significance of the t-values ($\alpha > 0.05$), the test power ($1-\beta$) is relevant for non-significant results; the value of β in this case is calculated as 0.46.

As β is calculated as being less than 0.95 no interpretation of the results is possible one way or the other as there is no evidence of the ATV Video Game or the Web Based Training as having an effect.

4.6. Summary of Research Findings

Sample Group A, were the group of course participants randomly assigned to play an ATV Video Game as part of an All Terrain Vehicle (ATV) Operator Course for research purposes. Sample Group B were a group of course participants on this course also randomly assigned to complete a Web Based Training input as part of the course for research purposes.

Both sample groups were all male and in Sample Group A, 40% were in the 18 to 35 years age bracket with 60% in the 36 years plus age bracket. Sample Group B had a 50 / 50 even split between these two age brackets. Both group used computers and the Internet in a limited fashion, with minimal use of ICT for learning or education. A small number from both sample group had access to or played video games but would not be considered experts or greatly experienced in this field.

Each group was assessed and tested formally as part of the All Terrain Vehicle (ATV) Operator Course but they were also observed during practice sessions, to determine if playing an ATV Video Game or the completion of a Web Based Training input would having any effect on the motivation or learning of the groups.

The playing of a video game clearly had a statistically significant effect on the motivation levels of Sample Group A but no conclusions can be drawn from the data or from the evidence obtained as to the effect of Video Games or Web Based Training on the learning of knowledge or skills by either Sample Group A or Sample Group B.

Sample Group C where all experienced Video Game players who mainly used the Sony PlayStation® 2 as the main game playing platform. The level of use of computers and access to the Internet was high among this group with significant use of ICT among the 'under 18 years of age group' for education and learning. Education subject such as mathematics and music rated highly. The main uses for ICT were as a tool to research information, send e-mail and as an entertainment centre by playing games and downloading music etc.

When it can to playing Video Games, there was a wide variety of genres of games played by this group. The most and least satisfying features were identified and a significant number of features were identified as being very important to the video game players Among the most satisfying features of video games were quality graphics, realism, challenges, interesting characters, storyline, the ability to choose and the level of choice, for examples car, weapons, locations, etc. Among the least satisfying features were bad graphics, music soundtrack, commentary, too easy to play or too difficult to play and repetition within the game.

5. Discussion

5.1. Introduction

This chapter discusses and analyses the literature and empirical research findings from all the sample groups and determines what, if any are the implications of the use of video games to improve motivation and learning. Based on the analysis of the finding it presents conclusions and recommendations.

5.2. Overview of Results

This research dissertation endeavoured to ask the question – Can video games or their features be used to improve motivation and learning? To answer this is was necessary to conduct a number of surveys, tests, observations and experiments among the various sample groups.

Firstly, the participants on the All Terrain Vehicle (ATV) Operator Training Course, having been assigned to two specific groups, one playing a video game and the other using Web Based Training as part of the training course, were ideally positioned to provide information on their own specific learning and motivational outcomes.

The detailed analysis of these specific aspects of the research as they applied to 'Sample Group A' and 'Sample Group B' provided some very interesting results. These results could be used to determine if it is possible to accept or reject the various hypotheses put forward as part of this research.

5.2.1. Hypothesis One

Hypothesis 1 stated that 'the use of video games will improve learning outcomes' or

H_1 = the use of video games will improve learning outcomes.

The Null Hypothesis in this case is that the opposite is the case, i.e.

H_0 = the use of video games will not improve learning outcomes.

To examine this hypothesis in the context of the All Terrain Vehicle (ATV) Operator Training Course is not an easy task to accomplish. The objective of this course is to ensure that operators of ATV's are competent to operate the ATV in a safe and correct manner. It is the objective of all participants on this course to successfully complete the course and be deemed competent. Everything and everyone is driven to achieve this goal. The mal-operation of an ATV is a life or death situation, if not one that results in a very serious injury.

Statistics from the U.S. alone show that over the last ten years, over five thousand people have been killed on ATV's.

The vast majority of participants attending this course, which is run by 'ESB Training', have been deemed competent after training. All participants who attended the course and participated as members of either Sample Group A or B as part of this research were deemed competent on completion of the course. It is highly probable that this would have been the outcome irrespective of the use of Video Games or Web Based Training.

The only feasible route to take was to test the learning of the groups within the experiment itself and to statistically and scientifically measure the results of the two sample groups to determine if there was a difference.

The results from three different areas were compared – 'Knowledge Tests', 'Observation of Practice Session' and 'Practical Assessment'.

Comparisons between the Sample Groups A and B, given that all participants achieved a 'pass' result in both Summative and Post-test knowledge tests, show very little difference between the Means of the results of both groups in both tests.

Observations of the practice sessions of the group who played the Video Game (Sample Group A) and the group who used the Web Based Training (Sample Group B) initially, from an observer's perspective, seemed to show that the video game player group were awarded less fault points under the 'Observation' skills category of assessment. However, specific statistical analysis of this result proved inconclusive.

Analysis of each of the areas under the 'Observation of Practice' yielded non-significant results.

Further analysis, using the same criteria, but this time during the actual 'Practical Assessment', yielded non-significant results. In interpreting the significance of the t-values ($\alpha>0.05$), the test power ($1-\beta$), which is relevant for non-significant results, was calculated at being 0.46.

This would indicate that overall, neither the null hypothesis H_0 could be rejected, nor that the alternative hypothesis H_A be accepted. It is neither one way nor the other and therefore further experimentation needs to be conducted in this area in order to make a determination as to whether the use of Video Games or Web Based Training can improve learning in this instance.

5.2.2. Hypothesis Two

Hypothesis 2 stated that the 'use of Video Games will improve motivational outcomes' or

H_1 = the use of video games will improve motivational outcomes.

The Null Hypothesis in this case is that the opposite is the case, i.e.

H_0 = the use of video games will not improve motivational outcomes.

In order to test the motivational levels and outcomes of 'Sample group A' who played the ATV Video Game and 'Sample Group B' who used the ATV Web Based Training, it was necessary to devise a method whereby comparisons could be made between the two sample groups' motivational responses.

Both the ATV Video Game and the ATV Web Based Training inputs were instructionally designed to achieve specific learning objectives as well as research objectives. To do so and to facilitate a measurement of the outcome in a motivational context, John Keller's 'ARCS Model of Motivational Design' (Keller, 1987) was used to construct both the instructional content and context of use of the ATV Video Game and Web Based Training.

As the ATV Video Game was a commercially available game, Sample Group A were directed to interact in a specific way with the game. They were allowed to have 'fun' and enjoy playing in the process of achieving the learning objectives.

This is not to say Sample Group B did not have any 'fun' as they indicated that did 'enjoy' this input to the training course as it was something very different from what they had all experienced before.

The figure below shows the specific strategies used as part of the instructional design process, design, development and use of the Video Game, the Web Based Training and the motivational question in the 'questionnaire'. The strategies used were designed to match the specific strategies associated with Keller's ARCS Model.

Attention	Relevance	Confidence	Satisfaction
Perceptual Arousal *Strategy:* *Virtual Environment in the Video Game*	**Familiarity** *Strategy:* *Discuss - Class B licence* *Bad Habits*	**Learning Requirements** *Strategy:* *Games / Web Based learning increase confidence in success*	**Natural Consequences** *Strategy:* *Participants can use of skills/ knowledge in real and virtual environment*
Inquiry Arousal *Strategy:* *Problem Solving e.g. Climb a hill with ATV*	**Goal orientation** *Strategy:* *Provide Objectives*	**Success Opportunities** *Strategy:* *Build up of skills- tasks completed step by step*	**Positive Consequences** *Strategy:* *Feedback, practice, testing, awards*
Variability *Strategy:* *Classroom, Games, Practice on Obstacle Course*	**Motive Watching** *Strategy:* *Matched to learners – what do they want? – ATV licence*	**Personal Control** **Strategy** *Self paced, open virtual environment to explore*	**Equity** *Strategy:* *Consistent standards – you fall off if you don't lean forward going up a hill*

Figure 5.1. Examples of strategies used with ARCS Model

Statistical analysis of responses provided to each of the statements under the motivational question by each sample group provided some interesting data. The statements on which the analysis was based were categorised under the four ARCS scales and as was seen in the research findings (see Figure 4.29. Mean Values of ARCS Motivational Scales), there was a significant statistical difference between the sample group who played the ATV Video Game and the sample group who used the Web Based Training.

This clearly means that the use of a video game in this overall context was highly motivating to the ATV course participants.

Analysis of the t-test results also showed that in almost all aspects of the use of the Video Games as distinct from the use of the Web Based Training, that there was a statistical difference in the level of motivation experienced by Sample Group A. Sample Group A, as the group who played the ATV Video Games, were highly motivated.

In terms of the hypothesis, the results of the analysis support the acceptance of the alternative hypothesis:

H_A = 'the use of video games will improve motivational outcomes'

and a rejection of the null hypothesis,

H_0 = 'the use of video games will not improve motivational outcomes'

5.2.3. Computer and Internet Use

The research indicated that among all three sample groups that there was a clear difference in the levels of computer and internet usage, It was clearly seen that the Sample Group C participants, as experienced game users were clearly more proficient and made more use of ICT that either of the other two groups.

The age profile is relevant in this respect and the majority of Sample Group C were in the under 18 year's age bracket. This has clear implication for future training initiatives for everyone in the training business. The use of ICT including the use of video games is highly likely to be much more appropriate to this next generation of learners.

5.3. Recommendations for Instructional Design

The feedback from all the sample groups provided some insight as to the implications for instructional design and instructional designers. The use of a motivational theory has proved to be very useful in designing the inputs for the use of the ATV Video Game and construction of the Web Based Training. Combined with the traditional use of Gagné's Nine Steps of Instruction (Gagne et al., 1992), a practical and effective learning strategy can be developed.

However, some issues have been identified as being important or potentially useful to future training intervention that may or may not include video games and they have been listed below in terms of Positive Aspects and Negative Aspects:

Positive Aspects / Ideas:

- Pay attention to detail
- Present challenges
- Have a storyline / context / or 'interesting' case studies
- Make it learner centred – they have control
- Never let it get boring
- Have fun
- There nothing wrong with venting emotions
- Make a mess
- Visible progress for everyone
- Have rewards
- Vary environments – virtual and real
- Leave hints, clues, even traps for learners
- Have a feel good factor
- Allow cheating and taking of short cuts
- Just do it
- Have real competition
- Never boring

Negative Aspects / What should be avoided:

- No bad quality graphics
- 2nd rate anything is not acceptable
- No poor quality content
- Don't have sound or music for the sake of it
- Avoid annoying voice-overs

- Don't make things too difficult
- Don't make things too easy
- Don't make it boring
- Avoid repetition

6. Future Perspectives

6.1. Introduction

This chapter outlines a future perspective on the use of computer and video games by learners, trainers and instructional designers.

6.2. The Future

This exercise involved using technology in a way that most of the people in this study would not have attempted before. It has involved learners engaging in new technologies and experiences. Most of the individuals who volunteered to participant in this research had never played a video game before, but some had made small excursions into virtual worlds with their children or family members, but never venturing too far or believing in their own abilities or imaginations. They have taught through years of schooling and then years of traditional training to leave the 'fun' outside the door.

It has involved the use of instructional design models that focus on the motivational aspects of training delivery and design and evaluation. It has involved the use of new ideas for training in term of the use of Video Games and Web Based Training. Most of the individuals have little or no experience of using computers but found the Web Based Training a unique experience. They are even making suggestion for its use in other areas of training or as a replacement for the traditional forms of training. Most had never even heard of e-learning. It has involved the use of a rapid instructional design system, which used existing templates for course presentation and assessments. Subject Matter Experts have been retrained as assessors and trainers and are now delivering this ATV Operator

Training Course to more learners. There are over one thousand more learners waiting to be trained in this are alone over the next two years.

The Video Game have proved to be a success among the trainers and the learners as it has added a different element and dynamic to the course. Its great fun, and changes the whole atmosphere of the training event – but they don't know why – yet!

Those who are familiar with computers and video games are enthusiastically supporting the idea of doing things differently.

The use of a video game has proved successful. It's a commercially available video game and as such has required a certain level of control over its use to maintain focus on the training goal. A customised game could be designed, but the cost would need to be considered carefully, but then it's the attraction of this type of game where there is a storyline, a challenge, a race against opponents and getting run over by a runaway locomotive, or landing on your head with your legs in the air, that give the game the sparkle we're looking for.

Technology is advancing all the time, computers are increasing in speeds and processing power and are becoming an integral part of our everyday lives. Video Games are to the forefront of this advance and there is a need to take advantage of all opportunities to do things better, and better for everyone, including the learner.

And finally,

"Will computers change the way we learn? Computers are already changing the way we learn - and if you want to understand how, look at video games".

"Look at video games, not because games that are currently available are going to replace schools as we know them any time soon, but because they give a glimpse of how we might create new and more powerful ways to learn in schools, communities and workplaces – new ways to learn for a new information age".

"Look at video games because, although they are wildly popular with adolescents and young adults, they are more than just toys. Look at video games because they create new social and cultural worlds that help people learn by integrating thinking, social interaction, and technology, all in the service of doing things they care about."

(Shaffer, Squire, Halverson, Gee, 2003)

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APPENDIX 1

Semi-Structured Interview / Questionnaire

Sample Groups A and B

SEMI-STRUCTURED INTERVIEW / QUESTIONNAIRE

Name: _____

Work Location: _____ Staff Category: _____

To complete this Interview / Questionnaire, please place an X in the boxes that apply

General Information

1. Gender: ☐ Male ☐ Female

2. Age: Under 18 yrs ☐ 18 to 35 yrs ☐ 36 yrs + ☐

Computer Use

3. Do you own or have access to a computer? ☐ Yes ☐ No

Designed to establish the level of access to computer by the respondent.

4. Do you have Internet access? ☐ Yes ■ No

Designed to establish the level of access to the Internet or World Wide Web by the respondent.

5. How often do you use a computer?

Very Regularly	☐
Regularly	☐
Irregularly	☐
Very irregularly	☐
Never	☐

Designed to establish the level of use of computers by the respondent.

6. How often do you access the Internet?

Very Regularly	☐
Regularly	☐
Irregularly	☐
Very irregularly	☐
Never	☐

Designed to establish the level of access to the Internet.

7. What do you most frequently use your computer for? (Please indicate your top three uses by numbering them 1, 2 and 3 in the boxes provided).

Creating documents (text, spreadsheets)	☐
Maintaining a web site	☐
Digital Photography	☐
Information gathering/searching (Internet)	☐
Communications (e-mail, chat)	☐
Banking / Financial	☐
Online shopping (any goods)	☐
Creating multimedia (graphics, animations, video)	☐
Education / Learning	☐
Entertainment (games, DVD's, Music Downloads)	☐
Ticket Reservations (flights, accommodation, concerts	☐
Other	☐

Designed to establish the main uses for computers by the respondents.

Use of computer for learning and education

8. Have you ever used a computer / Internet as a learning resource or tool to learn computer related subjects

☐ Yes ☐ No

Give examples: _____

_____

Designed to establish if the respondents have ever utilised a computer as a learning resource specifically to learn computer related subjects such as word processing, software applications, data entry, etc.

9. Have you ever used a computer / Internet as a learning resource or tool to learn any other subject other than computer related subjects

☐ Yes ☐ No

Give examples: _____

_____

Designed to establish if the respondents have ever utilised a computer as a learning resource specifically to learn non-computer related subjects such as driving test theory, garden design, music, educational subjects, how things work, etc.

Computer and Video Games

10. Do you own or have access to computer games or a video games console?

☐ Yes ☐ No

If 'No', proceed to question 14.

If 'YES', please indicate which platform/system you use. ***X*** all that apply.

PC	☐
Sony PlayStation® 1 (PS1)	☐
Sony PlayStation® 2 (PS2)	☐
Microsoft® XBox	☐
Nintendo GameCube™	☐
Nintendo DS™, Gameboy / Advance	☐
Other handheld or mobile devices (including mobile phones)	☐

Designed to establish if the respondents use or have access to a particular platform or system for playing games.

11. If you have played computer or video games, please list your three most favourite or recently played games.

1. _____ Platform/System _____

2. _____ Platform/System _____

3. _____ Platform/System _____

Designed to identify specific games titles played by the respondents

12. What main genre does your recently played or favourite games belong to?

Place an X in the appropriate boxes (1, 2 or 3) that you feel most represents the games you chose in Question 11.

	Game 1	2	3
Action Games (shoot-em-up, arcade, platform jumping)	☐	☐	☐
Adventure Games (explore unknown worlds, Collect objects, solve puzzles)	☐	☐	☐
Fighting Games (martial arts, boxing wrestling)	☐	☐	☐
Puzzle Games	☐	☐	☐
Role Playing Games (adopt role of mediaeval or fantasy character)	☐	☐	☐
Simulation Games (flight simulators or driving games)	☐	☐	☐
Sports Games (Football, baseball)	☐	☐	☐
Strategy Games (armies, civilisations, incl. Sims)	☐	☐	☐

Designed to identify the main genres of games played by the respondents.

13. In any or all of they games you chose in Question 11, list three of the best, most satisfying or interesting characteristics or features about the games and three of the worst or less desirable characteristics or features of the games.

Most satisfying/interesting

1. _____

2. _____

3. _____

Least satisfying/interesting

1. _____

2. _____

3. _____

Designed to identify the features of games that are most satisfying and interesting to game player respondents.

ATV All Terrain Vehicle Operator Training Course

14. Which of the following inputs of the ATV Operators course did you complete for the manoeuvres/procedures part of the training course?

ATV Video Game ☐ (Group A)

Web/Computer Based Training ☐ (Group B)

Designed to identify which sample group the respondents belong to.

Motivational Analysis

15. Rate the following statements as applicable to the input you received and place an ***X*** in the appropriate box that best represents your opinion.

The (Video Game)(Web/Computer Based Training) input	**Strongly Agree**	**Agree**	**Neither Agree or Disagree**	**Disagree**	**Strongly Disagree**
- really helped to gain my attention and maintain my interest in the operation of an ATV (A)					
- presented an virtual environment representative of the real ATV operational terrain (A)					
- gave me opportunities to generate questions or solve problems, e.g., how do I climb the hill? (A)					
- achieved the objective of enabling me to describe and understand the ATV manoeuvres / procedures (A)					
- used concrete and realistic examples that relate to my level of experience in the use of an ATV (R)					
- provided clear statements and objectives for the manoeuvres / procedures that would allow me to achieve my goals (R)					
- motivated me to learn (R)					
- enabled me to feel confident that I could successfully complete the ATV manoeuvres / tasks when using a real ATV (C)					
- built up the skills tasks step by step in a logical sequence (C)					
- was self paced and provided me with control over my learning (C)					
- allowed me to use the knowledge and skills I have acquired in both a real and virtual environment (S)					
- provided me with feedback that will enable me to sustain the desired behaviour when operating an ATV in real situation (S)					
- presented consistent standards for performance for every manoeuvre / task (S)					

Design to establish what strategies were most successful in motivating the respondents.

APPENDIX 2

GAME USER SURVEY (Sample Group C)

National College of Ireland (NCI)

GAME USER SURVEY

Hi,

My name is Jim Murphy and I am conducting research into the use of computer and video games to promote learning and motivation. The research is being conducted as part of my dissertation for an M.Sc. in Learning Technologies with the National College of Ireland.

To enhance your motivation, I'm offering a €50 gift voucher for GAME that can be exchanged for any game, DVD or other gaming accessories and one survey will be randomly selected from all completed surveys – so don't forget your contact details.

Please return to

Jim Murphy, 7 Ballyowen Crescent, Lucan, Co Dublin.

or,

ESB Training, Abbeyleix Road, Portlaoise, Co Laois.

GAME USER SURVEY

Name: _____

Contact details _____

(Address, e-mail or phone number is required) _____

_____

*To complete this Interview / Questionnaire, please place an **X** in the boxes that apply*

1. Gender: ☐ Male ☐ Female

2. Age: Under 18 yrs ☐ 18 to 35 yrs ☐ 36 yrs + ☐

General Computer Use

3. Do you own or have access to a computer? ☐ Yes ☐ No

4. Do you have Internet access? ☐ Yes ☐ No

5. How often do you use a computer?

- Very Regularly ☐
- Regularly ☐
- Irregularly ☐
- Very irregularly ☐
- Never ☐

6. How often do you access the Internet?

- Very Regularly ☐
- Regularly ☐
- Irregularly ☐
- Very irregularly ☐
- Never ☐

7. What do you most frequently use your computer for? (Please indicate your top three uses by numbering them 1, 2 and 3 in the boxes provided).

Creating documents (text, spreadsheets)	☐
Maintaining a web site	☐
Digital Photography	☐
Information gathering/searching (Internet)	☐
Communications (e-mail, chat)	☐
Banking / Financial	☐
Online shopping (any goods)	☐
Creating multimedia (graphics, animations, video)	☐
Education / Learning	☐
Entertainment (games, DVD's, Music Downloads)	☐
Ticket Reservations (flights, accommodation, concerts)	☐
Other	☐

Use of computer for learning and education

8. Have you ever used a computer / Internet as a learning resource or tool to learn computer related subjects

☐ Yes ■ No

Give examples: _____

_____

For example: word processing, software applications, data entry, etc.

9. Have you ever used a computer / Internet as a learning resource or tool to learn any other subject other than computer related subjects

☐ Yes ■ No

Give examples: _____

_____

For example: driving test theory, garden design, music, educational subjects, languages, how things work, etc.

Computer and Video Games

10. How often do you play computer video games?

Everyday	☐
5 to 6 days per week	☐
3 to 4 days per week	☐
1 to 2 days per week	☐
Less than 1 day per week	☐

11. Which platform/system you use. *X* all that apply.

PC	☐
Sony PlayStation® 1 (PS1)	☐
Sony PlayStation® 2 (PS2)	☐
Microsoft® XBox	☐
Nintendo GameCube™	☐
Nintendo DS™, Gameboy, Advance	☐
Other, (including handheld, mobile devices or mobile phones)	☐

12. Please list your three most favourite or recently played games.

1. _____ Platform/System _____
2. _____ Platform/System _____
3. _____ Platform/System _____

13. What main genre does your recently played or favourite games belong to?

Place an X in the appropriate boxes (1, 2 or 3) that you feel most represents the games you chose in Question 12.

Game	1	2	3
Action Games (shoot-em-up, arcade, platform jumping)	☐	☐	☐
Adventure Games (explore unknown worlds, collect objects, solve puzzles)	☐	☐	☐
Fighting Games (martial arts, boxing wrestling)	☐	☐	☐
Puzzle Games	☐	☐	☐
Role Playing Games (adopt role of mediaeval or fantasy character)	☐	☐	☐
Simulation Games (flight simulators or driving games)	☐	☐	☐
Sports Games (Football, baseball)	☐	☐	☐
Strategy Games (armies, civilisations, incl. Sims)	☐	☐	☐

14. For Game 1 in question 12:

List three of the best, most satisfying or interesting characteristics or features about the games and three of the worst or less desirable characteristics or features of the games.

Most satisfying/interesting

1. _____

2. _____

3. _____

Least satisfying/interesting

1. _____

2. _____

3. _____

15. For Game 2 in question 12:

List three of the best, most satisfying or interesting characteristics or features about the games and three of the worst or less desirable characteristics or features of the games.

Most satisfying/interesting

1. _____

2. _____

3. _____

Least satisfying/interesting

1. _____

2. _____

3. _____

16. For Game 3 in question 12:

List three of the best, most satisfying or interesting characteristics or features about the games and three of the worst or less desirable characteristics or features of the games.

Most satisfying/interesting

1. _____

2. _____

3. _____

Least satisfying/interesting

1. _____

2. _____

3. _____

Thank you for you cooperation

Jim Murphy

APPENDIX 3

ATV Practice Observation Sheet

ATV PRACTICE OBSERVATION SHEET

The following 'Observation Sheet' is to be used to observe the Trainee ATV Operator during the practice session on the 'ATV Practice Course area'. Any results / marks obtained do not influence or prejudice the marking or results obtained in the formal ATV Practical Assessment.

Candidate Name: _____ **(Optional)** **Location:** _____

Candidate Number: _____ **Date:** ___ / ___ / _____

1. Safety	Fault Rating	Award	Total
Non wearing of P.P.E.	5		
Exercise not completed in safe and efficient manner	3		
Incorrect use of appropriate tools and equipment	3		
Helmet not secured properly	5		
Non completion of pre-use checks	3		
No J.S.S.P.	1		
2. Observations			
Not looking in direction of travel	5		
Not completing all round check	3		
Poor all round site observations	1		
3. Steering and Riding			
Non use of both hands on handlebars	5		
Touches course, cones, trailed loads	1		
Shunts during exercises	1		
Poor use of controls	1		
Poor general use of brakes	3		
Inactive use of body	5		
Poor body weight redistribution	3		
Travelling too fast	5		
Straying from course	1		

4. Incline riding	Fault Rating	Award	Total
Wrong gear selection	1		
Incorrect use of brakes on descent	3		
Incorrect riding position on descent	5		
Incorrect riding position on ascent	5		
Non use of all-wheel drive	1		
Poor body position for emergency procedures	1		
5. Wet / bog land riding			
Incorrect gear selection	1		
Incorrect riding position	5		
Non use of all-wheel drive	1		
6. Loads and loading			
Loads not secured correctly	3		
Loads not balanced correctly	3		
Loads not distributed evenly	3		
Poor manual handling techniques	3		
ATV overloading	5		
7. Parking			
Fails to apply handbrake	1		
Fails to leave ATV in neutral	1		
Fails to switch off ATV engine	3		
Fails to leave ATV in safe position	5		
Mounts and dismounts ATV incorrectly	1		
TOTAL =			

Exceptions should be recorded as they occur

Participants may acquire twenty points or less to pass

APPENDIX 4

ATV
Practical Assessment
Record Sheet

ATV PRACTICAL ASSESSMENT RECORD SHEET

The following 'Practical Assessment Record Sheet' is to be used to observe the Trainee ATV Operator during the completion of the 'Practical Assessment' through the obstacle course in the 'ATV Practice Course area' All candidates must successfully complete both the 'Knowledge Assessment' and the 'Practical Assessment' to achieve the required standard and to be deemed competent in the operation of an ATV.

Candidate Name: _____ **(Optional)** **Location:** _____

Candidate Number: _____ **Date:** ___ / ___ / _____

1. Safety	Fault Rating	Award	Total
Non wearing of P.P.E.	5		
Exercise not completed in safe and efficient manner	3		
Incorrect use of appropriate tools and equipment	3		
Helmet not secured properly	5		
Non completion of pre-use checks	3		
No J.S.S.P.	1		
2. Observations			
Not looking in direction of travel	5		
Not completing all round check	3		
Poor all round site observations	1		
3. Steering and Riding			
Non use of both hands on handlebars	5		
Touches course, cones, trailed loads	1		
Shunts during exercises	1		
Poor use of controls	1		
Poor general use of brakes	3		
Inactive use of body	5		
Poor body weight redistribution	3		
Travelling too fast	5		
Straying from course	1		

4. Incline riding	Fault Rating	Award	Total
Wrong gear selection	1		
Incorrect use of brakes on descent	3		
Incorrect riding position on descent	5		
Incorrect riding position on ascent	5		
Non use of all-wheel drive	1		
Poor body position for emergency procedures	1		
5. Wet / bog land riding			
Incorrect gear selection	1		
Incorrect riding position	5		
Non use of all-wheel drive	1		
6. Loads and loading			
Loads not secured correctly	3		
Loads not balanced correctly	3		
Loads not distributed evenly	3		
Poor manual handling techniques	3		
ATV overloading	5		
7. Parking			
Fails to apply handbrake	1		
Fails to leave ATV in neutral	1		
Fails to switch off ATV engine	3		
Fails to leave ATV in safe position	5		
Mounts and dismounts ATV incorrectly	1		
TOTAL =			

Exceptions should be recorded as they occur

Participants may acquire twenty points or less to pass (deduct total points from 100 for percentage result %)

Please insert PASS or FAIL here →

_____

ATV Instructor's Signature

APPENDIX 5

ATV Operator Training

Knowledge Assessments

ATV TRAINING KNOWLEDGE ASSESSMENT TEST (A)

The following 'Knowledge Assessment' is to be completed at the end of the ATV Operator Training Course. All questions must be answered. All questions carry equal marks. All candidates must successfully complete both the 'Knowledge Assessment' and the 'Practical Assessment' to achieve the required standard and to be deemed competent in the operation of an ATV.

Candidate Name: _____ **(Optional)** **Location:** _____
Candidate Number: _____ **Date:** ___/___/_____

Enter the correct information in the space provided or circle the correct answer.

Q.1. Name four mandatory items of P.P.E. when using ATV's?

_____

_____

Q.2. Choose the correct type of helmet to wear on an ATV from the list below.

A. ESB Safety Helmet. B. Open-face motorcycle helmet.

C. Full-face motorcycle helmet. D. Any type of helmet.

Q.3. How many passengers may be carried on an ATV?

A. None. B. One. C. Two. D. Three.

Q.4. Who may operate an ATV?

A. Personnel chosen by a Supervisor.
B. Personnel who hold a current and full European Class B Driving Licence.
C. Personnel who are trained and licensed
D. Personnel who are trained

Q.5. When, should safety checks be completed on an ATV?

A. Daily before use.
B. Daily when time is available.
C. Daily after use in hazardous situations.
D. Daily before use in hazardous situations.

Q.6. What are the correct tyre pressures for an ATV and its trailer/bogey.

A. 2 – 3 psi. B. 3 – 5 psi. C. 6 – 8 psi D. 8 – 10 psi

Q.7. What is the correct method of operating an ATV?

A. Two hands on the handlebars, two feet on the foot rests, and bodyweight applied at the correct centre of gravity.
B. Two hands on the handlebars, two feet on the foot rests, and sitting on the ATV.
C. Two hands on the handlebars, two feet on the foot rests, and standing on the ATV.
D. Two hands on the handlebars, two feet on the foot rests, and standing or sitting on the ATV.

Q.8. Why is an ATV dangerous when used at speed on hard road surfaces?

A. Because of the danger of overturning when cornering.
B. Because the stopping distance is increased.
C. Because the tyres wear quicker.
D. Because it is not fitted with a drivers cab.

Q.9. Which of the following statements is most correct, in relation to the tyre pressures on an ATV?

A. The ATV tyre pressures should all be the same and soft.
B. The ATV tyre pressures should all be the same and be hard.
C. The ATV tyre pressures should be soft on the front and hard on the rear.
D. The ATV tyre pressures should be soft on the rear and hard on the front.

Q.10. What angle is given by Honda as a guide to the maximum angle of incline which may be travelled by an ATV?

A. 15 degrees. B. 20 degrees C. 25 degrees D. 30 degrees

Q.11. What is the maximum load that may be carried on the front load carrier of an ATV?

A. 15 kg B. 20 kg C. 25 kg D. 30 kg.

Q.12. What is the maximum load that can be carried on the rear carrier of a four wheel ATV?

A. 30 kg B. 40 kg C. 50 kg D. 60 kg.

Q.13. What is the maximum load that can be carried on the rear carrier of a six wheel ATV.

A. 300 kg B. 325 kg C. 365 kg D. 400 kg

Q.14. What is the correct load distribution arrangement for loads taken on ATV trailers.

A. Positioned over the axle and evenly distributed.
B. Positioned with the load to the front.
C. Positioned with the load to the rear.
D. Positioned with the load to one side.

Q.15. What is the correct mode in which to leave an ATV positioned when dismounting?

A. With the engine running and handbrake applied.
B. With the engine running and in gear.
C. With the engine off, handbrake applied and neutral selected.
D. With the engine running, handbrake applied and neutral selected.

Q.16. On a six wheel ATV, what is the purpose of the override control?

A. To enable the ATV to move forward at high speed.
B. To enable the ATV to move in reverse at high speed.
C. To enable the ATV to reverse out when stuck in position.
D. To enable the ATV to drive out when stuck in position.

Q.17. There is a requirement for a person to hold a current Full European Class B Driving Licence to be eligible for ATV training.

A. True ☐ B. False ☐

Q.18. At what speed should an ATV be ridden.

A. Slowly and deliberately at all times.

B. At a speed that reflects the rider's experience.

C. At a speed that is consistent with the terrain and the task in question.

D. At a speed decided by the supervisor.

Q.19. When driving down a slope, which braking sequence gives the best results.

A. Applying the front brakes only.

B. Applying the rear brakes only.

C. Applying the front and rear brakes evenly.

D. Applying the handbrake first and then the footbrakes.

Q.20. When reversing back down a slope, which of the following sequences best describes the appropriate actions.

A. Sitting on the ATV, body positioned forward, and applying both front and rear brakes.

B. Sitting on the ATV, body positioned forward, handlebars straight, and applying both front and rear brakes.

C. Standing on the ATV, body positioned forward, and applying both front and rear brakes.

D. Standing on the ATV, body positioned forward, handlebars straight, and applying both front and rear brakes.

ATV TRAINING KNOWLEDGE ASSESSMENT TEST (A)
ANSWER SHEET

All questions carry equal marks. All candidates must successfully complete both the 'Knowledge Assessment' and the 'Practical Assessment' to achieve the required standard and to be deemed competent in the operation of an ATV.

Candidate Name: _____ **(Optional)** **Location:** _____
Candidate Number: _____ **Date:** ___/___/_____

The correct answers are listed below:

Q.1. Name four mandatory items of P.P.E. when using ATV's?

Open Face Motorcycle Helmet, Eye Protection, Gloves, Safety Boots

Q.2. Choose the correct type of helmet to wear on an ATV from the list below.

B. Open-face motorcycle helmet.

Q.3. How many passengers may be carried on an ATV?

A. None

Q.4. Who may operate an ATV?

C. Personnel who are trained and licensed.

Q.5. When should safety checks be completed on an ATV?

A. Daily before use.

Q.6. What are the correct tyre pressures for an ATV and its trailer/bogey.

B. 3 – 5 psi

Q.7. What is the correct method of operating an ATV?

A. Two hands on the handlebars, two feet on the foot rests, and bodyweight applied at the correct centre of gravity.

Q.8. Why is an ATV dangerous when used at speed on hard road surfaces?

A. Because of the danger of overturning when cornering.

Q.9. Which of the following statements is <u>most</u> correct, in relation to the tyre pressures on an ATV?

A. The ATV tyre pressures should all be the same and soft.

Q.10. What angle is given by Honda as a guide to the maximum angle of incline which may be travelled by an ATV?

B. 20 degrees.

Q.11. What is the maximum load that may be carried on the front load carrier of an ATV?

D. 30 kg.

Q.12. What is the maximum load that can be carried on the rear carrier of a four wheel ATV?

D. 60 kg.

Q.13. What is the maximum load that can be carried on the rear carrier of a six wheel ATV?

C. 365 kg

Q.14. What is the correct load distribution arrangement for loads taken on ATV trailers.

A. Positioned over the axle and evenly distributed.

Q.15. What is the correct mode in which to leave an ATV positioned when dismounting?

C. With the engine off, handbrake applied and neutral selected.

Q.16. On a six wheel ATV, what is the purpose of the override control?

C. To enable the ATV to reverse out when stuck in position.

Q.17. There is a requirement for a person to hold a current Full European Class B Driving Licence to be eligible for ATV training.

A. True ☐

Q.18. At what speed should an ATV be ridden.

C. At a speed that is consistent with the terrain and the task in question.

Q.19. When driving down a slope, which braking sequence gives the best results.

B. Applying the rear brakes only.

Q.20. When reversing back down a slope, which of the following sequences best describes the appropriate actions..

D. Standing on the ATV, body positioned forward, handlebars straight, and applying both front and rear brakes.

ATV TRAINING KNOWLEDGE ASSESSMENT TEST (B)

The following 'Knowledge Assessment' is to be completed at a specific duration after completion of the full ATV Operator Training Course. It should be completed when the trainees return to the job.
All questions must be answered. All questions carry equal marks. Results will be used to determine level of knowledge transfer to the job.

Candidate Name: _____ **(Optional)** **Location:** _____
Candidate Number: _____ **Date:** ___/___/_____

Enter the correct information in the space provided or circle the correct answer.

Q.1. .Choose the correct type of helmet to wear on an ATV from the list below.

A. ESB Safety Helmet
B. Open-face motorcycle helmet.
C. Full-face motorcycle helmet.
D. Any helmet that includes eye protection.

Q.2. Where and when should tyre pressures on an ATV be checked?

A. On site before use
B. On site, anytime during use
C. In the depot, before departing for site.
D. In the depot, after returning from site.

Q.3. What is the maximum load that can be carried on the front carrier of a four wheel ATV?

A. 30 kg B. 35 kg C. 40 kg D. 45 kg

Q.4. What is the maximum load that can be carried on the rear carrier of a six wheel ATV?

A. 300 kg B. 350 kg C. 365 kg D. 400 kg

Q.5. What guidelines are given as regards depth of water which may be negotiated?

A. 400mm. B. 450mm. C. 500mm. D. 250mm.

Q.6. What angle is given by Honda as a guide to the maximum angle which may be travelled on an in-line slope?

A. 15 degrees. B. 20 degrees. C. 25 degrees D. 30 degrees.

Q.7. What is the correct mode in which to leave an ATV when dismounting?

A. With the engine running and handbrake applied.

B. With the engine running and in gear.

C. With the engine off, handbrake applied and neutral selected.

D. With the engine running, handbrake applied and neutral selected.

Q.8. On a six wheel ATV, what is the purpose of the override control?

A. To enable the ATV to move forward at high speed.

B. To enable the ATV to move in reverse at high speed.

C. To enable the ATV to reverse out when stuck in position.

D. To enable the ATV to drive out when stuck in position.

Q.9. There is a requirement for a person to hold a road traffic licence, category B, to be eligible for ATV training.

True False

Q.10. At what speed should an ATV be ridden?

A. Slowly and deliberately at all times

B. At a speed that reflects the rider's experience

C. At a speed that is consistent with the terrain and the task in question

D. At a speed decided by the supervisor

Q.11. When driving down a slope, which braking sequence gives the best results?

A. Applying the front brakes only.

B. Applying the rear brakes only.

C Applying the front and rear brakes evenly.

D. Applying the handbrake first and then the footbrakes.

Q.12. When reversing back down a slope, which of the following sequences best describes the appropriate actions?

A. Sitting on the ATV, body positioned forward, and applying both front and rear brakes.

B. Sitting on the ATV, body positioned forward, handlebars straight, and applying both front and rear brakes.

C. Standing on the ATV, body positioned forward, and applying both front and rear brakes.

D. Standing on the ATV, body positioned forward, handlebars straight, and applying both front and rear brakes.

Q.13. For what purposes, would an ATV rider be standing when operating an ATV?

A. To make it easier to be seen.

B. Because it is easier to ride the ATV in this manner.

C. To allow quick and easy weight redistribution.

D. Because it enables better route observation and facilitates weight redistribution.

Q.14. When deciding on the route to be travelled, what is the principle requirement?

A. That the quickest route is selected.

B. That the toughest route is selected.

C. That the safest route is selected.

D. That the longest route is selected.

Q.15. What methods may be used to stop the engine of an ATV?

A. Drive in high gear at low speed.

B. Turn off the ignition switch or press the emergency stop

C. Apply the brakes and accelerate in gear

D. Press the Emergency Stop only.

Q.16. To select reverse gear on a Honda ATV, you:

A. Apply the handbrake, depress the reverse button and select reverse.

B. Depress the reverse button, apply the handbrake, and select reverse.

C. Ensure gearing is in neutral, depress the reverse button, apply the handbrake, and select reverse.

D. Apply the front brakes, depress the reverse button and select reverse.

Q.17. The operator's handbook for any ATV should be kept clean and dry in a safe place on the ATV:

True False

Q.18. What angle is given by Polaris as a guide to the maximum angle which may be travelled on an in-line slope by a six wheel ATV?

A. 15 degrees. B. 20 degrees. C. 25 degrees D.30 degrees

Q.19. What is the correct riding position for the rider to adapt when ascending an incline?

A. Sitting on the ATV with your body forward toward the handlebars.

B. Sitting on the ATV with your body weight in the middle of the ATV.

C. Standing on the ATV with your body weight forward over the handlebars.

D. Standing on the ATV with your body weight in the middle of the ATV.

Q.20. What is the purpose for carrying out the pre-use safety checks on an ATV?

A. To check that the ATV works properly.

B. To find any faults in the machine.

C. Because the supervisor says to do so.

D. To ensure that the equipment is in a safe and fit condition.

ATV TRAINING KNOWLEDGE ASSESSMENT TEST (B)
ANSWER SHEET

All questions must be answered. All questions carry equal marks. Results will be used to determine level of knowledge transfer to the job.

Candidate Name: _____ **(Optional)** **Location:** _____
Candidate Number: _____ **Date:** ___/___/_____

The correct answers are listed below.

Q.1. Choose the correct type of helmet to wear on an ATV from the list below.

B. Open-face motorcycle helmet.

Q.2. Where and when should tyre pressures on an ATV be checked?

C. In the depot, before departing for site

Q.3. What is the maximum load that can be carried on the front carrier of a four wheel ATV?

A. 30 kg

Q.4. What is the maximum load that can be carried on the rear carrier of a six wheel ATV?

C. 365 kg

Q.5. What guidelines are given as regards depth of water which may be negotiated?

D. 250mm.

Q.6. What angle is given by Honda as a guide to the maximum angle which may be travelled on an in-line slope?

B. 20 degrees.

Q.7. What is the correct mode in which to leave an ATV when dismounting?

C. With the engine off, handbrake applied and neutral selected.

Q.8. On a six wheel ATV, what is the purpose of the override control?

C. To enable the ATV to reverse out when stuck in position.

Q.9. There is a requirement for a person to hold a road traffic licence, category B, to be eligible for ATV training.

True

Q.10. At what speed should an ATV be ridden?

C. At a speed that is consistent with the terrain and the task in question

Q.11. When driving down a slope, which braking sequence gives the best results?

C Applying the front and rear brakes evenly.

Q.12. When reversing back down a slope, which of the following sequences best describes the appropriate actions?

D. Standing on the ATV, body positioned forward, handlebars straight, and applying both front and rear brakes.

Q.13. For what purposes, would an ATV rider be standing when operating an ATV?

D. Because it enables better route observation and facilitates weight redistribution.

Q.14. When deciding on the route to be travelled, what is the principle requirement?

C. That the safest route is selected.

Q.15. What methods may be used to stop the engine of an ATV?

B. Turn off the ignition switch or press the emergency stop

Q.16. To select reverse gear on a Honda ATV, you:

C. Ensure gearing is in neutral, depress the reverse button, apply the handbrake, and select reverse.

Q.17. The operator's handbook for any ATV should be kept clean and dry in a safe place on the ATV:

True

Q.18. What angle is given by Polaris as a guide to the maximum angle which may be travelled on an in-line slope by a six wheel ATV?

A. 15 degrees.

Q.19. What is the correct riding position for the rider to adapt when ascending an incline?

C. Standing on the ATV with your body weight forward over the handlebars.

Q.20. What is the purpose for carrying out the pre-use safety checks on an ATV?

D. To ensure that the equipment is in a safe and fit condition.

APPENDIX 6

Raw Statistical Data

Group A

MSCLT Data research Record Sheet

Case	Candidate Name (Name Optional)	Knowledge Test (A) Score	Knowledge Test (B) Score	Practical ATV Test Score	Number of Test Faults						
					Safety	Observations	Steering and Riding	Incline Riding	Wet Ground/ Bogland Riding	Loads and Loading	Parking
1	Name Acknowledged	90	90	92	0	2	6	0	0	0	0
2	Name Acknowledged	100	100	90	0	0	3	1	0	0	0
3	Name Acknowledged	95	90	95	0	0	1	0	0	0	0
4	Name Acknowledged	95	85	99	0	0	1	0	0	0	0
5	Name Acknowledged	100	90	85	1	4	0	1	1	0	0
6	Name Acknowledged	95	90	88	0	4	0	1	1	0	0
7	Name Acknowledged	90	90	91	0	4	3	0	0	0	0
8	Name Acknowledged	90	90	90	0	6	1	0	0	0	0
9	Name Acknowledged	90	90	100	0	0	0	0	0	0	0
10	Name Acknowledged	90	90	90	0	3	3	0	0	0	0
11	Name Acknowledged	90	85	91	0	5	2	0	0	0	0
12	Name Acknowledged	100	95	85	0	3	6	0	0	0	0
13	Name Acknowledged	100	95	82	0	3	7	0	0	0	1
14	Name Acknowledged	100	90	86	0	6	2	0	0	0	0
15	Name Acknowledged	85	80	89	0	4	3	0	0	0	0
16	Name Acknowledged	95	95	100	0	0	0	0	0	0	0
17	Name Acknowledged	85	90	100	0	0	0	0	0	0	0
18	Name Acknowledged	95	95	93	0	4	2	0	0	0	0
19	Name Acknowledged	95	90	73	0	2	6	1	0	0	0
20	Name Acknowledged	100	100	95	0	2	3	0	0	0	0
	Average - Mean	94	91	90.7	0.05	2.6	2.45	0.2	0.1	0	0.05
	Standard Deviation	5.0262469	4.757265911	6.728572227	0.22361	2.062190966	2.258900524	0.410391341	0.307793506	0	0.223607
	Mode	90	90	90	0	0	3	0	0	0	0
	Variance	25.26315789	22.63157895	45.27368421	0.05	4.252631579	5.102631579	0.168421053	0.094736842	0	0.05
	Confidence	2.202808006	2.084924128	2.94887081	0.098	0.90377788	0.989988008	0.179858521	0.134893891		0.097998
	Median	95	90	90.5	0	3	2	0	0	0	0

Group B

MSCLT Data research Record Sheet

Case	Candidate Name (Name Optional)	Knowledge Test (A) Score	Knowledge Test (B) Score	Practical ATV Test Score	Number of Test Faults						
					Safety	Observations	Steering and Riding	Incline Riding	Wet Ground/ Bogland Riding	Loads and Loading	Parking
21	Name Acknowledged	90	90	83	0	6	2	0	0	0	0
22	Name Acknowledged	95	90	100	0	0	0	0	0	0	0
23	Name Acknowledged	100	100	85	0	2	7	0	0	0	0
24	Name Acknowledged	95	90	93	0	4	1	0	0	0	0
25	Name Acknowledged	100	95	89	0	6	1	0	0	0	0
26	Name Acknowledged	100	95	95	0	0	1	0	0	0	0
27	Name Acknowledged	95	95	97	0	0	2	0	0	0	0
28	Name Acknowledged	95	95	86	0	3	5	0	0	0	0
29	Name Acknowledged	100	100	94	0	0	1	1	0	0	0
30	Name Acknowledged	100	100	84	0	8	0	0	0	0	0
31	Name Acknowledged	85	90	85	0	6	1	0	0	0	0
32	Name Acknowledged	100	95	93	0	3	3	0	0	0	1
33	Name Acknowledged	100	95	97	0	0	3	0	0	0	0
34	Name Acknowledged	95	95	92	0	0	4	0	0	0	0
35	Name Acknowledged	95	95	100	0	0	0	0	0	0	0
36	Name Acknowledged	90	95	93	0	5	0	0	0	0	0
37	Name Acknowledged	100	95	99	0	0	1	0	0	0	0
38	Name Acknowledged	95	90	82	0	5	1	1	0	0	0
39	Name Acknowledged	100	90	83	0	8	4	0	0	0	0
40	Name Acknowledged	95	85	81	0	7	4	0	0	0	0
	Average - Mean	96.25	93.75	90.55	0	3.15	2.05	0.1	0	0	0.05
	Standard Deviation	4.253481548	3.931987578	6.452049858	0	3.030980387	1.932410548	0.307793506	0	0	0.223607
	Mode	100	95	93	0	0	1	0	0	0	0
	Variance	18.09210526	15.46052632	41.62894737	0	9.186842105	3.734210526	0.094736842	0	0	0.05
	Confidence	1.864135087	1.723236818	2.82768184		1.332227492	0.846900184	0.134893891			0.097998
	Median	95	95	92.5	0	3	1	0	0	0	0

MSCLT Data Research Record Sheet

ATV Practice Observation Score	Number of Observed Faults						
	Safety	Observations	Steering and Riding	Incline Riding	Wet Ground/ Bogland Riding	Loads and Loading	Parking
84	0	5	3	0	0	0	0
85	0	3	7	1	0	0	0
90	0	4	2	0	0	0	0
92	0	2	2	0	0	0	0
75	1	6	10	1	0	0	1
81	1	5	2	1	0	0	0
92	0	3	3	0	0	0	0
88	0	6	4	0	0	0	0
97	0	2	1	0	0	0	0
87	0	6	3	0	0	0	0
91	0	5	4	0	0	0	0
85	0	6	7	0	0	0	0
84	0	3	8	0	0	0	0
81	0	8	3	0	0	0	0
83	0	5	4	0	0	0	0
93	0	4	1	0	0	0	0
92	0	0	2	0	0	0	0
85	0	4	4	0	0	0	0
78	1	5	3	1	0	0	2
84	0	2	5	0	1	0	0
86.35	0.15	4.2	3.9	0.2	0.05	0	0.15
5.527681535	0.36635	1.880649384	2.403944128	0.410391341	0.223606798	0	0.48936
84	0	5	3	0	0	0	0
30.55526316	0.13421	3.536842105	5.778947368	0.168421053	0.05	0	0.239474
2.422187636	0.16056	0.824215285	1.053554964	0.179858521	0.097998139		0.214467
85	0	4.5	3	0	0	0	0

MSCLT Data Research Record Sheet

ATV Practice Observation Score	Number of Observed Faults						
	Safety	Observations	Steering and Riding	Incline Riding	Wet Ground/ Bogland Riding	Loads and Loading	Parking
78	0	9	3	0	0	0	1
91	0	4	2	1	0	0	0
82	0	10	12	0	0	0	0
80	0	6	5	1	0	0	0
78	0	7	6	1	0	0	2
88	4	4	0	0	0	0	0
83	0	3	5	1	0	0	0
80	0	8	3	1	0	0	0
88	0	5	4	1	0	0	0
68	0	9	6	1	0	0	0
74	0	9	5	0	0	0	0
77	0	8	5	0	0	0	0
92	0	4	2	0	0	0	0
85	0	6	6	0	0	0	0
90	0	5	3	0	0	0	0
84	0	7	3	0	0	0	0
88	0	4	3	1	0	0	0
65	0	10	8	1	0	0	0
74	0	9	7	1	0	0	0
64	0	11	9	0	0	0	0
79.25	0.2	8.9	4.7	0.5	0	0	0.15
9.227390576	0.89443	2.447340124	2.657980229	0.512989176	0	0	0.48936
80	0	9	3	0	0	0	0
85.14473684	0.8	5.989473684	7.063157895	0.263157895	0	0	0.239474
4.044005445	0.39199	1.072573736	1.164748837	0.224823151			0.214467
80	0	7	5	0.5	0	0	0

Case	Group A Candidate Name (Optional)	Age	Gender	Computer Own / Access	Internet Access	Use of Computer	Use of Internet	Use for Computer		
								First choice	Second Choice	Third Choice
1	Name Acknowledged	2	0	1	1	3	3	5	3	4
2	Name Acknowledged	2	0	1	1	4	3	4	6	1
3	Name Acknowledged	2	0	0	0	1	1	0	0	0
4	Name Acknowledged	2	0	0	0	1	1	0	0	0
5	Name Acknowledged	3	0	0	0	1	1	0	0	0
6	Name Acknowledged	3	0	1	1	3	3	5	4	0
7	Name Acknowledged	3	0	0	0	1	1	0	0	0
8	Name Acknowledged	3	0	0	0	1	1	0	0	0
9	Name Acknowledged	3	0	1	1	3	3	4	5	3
10	Name Acknowledged	3	0	0	0	1	1	0	0	0
11	Name Acknowledged	3	0	0	0	1	1	0	0	0
12	Name Acknowledged	2	0	1	1	5	3	5	10	11
13	Name Acknowledged	3	0	1	1	4	3	11	1	5
14	Name Acknowledged	2	0	1	1	2	2	9	4	5
15	Name Acknowledged	3	0	1	1	5	5	4	5	6
16	Name Acknowledged	2	0	1	1	4	4	4	3	7
17	Name Acknowledged	2	0	1	1	4	3	12	0	0
18	Name Acknowledged	3	0	1	1	2	2	11	4	5
19	Name Acknowledged	3	0	1	1	2	2	10	9	0
20	Name Acknowledged	3	0	1	1	3	3	10	4	0

Age	Gender	Computer	Access to	Use of	Use of	Use for Computer
<18 = 1	Male = 0	Own / Access	Internet	Computer	Internet	None = 0
18-35 = 2	Female = 1	No = 0	No = 0	V. Regularly = 5	V. Regularly = 5	Creating Documents = 1
36> = 3		Yes = 1	Yes = 1	Regularly = 4	Regularly = 4	Maintaining Web Site = 2
				Irregularly = 3	Irregularly = 3	Digital Photography = 3
				V. Irregularly = 2	V. Irregularly = 2	Info search = 4
				Never = 1	Never = 1	Communications e-mail = 5
						Banking / Finance = 6
						Online shopping = 7
						Creating multimedia = 8
						Education Learning = 9
						Entertainment games = 10
						Ticket reservations = 11
						Other = 12

Average - Mean	2.6	0	0.65	0.65	2.55	2.3	4.7	2.9	2.35
Standard Deviation	0.50262469	0	0.489360485	0.489360485	1.431782106	1.174285897	4.378175539	3.093286449	3.216323498
Mode	3	0	1	1	1	3	0	0	0
Variance	0.252631579	0	0.239473684	0.239473684	2.05	1.378947368	19.16842105	9.568421053	10.34473684
Confidence	0.220280801	#NUM!	0.214467617	0.214467617	0.627494261	0.514643715	1.918783601	1.35566682	1.409589161
Median	3	0	1	1	2.5	2.5	4	3	0

Computer to Learn IT	Examples	Computer to Learn Other	Examples	Own or Access Video Games	Platform / Systems used 1st Sys	2nd Sys	3rd Sys	Games played
0	None	0	None	0	0	0	0	
0	None	1	Holiday Destinations	0	0	0	0	
0	None	0	None	0	0	0	0	
0	None	0	None	0	0	0	0	
0	None	0	None	0	0	0	0	
0	None	0	None	1	5	0	0	FIFA 2004, Sports, play with family
0	None	0	None	0	0	0	0	
0	None	0	None	0	0	0	0	
0	None	0	None	1	7	0	0	Wrestling game, Fighting game, Play with family
0	None	0	None	1	5	6	1	Play with children
0	None	0	None	0	0	0	0	
0	None	0	None	1	4	0	0	Halo (Action), Splinter Cell (Action), Fable (RPG)
0	None	0	None	0	0	0	0	Great graphics, Realism, Fable Slow playing
0	None	1	Work related information, 'Doculive'	0	0	0	0	
0	None	0	None	1	7	6	1	Any car racing games available
0	None	1	Mechanical Maintenance	1	5	7	0	No 18.Gran Tourismo 4(Simulation),
0	None	1	Work related information, 'Doculive'	1	5	0	0	Colin McRea 3 (Simulation), LOTR (RPG)
0	None	0	None	0	0	0	0	No. 17.(18)FIFA Soccer, Formula 1, Touring Car
0	None	1	Encarta	1	5	0	0	Sports games, graphics, easy controls
0	None	0	None	1	6	0	0	Fighting Games

Computer to learn ICT
No = 0
Yes = 1

Computer to learn ICT
No = 0
Yes = 1

Own or Access Video Games
No = 0
Yes = 1

Platform / Systems used
PC = 7
Sony Playstation® 1 (PS1) = 6
Sony Playstation® 2 (PS2) = 5
Microsoft® Xbox = 4
Ninetendo Game Cube = 3
Ninetendo DS / Gameboy / Advance = 2
Other, incl. Mobile phone or handheld = 1
None = 0

0		0.25		0.45	2.45	0.95	0.1	
0		0.444281858		0.510417786	2.855742138	2.327750213	0.307793506	
0		0		0	0	0	0	
0		0.197388421		0.260526318	8.155263158	5.418421053	0.094736842	
#NUM!		0.19470256		0.223696211	1.251560413	1.020162142	0.134893891	
0		0		0	0	0	0	

18. The Video Game / Web Based Training really helped me												
Attention				Relevance			Confidence			Satisfaction		
Gain Attention	Real Virtual Environment	Solve Problems	Understand ATV manoeuvres	Realistic Examples	Clear Objectives	Motivated me to learn	Feel Confident	Build up skills	Self Paced Learning	Use skills in real and virtual environ	Provided Feed back	Consistent standards for performance
5	4	4	4	3	4	5	4	3	4	4	5	5
4	5	4	4	3	4	4	4	4	3	4	4	4
5	5	4	5	4	4	4	3	4	3	4	4	4
4	4	4	4	4	3	4	4	4	4	3	4	4
5	5	3	3	4	4	4	3	4	4	3	5	4
5	5	4	4	4	4	5	4	4	3	4	5	4
4	4	4	4	4	4	4	4	4	4	4	4	4
4	4	4	3	3	3	4	3	3	3	3	4	4
4	4	4	4	4	4	3	4	4	3	3	4	4
5	4	4	4	4	4	4	4	4	4	4	4	4
4	4	4	4	4	4	4	4	4	4	4	4	4
4	5	4	4	4	4	4	4	3	5	5	4	4
4	4	4	4	4	1	4	1	1	4	1	4	4
5	5	4	4	3	4	5	4	3	3	4	4	4
4	4	4	4	4	4	4	4	4	3	4	5	4
4	3	4	4	4	4	3	4	5	5	4	5	5
4	4	3	5	3	4	4	4	3	4	4	4	4
3	4	4	4	3	4	4	5	2	4	4	4	4
4	4	4	4	4	3	4	3	4	4	4	4	4
5	4	5	5	4	5	5	5	4	5	5	5	5

	Video Game / Web Based Training
5	Strongly Agree = 5
4	Agree = 4
3	Neither Agree Disagree = 3
2	Disagree = 2
1	Strongly Disagree = 1

4.3	4.25	3.95	4.05	3.7	3.75	4.1	3.75	3.55	3.8	3.75	4.3	4.15
0.571246571	0.560119904	0.384034453	0.510417786	0.470182349	0.786987516	0.552506251	0.850696309	0.887041208	0.690552374	0.850696309	0.470182346	0.368347548
4	4	4	4	4	4	4	4	4	4	4	4	4
0.328315789	0.302631579	0.155263158	0.260526316	0.221052632	0.618421053	0.305263158	0.723684211	0.786842105	0.484210526	0.723684211	0.221052632	0.134210526
0.250252485	0.241095969	0.172689939	0.223998211	0.208053821	0.344647384	0.242141944	0.372827017	0.388755569	0.30495241	0.372827017	0.208053821	0.160586644
4	4	4	4	4	4	4	4	4	4	4	4	4

Case	Group B Candidate Name (Optional)	Age	Gender	Computer Own / Access	Internet Access	Use of Computer	Use of Internet	Use for Computer		
								First choice	Second Choice	Third Choice
21	Name Acknowledged	3	0	1	0	2	1	10	0	0
22	Name Acknowledged	3	0	0	0	1	1	0	0	0
23	Name Acknowledged	3	0	0	0	1	1	0	0	0
24	Name Acknowledged	3	0	1	1	4	4	4	10	11
25	Name Acknowledged	2	0	1	1	3	2	4	1	10
26	Name Acknowledged	2	0	1	1	3	3	4	10	5
27	Name Acknowledged	2	0	0	0	1	1	0	0	0
28	Name Acknowledged	3	0	1	1	3	3	4	5	3
29	Name Acknowledged	2	0	1	1	3	2	4	1	10
30	Name Acknowledged	2	0	1	1	3	4	1	10	11
31	Name Acknowledged	2	0	1	1	3	3	4	6	10
32	Name Acknowledged	2	0	1	1	4	3	10	4	6
33	Name Acknowledged	3	0	1	1	3	2	1	4	0
34	Name Acknowledged	2	0	1	1	3	2	1	4	10
35	Name Acknowledged	2	0	1	1	3	2	4	1	5
36	Name Acknowledged	3	0	0	0	1	1	0	0	0
37	Name Acknowledged	2	0	1	1	3	2	1	4	5
38	Name Acknowledged	3	0	0	0	1	1	0	0	0
39	Name Acknowledged	3	0	0	0	1	1	0	0	0
40	Name Acknowledged	3	0	1	1	4	4	1	5	4

Age	Gender	Computer	Access to	Use of	Use of	Use for Computer
		Own / Access	Internet	Computer	Internet	
<18 = 1	Male = 0	No = 0	No = 0	V. Regularly = 5	V. Regularly = 5	None = 0
18-35 = 2	Female = 1	Yes = 1	Yes = 1	Regularly = 4	Regularly = 4	Creating Documents = 1
36> = 3				Irregularly = 3	Irregularly = 3	Maintaining Web Site = 2
				V. Irregularly = 2	V. Irregularly = 2	Digital Photography = 3
				Never = 1	Never = 1	Info search = 4
						Communications e-mail = 5
						Banking / Finance = 6
						Online shopping = 7
						Creating multimedia = 8
						Education Learning = 9
						Entertainment games = 10
						Ticket reservations = 11
						Other = 12

Average - Mean	2.5	0	0.7	0.65	2.5	2.15	2.65	3.25	4.5
Standard Deviation	0.512989176	0	0.470162346	0.489360485	1.100239208	1.089422831	3.048295468	3.567027363	4.430753767
Mode	3	0	1	1	3	1	4	0	0
Variance	0.263157895	0	0.221052632	0.239473684	1.210526316	1.186842105	9.292105263	12.72368421	19.63157895
Confidence	0.224823151		0.206053821	0.214467617	0.482191938	0.477451542	1.335949028	1.563288988	1.941826568
Median	2.5	0	1	1	3	2	1	2.5	4.5

Computer to Learn IT	Examples	Computer to Learn Other	Examples	Own or Access Video Games	Platform / Systems used 1st Sys	2nd Sys	3rd Sys	Games played
0	None	0	None	1	7	0	0	Wolfenstein, action shhot-em-up
0	None	0	None	0	0	0	0	None
0	None	0	None	0	0	0	0	None
1	Computer Repair	0	None	1	6	7	0	Colm McRae Rally, driving simulation game PS1
0	None	0	None	0	0	0	0	None
0	None	1	Car Mechanics	1	5	0	0	FIFA 2004, anything to do with football
0	None	0	None	0	0	0	0	None
1	Photo Software	0	None	1	5	0	0	Gran Turismo 3, selection of cars, bad sounds
0	None	0	None	0	0	0	0	None
0	None	1	Driving Test Theory	1	7	0	0	Need for Speed, Gran Turismo - Car games
0	None	0	None	0	0	0	0	None
0	None	0	None	0	0	0	0	None
0	None	0	None	0	0	0	0	None
0	None	0	None	1	5	0	0	Superbikes, FIFA Soccer - very realistic
0	None	0	None	0	0	0	0	None
0	None	0	None	0	0	0	0	None
0	None	0	None	0	0	0	0	None
0	None	0	None	0	0	0	0	None
0	None	0	None	0	0	0	0	None
0	None	1	Work related maintenance	0	0	0	0	None

Computer to learn ICT
No = 0
Yes = 1

Computer to learn ICT
No = 0
Yes = 1

Own or Access Video Games
No = 0
Yes = 1

Platform / Systems used
PC = 7
Sony Playstation® 1 (PS1) = 6
Sony Playstation® 2 (PS2) = 5
Microsoft® Xbox = 4
Ninetendo Game Cube = 3
Ninetendo DS / Gameboy / Advance = 2
Other, incl. Mobile phone or handheld = 1
None = 0

0.1		0.15		0.3	1.75	0.35	0	
0.307793506		0.368347549		0.470162346	2.788804631	1.565247584	0	
0		0		0	0	0	0	
0.094736842		0.134210528		0.221052632	7.776315789	2.45	0	
0.134693891		0.160555844		0.206053821	1.222136661	0.685986875		
0		0		0	0	0	0	

16. The Video Game / Web Based Training really helped me												
Attention				Relevance			Confidence			Satisfaction		
Gain Attention	Real Virtual Environment	Solve Problems	Understand ATV manoeuvres	Realistic Examples	Clear Objectives	Motivated me to learn	Feel Confident	Build up skills	Self Paced Learning	Use skills in real and virtual environ	Provided Feed back	Consistent standards for performance
5	2	3	4	2	4	2	1	4	4	1	1	4
4	4	4	4	2	4	4	4	4	4	2	2	4
4	2	2	4	1	3	1	1	4	4	1	2	4
4	2	4	4	2	4	3	4	4	3	2	1	2
3	2	2	4	4	4	3	1	3	4	2	1	4
4	1	1	4	3	3	3	3	4	4	2	2	4
3	2	2	3	1	2	2	2	4	4	2	3	4
3	3	2	4	3	3	2	2	3	4	1	1	3
4	4	2	3	4	3	3	2	1	3	2	1	4
4	2	2	3	3	3	3	3	4	4	2	2	4
4	2	3	3	1	3	2	2	2	3	1	1	4
4	2	2	4	3	3	2	2	1	3	1	1	4
4	3	3	4	4	4	3	1	1	3	2	1	3
4	4	4	3	2	2	4	2	2	3	4	2	3
5	2	2	4	3	3	3	3	3	4	2	2	4
4	2	2	3	2	2	2	1	2	4	3	2	3
4	2	2	4	3	3	3	2	2	4	1	1	5
3	2	2	2	2	3	3	1	1	2	2	2	3
4	1	1	2	3	2	3	1	1	2	1	2	2
4	2	2	3	1	3	3	1	1	3	2	1	3

5	Strongly Agree = 5
4	Agree = 4
3	Neither Agree Disagree = 3
2	Disagree = 2
1	Strongly Disagree = 1

3.9	2.3	2.35	3.45	2.45	3.05	2.7	1.95	2.35	3.45	1.8	1.95	3.45
0.552508251	0.864504726	0.87509398	0.686332741	0.998683344	0.686332741	0.732895097	0.998683344	1.278302225	0.686332741	0.787771896	0.804805319	0.686332741
4	2	2	4	3	3	3	1	4	4	2	1	4
0.305283158	0.747366421	0.765789474	0.471052632	0.997368421	0.471052632	0.536842105	0.997368421	1.628947368	0.471052632	0.569473684	0.365789474	0.471052632
0.242141944	0.378878708	0.383519595	0.300792875	0.437683984	0.300792875	0.242141944	0.372827017	0.559353493	0.300792875	0.336484481	0.265062585	0.300792875
4	2	2	4	2.5	3	3	2	2.5	4	2	1.5	4

Gender	Group C Case	Candidate Number (Name Optional)	Age	Gender	Computer Own / Access	Internet Access	Use of Computer	Use of Internet	Use for Computer First choice	Second Choice	Third Choiuce
19 Male	41	Name Acknowledged	1	0	0	0	1	1	0	0	0
2 Female	42	Name Acknowledged	1	0	1	1	5	4	10	6	4
	43	Name Acknowledged	1	0	1	1	1	2	1	0	0
	44	Name Acknowledged	1	0	1	1	2	1	10	0	0
	45	Name Acknowledged	1	0	1	1	4	4	9	10	4
	46	Name Acknowledged	1	0	1	1	3	2	10	9	0
	47	Name Acknowledged	1	0	1	1	4	5	10	8	5
	48	Name Acknowledged	1	0	1	1	5	5	5	10	4
	49	Name Acknowledged	1	0	1	1	5	5	10	0	0
	50	Name Acknowledged	2	0	1	0	3	1	9	10	4
	51	Name Acknowledged	1	1	1	1	5	2	9	0	0
	52	Name Acknowledged	1	0	1	1	2	1	10	4	3
	53	Name Acknowledged	1	0	0	0	5	4	0	0	0
	54	Name Acknowledged	1	0	1	1	2	2	10	4	8
	55	Name Acknowledged	2	0	1	1	3	2	0	0	0
	56	Name Acknowledged	2	0	1	1	2	1	5	10	7
	57	Name Acknowledged	1	1	1	1	4	3	10	5	9
	58	Name Acknowledged	2	0	1	1	3	3	6	5	9
	59	Name Acknowledged	2	0	1	1	4	4	10	6	7
	60	Name Acknowledged	1	0	0	0	5	5	9	8	0
	61	Name Acknowledged	1	0	1	1	4	1	10	1	0
	62	Name Acknowledged	1	0	1	1	3	2	9	10	4

	Age <18 = 1 18-35 = 2 36> = 3	Gender Male = 0 Female = 1	Computer Own / Access No = 0 Yes = 1	Access to Internet No = 0 Yes = 1	Use of Computer V. Regularly = 5 Regularly = 4 Irregularly = 3 V. Irregularly = 2 Never = 1	Use of Internet V. Regularly = 5 Regularly = 4 Irregularly = 3 V. Irregularly = 2 Never = 1	Use for Computer None = 0 Creating Documents = 1 Maintaining Web Site = 2 Digital Photography = 3 Info search = 4 Communications e-mail = 5 Banking / Finance = 6 Online shopping = 7 Creating multimedia = 8 Education Learning = 9 Entertainment games = 10 Ticket reservations = 11 Other = 12		
Average - Mean	1.227272727	0.090909091	0.863636364	0.818181818	3.409090909	2.727272727	7.363636364	4.909090909	3.090909091
Standard Deviation	0.428932027	0.294244943	0.351250087	0.394771017	1.333062743	1.517573821	3.773913651	4.150835727	3.293703819
Mode	1	0	1	1	5	1	10	0	0
Variance	0.183982684	0.086580087	0.123376623	0.155844156	1.777056277	2.303030303	14.24242424	17.22943723	10.84848485
Confidence	0.179235863	0.122954801	0.146775283	0.164961177	0.55704089	0.634141698	1.576988203	1.734490923	1.376325095
Median	1	0	1	1	3.5	2	9	5	3.5

Group C Case	Candidate Number (Name Optional)	Examples	Computer to Learn Other	Examples	Play Games How Often?	Platform / Systems used 1st Sys	2nd Sys	3rd Sys
41	Name Acknowledged	Word Processing	0	None	3	5	None	None
42	Name Acknowledged	None	1	Gameplay	3	5	None	None
43	Name Acknowledged	None	0	None	3	5	2	None
44	Name Acknowledged	None	0	None	3	5	3	None
45	Name Acknowledged	None	1	Projects, music	4	5	2	7
46	Name Acknowledged	None	0	None	4	5	2	None
47	Name Acknowledged	MS DOS	1	Languages, Maths, Astronomy	2	5	6	7
48	Name Acknowledged	Programming	1	Cookery, music, mechanics	1	5	4	7
49	Name Acknowledged	Software Applications	1	Music	2	5	7	1
50	Name Acknowledged	None	1	Education Subjects	2	5	7	1
51	Name Acknowledged	None	1	Mathematics	1	5	6	1
52	Name Acknowledged	None	1	Projects, music	4	5	7	None
53	Name Acknowledged	None	0	None	3	5	None	None
54	Name Acknowledged	None	1	Gameplay	3	5	7	6
55	Name Acknowledged	None	0	None	3	5	None	None
56	Name Acknowledged	Software Applications	1	Events, music ,motoring	2	5	None	None
57	Name Acknowledged	None	1	Education Subjects	2	7	None	None
58	Name Acknowledged	None	1	Education Subjects	5	5	None	None
59	Name Acknowledged	Software Applications	1	Health, how things work, garden decking	2	5	7	None
60	Name Acknowledged	None	1	Mathematics	3	5	2	None
61	Name Acknowledged	None	1	History	4	7	5	3
62	Name Acknowledged	Typning skills	1	Maths, Astronomy	3	4	5	7

Computer to learn ICT
No = 0
Yes = 1

Play Games How Often?
Everyday = 5
5 to 6 days per week = 4
3 to 4 days per week = 3
1 to 2 days per week = 2
Less than 1 day per week = 1

Platform / Systems used
PC = 7
Sony Playstation® 1 (PS1) = 6
Sony Playstation® 2 (PS2) = 5
Microsoft® Xbox = 4
Ninetendo Game Cube = 3
Ninetendo DS / Gameboy / Advance = 2
Other, incl. Mobile phone or handheld = 1

Average - Mean	0.727272727	2.818181818	5.136363636	4.8	4.444444444	
Standard Deviation	0.455842306	1.006472559	0.639602149	2.111194652	2.87711275	
Mode	1	3	5	7	7	
Variance	0.207792208	1.987075828	0.409090909	4.457142857	8.277777778	
Confidence	0.19048076	0.420570129	0.267267653	0.882195345	1.202246072	
Median	1	3	5	5	6	

Group C Case	Candidate Number (Name Optional)	Game Titles 1	Game Genre	Format	Most Satisfying Features	Least Satisfying Features
41	Name Acknowledged	Smackdown vs. RAW	6	PS2	Realistic fighting moves, Good Graphics, Lots of Levels	See-through Characters, Seasons too easy, bad soundtrack
42	Name Acknowledged	Enter the Matrix	8	PS2	Graphics, lots of levels, beating up enemies	Can be too difficult, the agents are boring
43	Name Acknowledged	Smackdown vs. Raw	6	PS2	Graphics, interesting levels, music soundtrack	Season too easy, Status Points, Referee gets in the way
44	Name Acknowledged	Sonic Heroes	6	Gamecube	Colour and Graphics, lots of games, good music	Unable to save game data, can get annoying at times, can become boring
45	Name Acknowledged	FIFA Street	2	PS2	Great graphics, easy to learn, great skills and players	Music
46	Name Acknowledged	Smackdown vs. Raw	6	PS2	Beating people up, using chairs, hammers, ladders as weapons	Very slow to load, commentary can be very annoying
47	Name Acknowledged	Dynasty Warriors 4	8	PS2	Based on real historical period in ancient china, 40 playable characters, control large armies	Repetitive after a while, you can beat game using only one button, poor in multiplayer mode
48	Name Acknowledged	Metal Gear Solid 3	8	PS2	Graphics, there little things like special moves or drawing weapon from holster, storyline	Game too short, lack of A.I. interaction, repetitative statements from character
49	Name Acknowledged	FIFA Football 2004	2	PS2	Exciting, Interesting, great if your bored	Hard on the eyes, becomes less and less exciting after you completes the game
50	Name Acknowledged	Smackdown vs. RAW	6	PS2	Great graphics, moves	Referee always gets in the way
51	Name Acknowledged	Need for Speed - Underground 2	3	PS2	Driving around streets, racing other cars, different types of races, customising your car	Can't save cars or its just difficult to figure it out
52	Name Acknowledged	Pro Evolution Soccer 4	2	PS2	Good detail, realistic, addictive	Commentators can be irritating, lack of real player names
53	Name Acknowledged	Killzone	8	PS2	Lots of tasks to do, never get bored	Difficult to find your way around
54	Name Acknowledged	Tekken 4	6	PS2	Lots of characters to choose from, great moves such as throwing opponent into the air, stories	Some fighting moves too difficult, some characters are boring
55	Name Acknowledged	FIFA 2005	2	PS2	Very realistic, good gameplay, good special effects	Too easy, can become tedious
56	Name Acknowledged	Need for Speed - Underground 2	3	PS2	Choice of cars, ability to modify cars, amount of tracks and you have to drive around to find races	Not many changes from previous version - 'Need for Speed Underground'
57	Name Acknowledged	SIMS	1	PC	Creating the ideal world, seeing your own people	You have to have version 1 to download additional versions
58	Name Acknowledged	Metal Gear Solid 3	8	PS2	Solid Snake character, range of weapons, realistics graphics	Difficult to aim weapons, vision isn't great, no vehicles to drive
59	Name Acknowledged	Age of Empires	1	PC	Interaction between people, religions, armies, the challenges of survival, hours of distraction	At point of no return it takes too long to be destroyed, defeated. Difficult to know where you went wrong
60	Name Acknowledged	FIFA 2005	2	PS2	Like a real football game, Manchester United is included, you can change team players	Nothing
61	Name Acknowledged	Empire Earth	1	PC	Great battles, you can build armies and plan your next moves	Takes too long to build some buildings, time limit can be a nuisance
62	Name Acknowledged	Halo 2	8	X-Box	Being one of a team, choice of characters, weapons, vehicles and killing enemies	Nothing

Group C Case	Candidate Number (Name Optional)	Game Titles 2	Game Genre	Format	Most Satisfying Features	Least Satisfying Features
41	Name Acknowledged	Spiderman 2	7	PS2	Excellent graphics, Can use web on Buildings, realistic and challenging enemies	Game too easy, enemies dested too easily, Cannot change character
42	Name Acknowledged	Tony Hawks Underground	6	PS2	Performing tricks, creating a park, characters	Fell off board very easily, music soundtrack
43	Name Acknowledged	Prince of Persia	7	PS2	Music, choice and use of weapons, monster characters	Difficult to play, too much talking, the fortune seller character
44	Name Acknowledged	Simpsons - Hit and Run	6	PS2	Great fun, good storyline and jokes, can drive lots of vehicles	Poor graphics, items disappear when you destroy them
45	Name Acknowledged	X-Men Legends	4	PS2	Difficult to beat, great graphics, choice of characters	The suits, the music
46	Name Acknowledged	Lord of the Rings - Return of the King	7	PS2	Good choice of characters and weapons,difficult to play. Gandalf is the best character	Very annoying when completed, Frodo is a very weak character
47	Name Acknowledged	Final Fantasy VII	4	PS1	Deep and interesting plot with many twists, great characters-moves-items, music score, graphics	Some boss battles are a bit too difficult, game on three disks, bad graphics on occasions
48	Name Acknowledged	Midnight Club II	3	PS2	Car options, multiple mode choices, graphics	Repetitive statements, constantly being mocked by game, maps too small
49	Name Acknowledged	WWE Smackdown - Shut your mouth	6	PS2	Great fun, good graphics	Can be boring at times
50	Name Acknowledged	FIFA 2004	2	PS2	Good fun	Gets boring after a while
51	Name Acknowledged	Tony Hawks - Pro Skater	6	PS2	You can create your own skater character, great challenges, brilliant graphics	You fall off too much
52	Name Acknowledged	Grand Theft Auto - Vice City	8	PS2	Graphics are good, resembles real life, cars are cool	Bad language means its difficult to play when young children are around
53	Name Acknowledged	Gran Turismo 4	3	PS2	Cars are very realistic, brilliant graphics, lots of cars to choose from	Can get too difficult
54	Name Acknowledged	Ratchet & Clank 2	7	PS2	Storyline excellent, lots of puzzles to solve, races, battle arena is cool	Some enemies are too easy to beat, annoying when game is completed
55	Name Acknowledged	Grand Theft Auto - San Andreas	8	PS2	Very realistic, good effects and freedom to play around	Can be tough to complete
56	Name Acknowledged	Need for Speed - Underground	3	PS2	Different race formats, tuning the cars to get best performance, very good graphics	Not much
57	Name Acknowledged	Who wants to be a millionaire	5	PC	Educational, very realistic (feels like your on TV)	Can be difficult for younger user, can become boring
58	Name Acknowledged	Grand Theft Auto III	8	PS2	Attention to detail, freedom of movement, choice of weapons	Frustration when you can't complete a mission
59	Name Acknowledged	Lord of the Rings - The Third Age	4	PS2	New characters within same storyline, new journeys and locations, different gameplay from previous games	Repetitive strategies used to defeat enemies, can be slow, difficult to complete without reference book
60	Name Acknowledged	Rugby 2004	2	PS2	Graphics show great view of tackles, great when you score a try or are in a scrum	Nothing bad
61	Name Acknowledged	Dragonball Z: Budokai 3	6	PS2	Good story, you have to beat game 100%, the characters are interesting, great graphics	Some characters are hard to unlock
62	Name Acknowledged	Grand Theft Auto III	8	PS2	You can steal any type of vehicle, good challenges	Short game, can be repetitive, bad language and soundtrack

Group C Case	Candidate Number (Name Optional)	Game Titles 3	Game Genre	Format	Most Satisfying Features	Least Satisfying Features
41	Name Acknowledged	Tony Hawks U.G. 2	1	PS2	Unusual and cool characters, levels recreate actual places, creating a park	Poor graphics, poor soundtrack, difficult navigation
42	Name Acknowledged	FIFA Street	2	PS2	Graphics, skills performing, player characteristics	Pitches are too small, bad music soundtrack
43	Name Acknowledged	X-Men Legends	4	PS2	The Characters, the storyline, great value for money	The music, the suits, the sentinal's
44	Name Acknowledged	Smackdown vs. Raw	6	PS2	Great fun, you can unlock new characters, good soundtrack	Using 'Cheat Disk' wrecks the game, bad storyline
45	Name Acknowledged	Age of Empires	1	PC	Good characters, great graphics, its very brutal but, you learn something	Nothing
46	Name Acknowledged	FIFA Street	2	PS2	Great tricks , good choice of streets to play in, build own character skills/traits	Nothing bad about this game
47	Name Acknowledged	Mortal Kombat: Deception	6	PS2	Many different fighting styles, interactive surroundings such as booby traps and weapons, plenty of gore and violence	Not many characters, combo moves too complicated, after beating up an opponent a number of times, you think 'why bother'
48	Name Acknowledged	Halo 2	8	Xbox	Graphics, game play with best graphics ever,campaigns,story, missions, weapon selection	No multiplevision options, ie night vision - thermal, bad A.I., some maps too small.
49	Name Acknowledged	Tony Hawks U.G. 2	1	PS2	A long game, very good graphics	Can be difficult, too many players and unplayable after completing game
50	Name Acknowledged	None	None	None	None	None
51	Name Acknowledged	Dance Mat	4	PS2	Choice of songs, lyrics shown on screen, choice of difficulty level	Some songs are not good
52	Name Acknowledged	Age of Empires	1	PC	Clever strategies, lots of history, a game that makes you think	Graphics could be better, more historical figures would be good
53	Name Acknowledged	Grand Theft Auto - San Andreas	6	PS2	Always keeps your interest, never boring, great storyline	There are areas where you can get stuck between walls and fences
54	Name Acknowledged	Ratchet & Clank 3	7	PS2	Weapon selection and upgrades, soundtrack, suits of armour	Very quick to complete, too easy to get weapon upgrades, trophies and skill points too difficult to get
55	Name Acknowledged	Need for Speed - Underground 2	3	PS2	Challenging game, great for car enthusiasts, very realistic	Tedious if your not a car lover, stages appear repetitive
56	Name Acknowledged	None	None	None	None	None
57	Name Acknowledged	Tomb Raider II	7	PC	Action packed, challenging and discover different worlds	Bad graphics, can prove difficult to move up through the levels
58	Name Acknowledged	Rugby 2005	2	PS2	Attention to detail, fast gameplay, good for learning rugby rules	Have to pass a training exercise at beginning, hard to follow instructions, off-side rule is bad.
59	Name Acknowledged	Moto GP	3	PS2	Realistic performance of bikes, great graphics, playback is as realistic as TV broadcast	The more you progress, the easier it is to fall off
60	Name Acknowledged	Lord of the Rings - Return of the King	7	PS2	Fighting and killing enemies, choice of weapons	When you lose or get killed you have to start again, sometimes too difficult to play
61	Name Acknowledged	Super Smash Bros Melee	6	Gamecube	Selection of characters, storyline, nearly all Nintendo characters available	Nothing
62	Name Acknowledged	Lord of the Rings - The Third Age	4	PS2	Story is brilliant, good graphics, great battles	Limited number of characters, lots of items to collect but have little value, some battles are too similar

Game Genre
Action Games = 6
Adventure Game = 7
Fighting Game = 8
Puzzle Game = 5
Role Playing Game = 4
Simulation Game = 3
Sports Games = 2
Strategy Game = 1

APPENDIX 7

ATV Training Course Specification

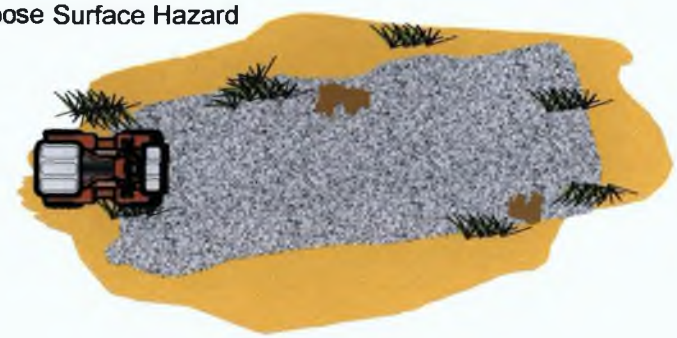
Course Title: All Terrain Vehicle (ATV) Operator Training Course

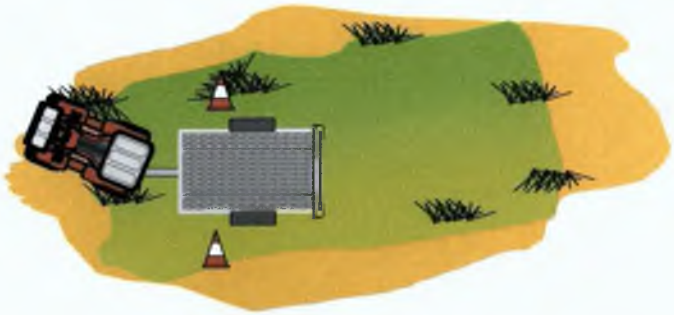
Course Code	NT-ATV-06	Notes
Training Aim	To provide the course participant with the skills and knowledge required to safely and correctly operate an All terrain Vehicle (ATV).	
Programme Objectives	At the end of this course the participants will be able to: • Demonstrate the correct and safe operation of an All Terrain Vehicle (ATV) in compliance with the Manufacturer's Instructions and the operational requirements of ESB by completing a specified series of practical exercises. • Successfully complete a knowledge and practical competency assessment on the operation of an ATV.	
Outline Training Plan	Refer to Course Timetable	
Training Duration	2 Days (can be run over three day period).	
Training Approach	Directed learning in Classroom and designated 'ATV Course Practice Area'. Practical participation of Trainees in Workshop.	
Record System	Attendance Sheet. Practical Exercise Control Sheet. Competency Assessment Forms. ATV Licence Issue Record Sheet Quality Assurance Reactionaries (Level 1). Course status to be recorded on PMIS and ESB Intranet. Course Participants can record their progress using 'ATV Operation Reference and Exercise Workbook'	
Assessment and Certification System	Assessment to be carried out using 'Knowledge Appraisal' and 'Practical Appraisal'. Assessment Record Sheets to be completed and kept for record. ATV Operators Licence to be issued and recorded by ESB Training, Shared Services. 'Report' to be issued to Customer. Course Participant status recorded on PMIS.	

Exception Reporting	In the event of a Course Participant **does not achieve the specified competency standard** in either the 'Knowledge Appraisal' or 'Practical Appraisal' , ESB Networks or ATV Operators employer must be informed immediately on the day of the course that the course participant has failed to reach the competency level required to operate an ATV, therefore: **The course participant cannot operate an ATV until competency has been achieved.** **For ESB Networks, please contact:** _____ _____ _____ _____ _____ _____ **Written confirmation is required.**	
Target Trainee Numbers and Profile	Maximum of 6 course participants. Course participants are required to use ATV's as part of their normal work duties All course participants must have a full B Class Driving Licence or equivalent as a minimum requirement.	Course participant who do not have minimum Driving Licence requirements cannot attend course. Course participants who display inappropriate behaviour towards the operation of ATV or act in an unsafe manner will *not be permitted to* proceed with the course.
Training Facilities	Classroom to accommodate Trainer and 6 . Trainees Designated 'ATV Course Practice Area' (ref ATV Course Practice Area Specification below)	
PPE	Approved ATV/Motorcycle helmet to standard BS:6658 or equivalent. Approved Safety Boots or steel toecap safety 'Wellington Boots' Eye Protection – Goggles, Visor or Safety Glasses Gloves Long Sleeves – recommended when operating in undergrowth.	
Presenter Resources	Presenter/Presentation Folder Trainer 'ATV Operation Reference and Exercise Workbook' Exercise Control Sheet. Attendance Sheet Laptop, Multimedia Projector & PPT file. ATV Training Video, HSE ATV Video. (or Acetates of presentation and OH projector) Personal Protective Equipment, incl. approved 'Open Face' ATV / Motorcycle Helmet and Eye Protection	Up to date training course material is available in the ESB Training Shared Drawer at the following mapped location: \\ho059s\esb_train$ Contact ITSECURITY for access details at 26699.

Stationary Resources per Trainee	ATV Exercise Workbook Writing Paper, pen & pencil. Quality Assurance Reactionaires (Level 1)	
Materials Required	**Equipment**: • 2 x 4 wheel ATV • 1 x 6 wheel ATV • 1 x 4 wheel ATV Trailer • 1 x 6 wheel ATV Trailer • 1 x Bogey • Selection of Stay Sleepers, rods, stay wires, insulators, crossarms, etc • ATV Manufacturer's Operating manuals ***Instruments:*** Tyre Pressure Gauge Foot Pump or Battery Operated Air Compressor	

ATV Course Practice Area Specification

Recommended Practice Area Requirements	**Dimensions:** Length = 100 metres Width = 50 metres Practice area should include a flat area of 30 sq. metres and the facility to operate the ATV over a 200 metre course track.
Specific ATV Hazards The practice area should contain the hazards shown as a minimum. Their purpose is to present the ATV operator with examples typical of the hazards that can be present when operating an ATV.	In-line Slope Hazard with a maximum gradient of 20°:  Cross Slope Hazard with a maximum gradient of 10°  Rough Terrain Hazard:  Water / Soft Ground Hazard with a maximum water depth of 450 mm (18 ins.)  Loose Surface Hazard 

	Chicane Hazard  Drain / Ditch Hazard (0.5 metres depth x 2 metres width)