Assess the impact of an introduction to HTML coding on adult learners for a wider choice of options for further academic study or direct employment

A case study

Sheila McDonald

Master of Arts in Digital Media Development for Education

Supervisor: Catriona Lane
Submitted to the University of Limerick
March 2014
I hereby declare that this is entirely my own work and it had not been submitted for the award of any degree at any other university.

Sheila McDonald
Student ID: 0526223
March 2014
Dedication

This thesis is dedicated to Tony McDonald for inspiring my ambition to succeed.
A case study to assess the impact of a short introduction to HTML coding on adult learners by presenting them with a choice of subject options for further academic study or direct employment.

Sheila McDonald

Abstract

An industry shortage of high skilled computer users create further options for adult learners by equipping them with an employable skill set and this research assesses the potential widening of progression routes for adult learners. An action case study was exercised to obtain data for this study and was obtained by using a representative sample of adult learners that formed into two groups of ten participants each. The participants attended class sessions during the research and completed one hundred per cent assessment projects by creating two web pages and writing a report on the background and a critical evaluation of their web sites.

One of the outcomes of the research was the creation of an adult learner profile in Limerick city that incorporated their educational backgrounds, perceptions of coding, attitudes and opinions of what they saw as important academic subjects. The disparity of computer skills demonstrated during the research was also documented that is linked to the choice and availability of courses for adult learners which in turn impacts on progression choices.

One of the implications of this research is the matching of provision of courses and requirements posed by the portrait of the modern adult learner. Academic progression may not be the primary motivator for adult learners as they have greater responsibilities than young learners and are seeking a way of returning to the labour force. Application of andragogical practices are implemented during the research and are tied to several learning theories and how these can be applied to the learning of HTML coding.
Acknowledgements

I wish to express my gratitude to the following people who were of assistance during the course of this research:

I would like to thank my supervisor, Catriona Lane for her help, direction and guidance throughout the period of this research project.

I would also like to thank my colleagues, staff and students at VTOS Limerick city where this study was carried out for their support and participation during this research.

Finally, thank you to my family and friends for support and encouragement over the time of this research.
**Table of Contents**

Chapter 1: Introduction ......................................................................................................... 7  
   1.1 Introduction ............................................................................................................................ 7  
   1.2 Background to the Research ................................................................................................... 8  
   1.2 Aims and Objectives of the Research Project ......................................................................... 9  
   1.3 Limitations............................................................................................................................. 10  
   1.4 Methodology ......................................................................................................................... 10  
   1.5 Research Structure ................................................................................................................ 11  

Chapter 2: Literature Review............................................................................................... 13  
   2.1 Introduction .......................................................................................................................... 13  
   2.2 Digital literacy ....................................................................................................................... 14  
   2.3 Digital Literacy and Education .............................................................................................. 15  
   2.4 Digital divide ......................................................................................................................... 16  
   2.5 Learning Theories.................................................................................................................. 17  
      2.5.1 Behaviourism ................................................................................................................ 17  
      2.5.2 Classical Conditioning ................................................................................................... 18  
      2.5.3 Operant Conditioning.................................................................................................... 18  
      2.5.4 Constructivism .............................................................................................................. 19  
      2.5.5 Social Constructivism .................................................................................................... 19  
      2.5.6 Multiple Intelligences .................................................................................................... 20  
   2.6 Andragogy ............................................................................................................................. 20  
      2.6.2 Assumptions of adult learners ...................................................................................... 21  
   2.7 Progression Paths for adult learners..................................................................................... 23  
      2.7.1 National Framework of Qualifications .......................................................................... 23  
      2.7.2 Further Education ......................................................................................................... 24  
      2.7.3 Quality and Qualifications Ireland (QQI)....................................................................... 25
2.7.4  Springboard ................................................................. 25
2.7.5  Bluebrick .................................................................... 25
2.7.6  Job Bridge – national internship scheme ...................... 26
2.7.7  Vocational Training and Opportunities Scheme (VTOS) ........ 26

2.5  Computing in Education .................................................. 27
2.5.1  Definitions of ICT in Education .................................... 28
2.5.2  Research on computing in education ............................. 29
2.5.3  Computing Curricula ..................................................... 29
2.5.4  Education reforms with curriculum changes ................ 31

2.6  Coding ............................................................................... 32
2.6.1  Current research .......................................................... 34
2.6.2  Advantages of coding ................................................. 35

3.0  Conclusion ......................................................................... 36

Chapter 3:  Methodology .......................................................... 37
3.1  Introduction ...................................................................... 37
3.2  Background to the Research ........................................... 38
3.3  Research Setting .............................................................. 38
3.4  Research Questions .......................................................... 40
3.5  Research Methodology ..................................................... 41
3.5.2  Rationale for Case Study Methodology ......................... 42
3.5.3  Methodology Chosen ................................................... 42
3.6  Research Instruments ........................................................ 42
3.6.1  Interviews ................................................................... 43
3.6.2  Observations ............................................................... 43
3.6.3  Questionnaires ............................................................ 43
3.6.4  Piloting ....................................................................... 45
3.7  Sample Group .................................................................. 46
5.2.1 Andragogy Assumptions ................................................................. 65
5.2.2 Andragogy Rules ............................................................................. 65
5.3 Learning Theories .................................................................................. 67
5.4 Coding ................................................................................................... 69
5.5 Computing in Education ........................................................................ 71
5.6 Digital Literacies .................................................................................... 72
5.7 Progression Paths .................................................................................. 74

Chapter 6: Conclusions ............................................................................... 77
6.1 Introduction ............................................................................................ 77
6.2 Summary of Research Findings .............................................................. 77
   6.2.1 Adult Learner Profile ....................................................................... 77
   6.2.2 Disparity of Skills ............................................................................ 78
6.3 Limitations of this research ................................................................. 79
   6.3.1 Time .................................................................................................. 79
   6.3.2 Sampling .......................................................................................... 79
   6.3.3 Languages ......................................................................................... 79
6.4 Recommendations for further research .............................................. 79
6.5 Concluding comments .......................................................................... 80

References .................................................................................................. 82

Appendices ................................................................................................. 1
Appendix A: Learner Questionnaire ......................................................... 2
Appendix B: Invitation to Participate in a Research Project ...................... 4
Appendix C: Permission to conduct research ......................................... 6
Appendix D: Class Observational Records ............................................. 7
Appendix E: Extracts from Researchers Diary ........................................ 10
Appendix F: Curriculum Plan Template .................................................. 12
## List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.7.1</td>
<td>National Framework of Qualifications</td>
<td>24</td>
</tr>
<tr>
<td>2.6</td>
<td>HTML Explained</td>
<td>33</td>
</tr>
<tr>
<td>4.2</td>
<td>Academic Background</td>
<td>51</td>
</tr>
<tr>
<td>4.3.1</td>
<td>Gender</td>
<td>52</td>
</tr>
<tr>
<td>4.3.2</td>
<td>Nationality</td>
<td>53</td>
</tr>
<tr>
<td>4.3.3</td>
<td>Self assessment of Internet skills</td>
<td>54</td>
</tr>
<tr>
<td>4.4</td>
<td>Perception of Coding</td>
<td>55</td>
</tr>
<tr>
<td>4.4.2</td>
<td>Prior coding experience</td>
<td>57</td>
</tr>
<tr>
<td>4.6.1</td>
<td>Widening of academic choices</td>
<td>61</td>
</tr>
<tr>
<td>4.6.2</td>
<td>Employment Prospects</td>
<td>62</td>
</tr>
</tbody>
</table>
## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPD</td>
<td>Continuous Professional Development</td>
</tr>
<tr>
<td>CSS</td>
<td>Cascading Style Sheets</td>
</tr>
<tr>
<td>ECDL</td>
<td>European Computer Driving Licence</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>FE</td>
<td>Further Education</td>
</tr>
<tr>
<td>FETAC</td>
<td>Further Education and Training Awards Council</td>
</tr>
<tr>
<td>HEA</td>
<td>Higher Education Authority</td>
</tr>
<tr>
<td>HETAC</td>
<td>Higher Education and Training Awards Council</td>
</tr>
<tr>
<td>HTML</td>
<td>Hypertext Markup Language</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>IUQB</td>
<td>Irish Universities Quality Board</td>
</tr>
<tr>
<td>LCA</td>
<td>Leaving Certificate Applied</td>
</tr>
<tr>
<td>LCETB</td>
<td>Limerick and Clare Education and Training Board</td>
</tr>
<tr>
<td>LCVP</td>
<td>Leaving Certificate Vocational Programme</td>
</tr>
<tr>
<td>NCCA</td>
<td>National Council for Curriculum and Assessment</td>
</tr>
<tr>
<td>NFQ</td>
<td>National Framework of Qualifications</td>
</tr>
<tr>
<td>NQAI</td>
<td>National Qualifications Authority of Ireland</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>PLC</td>
<td>Post Leaving Certificate</td>
</tr>
<tr>
<td>QQI</td>
<td>Quality and Qualifications Ireland</td>
</tr>
<tr>
<td>VEC</td>
<td>Vocational Educational Committee</td>
</tr>
<tr>
<td>VLE</td>
<td>Virtual Learning Environment</td>
</tr>
<tr>
<td>VTOS</td>
<td>Vocational Training Opportunities Scheme</td>
</tr>
</tbody>
</table>
Chapter 1: Introduction

1.1 Introduction

“Teaching in the Internet age means we must teach tomorrow's skills today.”
Jennifer Fleming

Technology has permeated every facet of education in the twenty-first century. In the twenty-five years of World Wide Web access, the landscape of education has changed dramatically along with greater access to and mobility of hardware. Learning is more accessible beyond the boundaries of the classroom. There are countless ways that technology is used both in classrooms and beyond in Ireland and across the globe. Traditional academic subjects are incorporating the use of technology to take advantage of the learning potential provided by information and communication technology (ICT) using sound files, web pages, and YouTube videos to explain, visualise and impart information to learners in the twenty-first century. Life long learning is a relatively new label for education outside of the formal second and third level systems. This is part of reskilling and upskilling that is demanded of careers in the twenty-first century. With the rate of change of technology, ECDL Ireland estimate ninety-three per cent of all jobs will use computers. With the growth of technology there is now a new and vast range of careers that dependent on technology and therefore, it is imperative that today's learners are equipped with the knowledge for tomorrow in the classroom of today.

There are many aspects of interacting with computing. Many students learn about ICT through using productivity applications in addition to Internet and email skills. An number of significant developments are taking place in addition to the introduction of coding to all levels of learners. Firstly, there is a rise in popularity of learning how to code and an appreciation of the different languages and possibilities opened with having this type of logical, procedural thinking that can impact on higher order thinking skills. Rather than being passive consumers, learners can be creators of original digital content and have a digital means of expressing creativity, communication and collaboration skills and the potential to share their concepts and innovations across the Internet. Career possibilities exist for code creators in the areas Internet technologies, apps for mobile devices and big data services.
Parallel to the rise in the popularity of coding is demand from industry for employees to having coding skills, particularly within the ICT sector. Demand for skilled ICT workers is expected to remain strong (FAS 2012) in the web designer and web developer sectors as they save businesses on the costs of recruiting from overseas. This has the added advantage of giving the Irish Government a better than current return on investment in the education of the citizens of Ireland.

1.2 Background to the Research
The context of the research is based in an second chance adult education setting. The learners represent a wide range of nationalities and it is expected that learners will come from a wide variety of social and cultural backgrounds and with a range of needs. In this environment, the learners are generally low skilled with few previous qualifications want to develop the skills and capacity to progress further in education, training and/or employment have qualifications at this level but need to re-enter education to re-establish confidence and consolidate core skills. The participants of this research are adult learners who are in the second year of a two year programme.

There are many pieces of existing literature from different stakeholders including the NCCA (2004), Department of Education and Skills (2012) that outline the strategies and potential uses for learning and education using ICT in an Irish context. These documents are attempting to provide a framework for equipping teachers to support learners so that they are able to achieve successful educational outcomes. A difficulty with these pieces of literature is that they provide generic information that is open to interpretation with a common denominator that the use of ICT is beneficial to learning. There is extensive literature around the use of ICT in generic terms from Chris and Good (2009), Cloke and Sharif (2001), and Grama (2013) that discuss the changes in education as a result of ICT in education. An alternative view is outlined by Wan (2013) that further emphasises the importance of coding by suggesting that it becomes a graduation requirement.

Age is used to define levels of digital citizenship; those born since the eighties have never known life without computers and some are digital native citizens that are able to maximise
their potential by working with and around computing technology. Mature citizens have had few chances to experience and learn with computers and therefore, are classed as digital tourists or digital immigrants. There is a digital divide between those who have access to and are able to use technology and those that have no access or not able to use technology. The ease of access to the Internet with mobile technology is the first unleashing of the person from the desktop and given greater availability of global knowledge.

In the past, the core focus of education was the three R’s of reading, writing and arithmetic. There is now an additional requirement of maximising the potential use of technology in education using a variety of methods to create core competencies that are required for the digital age. Those that have access to, and are able to implement solutions using technology are on the positive side of the digital divide whereas the others are going to become the illiterate of the twenty first century. For educators, they are on the crest of a technological wave that is transforming education. Teachers face many challenges in a changing system to equip learners while attempting to reduce the digital divide with inclusive courses that accommodates different pathways of prior learning.

1.2 Aims and Objectives of the Research Project

The scope of this research study is to investigate the possible widening of progression choices after introducing HTML coding to a group of adult learners in a second chance education setting. Progression pathways can be categorised as academic or career based. Adult learners provide an ideal platform for this research as they are primed and motivated to enter the work force sooner than full time second level or third level students. The purpose of this research is to address the following questions:

- Would the introduction of a short course in HTML coding widen the academic and career progression paths for adult learners?
- What is the profile of adult learners including educational backgrounds and demographical data in Limerick city?
- What is the adult learner perception of HTML coding? This is important as this subject choice was made available for adult learners in the research setting for the first time and their attitudes and opinions would influence the success of the subject
There are several objectives within the scope of the project; firstly, establish a profile of the adult learner in Limerick city including demographic and academic backgrounds with a view to ensuring provision is adequate for learner and commercial interests. Secondly, to assess adult learners perception of coding and gauge a level of interest in the subject. The introduction of coding using HTML was a useful tool to assess adult learners perceptions to coding and for assessing the potential for using HTML coding in future academic or career progression.

1.3 Limitations
Due to several constraints there are some restrictions that apply to the Findings chapter. These were the relatively short time frame of a single semester for the research. The size of the self-selecting sample group represented ten percent of the total college registration. Another limiting factor was the fact that many of the participants used English as a second or third language and this had implications for communications and comprehension during the research. It is interesting to note, not only are the adult learners focused on learning English for employability purposes, in addition, they are also updating ICT skills through English or in some cases starting initial formal ICT training.

1.4 Methodology
The approach taken for this research was an action case study. The researcher suggested the web design module as an elective subject for a group of adult learners that are aiming for a QQI Level 4 award in Employability Skills. This award comprises of a number of core and elective modules that form an overall award. The action case study allowed the researcher to participate and not influence the learners perceptions or the outcome of the findings by using a variety of instruments to accurately record the individual parts in each section of the research. This technique also allowed for comparison of data from the different sources for triangulation purposes.
1.5 Research Structure

The research is presented in chapters that focus on the different aspects of the study. They are as follows:

Chapter 1: Introduction
This chapter provides an overview and context of the research study and the justification for the research. It also serves to outline the other chapters of this theses.

Chapter 2: Literature Review
The second chapter introduces a wide range of classical and more recent literature and reports regarding several topical key areas for education technology including digital literacies, the digital divide, learning theories, andragogy, computing in education syllabi with a focus on coding as well as outlining the various progression options available to adult learners.

Chapter 3: Methodology
The third chapter profiles the research setting, the various instruments employed during the research including the collection of data from a number of digital and qualitative sources. In regards to data reliance and analysis techniques to extract the Findings are outlined.

Chapter 4: Findings
Chapter four makes available the combined findings from the questionnaire, observations and researcher diary that allowed the researcher to profile adult learners with regard to demographics and stages in education. This research also requested the opinions of the learners of their perception, attitudes and opinions of coding and the widening of possible progression routes.

Chapter 5 Discussion
This chapter provides an analysis of the Findings chapter in terms of andragogy, learning theories, coding as a form of using ICT in education in addition to digital literacies and progression paths for adult learners.

**Chapter 6  Conclusions**

The final chapter summarises the adult learner profile and the disparity of skills presented during the research. The limitations imposed on this research are outlined as well as a commentary for future and further research recommendations.
Chapter 2: Literature Review

2.1 Introduction

The pace of change and the integration of technology into all aspects of life has changed the complexity of how we participate in the various aspects of living and learning. According to (Naughton 2012) every technology driven revolution involves gains and losses where new media do not wipe out old ones but changes the complexity of the ecosystem.

The majority of educators qualified for teaching during the twentieth century but they are now facing cohorts of NetGen and Millennial (Considine et al 2009) learners who have had far more exposure to digital technologies than any previous generation and argues that they think and learn differently (So et al 2012). Learners from the Net Generation have attitudes towards using computers for learning that are different when compared to those earlier age ranges such as the Baby Boomers (Tapscott, 1998 in Newland and Byles 2013). These are some of the many changes in the education system, along with increasing access to computers and broadband access to the Internet. As the availability of broadband increases, so does the range of knowledge around using these new tools. Reading and writing may have been the important skills in the previous century, however, newer skills such as navigating the Internet as well as evaluating and processing the volume of information that is readily available are becoming more and more important in the digital age.

The use of technology in education can be analysed from two viewpoints; learners and administrators. Learners use generic tools such as spreadsheets or web browsers and these programmes claim to enhance skills, learning and access to information. For administrators, there are systems for registration, assessments and record keeping (Flecknoe 2002). Many past governments have made large capital investments for ICT in education with the rise of the Internet and the worldwide web to ensure all schools have access to global knowledge (Pelgrum 2001).

This chapter aims to present a range of definitions that encompass digital and computer literacies as they relate to education in the twenty first century. Learning theories will then
be related to these skills and how these may enable the promotion of wide ranging digital literacy skills to second-chance learners in the adult education sector.

2.2 Digital literacy
The term digital literacy is widely used and arguably has many different working definitions. A well-established definition is that used by the European Commission: “Digital Literacy is defined as the confident and critical use of ICT for work, leisure, learning and communication.” The anatomy of digital literacies encompasses access, skills and practice in academic practice, techno-social practice, media literacy, techno-literacy and information literacy which places these skills in a range of contexts.

*Information literacy is the adoption of appropriate information behaviour to obtain, through whatever channel or medium, information well fitted to information needs, together with critical awareness of the importance of wise and ethical use of information in society.*

*(Johnston and Webber 2003)*

Many authors including Bawden (2001), Knobel and Lankshear (2008) who have tried to define digital literacy and all the skills that it encompasses. The phrase ‘digital literacy’ can be originally attributed to Paul Gilster (1997) who proposed that it is about mastering “ideas, not keystrokes”. The term digital literacy is used in singular and plural formats, however, is it not a single skill set but rather a range of complementary skills that are required for the digital age. Digital literacy is usually regarded as a measure of the ability of users to perform tasks in digital environments (Jones and Flannigan 2006). There are several forms of digital literacy including new media, information, lateral and photo visual literacies to accommodate not only traditional definitions of literacy but also the ability to apply critical thinking skills to the information that has been sought out and evaluated on the Internet as outlined by Breivik (2005) and Jones and Flannigan (2006). Digital literacy has become an essential life skill, which if absent or underdeveloped becomes a barrier to social integration and personal development according to Shapiro et al (2009).

There are seven critical competencies associated with digital literacy in the twenty first century. They are; critical thinking, creativity, collaboration, cross cultural understanding,
communications, computer technology and career learning. Definitions of education, intelligence and skills are converging in the 21st century and the historic distinction between education and training is no longer valid (Department of Education and Skills 2012). Educators need to be aware of the growing focus on the advanced skills and qualifications that are required by the knowledge economy to allow people to fully participate in social and economic activities as skills have become the global currency of the twenty-first century economies (OECD 2013).

2.3 Digital Literacy and Education

An EU Kids Online survey was conducted to highlight the range of risks on the Internet and outlines implications for the need for digital citizenship skills and a minimum of skills for all children. The workforce of tomorrow and society (Expert Group on Future Skills Needs 2007) need to have the skills to take advantage of the changes which these new technological advances will bring and be fully equipped with the qualifications and skills to take advantage of the changes in technology.

The millennial generation presents educators with the challenge of multiple forms of literacy including information literacy, visual literacy, computer or digital literacy (Considine et al 2009). ‘Teachers are using ICT to support existing pedagogies’ (Balanskat et al 2006). There are a range of tools; interactive whiteboards, virtual learning environments and social networks are part of the digitisation of the learning process all of which (Carr 2008) and (Cascio 2009) consider how use of the Internet and computers is changing the way people think with ‘fluid intelligence’.

These digital tools need to be developed along with new curricula to accommodate the higher order thinking skills required by the knowledge based economy. Significant financing has been made available by the Department of Education & Skills in the equipping of the infrastructure and components necessary to connect to the digital world but there is limited analysis on the impact of this and the value associated with the investment in education. Plans for schools tend to concentrate more on infrastructural issues than on how ICT can be used to enhance teaching and learning (Department of Education and Science 2008). This is further supported by Zammit (1992) who reported that in the history
of computers in schools it has been easier to approve expenditure to purchase equipment than to pay for the time to enable teachers to develop their knowledge and expertise (p. 65)

2.4 Digital divide

The term digital divide refers to the divide that exists between those who have access to computing technology and those who did not have access which exists for a variety of reasons; low education, cost of accessing equipment or access to broadband connectivity. The divide still exists, and has developed different strains as more and more people have access to the technology and connectivity either at home or in the workplace. More effort is needed to ensure that schools and teachers can use ICT effectively, to provide the right high end skills, and to address new digital divides (OECD 2013). This is supported by the Irish Government commitment to having 280,000 more people online by 2016 (Kennedy 2013).

Some commentators including (Prensky 2001) have observed that the digital divide is based on age where the younger generation who have grown up surrounded with technology readily accept and utilise digital tools whereas older generations tend to be more cautious and more like tourists or immigrants in a digital world. There is limited research around this theory which has mainly come North America. Smaller studies in Australia (Waycott et al 2010) and Toledo (2007) highlight that perception is key to understanding the people and the digital divide. There is research outlined by Margaryan et al (2011) in Newland and Byles (2013) that construes that the digital divide does not apply to all learners. Many learners are more familiar with traditional pedagogical methods and they are more conventional in terms of linear learning. Although they have digital skills, they rely on established tools. The ease of use of Web 2.0 tools for learning may see the development of e-pedagogy for the use of technology in education (Newland and Byles 2013) while those on the wrong side of the digital divide may find themselves with technology illiteracy and unable to take advantage of information and communication technologies (Love 2000).

The continuing quest to conquer the digital divide is part of a European Digital Agenda and the Digital Agenda Assembly concludes you can do the beginnings: coding for dummies, do it online and be proficient at fun things in a few weeks and then you build from there
2.5 Learning Theories

There are multiple motivating factors for people learning a concept, process or theory. For the teacher, core beliefs are the most significant and difficult to change (Donnelly *et al* 2011). This is aligned with the multiple factors including prior knowledge and cognitive skills that are at play when people are learning. There are several different theories, all of which accommodate knowledge and skills (Phillips and Soltis 2004). Education in the past was usually transfer of information in the single direction, from teacher to learner (Pelgrum 2001).

As the practice of teaching has evolved, the theories of learning have also changed over time allowing for different investigations from varying perspectives (Phillips and Soltis 2004). With the evolving changes that the choices of media and technology offer, this is creating hybrid forms of teaching and they note the need to reinvent pedagogy for moving teaching and learning to the twenty first century (Bassendowski and Petrucka 2013).

2.5.1 Behaviourism

Central to behaviourism is the theory that a single element of conditioning will activate a response to a stimulus which does not regard the individual person in the process. This was identified by B.F. Skinner and supported by Watson and Thorndike as outlined by Forrester and Jantzie (2005). According to Cotton (1995), the focus is on the response to the stimulus as it would be difficult to study the process of the reaction to the stimulus. According to Bigge and Shermis (1992) from a behaviourist perspective, computers are ‘super teaching machines’ (p 310). Learners input responses to problems and can proceed provided they achieve the correct answer. This is typical of drill and practice scenarios or lessons delivered on the computer where the course material is focused towards the curriculum. The same could be applied to the iterative process of testing and debugging lines of HTML code, where a single typing error might not render a web page correctly. Limitations of behaviourism are that the expectation and control of behaviour can impact on the learning environment as can the group dynamic which is disregarded by behaviourist theorists.
2.5.2 Classical Conditioning
This was identified by Pavlov as a response to the ringing of a bell that started as a secondary stimulus and became the primary stimulus. This is described by Allen and Madden (1985) as a consumer behaviour responses to the responses to the stimulus of advertising. Classical conditioning can be seen in the return to education by adult learners who may have had a negative experience in the past. The impact and approach by teachers can set the expectations of learners and set the tone for the delivery of a course which will create memories that will condition attitudes to learning in the future.

2.5.3 Operant Conditioning

‘The learning principle behind operant conditioning is that new learning occurs as a result of positive reinforcement, and old patterns are abandoned as a result of negative reinforcement’ (Belkin and Gray, 1977, p 59 in Forrester and Jantzie 2005).

Skinner expanded on the previous work by Watson and Thorndike with the belief that more complex learning could be achieved using operant conditioning. Teaching is based on the plans and support of the teacher which aid the process of learning and controlling behaviour (Forrester and Jantzie 2005). Operant conditioning for learning could be so effective that infrequent random praising could act as a sufficient reward for the correct answer (Phillips and Soltis 2004). When designing web pages, there is an immediate visual reward in the presentation of the page – the fruits of the labour – of coding. This is reinforced with each modification to the code adding to the page and the coder receiving smaller visual rewards in observing the update(s) to the page.
2.5.4 Constructivism

Constructivism is a collection of theories and ideas, some of which come from psychology as they focus on the learner's ability to mentally construct meaning of their own environment and to create their own learning.

(Forrester and Jantzie 2005)

Many authors have contributed to the development of constructivism, from Dewey, Vygotsky, Piaget and Papert each adding to the collective knowledge of a greater understanding of the different ways learners construct their own meanings. The use of digital media was characterised by the instructional approaches of traditional teaching machines (Petko 2012). The role of the educationalist moves from the traditional “sage on the stage” to becoming a “guide on the side” (Hannon 2005 in Richardson and Hynes 2008 p 194). From the constructivist point of view, teaching web design could be considered a learner centred activity as opposed to the behaviourist teacher centred approach because of the individuality and creativity it can unlock in learners in designing the layout, colour scheme, navigation structure and content. There are some media claims that coding is a twenty first century literacy (Murphy 2012) and the future coding generation is being established with voluntary coding clubs, as coding is not yet part of the official second level curriculum. The ability of learners to construct web pages and sites and define their own meanings in the process will equip them with knowledge of coding which will be a necessary skill in the modern work force. Just as mathematics is used by different occupations from geologists to doctors, coding will be used in a variety of forms in the future.

2.5.5 Social Constructivism

In addition to learners constructing their own meanings, the impact of a group and the wider social group can impact on the different layers in the learning process. According to Dougiamas (1998) most authors can trace social constructivism back to Vygotsky almost three decades ago. The presence of others can influence the response to the task (Edited by Littleton and Light 1999). The organisation and structure of the class for web design will be a group learning process during the learning phase and more individual projects with group discussion and individual learner/teacher consultations during the project phase.
Constructivist theorists have scaffolded many variations of constructivism but they are learner centred and allow for broader methods of learning where the teacher acts as a facilitator and learners learn as peers (Schneckenberg et al 2011).

2.5.6 Multiple Intelligences
The concept of multiple intelligences was originally outlined by Howard Gardner to facilitate the different learning styles of students in a classroom. He proposed that by adapting the content to each of the intelligences which has been reframed for the twenty first century to include a wider range of intelligences that need to be accommodated. His work has been supported and sustained by Campbell et al (1996) to use technology to support multiple intelligences.

Learning to code can be adapted to expedite the learning curve of HTML by adapting the classroom methodologies to appeal to all classes of learner. Verbal linguistic intelligences can be utilised in the form of writing the copy text for the web pages. Mathematical-logical intelligences are assisted in the logical structure of a HTML page and the calculations required for page layout. Adult learners will also learn to collect, analyse and present data on their own creations. Kinaesthetic intelligence requires the learner to be an active participant in the learning process and will require hand eye co-ordination and quickly test design theories to produce the desired result. Visual spatial intelligence will allow learners to incorporate visual design elements including colour schemes, navigation, images or videos to appeal to a wide audience. Musical intelligent learners may choose to focus their abilities on creating a web page for sound files.

2.6 Andragogy
The study of adults as learners started early in the twentieth century with a view point from a psychological perspective (Merriam 2001). Andragogy is defined as a blend of art and science by Malcolm Knowles, a leading theorist of adult education who documented his theories in Boundaries of adult learning (Edited by Edwards, R. Hanson, A. Ragget, P. 1996). He also wrote a journal article entitled Andragogy and self-directed learning: Pillars of adult learning theory by (Merriam 2001). Knowles described how the longer life span of different generations has allowed the term pedagogy to be used instead of andragogy. The term
pedagogy comes from the ancient Greek language and means to lead children whereas andragogy should be viewed as a unique practice distinct from pedagogy, in the teaching of adults.

2.6.2 Assumptions of adult learners

The five assumptions that are at the core of andragogy outlined by (Merriam 2001):

1. The adult learner has an independent self-concept and who can direct his or her own learning
2. The adult learner has accumulated a reservoir of life experiences that is a rich resource for learning.
3. The adult learner has learning needs closely related to changing social roles
4. The adult learner is problem-centred and interested in immediate application of knowledge
5. The adult learner is motivated to learn by internal rather than external factors.

These assumptions are also outlined by Knowles (1996). Other assumptions according to Daines et al (1993) are; there is no plateau for adult learners and cognition is multidimensional. There are a variety of different techniques for educators working with adults called domains of learning for attitudes, skills and knowledge. Educators have implemented these rules and achieved in maximising adult learning on a technology course in Perdue University according to Ellis (2002) based on the work of Dick et al and Goodnight et al. According to Knowles (1990) who has reviewed the adult learner in the book *The Adult Learner: A Neglected Species* there are four rules for applying andragogy principles where adults are learning to use computers. They are as follows:

1. There is no need to explain why specific things are being taught – all the small elements form the bigger module of web design for this research project.
2. Instructions should be task orientated instead of memorising – learners will be able to practice and repeat tasks at their own pace with little need for memorising as the assessment is project based.
3. Instruction should take into account the wide range of different background of learners; materials and activities should accommodate the different levels and types
of prior experience with computers. Instruction will be provided using a variety of techniques that will accommodate the levels, experience and language issues for the learners.

4. Assuming that adults are self-directed, instruction should allow for learners to discover things for themselves with support and guidance for troubleshooting errors. This will be used extensively during the project assessment phase of the module, thus ensuring that all the work is completed by the learners for authentication purposes.

The assumptions and principles go some way to explain the many differences that exist between adult and child classrooms. Amongst some of the notable differences are; adults are capable of managing their own lives and therefore, should be capable of managing their own learning. More and more adults are choosing to participate in lifelong learning as we live in an increasingly complex world. Adults have a large amount of independence and control of the planning process in their learning experience. The environment also has changed; the teacher and the learner are more equal and this changes the roles and functions within the group (Zmeyov 1998). There is a movement from being behaviourist teacher centred to a more social constructivist learner directed environment.

The idea of a generic adult learner with certain universal characteristics and traits is rejected Guy (1999). Adult learners are for the most part, voluntary and therefore, are more participative in the process of learning. They bring a wealth of different experiences, both positive and negative. Past experiences where positive, can yield productive results and negative experiences could have unpredictable results.

All prior life experience can be used in a variety of forms including group discussion and demonstrations or drill and practice as outlined by Knowles in *Boundaries of adult learning* (Edited by Edwards, R. Hanson, A. Ragget, P. 1996). Where adults learn in groups, each individual in the group is on an intellectual journey and the learning depends on peers, mentors and other assistance enabling them to conceive ideas and create original solutions to assessments (Brookfield 1983).
Adult learners become bounded by the community of learning and this is reflected in the language and culture of the community which forms the educational experience for the learner (Guy 1999).

2.7 Progression Paths for adult learners

There are a number of progression paths that can be taken by second chance learners in the Irish education system. The majority of learners participating in this research will undertake a QQI (previously FETAC) certification at Level 4 on the National Framework of Qualifications (NFQ). Other learners choose to complete the junior and senior cycle exams on the traditional curriculum, administered by the Department of Education and Skills.

Learners are facilitated with alternative courses at levels 1, 2, 3 and 6 at other venues. Progression is currently one of three routes; further education, third level and direct to full or part time employment. A follow up study of the participants in the future, may yield results of an advantage in coding classes for adult learners.

With recent changes in legislation and the implementation of the Education Training Boards Act 2013 and the Further Education and Training Act 2013, the 33 Vocational Educational Committees (VECs) have been replaced with 16 Education & Training Boards which will encompass the various branches of the VECs and the training courses provided by FÁS will combine to create an era of great change in the delivery of change in the education sector to get the best results from that investment (Brady 2012).

2.7.1 National Framework of Qualifications

The NFQ provides providers and learners with the ten levels of qualifications that are available in Ireland. Each level is based on nationally agreed standards of knowledge, skill and competence i.e. what an individual is expected to know, understand and be able to do following successful completion of a process of learning at each level. It recognises through the framework from the very initial stages to the most advanced stages and all such learning may be achieved in schools or colleges at work or in the home or a community setting (National Qualifications Authority of Ireland 2009).
For learners who wish to pursue full time education, perhaps the level may become as important as the course title or award.

### 2.7.2 Further Education

The term “further education” embraces education and training which occurs after second level schooling but which is not part of the third level system (Department of Education 2004). This sector has grown considerably in recent years as more adults return to education to reskill and upskill. A unique feature of further education is its diversity and breadth of provision, and its links with other services such as social welfare, justice, voluntary and community interests. There are approximately 200,000 adults involved in formal, further education programmes (Aontas 2013). There are a range of courses and providers in the community and colleges of further education or post leaving certificate courses (PLC). In some cases, certification from PLC courses or colleges of further education allow for direct progression to courses in third level institutes.

Some courses may have preconditions such as age, employment status or educational background. There is an enormous range of courses to choose from and many learners require assistance in plotting a course through the academic routes that are available from...
different providers in different formats. To help this process, the national learners’ database, Qualifax (www.Qualifax.ie) is developing services to ensure that people have all the information you need to make informed choices about education, training and career paths.

2.7.3 Quality and Qualifications Ireland (QQI)
QQI was established under the Qualifications and Quality Assurance (Education and Training) Act 2012. It is a collective of four bodies that previously awarded certifications independently; the Further Education and Training Awards Council (FETAC), the Higher Education and Training Awards Council (HETAC), the National Qualifications Authority of Ireland (NQAI) and the Irish Universities Quality Board (IUQB). The majority of adult learners who return to education choose to complete either the state examinations in the junior and senior cycle at second level or complete a QQI certification in the form of a portfolio that is completed over an academic year rather than participating and depending on terminal exams.

2.7.4 Springboard
This is a labour market activation measure that provides a range of free courses for the unemployed aimed at creating graduates with skills in growth sectors including ICT as well as manufacturing and international financial services. There are a range of providers around Ireland using a variety of techniques for delivery including class sessions and online delivery for courses on levels 6-10 on the NFQ. There are no costs associated with these courses and eligibility is decided based upon certain payments from the Department of Social Protection and evidence that the claimant is actively seeking work. Some learners might be ready and others, especially those returning to education or experiencing the Irish education system for the first time might find the intense nature of Springboard courses too demanding with subsequent drop rates as they are often delivered by the Institutes of Technologies around Ireland.

2.7.5 Bluebrick
Bluebrick is a Higher Education Authority (HEA) Strategic Innovation Fund project and government initiative to provide flexible learning and central application process for courses
in the institutes of technology and other higher education course providers. According to the Bluebrick website it is about connecting the right person (non-traditional learners) with the right information (flexible learning courses) in the right format (classroom, distance, online courses) at the right time in the format of part-time, full-time or evening courses (Higher Education Authority 2013). Approximately 78% of applicants in 2012 were on job seekers payments from the Department of Social Welfare and over 90% found that the one stop online application system uncomplicated versus traditional methods of applying for courses. After completing an introductory module in web design as part of this research, learners may choose to progress onto one of the Bluebrick courses available in Ireland.

2.7.6 Job Bridge – national internship scheme

This is a national internship scheme to provide skilled workers as part of the labour market activation as part of the governments jobs initiative in May 2011 (Gray 2013). The scheme is run through the Department of Social Protection and it has the aim of providing those who are out of work with the opportunity to gain valuable work placement and experience for 6 – 9 months, while retaining social welfare payments and an added bonus of €50 per week. This, in turn, should serve to increase employment prospects for the interns.

The Job Bridge scheme provides 8,500 work experience placements in the private, public and voluntary sectors around Ireland. Potential employers are required to meet the 16 point requirements to be registered and then advertise suitable positions for internships. Approximately one third of interns held qualifications below degree level in 2012 and this scheme may be a progression route towards employment for learners who wish to pursue a career in software development.

2.7.7 Vocational Training and Opportunities Scheme (VTOS)

VTOS is a second chance education and training programme which provides courses of up to two years duration for unemployed people. These courses are delivered through the Education & Training Boards (ETBs) in each region and there may be multiple centres for each region. There are approximately 5000 learners nationally participating in VTOS courses (VTOS 2013).
VTOS in Limerick city operated under the City of Limerick VEC (CLVEC) which was a Local Authority Education Body charged with the provision of a suitable system of continuation and technical education within the City of Limerick. CLVEC has been merged with the VECs from counties Limerick and Clare to form the Limerick and Clare Education and Training Board (LCETB) and provides places for approximately 230 VTOS learners in Limerick city.

The LCETB provides a comprehensive range of education, training and development programmes and support services throughout its schools and colleges, community based centres, and partnerships with other organisations. A range of courses are offered on the VTOS programme, the majority of which are QQI awards at levels 3, 4 and 5 along with Leaving and Junior Certificate programmes for adults who are seeking a second chance education. The majority of learners on VTOS courses will pursue further education, however, a small percentage will seek employment at the end their course.

2.5 Computing in Education

Much of the 1990s and early years of the new millennium were spent researching, establishing and prioritising and devising frameworks for integrating ICT into all levels of education. The growth of computers in education has risen to the level that a computer is as expected as a desk or whiteboard in the modern classroom. The growth of the ICT in the Irish economy is recognised by the Government as an area for economic growth and development.

The many variations of technology have been described as a diffusion by Richardson and Hynes (2008). As newer technologies evolve, the invention and adoption of each piece of technology, particularly in the mobile sector will create as yet unknown demands on all stakeholders in the education sector. In order to maximise benefits to stakeholders in education, it is important to review how ICT is currently utilised. Much literature has focused on learning with or through ICT (Cloke and Sharif 2001) rather than the study of ICT in more general terms. Some users are more sophisticated, but the majority are still struggling with basic computing problems (Mandefrot 2001).
According to the NCCA arguments for using ICT in education are the knowledge based society and the need to prepare learners with knowledge for employment with technology in the work place. Other benefits are gains in learner motivation and higher order thinking skills as well as problem solving and collaborative working abilities. ICT also offers benefits in the special needs education using assistive technologies. It is noted that the teacher is a gatekeeper for learner access to ICT and therefore, continuous professional development for teachers (CPD) in ICT is required on an on-going basis.

Many publications regarding the use of ICT in Irish education include: IT2000 (which led to the establishment of the National Centre for Technology in Education in 1998), A Policy framework for the new millennium (1997), A Blueprint for future of ICT in Irish Education (2001) and New Connections, and A Strategy to realise the potential of Information Society (2002) were published and implemented on a school by school basis. The findings were summarised in Schools for the Digital Age, Information and Communication Technology in Irish Schools, Progress Report 1998 – 2002 that places digital literacy for all students at the core of the strategic vision with a triadic approach to learning about, with, and through ICT (NCCA 2004).

Having established the infrastructure within schools, the focus should move to the CDP of teachers. This should be cross curricular in teacher training and assessment techniques. The ICT framework for primary school teachers places the teacher at the centre of CPD provision with a view to the application of lifelong learning example being shown by teachers (NCCA 1997).

### 2.5.1 Definitions of ICT in Education

ICT includes the hardware and software devices and programmes that allow people to access, retrieve, store, organise, manipulate, and present information by electronic means (such as personal computers, assistive technology, scanners, digital cameras, multimedia programmes, image editing software, database and spreadsheet programmes). All of these are collectively referred to as ICT and impact on the curriculum and assessment in schools.
The National Council for Curriculum and Assessment (NCCA) has a framework for integrating ICT across the curriculum at all levels of primary and secondary education.

The EU recognises the importance of ICT to the growth and economic development of the EU. It looks towards the newer key enabling technologies so that Europe will be at the forefront of the knowledge based economy. The Digital Agenda for Europe (2010) and other initiatives relate to innovation, employment, education and industrial policy and includes references to the EU e-skills strategy.

2.5.2 Research on computing in education

It has been shown that different age ranges amongst learners use technology in education in different ways. The degree to which they use technology increases with age (Chris and Good 2009). The authors conducted a survey with over 1000 participants across the UK and discovered that younger learners prefer games and creative activities. A split then emerged with older girls preferring communications and older boy’s game playing. When completing homework, it was discovered that learners focused on the content and appearance of the work.

In a wider context, the e-learning Nordic study across Finland, Denmark, Norway and Sweden triangulated the results from teachers’, students’ and parents’ involving 8000 participants and 200 sites where they discovered ICT has a positive impact on learning (Balanskat et al 2006). Technology has provided many forms of learning and more interest has arisen in the effects of particular technologies such as the impact of blended learning and student motivation while learning online.

2.5.3 Computing Curricula

Technology for the state examinations is designed to be a two year programme which is available as part of the three variations of the Leaving Certificate (LC) examination; the LC Established, LC Vocational Programme (LCVP) and the LC Applied (LCA). There are seven sections within the core; ICT is only one of these sections. Contained within the options section, again ICT is the only computing based topic. Although the nature of the curriculum is designed to be broad in appeal by spanning systems, materials and electronics, ICT is
viewed in a much wider context. Assessment at both higher and ordinary levels differs in the range, depth and skills development and is assessed by 50% terminal exam and 50% project. For learners who wish to concentrate on a single aspect of technology, there is no option but to pursue higher or further educations routes. In the adult education sector there may be many factors (family, financial or academic) that contribute to the requirement of completing a two year cycle in one academic year. The technology module is currently inflexible for adult learners or those returning to education with the demand that the curriculum is delivered over a two year cycle.

QQI offers a range of ICT based modules which are typically delivered over 100 hours with additional learner self-directed study. At Level 4, there are a limited number of ICT based awards which are categorised with Agriculture, Science and Computing or generic application skills in ICT or office skills.

Alongside these, the Irish Computer Society offers two qualifications to second level students; the well-recognised and established ECDL (European Computer Driving Licence) and the four modules of the ICS Skills Computing Curriculum. The ECDL has been revised and updated to include the latest technology and makes use of blended learning techniques. Traditionally, this offered seven modules which had to be completed to achieve the ECDL certificate. This has been updated to include new and revised modules for the latest technology and allows more flexibility in that learners can now choose seven from eleven modules. The computing curriculum allows schools to implement a computing subject without the terminal examinations. It offers four keys areas; firstly, digital media for storytelling, which can be supplemented with a progression onto multimedia storytelling. This strand allows for digital creative skills with the need for computational thinking. The computational thinking 1 module allows learners to develop computational thinking and problem solving skills with an introduction to programming. The final module focuses on the hardware with learners exploring hardware by using and programming small microcomputers. A key with the ECDL program is that it can be implemented at any stage within the junior or senior cycle and can be delivered in a way to free time for study in preparation for terminal exams.
City & Guilds qualifications were formally aligned to the National Framework of Qualifications in September 2008. The ICT based qualifications are classified as functional skills, which splits into users and professionals. Users cover the common applications of word processor, spreadsheet, presentations and databases. Professionals cover system supports or programming. The skills gained will be of value in the workplace or in any further learning.

Outside of these formal structures, there are many short and long course providers around Ireland that facilitate adult learners. The most common provider of these types of courses is FÁS, which has now merged with the ETBs. This merge could change course availability which should review the various measures in the employment activation programmes by the Irish Government.

Once learners have achieved certification at second level, they can progress onto third or further education and then specialise into different sectors of technology from programming, to gaming or app development and contribute more effectively to the economic development of the country.

2.5.4 Education reforms with curriculum changes
There is a growing recognition of changes in the education system at all levels due to the increased influence and change brought about by ICT. The curriculum essentially remains unchanged from the previous version. Teachers are being encouraged to teach old knowledge with new technologies (Cloke and Sharif 2001). It has been described as a transformative change by (Grama 2013). It is argued by (Wan 2013) to make coding a curriculum or graduation requirement is only the beginning. As a language, coding crosses disciplines, industries, and cultures. It could be used as a tool in growing the economic development and success of the locality, as outlined by Jones et al (2011) and Roffe (1999). There are plans to grow an Irish version of Silicon Valley in in the Mid-West of Ireland (Limerick City Council n.d.). While plans are being developed for the region, the availability of students with even rudimentary coding skills will create skilled, certified graduates that
could have a significant impact on small to medium enterprises (SMEs) according to Jones et al (2011).

The development of ICT and the curriculum does not take into account the other opportunities that computing skills can provide learners of the future. In fact, ‘extensive use of ICT often creates a false sense of competency’ (Considine et al 2009). The role of the teacher is changing slowly to become more ICT based with facilitator skills to allow learners to enhance their own learning paths, however, there is no consistent effort to provide access to ICT tools for all learners and focusing attention on small projects while the majority of learners “receiving attention from parallel initiatives – if at all.” (Freeman et al n.d.). The National Council for Curriculum and Assessment (NCCA) are the government body responsible for implementing the challenging changes and are currently reviewing senior cycle syllabi (Donnelly et al 2011). Some of the changes that have been implemented are Project Maths and short courses at junior certificate level.

2.6 Coding
Coding and programming are two terms, often used interchangeably. There are many languages for programming and coding, depending on the environment such as the type of network in use and the reason for creating code. Most users of the Internet are not aware of the relationship between HTML and function of the browser. The task of the browser is to interpret HTML code and present content based on the instructions in the code; for example; display a name in a large heading style in the centre of the page or create a link to another file at a specific point in a web document.

Each coding language is a tool for a specific job; it is the job of HTML to control the layout and appearance of the content on a web page. In other contexts, the role of the language may be to solve specific problems. All programming languages have a structure and logic that applies across the language, much like grammar within the spoken languages. Computer languages have been created since the 1950’s to solve computer problems. FORTRAN was good at working with numbers, COBOL for tracking and organising data, LISP for artificial intelligence, PASCAL as a teaching tool and Visual Basic that uses a drag and
drop interface for programming within applications such as Excel and Access. HTML was created by Tim Berners-Lee for the purpose of sharing work across computer networks. Since the first version in 1991, it has undergone many changes and the introduction of Cascading Style Sheets (CSS) which separates the style of the presentation from the layout of the content. HTML5 is now standard, although there are many web pages still in existence that were created with older versions of HTML.

Behind every web page is a set of instructions for how the content of the page should be displayed. The formatting of the page consists of tags. Most tags come in pairs such as the title tag: <title> </title> which start and stop commands. There are different types of tags including text, images, lists, links and tables. With a knowledge of some tags, a web page can be created and the content presented in an attractive format – and this will impact on the absorption of the content by the reader.

Learning HTML offers many benefits for people wishing to gain an introduction to coding. It has a direct impact on the understanding of web page construction and web browser interaction. This in turn, creates a solid basis for learning other web technologies. HTML provides instant feedback which makes it rewarding as each line of code it added to a page. Furthermore, HTML is relatively straightforward to learn and teach. It requires very little setup; a copy of Notepad and a web browser can be used at a minimum or users can install WYSIWYG editors such as FrontPage or Dreamweaver. For people who choose to skip editors and use content management systems such as WordPress or Joomla, having knowledge of HTML will allow users to customise and further develop their own web sites for personal or professional use.
2.6.1 Current research

Ireland does not participate in Eurostat’s Adult Education Survey but the indications are that its findings apply fully to Ireland too (Sweeney 2013). There have been very few studies in recent years into academic success in computer programming, perhaps due to the levels and range of courses on offer. Moreover, there have been no direct studies comparing the study of foreign languages and programming. Parallels could be drawn from programming code could language studies (Byrne and Lyons 2001). Learning many of the programming languages could be compared to learning another language and levels of knowledge within a language. There are many stakeholders investing in ICT, each with their own agenda. In the United Kingdom the Education Secretary Michael Gove has established a new curriculum that will broaden the range of computing skills, including coding be taught (Wakefield 2012). This is further supported by government and technology experts who are becoming increasingly worried that vital computing skills are no longer being taught in schools (Hall 2013).

A recent survey by FIT Ltd in Ireland as part of a wider ICT skills audit which looks the different types of skills and knowledge are required for the ICT sector (Sweeney 2013). Of most interest, are the entry level and competent skill sets as there is a demand from adult learners who would prefer to access the jobs market directly rather than pursuing higher levels of education. This would complement the labour market activation aim of the Irish Government.

SOLAS, the Further Education and Training Authority has been established. It is responsible for funding, planning and co-ordinating training and further education programmes which are responsive to the needs of learners and the requirements of a changed and changing economy (‘Welcome to SOLAS’ 2013).

The Department of Education and Skills has published the Chief Inspector’s Report 2010 - 2012 which has reviewed learning and teaching at primary and post primary levels. This presents a new focus and when reviewed in light of whole school evaluations it may have significant impact in terms of material to be covered, in service training for teachers and
further investment into ICT resources as well as the proposed curriculum changes for the
Junior Certificate candidates (Department of Education 2013). The Department is currently
undertaking an ICT Audit of schools as well as a review of international education strategies.
There will have to be commitment to change from all stakeholders for the improvement of
the ICT skills that are required for the future economic growth of Ireland.

2.6.2 Advantages of coding
The use and range of information available on the web has grown exponentially in recent
decades. With each evolution of the web from static pages to interactivity and ecommerce
engagement to apps and beyond ‘Web designers that they are, are in fact, architects of the
future’ (Holzschlag 1988). By studying HTML and CSS coding, learners will gain an advantage
over low level users as they are able to understand on many different levels. They will be
able to de-construct how a web page is presented while at the same time separating
content from appearance. This will allow them to critically analyse the page and separate
the content from the presentation. In forming web design projects for the assessment,
students will gain a wider skill set when compared to a typical application skill set e.g. word
processing where they produce, edit and print a document. The demand for IT skills is
expected to remain strong based on the recent announcements of job creation by both
multinational and indigenous companies in the ICT sector. (FAS 2012)

Entry to the jobs market for graduates with HTML and CSS coding and web design skills will
position them in the lead for employment in software development and the wider ICT
sector. Ireland’s human resource base has been a key factor in the creation of competitive
advantage for its ICT industries (Green 2000). With industry intensifying its use of the
Internet for promotion and to do business with its customers (Littlejohn and Macrosson in
Peel 2001), there is potential for learners to progression on a pathway to full time paid
employment using an apprenticeship as a qualifying instrument.
3.0 Conclusion

Change is occurring in several aspects of education and technology in the twenty first century. Learners are a mix of digital immigrants, digital tourists and digital natives (Prensky 2001). Cohorts are becoming increasingly diverse in ages and experience as people reskill and up skill for the work place. Furthermore, educationalists should be aware that as the needs of a particular industry sector changes, education should change (Richardson and Hynes 2008). The current economic climate and industry demands should ensure that graduates are presented to industry with the appropriate knowledge and skills that will incorporate ICT and coding to varying degrees. The various theories that are associated with learning in the twentieth century are placing demands on all the stakeholders – to students, faculty, educational institutions an small firms owner/managers (Richardson and Hynes 2008).

Reflection on past theories may explain why modern theorists are more comfortable scrutinising only some aspects of learning. The more research and observation that is undertaken will test hypotheses and new theories will be weakened or strengthened. Learners of the future may be knowledgeable enough to be able to select the course, method of delivery and the theory that supports them in the learning process (Hergenham and Olson 2001).
Chapter 3: Methodology

3.1 Introduction

The primary aim of this case study is to determine if an introduction to HTML coding will widen the possible progression routes for adult returning to second chance education. The data gathered will be used to determine if the introduction of coding will match the needs of the learners in terms of academic or work progression options.

During the course of the research, discussion will be used in order to place relevance, context and understanding at a level that can be absorbed by the learners. A certain amount of reverse engineering will be employed in the classroom to show the learners how to deconstruct a single page and reinterpret elements and ideas for new digital creations.

By introducing web design to the cohort, some of which may already have prior ICT certification outlined above or no certification or indeed, limited computer experience. By familiarising the students with web design, they will gain from the exposure to a range of skills, all of which are sought out by the IT industry in Ireland and the growing requirement of all jobs that will utilise some form of ICT. The web design module is intended to serve as a vehicle on the journey of acquiring skills for the modern work place as well as a foundation for further courses in coding.

Competence in the use of ICT is limited for the most part to basic ICT skills, centred on the use of word-processing (Department of Education and Science 2008). The majority of learners are able to access information on the World Wide Web but a limited few have the ability to create material for presentation on the web. The majority of students, who use computers, use them for educational, functional and social use. They use the tools that are readily available but have limited capacity to create and contribute to the mass of material on the World Wide Web.

It is proposed that the research will introduce a change in perception of how computers are used, not only to create and edit existing documents in a word processing application but
designing a document for viewing on the World Wide Web. Currently, learners typically use the Internet in the form of social media, internet based research or communicating using email/instant messaging. Learners will be shown how basic HTML coding can be used to present information on the World Wide Web. Students like to apply their theoretical and abstract knowledge to real-world problems.....most students want to apply their knowledge and to express their creativity by making something new (Barrett et al 2001). Learners will be required to create a two page web site and a critical evaluation as part of the portfolio of evidence for assessment.

### 3.2 Background to the Research

The majority of learners that will participate in this research are at Level 4 on the NFQ receive certifications from FETAC/QQI. Each subject has a syllabus that is referred to as a module descriptor. This document outlines the range and depth of material to be covered, outline marking schemes as well as learning outcomes. Assessment takes the form of a variety of techniques – collection of work, skills demonstration or project work. The flexible nature of assessment and the variety of modules available at different levels of the NFQ facilitates learners on VTOS programmes across Ireland as they learn to engage and re-engage with the formal education system.

A virtual learning environment course using Moodle was used to enable the researcher to create an online course that could be utilised with traditional delivery methods to incorporate a blended learning approach. One of the reasons for this was due to the nature of the subject. It is better to study web design by spending time online trying to understand the layout and content and how web pages are structured together. Moodle facilitated the inclusion of subject matter content, related websites and online resources needed for practice and assessment. The mixture of class activities and blended learning activities enabled a blend of both self-paced and live learning in different environments.

### 3.3 Research Setting

The research was located in a second-chance adult education setting situated in the Adult Education College, Sexton Street, Limerick. The class consisted of twenty students
participating in a General Studies course on VTOS. Prior to conducting the survey, the
permission of the College, Board of Management, learners and teachers involved was
sought and granted.

In the academic year 2013/14 there will be several cohorts who will be aiming for QQI Level
4 awards. One of the cohorts will be the group where coding in web design using HTML will
be introduced and the findings of the research will be analysed. As part of this case study, it
will be necessary to determine the skills of the learners in using existing technologies and
how they perceive coding. Just as Microsoft Word is used to teach word processing skills,
Arachnopilia was chosen as the editor for teaching code. This software is freely available to
download and allows learners to use the same software on home computers for practicing
skills. This course was designed to be taught as a computer based subject using a
combination of traditional ‘chalk & talk’ methods, practice activities and group discussion.

The student questionnaire was distributed to the students at the first session of the course.
This ensured that the learners completed their responses with a subjective viewpoint.
Learners were informed that all information provided would remain anonymous. All
questionnaires were first piloted with some teachers within VTOS, some of which knew the
group and others with a speciality of English language studies. This proved to be very useful
and some change of words was suggested especially in relation to the questionnaire to
ensure that all the learners understood the nature of each question.

After the teaching phase, and before the project phase of the course, a focus group was
brought together to discuss the course. The selection of the focus group was based on the
data extracted from the questionnaire. The mixture of eight students was chosen to reflect
the diversity of the cohort; some having English as a primary language and others with
English as a second or third language. When the interviews were eventually conducted they
revealed another layer of qualitative data that was not revealed using questionnaires or
observational techniques which are detailed in Appendix D.
A research diary was used to make notes during and after each class. This does not provide quantitative statistical evidence, it does, however, give an insight into the opinions of the researcher and an overview of the classroom environment during the classes. The researcher also used an observational record tool to note learner engagement, activities, motivation, teacher characteristics, learning environment and the higher order thinking skills development.

3.4 Research Questions

The aim of this case study was to determine if a short introduction to HTML coding could provide adult learners with a wider choice of subject options for further academic study or direct employment. Research, through the instrument of an online questionnaire provided feedback of the digital literacy capabilities of the learners, albeit, their own assessment of abilities and skills as they relate to using the Internet and an understanding of various internet technologies. The questionnaire distributed post learning sessions provided an insight into the progress that each learner makes in the subject. Finally, questions asked of the other teachers for this cohort provided another insight apart from the learners surveyed in this study.

The purpose of this research is to address the following questions:

- Would the introduction of a short course in HTML coding widen the academic and career progression paths for adult learners?
- What is the profile of adult learners including educational backgrounds and demographical data in Limerick city?
- What is the adult learner perception of HTML coding? This is important as this subject choice was made available for adult learners in the research setting for the first time and their attitudes and opinions would influence the success of the subject

A student interview in the form of a focus group brought together specifically chosen participants who had similar backgrounds in terms of ICT skills. This gave detailed views on the introduction to coding, their impressions of the software and the motivational and
collaborative aspects, if any; this proficiency can bring to the class room environment. This experience can provide extra valuable insights, which will help to further enhance the existing teaching methods as well as practices that should be used when teaching adult in a second-chance adult education setting.

3.5 Research Methodology

For the purpose of this case study, the follow methods data collection was used:

- Questionnaires to obtain learner feedback
- Focus group interview
- Research diary
- Observation records

The information selected for use in a case study is fundamental. There is a need to collect data which represents the range of possible responses. However, there are often responses outside of the normal response range and the methods of data collection may help explain the deviations. Cohen et al point out that it ‘blends a description of events with the analysis of them’. The design of the case study for this research is of utmost importance with the emphasis on the research questions. Statistical data can be compared to a shining torch on a research project. The data needs to be deduced carefully and accompanied by analysis relying also on qualitative information.

The case study, through its real life information offers a reader a more colourful account of a situation in comparison to what might be achieve by presenting reader with a set of theories, principles or facts (Cohen et al n.d.).

Three research issues were devised. The first issue was to identify and quantify how the learners reacted to the introduction of coding. The second issue was to quantify the effect of coding on the learners, in terms of progression. Thirdly, it was deemed useful to acquire feedback from the learners by allowing them to comment on different aspects on the experience of learning to code. Finally, the opinions of other teachers were sought in terms
of learners’ abilities in mathematics and ability to focus and complete assigned work on tasks in a classroom environment to develop an adult learner profile.

3.5.2 Rationale for Case Study Methodology

A case study can allow the reality of events and situations in the teaching environment to extract conclusions rather than reply on the researchers’ interpretation (Cohen et al. n.d.). The specific instance in this case study is the possible widening of progression routes via the introduction of coding as a new subject choice. The single instance is a closed system of a particular group of learners who are aiming to achieve a full award in Employability Skills at Level 4 on the National Framework of Qualifications.

A case study accommodated the viewpoints of all stakeholders and the researcher reports will little control over events. The issues targeted were:

- Identification of the level of ICT skills
- Level of interest in coding/programming
- Level of assistance that coding would provide in future academic choices

3.5.3 Methodology Chosen

(Cohen et al. n.d. 2003) states that case studies can replace quantity with quality, separating the significant few from the insignificant many instances. It was with this in mind that the research used a collection of tools to strive to gather quality over quantity in order to fully appreciate the learner’s level of understanding. A case study was chosen as it merged with the needs of the research and the practicality of delivering the curriculum within the specified time constraints.

3.6 Research Instruments

With the aim of the case study decided upon, appropriate and effective tools to gather data were chosen. Of the eight instruments outlined by Cohen (2003), three seemed the most appropriate. These included:

- Questionnaire
- Interview
• Observation

3.6.1 Interviews
Another method of data collection was the group interview. A focus group of eight people was chosen from the cohort. This group was interviewed and their feedback was recorded. The advantage of this approach is that a wealth of detailed information about a specific event is produced. This increases insight while at the same time reduces generalisations. The purpose of the focus group was to test the hypothesis of the introduction of coding to widen progression routes.

3.6.2 Observations
Two methods of ethnography were utilised; a class observational record (See Appendix D) and a researchers diary (See Appendix E). Some learners were observed working with more sophisticated work processes as supported by Littleton and Light (1999 p 144). These techniques provided useful insights into the delivery of course and how learners’ perception of coding changed as they learnt code and gained confidence in coding.

The objective was to gather information on the environment in the computer room, the characteristics of the groups (gender and age profiles), the interactional settings, whether formal or informal and the programme setting including the pedagogic style and curriculum. They offer the opportunity of live data in live situations which a role play could not replicate. The researcher used a diary which was written up after each session. The sessions were two hours every second week. The observational tools were powerful in enabling the research to gain insights into the factors at play during the sessions.

3.6.3 Questionnaires
Questionnaires can be used to collected survey information using structured question, often with numerical data that is usually straightforward to analyse and may be administered with or without the presence of the researcher. This allows for a measure of reactions of many people to a limited set of questions thus facilitating comparison and statistical collection of
data. It also makes the most of efficiency in terms of gathering data that might otherwise be obstructed due to time or facility constraints. According to Wright (2006) the advantages and disadvantages of questionnaires are outlined below:

**Advantages**
- Access to unique populations
- Time
- Cost

**Disadvantages**
- Sampling issues – only those who chose HTML coding as an elective
- Sampling from an online community
- Other sampling concerns
- Access issues

For this research survey, the unique population are the students that chose HTML as an elective and the time constraint was a single two hour class to complete an introduction to the course and issue the online questionnaire. This was very time efficient in terms of questionnaire access and distribution and offered significant cost saving versus printing and issuing costs. In terms of disadvantages, the sample was drawn from the class participants and not the entire cohort of the class group. The learners were not required to release their email addresses or any other personal details which may be an indication as to why the response rate was nearly one hundred per cent. The purpose of the study was explained to the learners before the questionnaire was issued. A request for their time and honest answers were requested without any incentives, other than to aid the researchers study. Access issues did not arise due to the fact that all the learners had individual access to a computer and were able to complete the questionnaire.

The questionnaire was designed to extract both qualitative and quantitative data. The purpose of the questionnaire was to elicit quantitative information such as level of knowledge, using Internet and email skills as a base line personal evaluation point as well as academic background. As well as this, the opportunity to extract qualitative information such as the perception of HTML coding on a scale of difficulty, the progression routes in terms of academia and employment, in addition to this, an enquiry into any level of interest
in the subject. This presented the opportunity to assess the depth and meaning behind the perceptions of coding.

According to Cohen et al (2003 p 270) a questionnaire tends to be more reliable and saves on time and money and allows for more honest answers, due to anonymity. Several questions posed on the questionnaire used a multiple choice and a Likert rating scale because they lend themselves to ease of coding without discriminating any responder and allows the questionnaire to remain neutral during the response phase.

Post evaluation questionnaires were also distributed, the purpose of which was to determine any changes in perception of coding and attitudes towards progression routes that may involve coding. Each learner was asked to comment on the various aspects of the course, after which information was collected and collated. This allowed for a comparison with the student questionnaire.

3.6.4 Piloting
Cohen et al (2003) state that the wording of questionnaires is of utmost importance and that piloting is crucial to its success. The questionnaire was chosen as an instrument that gave structure to the data collection process. The function of piloting is to increase the reliability, validity and practicability of the questionnaire. The objectives are:

- To check the clarity of the questionnaire items, instructions and layout.
- To remove any ambiguities or difficulties in wording.
- To gain feedback on the appropriateness of specific questions or question routing.
- To gain feedback on the type of question and its format (e.g. rating scale, multiple choice, open, closed etc).
- To gain feedback on the attractiveness and appearance of the questionnaire.
- To gain feedback on the layout.
- To check the time taken to complete the questionnaire.
- To try out the coding/classification for data analysis.

(Cohen et al 2003 p 261)

The questionnaire was piloted on five individuals; two teachers from the programme, two English teachers within the VTOS programme and post graduate student on work
experience within the programme. The various teachers offered advice on the wording on the questionnaire ensuring the layout and nature of the questions was clear for the learners. The feedback from the other parties involved minor adjustment to the wording of the questionnaire and a change in the order of the questions.

3.7 Sample Group

There is an allocation of 210 students for VTOS of which there were 34 students on the course where web design was a choice. Twenty students chose web design over desk top publishing. The gender balance was slightly in favour of men with 7 women and 12 men in the cohort. The students on this course are relaxed in their approach to learning when compared to the prior year. Prior to conducting this case study the permission of the VTOS Co-ordinator, Course Leader and the learners was sought and it was readily obtained. The sample group presented with a wide variety of prior learning experiences. Some are Irish while the others are from a range of European and worldwide countries. They are completing their second and final year on the VTOS programme. In their prior year, they completed their Junior Certificate state examinations. In the second year, they complete a QQI Level 4 full award certificate in Employability Skills. This allows learners to build on skills for employment or further education. The General Studies Web Design class was chosen for this case study for a number of reasons; firstly, the researchers contact time with the class was once a week (this transpired to be on a bi-weekly basis) for 2 hours. Secondly, and most importantly for this case study, the General Studies Web Design class was the only class on the timetable where web design was available. At the start of September 2013 twenty students attended an expression of interest session, when the online student questionnaire was issued. During the semester, a number of students changed subjects for a number of reasons; timetable clashes, finding the class to difficult or for medical reasons. Due to a lack of resources, it was quickly realised that it was only possible to deliver classes on a bi-weekly basis as the computer room was limited to 10 workstations.

During the autumn semester, the focus of the course was learning basic coding skills with a 100% project as assessment in the second semester. Some learners were unavailable for class in the autumn as they were completing work placement experiences. For two weeks,
attendance was particularly low with 2 students. During this period, the students practiced skills they had already learnt which later aided in the development of the project. It is anticipated that more students will be on placement during the spring semester and they in turn, will miss some of the project development time.

3.7.1 Limitations of the sample group
Within each sample group of research participants in a study there are limitations as they are only a single representation or snap shot of the entire student body. Within this research project there are four key limitations that were observed during the research. All the participants had different levels of prior learning, ranging from junior certificate level to third level education in a different country. The different levels of English amongst the participants meant more time was needed to explain terminology in a way that was comprehended by every learner while at the same time accommodating the range of ICT skills employed while completing coding exercises.

3.7.2 Limitations of the Computer Room and Resources
The class room for the web design course was equipped with ten learner workstations arranged in a horseshoe configuration. Maintenance of the computers is with one company and printer maintenance is with a different supplier. There was large table in the centre of the room which meant that one corner of the room had constricted access. There was internet access with multiple browsers installed and networked printer access with a white board, however, there was no teacher workstation or digital projector for demonstrations. Board markers in a variety of colours were used on the white board to show the differences between code and content for a web page.

3.8 Reliability and Validity of Research
Triangulation allows research authors to validate results by achieving the same results regardless of the method employed. Another alternative view is ‘the use of two or more methods of data collection in the study of some aspect of human behaviour’ (Cohen et al 2003 p 112). As a result, both qualitative and quantitative data can be collected adding validity to the results. Using a single method of data collection may lead to bias or distortion in the study, in turn changing the outcomes. Research using a variety of tools - being a builder (researcher) shouldn't mean you only use a hammer (single paradigm)
(McGann 2013). The researcher can be confident about the results of the research when different methods yield similar results.

In summary, several methods of data collection were used in the research phase to triangulation the following data:

- Feedback obtained from the learners in the form of a questionnaire
- Feedback obtained from an interview with a focus group
- Feedback obtained from teachers of subjects with the same cohort
- Observation records were maintained throughout the study
- A researcher’s diary of the case study was updated on a regular basis

Each of the above was used to cross check against each other to elicit statistical data and conclusions from all the results obtained. This accommodated consistency in measurement of each session with accuracy and in measuring the various interactions, accomplishments and activities during the research. The main disadvantage of triangulation involves the time in preparing, organisation and reporting of the different aspects of the study as well as the resources, which are not always available for each aspect of the study (Guion et al. 2011).

### 3.9 Data Analysis

The questionnaire was created using an electronic system to facilitate ease of coding and routing of the questions. The questionnaires (Appendix A) were distributed using Google Forms in a computer room. The responses were automatically inputted to a Google Documents Spreadsheet. This data was exported to Microsoft Excel for analysis and interpretation. The researcher verified that there was no loss or change of data when exporting between programmes.

There were a total of twenty responses for each question which was distributed to a single worksheet per question, with twenty worksheets in the Excel workbook. The data was stored and analysed using a CountIF statement for the responses to collate the summary quantitative data. This data was then visually represented using a 3D pie chart on each worksheet for each question to generate percentage results.
3.10 Ethical Considerations

There are several ethical considerations that operate at different levels when undertaking research. In order to ensure that researcher behaviour and method employed are in every way considered to be acceptable. The researcher should be technically component and fair minded in order to avoid bias in reporting. All findings from this research are presented in fully and completely. The researcher is willing to share and possibly assist in future research in the topic area. There is a currently a public debate and government consultations on the topic in the junior cycle curriculum.

The major aim of the researchers is to protect the safety, rights and privacy of the subjects. This is to ensure that no physical, psychological or social harm accords with any of the participants. All of the participants were informed about the study at the first class session and their informed consent was sought and approved. The cohort was advised of all the implications of hazards and obligations of participating in the study. There were no conflicts of interest from any party during the research. A key component of this research project was the need for a heightened cultural sensitivity due the multi nation nature of the participants. A small proportion of the cohort was Irish, with the remaining being Polish, Lithuanian, Latvian, Russian, French along with representation from the Ivory Coast and Kosovar.
Chapter 4: Findings

4.1 Introduction

The introduction of a new web design module on the General Studies course has proved to be enlightening from several aspects; the skills that today’s learners are seeking to develop within the constraints of the curriculum, the awareness of the learners needs for the modern work skills and the future of coding.

“We are learning a new unknown subject and gaining knowledge”

(Focus Group Participant)

This chapter presents the results and analysis of the primary data, which was obtained from several sources. Raw data was obtained from questionnaires that were distributed electronically, interviews with a focus group and observational records from the researcher who had class contact time with the cohort.

The hypotheses for this case study was to determine if an introduction to HTML coding would widen the possible progression route in regards to academic and career choices for adult learners in a second chance educational environment.

4.1.2 Profile of Respondents

Data collection from adult learners in a second chance education setting was used to determine the pre-existing perceptions of coding and if there was a genuine interest in the subject. The data has been analysed to extract a number of findings in relation to the learner profile, including prior education levels as well as perceptions of coding and future academic and career options as a result of the web design course.

4.1.3 Sources and Resources

The findings are drawn from a variety of qualitative and quantitative sources; raw data from questionnaires, focus group findings, observations, interviews and a researcher’s diary. The raw data enabled the researcher to design and plan the learning sessions using a curriculum planning template provided by the LCETB for delivery of courses. This document was prepared in conjunction with the class materials; ensuring that is was learner centred, pitched at a suitable level factoring in the different levels of the English language in the group. Learner support was also provided for using a virtual learning environment system.
called Moodle that allowed learners to access class materials and further resources between class contact times. All of the materials were designed to engage the learners while at the same time achieving the learning outcomes on the module descriptor.

The results will be presented with charts to demonstrate the percentage values in response to the range of responses in the online questionnaire as well as an interpretation of the focus group findings in conjunction with the observational records.

4.2 Stages in Education

In the academic year 2013/14 all the learners participating in the web design course were over 21 years old (one of the prerequisites for joining VTOS programmes), however, there is a wide span of ages across all courses within VTOS. All participants in the sample group had completed primary education and this is reflected in the fact that primary education is obligatory in most countries. Differences started to emerge with the analysis of second level education; just over half of the cohort had completed the Junior Certificate or equivalent with a fifth of the sample progressing to the terminal senior cycle examination of the Leaving Certificate or equivalent.

Just over a quarter of the group had completed a PLC or third level course. Further investigation and analysis would be required to enquire into the nature for non-completion of PLC or third level courses. This is reflective on the wider nature of VTOS participants as they are opportunities for adult learners in a second chance-learning environment and suggests that VTOS courses are targeting the correct segment of the population.

![Academic Background](image)
4.3 Demographics

The anonymous nature of the questionnaire allowed the researcher to extract a demographic profile of the learners. This is important as it was the basis for the research and it also represented a smaller version of the entire VTOS cohort. In total twenty two learners started the module in September, however, a small number of learners failed to complete the module for a variety of reasons; timetable clashes, more time required for core exam subjects, medical issues, along with two learners who had a sustained difficulty with the subject due having poor English language standards or inadequate basic computer skills and were unable to meet the demands of the class.

4.3.1 Gender

![Gender Pie Chart]

The sample group was only marginally male dominated. This was surprising, as most people would associate programming or coding with male students. It was observed that the more mature learners were more comfortable consulting with the same gender when attempting to problem solve in the project phase. It was observed during the class practice times that males in particular did not like receiving instruction from the females in the group even when it was apparent that the female was more knowledgeable than her male counterpart.
4.3.2 Nationality

With over thirty nationalities across VTOS programmes, it was deemed to be important that a variety of nationalities were represented in the sample group. Only a fifth of the sample group was Irish. The majority of the learners are in the process of learning the English language as well as a range of academic subjects. Within the student cohort a range of eastern European nationalities are represented; Polish Lithuanian, Latvian and Russia with smaller representations from France, Ivory Coast and Kosovar. This was an important consideration when planning classes and preparing course material for learners with English as a second language as clarity and simplicity are required to ensure learners gain the most from each class session.
4.3.3 Student Profile

Three identifiers were used to determine the profile and characteristics of the learners, the majority of whom have no prior knowledge of coding in any form. All the adult learners were asked to evaluate their own skill of researching information on the Internet; they could all find information but there was varying level of ability within the cohort. These ranged from very poor to excellent demonstrating the disparity of generic computer skills within a single class group. Eight learners from the sample of twenty two had completed level 3 programmes with the word processing and Internet/email modules amongst the most common computer modules selected for the learners. Some of the learners may be self-taught and lacking in fundamental web based skills, which is a common feature across all VTOS courses.
4.4 Perception of Coding

![Pie chart showing perception of HTML Coding]

Forty two per cent of the sample anticipated no challenge at the start of the academic year. This was supported by some of the learners inputting coding exercises and achieving the expected results. However, fifty three per cent of the students anticipated that it would be either somewhat difficult or difficult which may be more of a reflection on their own IT skills. They found it difficult to compare their own code and the original and relied on the teacher to identify and solve coding errors. Only 5% found it easy, however, in analysing the raw data, it was noted that these were the respondents who had prior learning with coding by using either JavaScript or HTML coding.
4.4.1 Level of interest in coding

All of the respondents, except one, indicated that they had an interest in the learning coding. A single respondent chose the class due to the fact they had previously completed or had no interest in the alternative module and needed to complete a twenty-two hour student timetable. Such was the level of interest in the course at the start of the year that four students from other courses signed up to attend classes. Unfortunately, nearly all had to withdraw from the class due to timetable clashes and one person left for full time employment. One student has committed to completing the 100% assignment project without attending the classes. The level of positive responses could be attributed to the opportunity of a new computing module and the move away from more traditional elective subject choices. Some learners expressed their interest in the subject by not taking scheduled breaks or contacting the teacher outside of class time to review student work.

"Web design is more creative than desktop publishing – there can be videos and animations on web pages but not in desktop publishing"

(Focus Group Participant)

However, it was also noted that some learners did not have the ability to concentrate for enough time to sustain any momentum to achieve basic results within the time frame of the scheduled class. This suggests that they have an interest and require small amounts of learning with a lot of time spent on practising core skills.
4.4.2 Previously used programming languages

The majority of students, at 85 per cent represented in the survey did not have the opportunity to experience coding in any form before starting on the VTOS programme. Only twenty per cent of the sample had completed some form of coding in the past. Of those surveyed, 85% had no prior experience of coding and 15% had a combined experience of HTML or JavaScript coding, however, none of the participants had advanced skills in using applications and relied heavily on the same core skill set. It is interesting to note that JavaScript can be used in conjunction with HTML and this may be used during the project phase of the course.

4.5 Traditional perceptions and new realities

Perceptions are influenced by bias or past experiences and as a result approximately half of the cohort classified the course as it ‘presented a challenge’. Where there had been prior negative experience, the learners did not identify this as a factor for motivation for learning the new subject of web design. Traditional perception would present coding as a male dominated course for both learners and teachers; however, with 48% of the sample being female, the perception has been debunked. When this issue was presented to the focus group, the explanation they stated was that having a female teacher for coding was an exception rather than the norm. The traditional perception of coding being subscribed more by male learners was changed for the purpose of this research, without input from the researcher. The students within the General Studies Level 4 course were offered elective subjects for different slots on the timetables and the learners who selected web design
were requested to participate in the research. Within a mixed gender balanced group, some of the females in the group made more progress with concepts while combining multi-tasking practical tasks e.g. changing between software applications, the browser and the file management screens. This issue was raised during the focus group interview and yielded a surprising result – the teacher being female had perhaps drawn female students who had been previously taught by the female facilitator who employed a teaching style that emphasised clarity for all learners. The teaching and training techniques used in class made them feel they are really learning an entirely new subject, gaining knowledge and as a result, they feel smarter.

“It is interesting and it makes me feel smarter”

(Focus Group Participant)

This is empowering them for the future progress they make in academic and economic arenas. At the beginning of the research, approximately half of the group anticipated some level difficulty with the subject, the same that could be said for any new subject that is being introduced in any educational establishment. The perception of the subject being difficult proved to be true for some of the students; however it proved to be a lack of practice and revision of the exercises that proved to be the difficulty within the web design module. The students’ perceptions of the teacher holding their hands while they completed work on their projects proved to be a steep learning curve for students as learners were over reliant on the teacher and were not able to self-manage their own learning of the subject.

The subject was a journey into the unknown with the teacher as a guide on the side rather than the learners building on past experiences in more familiar subjects such as Maths, English or Basic Computing.

“This module represented a new challenge on my second year in VTOS”

(Focus Group Participant)
The web design module provided the learners with powerful results that were demonstrated in the projects. Some the learners took considerable time to accomplish basic tasks in the project phase such as remembering the line of code required to insert a picture onto a web page. The module offered a completely new experience in comparison to the easy alternative elective subject of desktop publishing and the learners realised that coding would a valuable computing skill to have in the future for a variety of reasons such as running an online business or future studies, however, they would have to practice the skills or the web design module would be one off introduction to the subject.

4.5.1 Coding and the Curriculum

“It will be useful in the future and it has given me a new way to interact with a computer”

(Focus Group Participant)

The learners easily recognised the potential of learning new computer skills, rather than persisting with the traditional practice of increasingly difficult word processing tasks. The new forms of digital literacies in the twenty-first century of critical thinking, creativity, collaboration, cross-cultural understanding, communications, computer technology and career learning are broadly addressed with the introduction of the web design module. A key motivator for selecting the web design module was the creativity aspect when compared to the alternative module desktop publishing that was recognised as being limited to text and images whereas web design could also include hyperlinks and video in addition to text and images. However, the cohort did not as easily identify the other skill sets that are required by learners in the new millennium.

4.5.2 Disparity of Skills

The range of skills that the learners presented with at the start of the academic year was broad as they all had different prior experiences with computing. Across the cohort it was observed that they learners could operate a computer with basic functionality, although they did not appear to have confidence or efficiency while using the computers. Basic inputting in the form of typing was severely undervalued by the learners and as a result, they found themselves needing more time to accomplish rudimentary tasks such as entering files name or copying files between folders. It was noted that the learners were not
prepared to study the subject or practice skills learnt from the module. This was emphasised after a holiday break when one learner had difficulty in remembering to double click to open a folder that served to indicate the different learning issues that may arise when working with adult learners.

The disparity of skills was noted by the learners during the focus group in the form of younger family members quickly solving computing problems but the adults are never shown and do not gain new knowledge but repeat familiar reliable habits. With the introduction of coding the learners appreciated the fact they were in a new subject area and their children would not be as familiar with this subject when compared to applications. This would earn them respect from family members of the younger generation.

One outcome of the focus group was the fact that the cohort would have preferred more contact time. The original timetable, issued in September 2013 with a single two hour class scheduled for once a week had to be rescheduled for bi-weekly classes due to demand. The learners would have preferred to have the same amount of time allocated computing, as is currently the case with mathematics having several one-hour sessions throughout the week. Some of the participants stated they would have like to have received more homework, however, there was never a request for more homework nor was there a request for extra materials.

From an observational point of view, the learners are in the second year of a two year VTOS programme and do not have the same motivation to succeed as they did in the first year of the programme. Perhaps it is the lack of confidence in using and applying ICT solutions along with lack of self-management in learning is hindering the motivation to strive for academic success or apprehension for the future after VTOS.

4.6 The future in code

The introduction of coding in adult education is reflective of what is happening at primary level where children are receiving an introduction to coding in a drag and drop interface.
using Scratch. It is appropriate that second chance adult learners receive similar opportunities in terms of subjects and career choices. In the future all learners, regardless of age, will learn some form of coding just as English and Mathematics are core subjects. Although most people may not necessarily go on to become programmers, they will understand the concepts, thought processes, logic and vocabulary to discuss exact requirements for software programmes. Furthermore, as we move more into the twenty first century, one of the demands of big business will be the ability to query big data using analytic software. This is often completed by using coding skills and could possibly sustain a learner of today in a career tomorrow.

4.6.1 Widening of academic choices

The responses reflect the choices that the learners are in the process of making; fifty three per cent have concrete plans for further academic progression after completing two years on VTOS courses. Some of the possible progression routes that are planned are places on level 5 and 6 courses in other QQI centres along with some students gaining direct entry to third level courses as mature applicants.

“Different computing subjects are as important as the different topics in Maths”

(Focus Group Participant)
Over half of the responses accepted that having knowledge of HTML would widen academic choices in the future. It will equip them with a core of generic transferable skills in computing as well as subject matter knowledge that may develop into expertise. A further third of respondents were open-minded to the possibilities of the future pathway in their learning. Nearly half of the respondents were undecided in terms of furthering their educational qualifications. The remainder have decided to seek employment directly after completing their General Studies course in June 2014.

4.6.2 Widening of employment choices

“This subject has improved my employability skills”

(Focus Group Participant)

The sample group clearly appreciated the opportunity that was presented by having a qualification in web design. It would be beneficial on a number of levels; in running an online business or assisting relatives who are also in the education system as well as personal gain. Most of the respondents have basic ICT skills but they realise that the jobs of the future will involve the use of computers to different degrees.

The web design module has presented the learners with a new way of interacting with computers that constructively builds on prior knowledge of the Windows operating system and web browsers. Prior experience with software applications provided instant results of
applied tools whereas in web design the learner has to wait momentarily while the browser parses the code and then presents the output of the code to the user.

The web design module covers the fundamentals at Level 4. At the end of the module, the learners have a clear understanding of the subject including the various sub topics and the fact they completed the class sessions there would be far less anxiety should they be presented with coding in the work place. A minority regarded coding as an essential skill in which implies they have a specific career path outlined and are aware of the requirements of the modern work place.

4.7 Conclusion: Coding in the work force of tomorrow

Half of the sample estimated that coding in some form would be important in their working lives in the future. This is reflective on the variety of roles that require an understanding of code for web browsers such as online marketing campaigns and other aspects of computing the business and engineering sectors. A quarter of the learners reported that coding would be very important and this will be reflected in the learners’ career choices that will be accounted for when progression data is made available. A further 15% of the respondents regarded coding as an essential skill in the modern work place, showing a high level of awareness of the power and productivity of computing in academia and work. Only 10% of the sample regarded coding as not important in their working lives, as perhaps they have long term career goals that do not involve the use of computers.
Chapter 5: Discussion

5.1 Introduction
The study of how people learn has evolved in the past and impacts on the beliefs and values that will shape future learning. There are a number of perspectives that need to be considered when regarding learning theories and the impact of introducing coding to second chance adult learners. These will be outlined in a wider framework of computing in education, digital literacies and the variety of progression paths that are available to adult learners.

5.2 Andragogy
The profile of adult learners outlined in the Findings chapter presented the researcher with adult learners, who for the most part are in the process of learning the English language as well as a range of other subjects. An educational commonality is that they have all completed primary level education; however, there appears to be a disparity with second and third level access and completion rates. The learners represented a broad mix of nationalities that are bonded in the way that they over rate their own Internet skills.

From the literature review andragogy is regarded as a blend of art and science (Knowles 1990) that presents a set of unique challenges when assisting adults in the learning process. A number of assumptions were presented from various authors including (Knowles 1990) and Ellis (2002).

The rules suggested by Knowles (1990) were applied during the course along with an awareness of the role of the teacher as outlined by Zmeyov (1998). Each of the learners that participated in this research were regarded as individual learners with different backgrounds and motivations as is supported by (Guy 1999) however, they all share the common community of VTOS in Limerick city where all learners are part taking in their own personal intellectual journey where the teachers support them in a way that allows learners to develop their own solutions with appropriate assessments as proposed by Brookfield (1983).
5.2.1 Andragogy Assumptions

In light of the research project, the researcher would agree with the application of the assumptions of adult education according to Merriam (2001). The assumptions previously outlined in the literature review were considered in light of the research and this researchers opinion they are true for the following reasons:

1. The adult learner should be seen as an independent person who is able to self-manage their learning. However, there should be an awareness that adult learners can equally choose to be extremely mentally and physically lethargic from the act of absorbing and processing new learning or they may be affected by external forces such as financial or addiction issues that detract from the learning process.

2. Not all prior life experiences can prepare a person for unique new experiences, as there is no comparison to draw upon. In relation to the web design module, the rudimentary skills of basic keyboarding, Internet browsing and email skills were scaffolding on the foundation of those basic skills, the course would have presented far more of an academic challenge than any other subject at Level 4.

3. The adult learner has a need for skills that are required in the twenty first century and potentially generate a personal income through the creation of web sites and perhaps one day, apps that are created from coding skills. Where learners appear to be focused on personal problems and not engaged with learning the problems tend to be financial, health or family issues. The intrinsic motivation to achieve academic results is being suppressed by the external stress factors.

4. The application of the drill and practice technique allows adult learners to rehearse the core concepts from the class using a method that suits adults as they can practice at their personal speed without the need for interaction of others in the group while concentrating on a singular task.

5.2.2 Andragogy Rules

The task of maximising the the learning potential was achieved on the web design module and further supports previous research with adults in education (Ellis 2002). The andragogical rules according to Knowles (1990) were applied in the following ways:
1. During the teaching phase, at the start of the academic year, each class session was dedicated to a concept and application of the concept during the exercise practice time. Once the class sessions were completed, the learners entered the project phase of the course where they are assessed 100% on the submission of project. This successfully demonstrates they are able to create their own HTML pages with their own original digital content and complete an evaluation of their own work.

2. In the teaching phase, the practical task of entering a line of code was outlined on a whiteboard with each element explained and allowing learners to practice this skill again with a self-paced exercises further supported this.

3. Instruction during the teaching phase utilised a variety of techniques; lecture, discussion with questions and answers allowed information and knowledge to be transferred using a multi-level approach appealing to different intelligences. The learners supported themselves in the form of supplementary hand written notes, exercises and documentation on the virtual learning environment.

4. In addition to the official curriculum, there are often hidden concepts and topics that adult learners need to acquire in conjunction with structured learning outcomes. The adult learners in this research needed guidance on how to solve coding problems that were self-generated. A single learner with a single problem could be easily fixed by the teacher but the group would not benefit from the exchange nor would all the learners gain from the experience. When shared in a group context, learners broaden their understanding in troubleshooting their own errors while gaining self-satisfaction in applying a solution to a previously not encountered problem. This was evident in poor file management skills when organising content for the project.

Without the guidance and support of previous research in working with adult learners, the outcomes of the course could have been very different. It would have been very easy to assume that all participants in the group shared common traits and therefore, required the same input, suggestions and guidance from the teacher. This would have impacted on the group in a detrimental way in so far as they would not have achieved the desired results for themselves nor for the outcomes of the course.
The rules of andragogy were also factored into the planning of the classes and materials. Without these, the class materials may have been completely unsuitable and results unachievable for the learners. Just because the teacher finds the subject easy being a subject matter expert, does not make it easy for the learners. The additional support provided in the form of a virtual learning environment facilitated the adult learners need for independent learning and planning of access and practice of the skills learnt in the class room, without this support, learners would have struggled in several areas such as remembering to bring the correct notes to the class or having a selection of digital resources to work with in code.

In recognising the uniqueness of each adult learner, there comes of recognition from teachers and management of the individual pathways that learners progress. After completing the class sessions, the cohort appear to be more engaged with the subject and their projects than any other computer based assignment in the previous year. With the experience of the web design course, they now have more accurate confident in their computing skills as well as using a virtual learning environment, both of which will be useful for future learning.

If the learner profile consisted of more Irish students or a younger age range the dynamic of class would be changed and the need for clarity would be reduced. By presenting the group with smaller pieces of information, they could more easily process what was demanded of them, despite the language barrier. The increased participation by international learners has added a rich diversity to the programme and the close integration of individuals from different social and ethnic backgrounds is driven by a shared desire to improve their lives. It is doubtful if the same results would be achieved in a different context such as a part time or evening course. VTOS as a vibrant, progressive, inclusive place of learning is one of a limited selection of full-time education for unemployed adults in Limerick city.

5.3 Learning Theories
A number of learning theories were outlined in the Literature review chapter. Different learning theories can affect the motivation of learners and the evolution of learning theories
is supported by Phillips and Soltis (2004) when comparing outdated one way information transfer from teacher to learner as suggested by Pelgrum (2001). In the twenty first century there is now acceptance of differing perspectives in learning theories from many sources including Phillips and Soltis (2004) and Bassendowski and Petrucka (2013).

From a behaviourism perspective, the person is not regarded as part of the process according to Forrester and Jantzie (2005) and there are limits on the behaviour of adult learners in an educational setting. The behaviour of individuals within a group can affect the dynamic and impact on the group. Conditioning can be utilised on a number of levels; negative past experiences can be discarded and the attitude of the teacher can assist in forming positive learner attitudes to the present and future learning. Where conditioning is applied correctly, occasional praise for learners is a motivating reward according to Phillips and Soltis (2004). Constructivism enables learners to scaffold their own meanings and changes the focus from teacher centered to learner centered with the teacher evolving their role to facilitator as proposed by Schneckenberg et al (2011). Multiple intelligences as first outlined by Gardner and supported by Campbell et al (1996) which accommodates the different learning styles that are inherent in a classroom.

The development of the Findings chapter allowed the researcher to discover the opinions and attitudes of the learner towards the subject of web design and coding. The group was split into two categories; those who anticipated no challenge and those who anticipated a challenge within the course, however, when the need arose to compare inputted code with the example, all learners appeared to default back to previous learning styles and ask the teacher for the solution rather than attempting themselves. The vast majority of learners expressed an interest in the course at the start, which included learners from other courses which proved to be an excellent positive starting point. The introduction of a new technology based module was popular and resulted in enthusiastic learners who have reached a plateau with traditional subjects that are available in the General Studies course. However, considering that the learners are at Level 4 on the NFQ, it is a reasonable expectation that they have limited concentration spans and need bite sized chunks of information and appreciate the instant results of accurately inputted code.
If all the learners started the module with the same learning style, it would have made the researchers’ task much easier as the one method for all would make the process of learning a new subject much faster. This could have resulted in more high level use of HTML coding with the introduction of JavaScript and embedded items from other web sites.

An unknown factor is if the Level 3 internet and email module was to serve as a conditioner for the Level 4 web design course. The Level 3 courses could be adapted so as to serve as a foundation layer then the time spent on developing core skills such as copy and paste could be spent in a different direction such as working on editing images for the web.

Considering the resources that were available, the learners were very accepting of the arrangements including the scheduling of bi-weekly class contact time. The outcomes of the course would be different if the teacher had a computer and projector to demonstrate concepts and techniques to better assist visual learners.

If the web design module was to be offered to another group, it would be strongly advisable that the group are not left to construct their own meanings but are guided before the start of the module with techniques on how to learn with study skills and classroom self management skills so that each of the learners can gain the maximum return on their investment into their education.

5.4 Coding
As previously outlined in the Literature review there are many coding languages, each one with a specific purpose. The learners in this research were able to witness the relationship between HTML code and a web browser. The learners were rewarded in their coding efforts by viewing the results in the browser. The lack of resources for teaching proved to be a minimal obstacle as the students were adult learners who had anticipated the available resources due to prior education and training within VTOS. With the skills obtained through coding the learners will have the ability to customise existing websites in the work place.
A small number of the learners had previously used coding prior to joining the VTOS programme. These students did not anticipate any level of difficulty in learning the concepts and application of HTML coding, however, for the learners with no prior exposure to coding, they experienced varying levels of difficulty with the practical tasks on the course. All the learners demonstrated over confidence in their self-evaluation of ICT skills. Many learners exhibited an apprehension in the area of discovery learning with an over reliance on the teacher for troubleshooting, however, all the learners were aware of the need to improve ICT skills for future academic progression and employment.

The findings support that learners are undergoing a paradigm shift from passive and uninformed consumers to creators of technology with a potential global audience. They are in the process of preparing for a society that will integrate technology and will shape a society that does not yet exist. Some learners recognised their own limitations and expected a challenge. Equally some learners over estimated their skills and the reality of the gaps and lack of confidence when interacting multiple applications and previewing results. Similarities between learning a programming language and another language but unlike other languages, programming only has a written component with syntax instead of grammar. If some learners had high level skills at the start of the year, the potential existed for installing a customising a content management based websites and the learners could have achieved professional standard results and time could have been allocated to broader topics such as search engine optimisation or digital marketing techniques.

If more learners had strong basic ICT skills then the course would have moved into high end areas of coding using CSS and perhaps JavaScript, rather than focusing on the core learning outcomes. The projects would have represented a completely new level of digital evidence. Had a module descriptor for web design using HTML not been available, then an alternative module of Digital Media Technology could have been utilised. However, this module was previously introduced by a different teacher who had to revert to a core skills module.

Learners were affected with a lack self-management and time management skills to practice and apply techniques in a class environment. Had these issues been addressed prior to a
second year on the VTOS programme, the learners would have experienced the same levels of frustration when encountering difficulties.

Where to the cohort were to present a greater gender imbalance, the dynamic of the group would have changed in several areas including the topics of choice for the project and collaboration efforts depending on the predominant gender.

5.5 Computing in Education

There is a wealth of previous literature supported by Phillips and Soltis (2004) and Cloke and Sharif (2001) that documents the growth and variety of ICT used schools at all levels. There are some sophisticated users with many struggling according to Mandefrot (2001) which is supported by observations from this research. Prior publications place the learner at the centre of the interactions with computers which is supported by research from the NCCA for using ICT as a stand-alone subject and implementing ICT incorporation across the curriculum. This is parallel to the need for teacher CPD in using ICT based education solutions both for a broader overview to share ideas and for specific examples and solutions on implementing an ICT based education. Many passionate teachers are willing to practice and share innovative ways of engaging learners who are motivated through the use of technology based projects across the curriculum. There is potentially a huge return on investment with new approaches in the learners, as both children and adults are starting the transformative process of changing from low level to high level end users.

The findings outline the new digital literacies and the different motivators the learners employ when choosing technology modules. The disparity of skills was acknowledged and accommodated during the research with awareness that new knowledge creates a new level of respect and appreciation of specialist information. The learners had placed a greater emphasis on the need for more class contact time for use of technology and it was noted that the scheduling of bi-weekly classes de-emphasised technology in relation to English and Mathematics.

The position of the researcher is in agreement with the Findings in so far that new digital literacies are emerging along with new methods of inputting data that reduces the need for
accurate and efficient keyboarding skills. The comprehension of new specialised knowledge means that the learners are more respectful and value the experience of a skilled ICT teacher and the vision of the organisation for making new technology choices available. The outcomes of the course could have been very different had modern ICT equipment been made available for the teacher and learners. The ease of demonstrating via a projector would have assisted the students understanding of the syntax and precise nature of coding. The availability of Wi-Fi in the college building would have facilitated ease of accessing resources on the virtual learning environment and would have encouraged the adult learners to take greater responsibility for their own learning.

If the course timetables were centered on the accommodation of ICT skills development rather than the core traditional subjects, then more frequent exposure and practice would have reduced frustration levels with the upskilling practice of all ICT skills. Furthermore, it would have made more efficient use of the existing resources. If the learners were proficient in core ICT skills, they would have had higher confidence and ability levels and willingness to make mistakes and learn from the errors rather than being restrained by a lack of competence.

Teacher CDP in the field of technology also serves as an example for adult learners. Teachers who share and experience their own learning curve are more easily able to relate to the challenges that face learners. They become peers at different stages of their personal learning journeys.

5.6 Digital Literacies
The new millennium has presented a new vocabulary with new terms for the first digital native generation along with new descriptions for the first digital native generation (So et al. 2012). A digital divide exists for those in different age profiles in society. From the mid 1980s to the year 2000 a generation was introduced from an early age to the Internet. The pace of change and the increase in complexity of technology that presents a new range of tools was noted by Naughton (2012). The increased use of technology necessitates the importance that all citizens are able to communicate, collaborate and express their creativity in digital formats. The future needs to be viewed from the different perspectives
of learners and administrators (Flecknoe 2002). Along with the pace of change in technology there appears to be a demand for global knowledge (Pelgrum 2001). Being digitally literate requires a range of skills in furtherance of being a digital native as outlined by Gilster (2013), Breivik (2005) as well as Jones and Flannigan (2006). As society has progressed into the new millenium, core competencies for computing in the twenty first century have been proposed by Shapiro et al (2009).

As society moved from the industrial age to the digital age, prior differences between education and training that were separate are now being realigned with little or no distinction in the knowledge based economy. This presents challenges for educators according to Balanskat et al (2006), Carr (1998) and Cascio (2009). Educators are introducing new curricula with limited analysis on the best use of technology in education as prior funding focused on infrastructure as this type of funding was easier to access than teacher CPD (Zammit 1992). The digital divide marks the boundary between those that have access to and use technology with many variations, some of which are marked by age (Prensky 2001). The increased use of computing in education necessitates a need to change to a new e-pedagogical framework that is supported by the European Digital Agenda.

The Findings chapter notes the disparity in the research cohort. All the learners presented with different background life stories, cultures and beliefs. All the learners were observed to have some basic computing skills, however, they are only just over the border of the digital divide. They all struggled with the twentieth century form of inputting using a keyboard. The learners demonstrated reliable, albeit inefficient techniques for the duration of the research, however, they wanted new knowledge with more class contact time with a view to gaining confidence in coding.

The disparity of the cohort was also represented in the disparity of computing skills. There were a range of digital tourists and digital immigrants with only the researcher as a digital native. The poor basic inputting skills illustrates the nature of second chance adult education. These learners are not primed for the seven digital competencies, however, this may occur in further education. Learners and teachers are adapting to new curricula while
making use of the existing infrastructure such as white board markers to illustrate HTML coding.

If the disparity in the cohort was wider, it may have been exceptionally difficult to teach the module as more time would have been needed to establish core skills. Equally, had there been less disparity, then more users would have gained high end use of computing skills and been given chance to practice their skills for future progression. Assisting the learners to identify and develop these skills could be developed across the range of modules that are currently on offer to the learners at level 3, 4 and 5 on VTOS programmes. Had the research setting had more learners with English as a first language, the language used and the pace of delivery would have changed the outcomes of the course. In regard to the level of prior education, some of recognition of prior learning and life experiences mapped to other countries would facilitate better streaming according to ability and require less rudimentary teacher lead activities. If the source of recruitment of adult learners was profiled and shared with partners such as the Department of Social Protection, the Department of Social and Family Affairs and the Department of Education this would reduce disparity across all courses and perhaps increase academic motivation in learners returning to and participating in adult education. The impact of the facilitator on the research study was noted in the Findings. It is important to note that this was most unexpected and had presented a positive image which may have influenced the females participating in this research and perhaps in the future.

5.7 Progression Paths

There are a variety of progression paths undertaken by adult learners, especially for those in a second chance setting. The progression paths for those who successfully complete the Level 4 Web Design module is to proceed to a Level 5 full or component award either within VTOS or at another venue. There are three core routes identified in this research; further education with qualifications awarded by QQI, direct to third level as mature students or entering the work force after completing studies in May 2014. Learners are making these choices while the educational system for is undergoing an era of change including structural changes (Brady 2012). The purpose of the National Framework of Qualifications was outlined and allows for comparisons to be drawn and recognition of prior learning,
however, within the further education sector there is a wider diversity of learners and broader choice of subjects supported by electronic resources by introducing adult learners to VLE systems. QQI offers adult learners a second chance at learning that does not focus on terminal examinations, however, it is subject to external authentication of results to ensure academic and skills based standards are maintained.

There are a number of initiatives available for those who wishing to pursue a route of returning to employment; Springboard, Bluebrick, JobBridge, internships and VTOS offer courses for learners that support a range of labour market activation measures to reach out to the medium and long term unemployed. The aim of these options is to provide the learner with a set of skills and knowledge that you make them more employable and attractive to employers in the twenty first century.

The Findings chapter outlines the opportunities that are available for adult second chance learners that are broadly similar to those at different stages of the education system. This is important as many adult learners may have missed these opportunities on the first attempt at education. The significance and rise of coding will need for many careers to understand computational thinking and processes.

For those seeking academic progression, half of the participants are pursuing further education using the avenues available to adult learners; Levels 5 and 6 on the NFQ with qualifications from QQI and accessing direct entry to third level as mature students. Depending on subject choices, some learners may be able to gain credit exemptions on entering third level courses. The half of the cohort that were undecided in their choices for future progression appear to be more motivated by financial rewards by gaining any form of paid employment after completing studies in VTOS. The majority of participants in this research accepted that knowing HTML coding would present them with wider choices when choosing elective subjects in the future and the gaining of additional generic transferable skills for the workplace along with subject matter expertise in HTML coding. Some learners were open to progressing in coding and used the opportunity in VTOS to discover an unknown interest in a new subject area. For those not pursuing academic progression they
viewed web design as an employability skill which is appropriate as the title of the full award at Level 4 is Employability Skills. Learners appreciated that they could learn web design in a similar fashion to on the job training. A limited selection of learners regarded coding as an essential skill and these are the learners who are most in tune with the workforce of tomorrow. However, it must be noted that there were learners who will progress to a work place situation that will not involve the use of computers.

The researcher is in agreement with the Findings chapter. With the introduction of a new module that is designed for the modern work force VTOS Limerick city could serve as an exemplar for other VTOS centres. With an increased emphasis on computing there is a need to provide reliable cost effective solutions such as Wi Fi and VLEs so that second chance learners compete on an more even education playing field. Progression should be viewed as a personal learning pathway in the journey of life long learning.

There are a number of influences that may have changed the outcomes into progression research. If learners had increased access to guidance counselling or closer work with a case worker from the Department of Social Protection learners may become more focused on the outcomes before the commencement of a course. This would impact on the motivation level of adult learners. Had the situation occurred that more adult learners regarded web design as a timetable filler then attendance and participation would have been lower. The age profile of the adult learner demonstrated that adults are as open to learning new technology as other learners, however, if the age profile had presented the researcher with Luddite attitudes then there would have been a struggle to maintain interest in the class. If more links were established with local employers so that learners can obtain work placements to practice skills in a real world situation then the case may exist that employers could recruit direct from the college.
Chapter 6: Conclusions

6.1 Introduction
This study set out to determine if an introduction to HTML coding will widen the possible progression routes for adult returning to second chance education. This research was required as adult learners have specific measures of demands and challenges when returning to education. The research took place in Limerick city in a second chance adult education setting where learners achieve QQI accreditation and awards on levels 2 - 5 on the NFQ. The introduction of the web design module was a new departure in module choices for learners and it was deemed important that measurement was made of academic background, demographics and perceptions of widening academic and career choices at the start of the course. This research will support the end of year academic results (available May 2014) and will fill any gaps that may exist in relation to other LCETB venues facilitating the Level 4 Web Design module.

6.2 Summary of Research Findings
The main findings are as follows:

6.2.1 Adult Learner Profile
The profile of an adult learner in this study was a person over 21 years who originated from Eastern Europe and is now resident in Ireland. Some of the adult learners had completed some forms of prior education with primary level as a common denominator. Some may not have had the opportunity to obtain a second level senior cycle qualification with resulting differences in the level of comprehension and use of the English language. Comparisons have been made between learning a language and a computer language at the same time by Roffe (1999) which is also supported by Jones et al (2011) as well as Byrne and Lyons (2001). There appeared to be limited access to Leaving Certificate or equivalent or Post Leaving Certificate courses as earning an income is a higher priority than qualifications that need the dual investment of time and energy. These learners have a tendency to over rate their own level of competency, especially when comparing themselves to others in an educational context. At the start of the study some of the learners had anticipated some level of difficulty with the subject, however, on reflection the difficulty may have lain more with lack of self managed learning skills than difficulty with the course materials. The experience
from this research is that some adult learners need to be pushed out of their comfort zones to discover new concepts, theories and ways of learning and then build on this to increase confidence and efficiency in using technology.

Acknowledgement of the assumptions and implementation of the rules of adult learners according to Knowles (1990) facilitated the transfer of knowledge, focus and attention to class activities while having a relaxed atmosphere to allow adult learners to express themselves allowing the learners to construct their own meaning and applying coding skills for the project phase of the course.

6.2.2 Disparity of Skills
The range of skill sets displayed by the learners was from very rudimentary to fundamental. Where the learners had achieved prior certification in a computing module, it was at Level 3 on the NFQ which is basic word processing along with learning how to make effective use of the Internet for information, communication, collaboration and learning. At Level 3 there are no examinations, only a collection of work and a short skills demonstration that serves as evidence of ability. The participants of this research are, for the most past, are dual immigrants of computing and countries. It would be interesting to correlate skill sets before and after completing VTOS courses so as to ensure that the courses are suitable and facilitate the learners needs to acquire ICT skills for future education or employment.

From a theoretical perspective, a deeper understanding of the adult learner in the second decade of the twenty first century would be pertinent. The rate of change in technology demands new digital skills of all generations in order to avoid the digital divide as outlined by Gilster (2013). The rise in popularity of social media is bridging the gap between the digital divide as more people engage in collaborative communications. Digital literacy should be seen as way forward for social integration and personal development (Shapiro et al 2009) with greater access to and use of ICT in education. Society is depending on traditional teaching methods that have evolved over time, however, ICT is developing at a faster pace.

The differences between education and training are merging with the organisational structural changes in adult education. In this state of flux, perspective is needed for all
stakeholders in order to best serve the knowledge based economy as there is a requirement for publicly funded education systems to provide graduates that are required in the future economy as suggested by the Expert Group on Future Skills Needs (2007).

6.3 Limitations of this research

There are a number of limitations that applied during this research that impact on the results.

6.3.1 Time

The teaching phase of the course took place over twelve weeks and only provided a snapshot view of a yearlong course. An additional time restriction was the scheduling of bi-weekly classes that were further curtailed with some learners completing work placements at different times in the year.

6.3.2 Sampling

The sample size of twenty two participants represented the entire cohort of 210 VTOS students which is approximately a ten per cent sample. Had the web design module been made available to the entire student cohort, then there possibility would have been greater subscription to the module with a broader sample. The perceptions of coding as perceived by the learners were representative of the wider student body.

6.3.3 Languages

The course content was presented using traditional pedagogical methods, however, the variations in the levels of English language that learners presented impacted on the research in terms of learner comprehension and interactions using the English language. Furthermore, some learners were learning to type in a second or third language and an unfamiliar keyboard layout. This had a dramatic effect on learner input efficiency and added to the project work load. During the course of this research, the only coding language used was HTML which did not allow for comparisons to other coding languages.

6.4 Recommendations for further research

It would be a worthwhile exercise to follow up the actual progression routes taken by the adult learners that participated in this research. This information will become available from September 2014 and this documentation will prove to be interesting along with
informal discussions at the graduation ceremony to assess the widening of progression choices.

There is a wealth of literature of the use of ICT in education from Balanskat et al (2006), Zammit (1992) and from the Department of Education and Science (2008) however, there are limited best practice examples as both learners and educators explore the many possibilities and interest avenues that are available in utilising ICT solutions for learning. There is a wealth of literature regarding the benefits of ICT in education as outlined by Richardson and Hynes (2008), however, there is little research on best practice for adult learners. Curriculum development needs to be developed for the new technologies that do not yet exist and computing curricula need to be future proofed to enable digital citizens the focus of primary and second level education with consultations from all stakeholders.

Future research would also provide interesting insights regarding the impact of blended learning and student motivation. As this research showed, despite encouragement, learners were reluctant to accept full responsibility for their own learning and solely relied on the teacher within allocated class contact time. Future research might be useful and might be able to address why learners do not fully accept the need to take greater responsibility for their own learning.

Further research based on an enquiry into the causes and reasons behind the lack of completion of PLC courses would prove enlightening for PLC providers. Government funding provides access to adult learners at little or no cost and this investment is for the future economic growth of the country with the as yet unknown demands as suggested by Richardson and Hynes (2008).

6.5 Concluding comments
This case study has outlined an assessment of the widened choices for adult learners after the introduction of HTML coding. There were a number of findings in relation to adult learners, perceptions of coding and future academic and career choices. The adult learners that participated in the web design module appreciated the opportunity to learn a new vocational skill while developing confidence in use ICT. The addition of a virtual learning
environment will be of assistance to learners that choose to progress on an academic pathway.

It is hoped that the findings and recommendations of this research will be a source of reference and assistance for organisations that facilitate web design and ICT modules in adult education.
References


McGann, R. (2013) ‘Research using a variety of tools - being a builder (researcher) shouldn’t mean you only use a hammer (single paradigm)’, *Twitter*, available: https://twitter.com/rorymcgann1 [accessed 14 Jun 2013].


Naughton, J. (2012) What You Really Need to Know about the Internet from Gutenberg to Zuckerberg, Quercus: London.


Appendix A: Learner Questionnaire

Research Questionnaire - Sheila McDonald

This research is being conducted as part of a University of Limerick Masters research project for Sheila McDonald. The topic of research is:

Will introducing HTML coding widen your progression routes?

The personal questions at the end will only be used to classify your answers and make statistical comparisons - your details will not be shared with any other sources. Your help is appreciated in completing the questions below.

1. Can you use the Internet for searching for information?
   - Yes ☐
   - No ☐

2. How would you rate/score your level of skills on the Internet
   
   1 2 3 4 5
   
   Not good ☐ ☐ ☐ ☐ ☐
   Excellent

3. What is your perception of HTML coding? *
   
   1 2 3 4 5
   
   Easy ☐ ☐ ☐ ☐ ☐
   Difficult

4. Do you have an interest in coding/programming?
   (Do you want to know how to created web pages with HTML code?)
   - Yes ☐
   - No ☐

5. Have you ever used any programming languages before this course?
   - Yes ☐
   - No ☐

6. Will having knowledge of HTML help your job prospects?
   - Yes ☐
   - No ☐

7. Do you have any experience of:
   - HTML ☐
   - CSS ☐
   - DHTML/XML ☐
   - JavaScript ☐
   - Python/Perl ☐
   - Other: ☐

2
8. Will having knowledge of HTML help your academic choices?
   Will HTML be of use in further education?
   ☐ Yes ☐ No

9. How important do you think coding will be in your working life?
   1  2  3  4  5
   Not important ☐ ☐ ☐ ☐ Very important

10. What is your nationality? *
   
11. What is your academic background?
   ☐ Primary ☐ Junior Cert ☐ Leaving Cert ☐ PLC/Third Level
   ☐ Other: ____________________________

12. Are you male or female? *
   ☐ Male ☐ Female

Thank you for your participation
Appendix B: Invitation to Participate in a Research Project

Informed consent

An academic case study to exam if the introduction to coding would provide adult learners with wider options when reviewing possible progression options.

Dear Learner
You are being invited to participate in a research study which looks at attitudes, perceptions and opinions of adults in a second chance educational setting.

You may stop at any time if you feel uneasy or unhappy about answering questions and decide to excuse yourself from the survey. This research is academic research on the M.A. Digital Media Development for Education from the University of Limerick.

Your responses are completely anonymous and your data will be held in a password protected environment.

I have read and understood the above and I agree to participate in this study.

Signed: ___________________________      Date: ___________________________
Appendix C: Permission to conduct research

VTOS Coordinator

2nd September 2013

Title of research study:

A case study to assess the impact of an introduction to HTML coding on adult learners by presenting them with a wider choice of options for further academic study or direct employment.

I am a student on the Master of Arts in Digital Media Development for Education, at the University of Limerick. As part of my studies, I am undertaking a research dissertation on a topic related to ICT in education.

In my research, I am reviewing the possible widening of academic and career progression routes for adult learners as a result of being introduced to HTML coding on a Vocational Training Opportunities Scheme (VTOS). The study also aims to create an adult learner profile. In order to collate information on the topic, I would appreciate if you would agree to me carrying out this research in the college. With your permission, I intend to invite members of the web design module on the General Studies course at Limerick Adult Education College to participate in my research.

The collected data will be stored in a secure password location. Participation in the study is voluntary and participants can withdraw from the research at any time. The results from this research study will be reported in my thesis and may be disseminated through professional publications. If you have any queries or require further information on the research study, please contact me or my Supervisor:

Student name: Sheila McDonald
Email: [Redacted]
Tel: [Redacted]

Supervisor: Catriona Lane
Email: [Redacted]
Tel: [Redacted]

I understand in detail the particulars of the research dissertation and I hereby give my consent for Sheila McDonald to carry out this research in the college.

Signature: [Redacted]
Printed Name: [Redacted]
Date: 5 September 2013

Researcher signature: [Redacted]
Date: 5 September 2013
## Appendix D: Class Observational Records

<table>
<thead>
<tr>
<th>Student Characteristics</th>
<th>Student Activities</th>
<th>Student engagement</th>
<th>Student motivation</th>
<th>Teacher characteristics</th>
<th>Learning environment</th>
<th>Atmosphere in class</th>
<th>Dev. of higher order thinking skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed: ages, gender and first language. Unknown subject for all</td>
<td>Observing class objectives, watching demo and replicating</td>
<td>Half fully engaged, worked in pairs. It was easy for some people not to participate</td>
<td>Low, not remembering the 2 steps of save &amp; preview and slow moving between applications</td>
<td>Subject matter expert using class plan when class was delivered previously with a similar target audience.</td>
<td>10 learner PCs, no teacher PC, whiteboard using 2 different colours for tags etc. Writing one line of code on the board at a time.</td>
<td>Short attention spans, some anxious for the break time and reduced class contact time as a result.</td>
<td>Not evident</td>
</tr>
</tbody>
</table>

<p>| Group A: | Observing class objectives, watching demo and replicating | Full engagement, some had trouble keeping up with the number of steps involved. | Where a learner struggled, the level of engagement was low with those with good core IT skills engaging more | Subject matter expert using class plan when class was delivered previously with a similar target audience. | 10 learner PCs, no teacher PC, whiteboard using 2 different colours for tags etc. Writing one line of code on the board at a time. | Short attention spans, some anxious for the break time and reduced class contact time as a result. | Some learners actively participating and experimenting with their own choices. |</p>
<table>
<thead>
<tr>
<th>Group B:</th>
<th>Observing class objectives, watching demo and replicating</th>
<th>Full engagement, some had trouble keeping up with the number of steps involved.</th>
<th>Where a learner struggled, the level of engagement was low with those with good core IT skills engaging more</th>
<th>A larger proportion of high quality 1 to 1 tuition required due to lack of input accuracy and the added difficulty of having English as a second or third language.</th>
<th>10 learner PCs, no teacher PC, whiteboard using 2 different colours for tags etc. Writing one line of code on the board at a time.</th>
<th>Due to the precise nature of coding, some learners have input errors (typos) with resulting error(s) in the browser.</th>
<th>Some development of an awareness of the exact nature of the task and the focus required for same.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A:</td>
<td>Watching demo and replicating</td>
<td>Students not reviewing material in a 2 week gap although engaged in class.</td>
<td>Where a learner struggled, the level of engagement was low with those with good core IT skills engaging more</td>
<td>10 learner PCs, no teacher PC, whiteboard using 2 different colours for tags etc. Writing one line of code on the board at a time.</td>
<td>Some learners actively participating and experimenting with their own choices and assessing results.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B:</td>
<td>Introduction to VLE for resources were made available - note: some of the learners had</td>
<td>Students not reviewing material in a 2 week gap.</td>
<td>Where a learner struggled, the level of engagement was low with those with good core IT skills engaging more</td>
<td>10 learner PCs, no teacher PC, whiteboard using 2 different colours for tags etc.</td>
<td>Some learners actively participating and experimenting with their own choices and assessing results.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
used Moodle previously.

Mid term | Mid term | Mid term | Mid term | Mid term | Mid term | Mid term | Mid term

Group A: Introduction to VLE for resources were made available - note: some of the learners had used Moodle previously. Showed resource for choosing and setting colours.

All engaging in activities with some displaying an alertness to how fast others were completing the activities.

Some excelling at activities. Others very slow at typing and saving activities.

10 learner PCs, no teacher PC, whiteboard using 2 different colours for tags etc plus 5 activity handouts for learners

Handout for software toolbar issued and a run through before class to review the required actions.

2 students out of 10 have developed the basic skills in HTML and rarely make errors, unlike the rest of the group.
Appendix E: Extracts from Researchers Diary

The following are extracts from the researcher diary that was completed over the course of the research.

2 October 2013

The oversubscribed expression of interest session last week resulted in the division of the class into two groups; A and B. Today, Group A worked on understanding each line of code in a basic HTML document. Some learners struggled to process the number of steps and concentrated on writing each instruction with extra explanations for their own records. Other learners appeared to grasp concepts more easily and investigated their options for applying different colour combinations in hexadecimal notation in HTML code. Some of the learners displayed difficulty in navigating software that was not made by Microsoft. It was also interesting to note that some of the learners preferred not to write notes but take photographs of the whiteboard with smart phones.

9 October 2013

Today was meant to be a repetition of the content from last week. This was a more intense class as more people in Group B required individual tuition to explain concepts in different ways as they struggled with the concepts and inputting more slowly and with less accuracy than Group B. It was very difficult to allocate personal time slots for each person in the group.

23 October 2013

The class looked at me in absolute horror! Prior to class I had sent everyone an email that explained how to access the VLE and how I monitor student access and track activities. Not one person in the group had accessed the VLE, very few had checked their email accounts. I was very disappointed and frustrated at their lack of self-managed learning. I left the class exhausted as I had spent a lot of valuable class time explaining how to access the content of the VLE instead of working on my intended class plan.
6 November 2013

The two week gap between classes is starting to show in the actions of the learners. One learner had forgotten how to open a folder on the Desktop. This person expressed great apathy towards the class; thankfully, others are excelling at the given tasks, perhaps because I was the person who taught them last year?

13 November 2013

It was difficult to maintain enthusiasm for the web design class as only 2 from a group of 10 arrived for class. In the days before this, I had received an email informing me that some of the learners on the General Studies course were starting work placement for 10 days. When I read the email I didn't think it would impact on my class quiet so much. The 2 students received more individual attention and this was of much benefit to the learners. It now appears that the bi-weekly schedule is working against me as I will not have class contact time with these learners for over a month.
### Appendix F: Curriculum Plan Template

<table>
<thead>
<tr>
<th>LCAES Curriculum Plan Template</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Name</strong></td>
</tr>
<tr>
<td><strong>Course Code</strong></td>
</tr>
<tr>
<td><strong>Duration</strong></td>
</tr>
<tr>
<td><strong>No. of Sessions</strong></td>
</tr>
</tbody>
</table>

**Overall Aim**

To enable learners to gain an understanding of best practice in web design from structural, presentation and usability perspectives.

**Objectives:**

This programme will enable learners to:

- Become familiar with Hypertext Markup Language (HTML) and the use of HTML Editors
- Become competent in the use of Cascading Style Sheets (CSS) and CSS Editors
- Design, construct and maintain webpages and a website
- Explore webpage design and usability best practice

**Outcomes**

Learners will be able to:

1. Describe the structure of a webpage.
2. Discuss the features of a good website.
3. Design a basic website to a maximum of two pages.
4. Insert basic HTML tags.
5. Format text to include bold, italics, font size, font colour.
<table>
<thead>
<tr>
<th>Accreditation and Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>The 100% Project will require learners to demonstrate the following knowledge skills and competences:</td>
</tr>
<tr>
<td>• An understanding and application of concepts of web authoring</td>
</tr>
<tr>
<td>• Use of relevant research techniques</td>
</tr>
<tr>
<td>• Mastery of web authoring tools and techniques</td>
</tr>
<tr>
<td>• Ability to design and construct a website</td>
</tr>
<tr>
<td>• Ability to enter and retrieve data from paper/computer sources</td>
</tr>
<tr>
<td>• Ability to evaluate the finished product</td>
</tr>
</tbody>
</table>

6. Format page layout to include centre, background colour and Background.
7. Apply RGB colour system.
8. Create ordered and unordered lists.
9. Insert hyperlinks, and images or graphics.
10. Use a paper based system and a computer system to enter and retrieve data.
11. Save webpage as HTML file.
13. Print finished website.
<table>
<thead>
<tr>
<th>UNIT/TOPIC/SESSION</th>
<th>METHODS</th>
<th>RESOURCES/SUPPORTS</th>
<th>ASSESSMENT/EVALUATION</th>
<th>NOTES</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduce web design with an overview of the subject</td>
<td>PowerPoint presentation plus 6 page handout for explaining code, course structure (100% project), subject support and progression routes</td>
<td>Handout ready for all participants</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to software (Arachnopillia)</td>
<td>Chalk &amp; talk with learners practicing inputting of code</td>
<td>Whiteboard, different coloured markers for text and code and attributes</td>
<td>Completion of steps in class</td>
<td></td>
<td>1, 2</td>
</tr>
<tr>
<td>More work in coding</td>
<td>Demonstration of viewing source code of existing web sites. Chalk &amp; talk with learners practicing inputting of code</td>
<td>Explaining tags with handouts</td>
<td>Completion of steps in class</td>
<td></td>
<td>4, 5</td>
</tr>
<tr>
<td>Working with RGB colours</td>
<td>Setting 5 colours in Arachnopillia</td>
<td>Moodle with resources added for web design course Using a colour picker tool on Visibone.com/colorlab Printed colour swatches</td>
<td>Completion of steps in class</td>
<td></td>
<td>5, 6, 7</td>
</tr>
<tr>
<td>Heading styles</td>
<td>Drill and practice of inputting code of an exercise based on heading styles</td>
<td>Class exercise handouts for each participant</td>
<td>Completion of steps in class</td>
<td></td>
<td>4, 7</td>
</tr>
<tr>
<td>Font sizes</td>
<td>Drill and practice of inputting code of an exercise based on font styles</td>
<td>Moodle with resources added for web design course Exercise created for font sizes</td>
<td>Completion of steps in class</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Lists – Ordered and unordered</td>
<td>Drill and practice of inputting code of an exercise based on font styles</td>
<td>Moodle with resources added for web design course Exercise created for lists</td>
<td>Completion of steps in class</td>
<td>4, 8</td>
<td></td>
</tr>
<tr>
<td>Tables &amp; character entities</td>
<td>Drill and practice of inputting code of exercises for tables to include special characters</td>
<td>Moodle with resources added for web design course Exercises created for special symbols eg. €</td>
<td>Completion of steps in class</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Hyperlinks</td>
<td>Drill and practice of inputting code for different types of links: Internal, external, bookmark and email</td>
<td>Moodle with resources added for web design course</td>
<td>Completion of steps in class</td>
<td>3, 7, 9</td>
<td></td>
</tr>
<tr>
<td>Images and the web</td>
<td>Demonstration with drill and practice of sizing, cropping and organizing images for the web</td>
<td>Resources on Moodle for types of graphics and image editing software</td>
<td>Completion of steps in class and preparation of images for the project</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Start project</td>
<td>Discussion Q &amp; A Idea generation</td>
<td>Whiteboard Markers Assessment Brief Moodle</td>
<td>When project is submitted Emphasis on the 100% project aspect and the deadline for submission and exact details of what is to be included where in the project</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Development of project</td>
<td>Discussion with individual students and group</td>
<td>Whiteboard Markers Assessment Brief Moodle Template plan for report section of project</td>
<td>When project is submitted</td>
<td>Stress the importance of working on the project outside of class contact time</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>---------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Finalise project</td>
<td>Discussion with individual students and group</td>
<td>Resources on Moodle as a check list for completing a web site</td>
<td>Review project and supporting documentation</td>
<td>Students can use print outs/screen shots and online resources for evaluating the projects</td>
<td></td>
</tr>
<tr>
<td>Evaluate project</td>
<td>Discussion with individual students and group</td>
<td>Resources on Moodle for evaluating a web site</td>
<td>Review and submit project documentation</td>
<td>Students can use print outs/screen shots and online resources for evaluating the projects</td>
<td></td>
</tr>
<tr>
<td>Finalise portfolio</td>
<td>Discussion with individual students and group</td>
<td>Portfolios Marking sheets All necessary paper work – print outs of web pages and supporting documentation</td>
<td></td>
<td>Possibly publish (upload) completed sites to the Internet to be viewed the other students in the College.</td>
<td></td>
</tr>
</tbody>
</table>