Computer simulation in Initial Teacher Education: A bridge across the faculty/practice divide or simply a better viewing platform?

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Abstract

This thesis reports on a mixed methods research project into the emerging area of computer simulation in Initial Teacher Education (ITE). Some areas where simulation has become a staple of initial or ongoing education and training, i.e. in health care and military applications, are examined to provide a context. The research explores the attitudes of a group of ITE students towards the use of a recently developed simulation tool and in particular considers the question of whether they view computer simulation as a 'third place' between faculty based 'theory' elements and school based 'practice' elements of their training or whether they consider the simulation to be enhanced 'theory' learning.

Data from pre-experience and post-experience questionnaires are compared. A series of indicative case studies, representing positive and negative changes in attitude, are presented from data collected using semi-structured interviews.

A range of themes emerge indicating that the students' attitudes towards computer simulation are complex and not based on single factors such as the fidelity of the simulation presented. A major finding of the research is that students' attitudes towards the computer simulation appear to reflect deep seated views of teaching and learning unrelated to simulation. Indications are that if future use of simulation is to be effective then designers must pay at least as much attention to emotional impact as cognitive development.

Evaluation of the success of the study is included and suggestions for further study are made.

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This one is for me – to see if I could.

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Glossary & Abbreviations

Note: Many of the following terms are open to debate and are widely interpreted. Whilst it is acknowledged that the definitions below are not the only ones in use, they are:

a) Commonly used by writers and researchers in the field and
b) Where not otherwise indicated, consistent with definitions from the Cambridge Advanced Learners Dictionary (online).

Attitude	A feeling or opinion about something or someone, or a way of behaving that is caused by this.
Computer Simulation	A model of a set of problems or events presented via a personal computer interface that can be used to teach someone how to do something.
Disposition	The particular type of character which a person naturally has and therefore a natural tendency to behave in a particular way.
Fidelity	The closeness to reality of a simulation. A simulation with 100% fidelity would be indistinguishable from reality.
Flow	A state of mind first postulated by Mihaly Csikszentmihalyi. When engagement with an activity becomes such that outside concerns (such as self consciousness and a sense of time) become irrelevant, a person is said to be in a state of flow.

Game	A voluntary activity, separate from real life, creating an imaginary world that absorbs the player's full attention. Games are played out within a specific time and place, are played according to established rules, and create social groups out of their players (Michael & Chen, 2006, p19).
Retroduction	A form of inference in which events are explained by postulating and then identifying mechanisms which are capable of producing them (Sayer, 1992, p107).
Serious Game	A game that has an explicit and carefully thought out educational purpose, not intended to be played primarily for amusement (Abt, 1970, p9).
Simulation	A model of a set of problems or events that can be used to teach someone how to do something
VCC	The Virtual Case Creator – A computer simulation software tool, designed by academic staff at the Faculty of Health, Birmingham City University, UK. Originally used to teach nursing students decision making skills, the creators are now considering its application to a wider range of professional education including Initial Teacher Training.
Virtual Reality	An immersive set of sensory inputs controlled by a computer, which seem to represent a real place or a situation that a person can take part in.

Chapter 1 – Introduction

This thesis concerns the use of computer simulation in Initial Teacher Education. Both before and after engagement with a computer simulation designed to teach ITE students professional skills, knowledge and attitudes concerning multi-agency working, students' views and opinions were elicited in an attempt to try to understand the complex relationships between student attitudes towards this pedagogy as both learners and teachers.

This first chapter sets the context for the thesis that follows in that it puts forward the main reasons for the research and the direction that the research took from a variety of perspectives. These perspectives include my personal interests and motivations, the local context of the faculty within which I work and the research is situated, and the historical backdrop against which the project that is an intrinsic part of the study was created. In order to do this it will be also necessary to consider the use that simulation has been put to in fields outside of ITE. It is not possible to consider the use of computer simulation without some discussion with the closely allied concept of 'serious game' and so there will be a section dedicated to that. From these discussions questions begin to emerge that will be explored in the following chapters. The second chapter will examine the literature in the field and will attempt to provide both a theoretical framework within which to place the empirical study and the beginning of an attempt to answer some of the emerging questions. Chapter three will present the actual computer simulation project that lies at the heart of the study in an attempt to give the reader a clear view of the interactions undertaken by the students. This is necessary if one is to understand the interpretations given to the student responses to the research tools used, which are explained and critiqued in chapter four. Chapters five and six go on to discuss the results of the study and attempt to answer the research questions more fully. Chapter seven will conclude the thesis with a critical appraisal of the degree to which the research questions have been answered

and, in light of this, will attempt to indicate some provisional ways forward for further research in the area.

1.1 – Personal context

I work as a tutor in an education faculty of a Post 1992 University. The university is one of the largest providers of Initial Teacher Education (ITE) in the West Midlands Region of the United Kingdom and the faculty runs a range of courses covering Early Years, Primary, Secondary and Post-Compulsory Education. My main input is into the BA (Hons) Primary Education with Qualified Teacher Status and Postgraduate Certificate in Education Primary Courses which are rated by Ofsted as excellent. The students that took part in the project and research reported herein were final year undergraduates on the three year Primary Education course. During my work in the faculty I became involved in a project that aimed to increase student engagement by the use of computer simulated scenarios. My personal interest in the use of computer simulation has developed over a considerable period of time and it is really not possible to attribute it to any one particular experience. I was the first person I knew to own a personal computer and I have long been interested in the use of computers for both educative purposes and for entertainment. The fact that the first wave of personal computers to enter schools did so at around the time that I started out as a primary school teacher, may have some part to play in my interest. In relation to the use of simulation, certainly a formative moment would be my own initial teacher training at a polytechnic in the early 1980's. In the final year of the four year undergraduate course that I attended, a simulated school was presented as a context for learning about and assessing my understanding of issues related to

school management and organisation. This was not a computer simulation as this was in the very early days of the personal computer and they were rare in the institution. The simulation was presented on paper in a series of documents such as might be found in a real school. These included design plans, policy documents, children's records etc. Scenarios were presented, also in writing, that we were able to respond to individually and in groups. Although the exact details of this simulation have long since faded from my memory, the main impression that remains is a mixture of intrigue and concern – intrigue in the prospect of doing something 'new' and 'different' and concern in the fact that something that seemed so 'experimental' might have a significant impact on my final grades in the associated exam. In retrospect, it is possible to see this innovation in the context of the wider changes happening in ITE at the time.

1.2 – Changes in ITE

Initial teacher education has gone through a rapid series of changes in the last thirty years and there is little indication that the pace of change is likely to let up (Hobson, 2002). From the creation of CATE (the Council for the Accreditation of Teacher Education) in 1984, its transformation into the TTA (Teacher Training Agency) in 1994 and the requirement of OFSTED (Office for Standards in Education) to monitor the quality of courses in the same year, to the creation of a National Curriculum for ITE in 1996, there has been one recurring theme – the desire of successive governments to move teacher training towards a more 'technicist', less academic or 'theoretical', basis (Blake & Hanley, 1998, Williams & Soares, 2002). An analysis of the political background to the desire for this change is beyond the remit of this thesis, although the fact itself is key to the direction the research took.

As Hobson (2002) points out, the idea that teaching is a technical activity, leading to an ever increasing emphasis on practicum experiences in ITE, is a view that is shared by a majority of ITE students. Interestingly, this is a view that is apparently formed *before* exposure to actual ITE courses (Hobson & Tomlinson, 2001). Tutors, who are (or perhaps *were)* often experienced and successful teachers themselves tend to place a greater value on 'theory', that is the importance of pedagogic knowledge, than do students. It has often been found that students who place less value on what they learn outside the classroom are not in a position to make effective use of what they do learn. For example, Eraut (1994) found that students and newly qualified teachers often adopt coping strategies in classrooms that, 'relegate valid theoretical ideas to 'storage' and [that] then [they] are not able to return to them' (Emery,1998, p287). This can lead to a tension between what the students see as the 'important' aspects of the course and the perceptions of those running and delivering the course.

These ideas will be returned to shortly in the Literature Review that follows, however, for the moment suffice it to say that it is not surprising that Higher Education Institution based ITE providers should look for ways to 'bridge the gap' between theory and practice by trying to find ways to make faculty learning seem to be more relevant to the students. Such an attempt opened the door to the research that is described in the following pages. Essentially the project involved the use of simulated scenarios presented to the students via computers. A much fuller description of the project follows in a later chapter; however, in order to more clearly understand the historical context, it is necessary to take a small diversion from teacher training to two other kinds of training.

As this study is concerned with student teachers' attitudes to computer simulation in terms of their own learning and as pedagogy for the children they will teach, a review of the history and current state of simulated learning in that field is necessary. We will find that this is a relatively new area. However, a brief exploration of simulated learning in two other areas will be illuminating. Military usage of simulation has a long history whilst its usage in medicine is somewhat

newer, but still more advanced than in teacher training. By looking at what these two areas have in common, we may discover insights into its application in Initial Teacher Education.

1.3 – Military and Defence Applications

The use of simulation in defence training is clearly not new (Smith, 2010) and as Michael & Chen (2006) point out, 'The military has perhaps the longest history of using games to teach new recruits and new officers.' (p49). The first known military simulation is considered to be Chaturanga, (fig 1.1) a board game played in India over four thousand years ago (Perla, 1990).

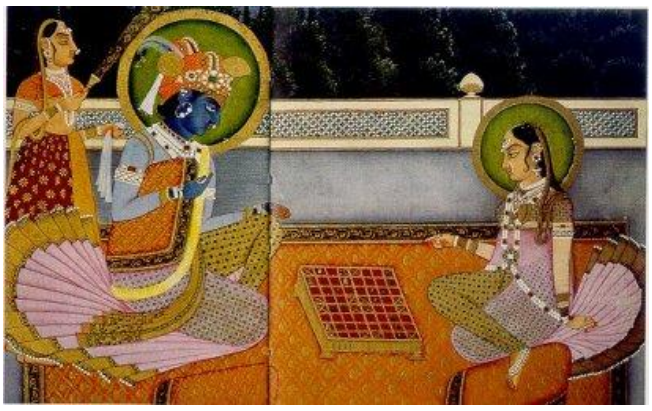

Fig.1.1 Krishna and Radha playing chaturanga on an 8x8 Ashtāpada (http://en.wikipedia.org/wiki/File:Radha-Krishna_chess.jpg)

Although Chess is the more well known simulation of battle, both games have in common a regard for tactical decision making that was considered to be the basis for 'officer' training. The first 'modern' use of a simulation to train commanders of troops was probably a game designed by George von Reisswitz called

'Kriegspeil' (fig 1.2). This was used in the Prussian army as training in the Franco-Prussian war of 1870-71 (Michael & Chen, 2006, p52). What made this 'game' stand out from simple board games such as chess was the introduction of an 'umpire' whose role it was to mediate between the sides. In this way, although the game was played out on topographical maps, a sense of the frustration of reality was achieved by only allowing each commander to 'see' the troops that he would see in reality. In retrospect, it is this innovation that points the way to the convergence with computer based technology of modern simulations and games. The computer can act as an impartial umpire, selectively hiding and revealing information and ensuring that all the 'rules' of reality are followed.

There is also an interesting parallel here with education generally. As a teacher, what one 'sees' are the physical and verbal actions associated with learning. However, the actual process of learning, what happens inside the brain of the learner, is hidden and can only be inferred.

Fig.1.2 recreation of a Kriegspeil set (© von Hilgers, 2000)

What is also clear is that the reliance on simulation for training in the military is becoming greater rather than less (Kitfield, 1997) and that large sums of money

are invested in simulations for military applications (In 2003, for example, the USA government spent $4 billion out of its $10 billion training budget on simulation - Michael & Chen, 2006, p55).

The fact that the details of training of defence personnel is such a heavily guarded secret due to national security implications makes tracking the development of military and defence applications difficult. Physical simulations (sometimes called 'War Games') where actual troops simulate an actual offensive have long been a part of Western Military training. The issue of the difficulties in tracking developments are highlighted by '*Exercise Tiger'*. Six weeks before the D-Day landings in Normandy, the U.S. army simulated the landings in Devon. They used real equipment (including live ammunition and Royal Navy warships) to ensure that the experience was as close as possible to what they expected to happen in June. The results of this simulation were kept a closely guarded secret for some fifty years. In fact around seven hundred servicemen were killed in that 'simulation' (Exercise Tiger Trust, 2004, p1).

As the ability to create safer and more computer based simulations has grown, the appetite for their usage appears to have grown alongside. At least as long ago as the post-Yugoslavian wars of the mid 1990's, for example, computer simulation has been a key part of NATO training. For example,

> NATO aircrews bombed Bosnian Serb positions chosen with the help of a computer program called the Contingency Air Control System, which selects targets based on intended outcomes. Before launching, the pilots rehearsed their mission on Powerscene computer programs that create virtual landscapes in stunning detail from satellite photographs and other information. Developed by Cambridge Research Associates, the Powerscene was instrumental in helping achieve the Dayton Accords that brought peace to Bosnia (Kitfield, 1998, p1).

What is striking to note about this is the fact that the military had invested so heavily. Actual figures are not available, but one only has to consider the state of personal computers in 1994 (for example, MS Windows 3.1, 66MHz processor,

80 Mb Hard Drive, 256Kb RAM) to realise that this would have been highly expensive cutting edge technology.

Perhaps the best known military application of simulation in military training (and one that has also crossed over into the private sector) is the ‘Flight Simulator’. The history of the flight simulator as a training device goes back almost as far as the invention of the aeroplane itself (Moore, 2008). Early attempts were essentially low powered versions of the real aeroplane with ‘clipped wings’ so that the pilot could practise taxiing and become used to the controls. This would then proceed to the use of a real aeroplane with the trainee taking ever increasingly long ‘hops’ until flight was attained.

The analogy with a student teacher taking the first steps into teaching by working with small groups, then the whole class for short amounts of time, steadily increasing until they can ‘fly’ on their own is intriguing – not least because this was seen as a very dangerous, long winded and expensive training method.

The first functioning ground based training simulator that used similar radio and navigational instruments to the real thing is generally regarded as the ‘Link Trainer’ of 1930. The pilot sat in a chair within an aeroplane fuselage mounted on a universal joint.

Fig 1.3 TSgt James R. Schneid in a Link Trainer at Freeman Field, Seymour, Indiana USA in 1943

A system of pneumatic devices allowed the pilot to control pitch, roll and yaw in a simulated version of real flight. The dials, readouts and controls were designed to be a match for a real aeroplane.

Later versions had the ability to simulate mechanical failure. This early use of technology to simulate reality is notable for two important reasons. The first is summed up in an advert for the trainer from the 1940's where it clearly states, 'Perfection in Instrument Flying and Radio Navigation Technique can be attained quicker, safer and more economically in the LINK INSTRUMENT FLYING TRAINER' (Roberson Museum and Science Center, 2000, p4). This advert effectively sets out the rationale for all subsequent military applications of simulation technology. The simulator could speed up training (and this became increasingly important during the Second World War) and mistakes did not lead to the loss of an aeroplane or loss of life. The second reason why such an early use of simulation is notable relates to both how the patent was written and how this was used in other adverts. According to Moore (2008), the trainer was described in the patent as, "an efficient aeronautical training aid - a novel, profitable amusement device" (p2). At first Link did take the trainer to various fairgrounds in order to recoup some of the costs, however the words 'novel and 'amusement' were still used by Link when trying to obtain military backing. The novelty value and inherent 'fun' in using such a device was not lost on Link even though he had a serious purpose in mind.

The link between enjoyment and seriousness is similarly not lost on those responsible for modern day military training. What is interesting is how early the process starts. In 2002 the US Army commissioned and released *America's Army*, a role playing game aimed at those considering joining up showing them what it is like to be a soldier. 'The next best thing would be to be a real soldier' (Col. Casey Wardynski, Director of U.S. Army's Office of Economic Manpower Analysis, cited in Michael & Chen, 2006, p56). As a recruitment tool intended to help achieve a target of up to 80,000 new volunteers a year the game has been, 'surprisingly successful at doing just that and at 15 percent of the cost of other

recruitment programs.' (ibid). The military in the United Kingdom has now begun similar efforts to use games that simulate the reality of military service. For example, the Royal Navy website has links to two purpose built games that can be played on line [http://www.royalnavy.mod.uk/multimedia-centre/games/39772/]. The first – Commando Adventure – begins with the following statement splashed across the screen, "Do you have the strength of mind to become a Royal Marines Commando? 99.9% need not apply". It then goes on to state, "Welcome to Commando Adventure – the perfect place to test your skills as a potential Royal Marine. Our demanding combat scenarios call for commitment, focus and intelligence." In fact the game presented consists of some very basic multiple choice questions and straight forward mouse control 'point and click to fire' shooting games. The intention seems more to be to flatter potential recruits into believing they 'have what it takes' rather than to actually simulate reality. What is intriguing, then, is not the question of whether it fails to simulate reality, but whether it really sets out to try.

This blurring of the line between education and fun, which is a recurring theme of this study, is further emphasised by the interest that Military trainers have recently shown in applicants who have experience of commercially available 'war games'. Dunnigan (1992) wrote the following sincere, if somewhat optimistic, statement on the dedication page to his handbook on war games:

> To Raymond Macedonia (colonel, U.S. Army, retired), who single-handedly exposed the current generation of generals to wargaming and what it could do. His efforts, aided by a new generation of wargamers and wargame designers in the U.S. military, had a lot to do with the outcome of the 1991 Persian Gulf War, and our prospects for peace in the next century. (p5)

Research has also shown that, 'there are natural outgrowths of playing video games' (Michael & Chen, 2006, p58-9). Whilst not everyone would agree that these are valuable improvements for society generally, the military have been pleased to find that existing players of video games are de-sensitized to shooting

human targets, more willing to take aggressive action and more able to work in a team with minimal communication (ibid).

1.4 – Medical Applications

Simulation for teaching in the area of medicine is generally considered to have its origins in the mid to late Twentieth Century with the development by Åsmund Lærdal's 'Resusci-Anne' (Bradley, 2006, p255). This was the first effective, low-cost simulator that allowed students to practise resuscitation techniques. Later models have improved upon fidelity with the ability to simulate breathing, heart beat pulse etc. but the principle has remained the same – students are able to learn skills through experiencing some of the actual physical sensations required.

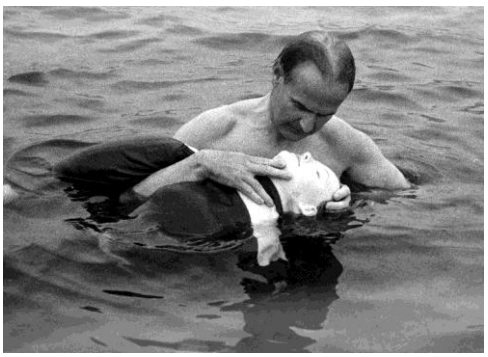

Fig 1.4 Åsmund Lærdal with a prototype 'Resusci-Anne' c1960

By the beginning of the twenty-first century simulation started to be used more in undergraduate and post graduate training of medical staff – principally doctors

but also nursing and technical staff. However use was somewhat patchy and left to individual innovators and researchers. Many of these small scale innovations in the use of simulation techniques report that students value the simulated experiences. For example, Weller (2004) reports on a case study of Medical students in New Zealand where the majority of students found the outcome a positive one. 'In particular, they value the opportunity to apply their theoretical knowledge in a safe and realistic setting.' (p32). This simulation, as in many of the simulations reported on in medical literature, did not use any kind of electronic or computer system. It was, in essence, a controlled role-play situation with real professionals supporting the trainees through a series of scenarios. Although a small scale study with just thirty one students,

> All students were very positive, with comments such as very valuable, fantastic, an excellent way of learning and better than alternative methods. Fourteen students felt simulation should be used more or that it was essential in their training. Five students remarked on the realism of the simulation, illustrated by the comments: '[It] gives some idea of an emergency situation and makes it more real.' (p35)

However, the report does not go on to state whether or not the actual learning gains, as opposed to the student perception of learning gains, were real, better than previously or longer lasting. The lack of long term studies on a very new area is an ongoing issue in all forms of social research and is a consistent feature of much of the literature related to simulation in medical education.

Kneebone & Nestel (2005) report on a view of simulation that mixes real people, to provide the sense of reality, and bench-top materials. These materials (such as a pad representing a gash to be sutured) can be carefully placed to make them seem like part of the person.

> Placing a living person at the heart of the encounter requires the learner to engage with a wide range of professional skills as well as technical ones. Crucially, it places the patient at the centre of the encounter, ensuring that the patient's voice is part of the learning process. This concept is a simple one, but its effect is very powerful. (p87)

Again, students were generally very positive in their comments about how well they thought the simulations worked in preparing them for reality. And, again, no attempt is made to evaluate the actual learning in a long term study – although the authors state that this is their intention for the future.

Whilst these and other examples point to the positive benefits of simulation in healthcare education, many writers in the field have been cautious to say the least. Several researchers have pointed out that the literature on simulation in this area, 'generally remains more descriptive than critically reflective.' (Bligh & Bleakley, 2006, p607) and this is hard to disagree with. In particular, there is strong criticism that the literature lacks a theoretical background linked to a clear pedagogy that can establish, in principle as well as in practice, whether learning through simulation is a 'good thing'. In essence, the question has become 'whether, learning by simulation can become self-referential and offer a simulation of learning' (Bligh & Bleakley, 2006, p606).

Longer term studies are needed to really establish whether simulations in medical education are producing more able professionals (Bradley, 2006). This leads to a circular problem, because whilst the lack of a coordinated and sustained approach leads to only small scale innovations and research, the results of that research are such that they do not inspire policy makers and those holding the purse strings to invest more heavily in simulation.

However, the desire for a more co-ordinated approach has been expressed by the NHS in the UK. The department of Health's 2008 review of training stated:

> We need to use modern education techniques if we are to fulfil our ambition to widen participation in learning and to enhance the learning environment for both those in training and those undertaking CPD. We will therefore review the appropriate use of e-learning and other modern education techniques, such as high-fidelity simulation suites, to develop a strategy for the appropriate use of e-learning, simulation, clinical skills facilities and other innovative approaches to healthcare education. (Department of Health, 2008, p42)

Whilst the use of simulation is not as developed in medical training as in the military, the rationale is in fact very similar. Firstly there is the fact that training medical staff is very time consuming. This, coupled with the expense, is a limiting factor that prevents more training from taking place. In developing countries in particular, the use of virtual patients may help to solve some of the problems of trying to train an increasing number of people (Dewhurst et al, 2009).

Secondly, the vast majority of research into the use of simulation report on students identifying a sense of 'fun', leading to improved student engagement. Finally, there is the element of risk that is reduced by using a simulation rather than reality.

In this case, the risk is to the patient rather than the trainee. As Bligh & Bleakley (2006) make the claim, 'For safety reasons, certain clinical procedures can only be learned through simulation'. (p610). However, this is actually more of a value statement than the factual statement it appears to be. It would actually be possible, for example, for a trainee doctor to practice suturing on real lacerations in the accident and emergency department. A few weeks practice and presumably the skills would be developed as easily as on a simulator – perhaps, because it is real, even better. What is really behind the statement, then, is the idea that it is unacceptable for students to be trained in this way due to the treatment received by the initial patients. There is an ethical dimension to the use of simulators in medical training that is perhaps not so keenly felt in military training. What is perhaps most interesting about this ethical dimension is that it is very rarely mentioned in the literature. Like Bligh & Bleakley above, it would appear that the ethical dimension is so much an intrinsic part of the thinking of health professional trainers, that they are not even aware of it – or at least see no need to draw particular attention to it.

1.5 – Simulation and Serious Games

The term ‘simulation’ as applied to the field of education and training is a contested one and any definition offered is therefore only to be taken as convenient shorthand for the type of simulation being discussed in this work. Encyclopaedia Britannica defines simulation as, “a research or teaching technique that reproduces actual events and processes under test conditions.” And notes that the word stems from the Latin word *simulatio* meaning ‘an imitating or feigning’. Smith (1999) defines simulation as, “the process of designing a model of a real or imagined system and conducting experiments with that model.” (p2)

It is not possible to accurately define the origins of the practice of simulation as a training tool. It may be that as part of the training or apprenticeship of many crafts in the Middle Ages, novices would be expected to hone their skills in masonry or ship building in situations or using materials that would not become part of a finished cathedral or warship. The ancient Egyptians’ ability to embalm and mummify the Pharaohs was presumably ‘simulated’ with slaves or other unimportant people before attempting on the ‘real’ thing. The concept, then, that important education or training might be simulated before exposure to the real situation is clearly not a new one. The two examples given, though, do highlight two of the main reasons why simulation might be considered an appropriate tool for learning. Firstly, simulation can save time or money. Where the practice of the real activity is considered to be prohibitively expensive or inconvenient, a simulation can be a cheaper alternative. Secondly, simulation can provide a safe ‘trial by error’ approach whereby making mistakes and seeing the consequences is not only possible, but perhaps desirable. So whilst simulation in principle is not

a new concept, what is new, of course, is the ability to present a simulation via ubiquitous computer technology.

The rationale behind the use of games as learning tools is generally one of increased motivation. Student engagement is often cited in advertising of educational games as a key feature and several studies do report increased motivation (Garris et al, 2002; Hays, 2005; Lean et al, 2006) although, as Annetta & Cheng (2008) point out, there is little empirical research to indicate that this necessarily translates into more effective learning. Rapeepisarn et al (2004) indicate that this is a complex issue and the value of using video games is dependent on a range of individual factors relating to learning styles meaning that any generalisations are impossible.

The convergence of simulation with computer technology is probably most easily identified in the 'Serious Games' movement. The term 'Serious Game' was first coined in the late 1960's by Clark Abt. Abt defined a game thus,

> 'Reduced to its formal essence, a game is an activity among two or more independent decision-makers seeking to achieve their objectives in some limiting context. A more conventional definition would say that a game is a contest with rules among adversaries trying to win objectives' (Abt, 1970, pp 6-7)

Abt recognises a key limitation with these 'textbook' definitions in that they fail to take account of two important aspects of some games. That is, there are games where co-operation is needed to be successful and other games where the 'adversary' is the game itself. These are key points when considering the nature of the 'serious game' which Abt goes on to define as being those games that, "have an explicit and carefully thought out educational purpose and are not intended to be played primarily for amusement." (Abt, 1970, p9) The concept of using a game (which Abt often uses interchangeably with simulation) to support learning fits in well with a constructivist epistemology and pedagogy. Dewey's ideas regarding 'active learners' (Vanderstraeten & Biesta, 1998), Piaget's ideas about the need to modify and change environments to know them (Huitt &

Hummel, 2003) and Bruner's insistence that learners find things out for themselves (Smith, 2002) can all be taken as key elements of serious games.

For Abt serious games most often consisted of paper and pencil exercises such as "Colony"; a game designed to simulate political and mercantile tensions between Great Britain and the USA in the 18th Century and "Sepex"; a game designed to simulate decision making in educational institutions (Abt, 1970, pp156-176). However, the phrase has really come to be associated with the use of computer or video games technology for educational purposes. Indeed, leading innovators in this area, Michael & Chen (2006) similarly define a serious game as, "a game in which education (in its various forms) is the primary goal, rather than entertainment." (p17) In some ways this definition helps to perpetuate a distinction that in the eyes of many engaged in the field (Singhal & Rogers, 2002) does not exist, i.e. that education and entertainment are two distinct outcomes and that they may, in some way, be at odds with each other. It is an interesting distinction that will be returned to later in the work when considering the motivational effect of computer simulations on the learners involved in the empirical study that follows. Another issue that will be returned to is the notion of whether or not the computer simulation at the heart of the empirical study presented in this thesis *is* a game (or perhaps, more importantly, whether it is *perceived* as such by the learners) and what impact this has on the attitude towards it and the value students place on it. This is important, because much of the recent work on simulations and serious games shows a convergence, to the point where the two are used synonymously.

> Video games and simulations have traditionally followed separate but parallel development tracks. Both strive to duplicate reality in a convincing manner, but simulations need to be as 'real' as possible... Beginning in the 1990s, though, with the explosion of 3D technology and real-time rendering techniques, the two paths started to converge. (Michael & Chen, 2006, p46)

1.6 - Emerging questions

From the preceding discussions some questions begin to emerge. It seems self evident that the success of the use simulation as a teaching technique is closely connected with the fidelity or perceived closeness to reality of the simulation. Indeed, much of the development of the uses of computer technology is based on that supposition. However, it is not necessarily so. It may be that simulations do not need to provide very high levels of realism if the student is able, or willing, to suspend their disbelief sufficiently. It may be that students will 'buy into' the simulation either consciously or unconsciously regardless. If the student perceives value in the technique either before, or through usage, for other reasons, then the level of fidelity need not be high. It may be, for example, that students can become so engrossed in the simulation that the ways in which the simulation departs from the real world are ignored, at least temporarily.

The first questions that need to be addressed, then, concern ITE student attitudes towards computer simulation in relation to the approximation to reality achieved. In particular,

How important is fidelity to students when engaged in a simulated scenario? Subsidiary to that question, of course, is: **What else is important?**

It may be possible that the use of the computer to present the simulation may, for some students, have a negative impact on their attitude to the simulation. Some students may not have access to computer technology, or decide not to have access because of a pre-existing negative attitude towards it. The ubiquitous

nature of computer technology would seem to suggest that this is unlikely to be the case for most students, however, in order to establish this, further questions must concern the use that ITE students make of computer technology and whether it is as integrated into their lives as anecdotal evidence would suggest:

What access do students have to computer equipment? and

To what use do they put it?

These issues will be further complicated by any perception of a theory/practice divide. The use of simulation is considered by most designers, including the designers of the Virtual Case Creator described later, to be a useful way of bridging the theory/practice gap. However, student conceptualisation of this issue may be somewhat different. It may be seen more simplistically as, for example, a better way of learning theory - but that doesn't necessarily mean it will impact differently on practice. The following two questions arise then:

What proportional value do ITE students place on time spent in school and time spent in faculty? and

To what extent do students consider that the use of simulation might enhance the value of time spent in faculty?

It has been pointed out that computer simulations have much in common with some computer games. One might assume that any student who enjoys simulation style games (for example, Sim City) might place more value on simulation as a pedagogic tool than one who does not. Alternatively, students who play such games may only consider them as entertainment and therefore be dismissive of simulation as a pedagogic tool.

It seems self evident that a student teacher's attitude towards simulation as a pedagogic tool will both impact on their own performance when subject to that

pedagogy as a learner and their willingness and commitment to its use as a pedagogy for their classroom as a teacher. However, personal experiences of using a variety of teaching methods with students, including approaches that might be best described as ‘social constructivism’, indicate that students do not always translate ways of learning into ways of teaching. The final, and perhaps hardest, question to ask then is:

What relationship, if any, exists between a student teacher’s attitude to computer simulation as a pedagogy for themselves and as a pedagogy for the children they will teach?

Chapter 2 – Review of the Literature

2.1 – Introduction

This chapter will examine the literature that surrounds the key issues beginning to emerge. Firstly, the question of whether teacher training students really do perceive a clear distinction between the theory and practice elements of their training will be examined. This will be followed by a consideration of the research that has been carried out to date in the area of computer simulation in ITE. The concepts of 'flow', of becoming engrossed in an activity, and of 'suspension of disbelief' will also be considered in order to establish the framework for the empirical study. This will lead to an exploration of the place of emotion in learning and the implications this may have for ITE students engaging in computer simulated activities.

2.2 - The faculty/reality divide

The fact that teacher training is now generally located within Higher Education institutions in the UK indicates, at least in the recent past, that those ultimately responsible for Initial Teacher Education considered the process to be more than just that of learning a set of skills (Drever & Cope, 1999). The ever increasing range of routes into teaching (Graduate Teacher Programme, School Centred Initial Teacher Training etc.) would indicate a move away from a 'theory led' model towards a more practice-based approach. However, the recent moves

towards insisting that Postgraduate Certificate in Education courses contain work at Level 7 and the fact that GTPs and SCITTs are required to be validated by an HE institution would indicate otherwise. The creation of a Masters in Teaching & Learning for existing teachers might, on the surface, indicate a more theoretical approach, and yet there has been much criticism of the way the MTL has been formulated as a practice-based qualification. Clearly the situation is fluid and confused and this is not the place for extensive discussion.

In 1984 the Council for the Accreditation of Teacher Education (CATE) was set up by the then Conservative government as an attempt to exert more central control over teacher training. This was accompanied by Her Majesty's Inspectorate of schools (HMI) being required to oversee issues of quality. The National Curriculum for children aged 5-16 was introduced in 1988 - 1990 and clearly the government closely associated the success of that reform as being dependent on the quality of teachers 'delivering' it. In 1994 the word 'education' was replaced by 'training' when CATE was replaced by the Teacher Training Agency (TTA) and, in collaboration with the newly formed Office for Standards in Education (OFSTED), began the process of linking funding to judgements of the quality of courses. The newly created framework for the OFSTED evaluation of courses had the dual aims of contributing to 'raising standards of attainment in schools by improving standards in ITT' and to 'help providers identify clear targets for improvement' (OFSTED, 1996, p6). As Blake & Hanley (1998) pointed out, *"The implications are that initial teacher education is deficient and requires overhaul"* (p16). In 1996 the TTA was also given the task of creating a National Curriculum for Initial Teacher Education presumably pre-judging the overall results, if not the details, of inspections to be carried out under the new framework. The TTA were also given the remit of finding ways to locate more teacher training in schools (Blake & Hanley, 1998, Williams & Soares, 2002) as this was seen as a way to make ITE more focused on practice than on theory, a key aim of the Department for Education & Science as signified when Her Majesty's Inspectorate later noted the following:

> In general there has been a reduction in the amount of time allocated to the theory of education as a discrete area and an increase in that given to the students' professional training. This indicates a change in balance from academic study, often reflecting the research interests of the staff, to give more weight to the professional needs of the new teacher in the classroom. (HMI, 1988, p1)

The culmination of this raft of measures introduced in the mid to late1990s was the introduction of the National Curriculum for Initial Teacher Training in 1998 which included specific sections on required entry qualifications, subject knowledge expectations, specifications on the amount of time trainees should spend in school, skills and attitudes expected post training (including both technical, practical, pedagogic and reflective ones) all wrapped up in the language of 'Standards'. Although the details of this curriculum continue to be changed and developed, the tenor has remained the same ever since - a Curriculum for teacher training based on a set of assessable 'standards'. At the same time, in light of the remit to get schools more involved, wholly school based training programmes based on an 'apprenticeship' model were trialled leading to the SCITT courses of today. As summed up by Williams & Soares (2002),

> A key trend throughout has been an increased role for teachers and, latterly, a corresponding reduction in the role of the HE tutor. The privileging of teachers' knowledge emerged in 1984 … By 1992 this emphasis on the teachers' role was articulated through requirements that funds be transferred to schools to finance an increase in teachers' responsibilities…At the same time schools were, for the first time, initially allowed, and subsequently encouraged, to work as consortia to provide initial teacher training independently of HE (p226).

What these changes have left us with is a diverse yet centralised ITE terrain. Statements of specific standards to be met permeate all types of ITE whether undergraduate HE courses, graduate HE courses or SCITTs. And yet those standards embody a diverse range of knowledge, skills and abilities for trainees to master including not just detailed subject knowledge and technical expertise but the ability to reflect on their own practice and to learn from the practice of experienced teachers. In other words, the current system is essentially a

standards based model with elements of a reflective model and an apprenticeship model integrated (some might say tacked on) within it. As Harrison (2007) says,

> Thus we have a competence-based model of initial teacher education, with a focus on acquiring professional skills and attitudes - which might be broadly described as teacher professional behaviours as distinct from teacher behaviours such as appropriate dress and actions - also attempting to incorporate and measure the development of understanding in relation to professional values (p325).

Although the concept of apprenticeship as a model of learning can be traced back at least as far as the ancient Greeks, its application as a model of Initial Teacher Education in the UK really came to the fore in the early 1990s following the influential publication of *Learning to Teach* by the neo-conservative Hillgate Group. They argued that teaching should be seen as a practical activity and that, in much the same way that junior surgeons learn by emulating more experienced senior surgeons, so new teachers should learn the skills of teaching at the feet of more experienced experts. Their determination that, *'apprenticeship should take precedence over instruction'*, because formal instruction, *'can never substitute for real practical training'*. (Hillgate Group, 1989, p9) formed the backbone of much of the ITE reform agenda of the late Thatcher and early Major governments. This can be seen in the desire to increase the amount of time trainees spend in school when on HE based ITE courses and the push to create a greater sense of partnership between HE and schools (Furlong et al, 2000; Wideen & Grimmett, 1995), and also, most dramatically, in the creation of the new routes into teaching such as the Graduate Teacher Programme and the SCITTs. The desire for learning from the 'master' is also noted in the research literature. Hobson (2002), for example, reported on data collected from secondary PGCE students before they began their ITE course:

> They expected school-based mentoring to be pivotal to their learning of teaching. [and that] Such expectations of the potential value of working with school based mentors were significantly higher than their expectations of the potential value of other ITT provision, such as 'reading books on educational theory/research' and 'planning lessons with' and 'gaining feedback from' university tutors. (p6)

Whilst such expectations might be high that does not, of course, mean that they accurately reflect what is really needed. However, following the training, Hobson reported that the trainees perceptions of what had been most valuable was much the same with 'learning from trial and error in the classroom', and 'watching school-teachers teach' clearly being the methods most described as quite valuable and very valuable (Hobson, 2002, p10). The valuing of the one-to-one mentor/apprentice model by students is prevalent in all phases from primary to post compulsory (Foster, 1999; Brooks, 2006; Jones et al,1997). One possible reason why trainee teachers value the observation of 'real' teachers is that they see an 'immediacy' or context dependent view of teaching that they do not see in faculty based sessions. Anecdotal evidence of my own experiences of using Qualifications & Curriculum Authority (QCA) produced video materials for the National Numeracy Strategy (NNS) with both students and in-service training suggests that teachers and students value 'reality', the most common complaint about such videos being that they do not represent reality. Haldane (2005) reports on a project using an Interactive whiteboard set up whereby groups of up to 80 student teachers were able to observe lessons by experienced teachers. Interestingly, although the students requested that the sessions be videoed for later review, they much preferred the first view to be in 'real time' giving the following reasons,

> 'Live sessions, with the element of risk that things can go wrong have a feeling of immediacy and reality that contribute to the 'situated learning' aspect of the experience. An analysis of the session that incorporates the teacher's own review of how things went is better than looking at a video and then speculating about aspects of the teacher's reactions and responses.' (Haldane, 2005, approx. para.45)

The value that students place on learning from experienced teachers, in a real context, with the potential to ask questions and discuss the approach taken has been long established. However what is not so clear is whether such an approach can be seen as the whole of Initial Teacher Education. One disadvantage is that

of consistency of approach. How can one be sure that the mentor is providing a good role model for the apprentice to learn from? Connected to this problem is the issue of individuality.

By copying the practice of one individual they see they may not appreciate that there are other ways that may be equally valid or even more successful. The inherent power relationship of the mentor/apprentice model may well dissuade a trainee from even exploring this issue, especially if the mentor also has a role in the assessment of the trainee. Jones (2000), in a comparative study of British and German attitudes towards mentors found the same concern among both sets of 'apprentices': *'As one German trainee explains there is a need to `keep their tutors/mentors sweet' (Butter aufs Brot schmieren) by trying to teach their way* (Jones, 2000, p77).

Perhaps the biggest drawback associated with the apprenticeship approach is the value, or rather lack of value, which it places on educational research and theory. By seeing teaching as a technical, skill based activity that can be 'picked up' as an apprentice to an experienced mentor the implication is that teaching can only improve incrementally. But as Robinson (2007) says of education generally, *'the biggest mistake is to believe that we can face the future by doing better what we did in the past.'* (Speech, time index approx. 2:00 minutes). If we accept Robinson's point, then we must accept that educational theory and research enable teachers to do things differently - not just more of the same but in new and better ways.

Reflection on practice is seen as of central importance to many engaged in teacher education. When asked what underpinned their programmes, 70 - 73% (depending on phase) of ITE course directors identified a 'reflective practitioner model' (Furlong et al, 2000, p41).

The word 'reflection' has found its way into the vernacular of many teacher educators, claimed by them as a goal, and frequently proposed as the means by

which programmes of teacher preparation can be improved (Wideen and Grimmett,1996, p25).

The concept of the teacher as a 'reflective practitioner' is generally traced back to Schön (1983). However, similar to the concept of education itself, reflection is one of those words that,

> 'are easy to use and to feel that we understand what we mean by them but notoriously difficult to explain to others, other than appealing to common sense and asserting that 'everyone' knows what justice, fairness, equality and so on actually are' (Matheson, 2004, p1).

In fact, despite the title of his book, Schön's preferred expression was to describe professionals as engaged in 'Reflection-in-action' by which he means that reflection is an ongoing, dynamic process. He distinguishes it from a more common usage of reflection that he calls 'Reflection-on-action' which is done, *'in the relative tranquillity of a postmortem'* (p61). The importance of such a reflective approach, according to Schön, is clear,

> When the phenomenon at hand eludes the ordinary categories of knowledge-in-practice, presenting itself as unique or unstable, the practitioner may surface and criticize his initial understanding of the phenomenon, construct a new description of it, and test the new description by an on-the-spot experiment…Reflection-in-action…is central to the art through which practitioners sometimes cope with the troublesome "divergent" situations of practice (Schön, 1983, pp62-63).

In other words, by being this kind of reflective practitioner, one is much more able to cope with the new and the unexpected and, therefore, the future than, say, if one followed a technicist, apprenticeship model.

One of the major problems with using Schön's Reflection-in-action as a model for ITE has been noted by many researchers. That is, how does one develop, or support the development, of such reflective skills within ITE students? Some researchers have found that such skills are a predisposition of some students

whilst other students find it inherently more difficult. LaBoskey (1997) is fairly typical in reporting that,

> In my research I have found that those student teachers who are more reflective than others tend to be guided by what I call 'passionate creeds' and are more likely to ask more why questions (LaBoskey,1994). I have also found that it is difficult, though not impossible, to develop the skills and attitudes of reflective practice in those student teachers for whom they are largely missing (LaBoskey, 1991, 1994) (pp150-151).

LaBoskey's approach, is to spend much of the ITE program she has devised exploring concepts such as 'purpose' and 'passion' on the grounds that those most articulate in exploring those concepts tend to be most reflective. However, she does not provide a clear rationale based on any identified causal relationship. There may be some unidentified, underlying, factor that means that some students are both more passionate *and* more reflective without there being a direct causal link. For this reason most ITE programmes, that emphasise reflection as a key ingredient, work on a different premise. That premise is that reflection-in-action and reflection-on-action are developmental stages. By teaching students specific ways of how to reflect on their action (by, for example, writing reflective assignments, carrying out and discussing school based tasks, writing lesson evaluations etc.) the hope is that they will 'embed' the reflective process and be able to carry it out subconsciously, 'on the job', as it were. In motoring terms, it is the equivalent of learning the process of gear changing step by step until the point when one can change gear without even realising it has been done.

What is not clear is how, or even if, the kind of reflection that is encouraged through many ITE programmes, which is essentially Schön's reflection-*on*-action will lead to the reflexive, spontaneous Reflection-*in*-action necessary to enable new teachers to adapt to a changing future. Some research even suggests that reflection can have a negative impact on the ability of a teacher. As Carson (1995) has pointed out, 'there is a troublesome side to critical reflection, it makes

you doubt yourself' (p156). Carson goes on to relate this to the experience of a student teacher who explained his own doubts thus:

> I was so engrossed in reflection that it nearly drove me bonkers. A cooperating teacher told me one day it would be the end of me if I didn't learn to relax and accept my mistakes or what I considered to be failures. I constantly felt I was to blame for my shortcomings. My problem was over-analyzing - one should be critically reflective, not critically destructive. (ibid)

However, I would suggest that this demonstrates a common misunderstanding of the two types of reflection being discussed. By reflecting on what has occurred the student is able only to see the negatives. He believes that he is being made to reflect in order to 'do it better next time'. What he is not doing is reflecting-in-action. If a reflective practitioner model is to be part of an ITE programme then it must make explicit that reflection-on-action is intended to lead to the reflexive, spontaneous reflection-in-action that Schön sees as the mark of the true professional. Reflecting in the way that is commonly advanced in ITE programmes is the means towards being a competent teacher, not the end.

The value of using computer simulation in this sense is that it can allow for both types of reflection. During the use of a simulation students will be able to gather data, hypothesise, make changes and implement as they proceed. Then, after completion, they will be able to reflect on the decisions made and review the consequences of their actions.

Much has been written about the relationship between theory and practice in relation to teacher training and student attitudes. One of the most pervasive themes in studies has been the perception of a faculty-reality or theory-practice divide. In essence, such a divide is epitomised by the belief that faculty is the place to learn how to do things whilst teaching practice is where you actually do it and one really 'learns by doing'. Drever & Cope (1999) indicate that such a perception has existed in students since at least the 1970's. At the heart of such a view is a very clear conception of both what it means to be a teacher and what it means to be a learner. Firstly, it exposes a very technicist view of teaching. It

pre-supposes that teaching is essentially a set of skills to be learned, developed and applied. By applying the right skills, in the right order, teaching will be successful. Equally, it pre-supposes that the only way to learn how to apply those skills is to apply them in a real situation.

Studies of different ITE models and the place of practice/theory can be difficult to interpret. Zeichner & Conklin (2005), for example, report that evidence from a range of studies is, 'inconsistent and contradictory' (p698). In relation to teacher attitudes and dispositions they state, 'We know from the research that teacher education programs and those who enrol on them matter in terms of teacher and pupil outcomes, but because of a lack of close study of *what teachers brought to the programs* [my emphasis], the programs themselves and the contexts in which they operated, the inconsistencies in the findings cannot adequately be explained' (p698).

However, recent studies (Malderez et al 2010; Hobson et al, 2010) do indicate that many of the attitudes that pre-service teachers display are pre-formed dispositions. This is evident in that many pre-service teachers, 'saw becoming a teacher as building on existing strengths' (Malderez et al 2010, p231). In this study, they too found a pre-disposition to view 'theory' as less important than actual practice:

> Before they embarked upon their ITP [Initial Teacher Preparation], student teachers had preconceptions about the value or relevance of various potential aspects of course provision. For example, having been asked to think back to immediately before they started their training, 75% of respondents stated that they had considered that it would be very important to 'have school teachers/mentors observe your lessons and give feedback' and 74% thought the same about 'watching schoolteachers teach', whilst a relatively low 48% indicated that they had thought that it would be very important to 'study ideas about how pupils learn' and just 22% said this about 'studying current research on teaching methods'. In general, the further removed from classroom practice, or from their own classroom practice, the lower the perceived importance or value. (Malderez et al 2010, p234-5).

What is important to note here is that it is the pre-conception of what is 'removed from classroom practice' that is driving the perception of the value of the

theoretical aspects of the course. In other words, even before they started on the course, many students may have made the judgement that the theoretical aspects would be of less value than the practical. This is not the result of the training itself, but a pre-existing disposition.

In general terms, then, there has been a persisting view amongst many students in Initial Teacher Education that the real value of the course they are engaged in is in the experiences in front of the children. Studies have consistently shown (Brooks, 2000; Brookes 2005; Burn et al, 2007; Cheng et al, 2009) that attitudes towards 'theory' or other faculty based activity is considered less important or unimportant in their training when compared to teaching practice experiences. The theoretical position taken for this study is that faculty based work that includes theoretical aspects of teaching and learning is and should be a key component of any Initial Teacher Education programme. This contention is generally shared by those responsible for establishing the framework of the course within which this research was carried out and so the student participants of this research are working on a programme that attempts to work within that stated position.

2.3 – Simulation in Teacher Education

> "The shortage of qualified teachers, limited training facilities, and too few expert supervisors dictate that new methods [sic] to be found to provide systematic practice teaching opportunities for beginning teachers." (Kersh, 1962, p109 cited in Tansey, 1970, p283)

Much has been written in recent years about the usefulness of computer technology in ITE. The vast majority of this concerns applications that are not simulation oriented. Barbera (2004), for example, highlights issues of quality when using managed learning environments such as WebCT and Moodle, whilst Gibson (2001) effectively vanquishes the myth that 'Technology is 'Good' and All Learners Like 'IT'' (p39). I pick out these two examples from many because they highlight a particular issue – they both use the word 'virtual' to describe the use of ICT. The use of the word 'virtual' has come to be used as a generic phrase for any activity carried out using a computer rather than a more traditional medium such as face to face conversation or pen and paper. In order to fully explore the use of simulation in ITE, one must go back to a time before the word 'virtual' became such a general term.

Simulation as a tool for teacher education has its roots in the early 1960's. One of the earliest known examples is by Kersh (1962) whereby a series of classroom incidents were projected onto screens using 16mm projectors and students were expected to indicate their response to each scenario. Students were also presented with printed background material such as individual reports for a fictitious class, school documents and contextual social information (Tansey, 1970, p283-284). In this instance a set of pre-defined expected responses was created and students given a numerical score based on their performance as part of the feedback. In this sense, the simulation was clearly being mainly used as an assessment tool to evaluate 'readiness' for the real world of the classroom. Students had been subjected to the usual methods of training (lectures, reading etc.) before hand and the simulation gave them the opportunity to demonstrate

their newly acquired skills. In the modern world of formative feedback and assessment *for* learning strategies it seems strange to think that the simulation itself, via discussion, self review and reflection and so on, did not form part of the actual training itself.

Cruikshank and Broadbent (1968) extended the idea of simulation by including situations that occurred outside of the classroom, including disagreements at break time, students discussing personal problems etc. Again, film was used to present the simulated class as being real and an extensive range of printed documentary materials was provided. In this work there does appear to be more interaction and discussion between the students about alternative courses of action, with scenarios presented and the question, 'What would you do in this situation?' being asked by the tutors. One of the criticisms made by the students was the fact that the teacher in the simulation appeared to be a poor role model. Whilst this was necessary in order for situations to be presented that the students could analyse, it does highlight another aspect of simulation that is now taken for granted – that of interactivity. The fact that the material was presented on film, or paper, to the students and that there was no way that they could actually influence the outcome of the scenario would appear to be a major stumbling block. In this sense, although the authors used the word 'simulation' to describe their work, given the definition that this thesis uses, one would have to question whether this early work was indeed simulation. The author's own personal experience of Initial Teacher Training from 1984-1988 included a simulated school scenario which was presented via printed documents. The simulation itself revolved around the organisation and structural aspects of education rather than classroom practice, however the workings of the simulation itself were remarkably similar to those reported by Cruikshank and Broadbent. As students we were expected to respond to 'what if?' type questions. The lectures preceding the use of the scenario involved discussion of the issues but there was very little time or opportunity to discuss possible courses of action. The simulation itself was built

into the final exam for that component of the course and no formative use was made, as far as I recall, of the simulation.

Tansey & Unwin (1969) proposed that, 'there does not seem to be any level of education at which simulation cannot be used'. (p vii) However, they do seem to consider simulation to be of particular relevance in the Initial training of teachers. It is interesting to note that the reason put forward for this notion was the perceived gap between the theoretical based training colleges of the time and the practical nature of the job they were being trained to do. Although Tansey & Unwin claim that an over emphasis on the practical is a, 'superficial view of the teachers' roles' (p111), they recognise the difficulties in achieving a balance. They go on to state,

> 'It is necessary in these circumstances... to search for an alternative to visits to an actual classroom. Simulation seems to offer this alternative, and it is finding more and more acceptance, especially overseas, as a way of compensating students under training for lack of actual time spent in practice.' (Tansey & Unwin, 1969, p112)

As was discussed previously, the theory-practice gap persists today, at least in the minds of the students in training, and this is a theme followed up on in the empirical study that follows. This attitude towards simulation as an alternative to actual classroom practice coupled with a somewhat 'make do' attitude to the method is fairly typical of the literature of the time (Garrison & Kersh,1969, Cruikshank 1971). Simulation tends to be seen as a practical alternative to a practical problem. There are not enough school places; we have too many students: teachers are under enough pressure etc. What is less commonly put forward is the idea that simulation might be *better in principle* than actual practice. Perhaps not better for the student who is being trained, but one also must consider the education of the children being practiced upon. What is missing from the educational literature of the time, or at least tends to be dealt with fleetingly or considered of secondary importance, seems to be this ethical dimension to the discussion. In the application of simulation to the fields of medicine and defence a

major component of the drive towards more use of simulation was one of the ethics of letting, for example, pilots 'practice' bombing targets or nurses 'practice' giving injections. It is also worth remembering that the ethical dimension was largely assumed or implicit in those areas in a way that it is not in discussions of teacher education.

Other approaches to simulation in Initial Teacher Education appear throughout the 1970's and early 1980's when the advent of the microcomputer led a few forward thinking teacher training institutions, particularly in the USA, to consider the application of computer technology to the form. Strang et al (1989) report on several examples including Lunetta's (1977) interpersonal exchanges simulation and Varnhagen & McCann's (1981) behaviour management simulation.

Baird & Koballa (1988) used a very basic simulation to try to increase pre-service teachers' hypothesising skills. Although they reported some success, the research was severely hampered by the fact that the available technology only allowed for hypothesising about mathematical functions when the intended learning related to scientific hypothesising.

In most cases the primitive nature of the computer equipment available meant that these computer simulations were essentially text based binary decision diagrams presented on the screen with very little interaction possible. A good example of this type of simulation is reported by Gorrell & Downing (1989) who developed a simulation for behaviour management that had a short list of three pre-determined responses to a complex scenario such as controlling pushing and shoving in the lunchtime queue. Their experimental approach, with some students using the simulation and others attending lectures, showed greater improvement in the students using the simulation. However, the chosen measure of success was a paper copy of the same simulations worked on by the simulation group and so it is really not clear what the impact of the computer element of the simulation was other than to act as a convenient method of presentation.

Of particular interest are Strang & Loper's (1983 – 1986) series of simulations that used, for the time, cutting edge computer equipment to simulate pupil responses to classroom scenarios such as applying a spelling test. From this work two major themes emerge. Firstly, the researchers themselves consider that one of the key attributes of computer simulation over traditional forms is the degree of realism achieved. They set out the key features of their simulation that contribute to its reality for the students. They are:

Variety in Pupil Responding

Immediacy of Pupil Responding

Authenticity of Pupil Responding

Multiplicity in Pupil Responding (Strang et al, 1989, p143-144)

The results of their research following the use of the simulation with a cohort of students (n=61) seemed quite clear. A statistical analysis was applied to show how often and how successfully the trainees performed on the simulation. The majority of the analysis relates to the effectiveness of the simulation in relation to the objective of increasing the students' ability to demonstrate the 'correct' behaviour. The section on student attitudes consists of barely a paragraph and is clearly not considered to be a major part of the research. All the students rated the simulation as 'useful' with 88% describing it as 'very useful'. In relation to the issue of realism, again all students rated it as 'realistic' with 48% describing it as 'very realistic' (Strang et al, 1989, p151). It should be noted that by this time the simulation has become part of the learning process rather than simply part of the assessment process. In the reported research, students mention the ability to use feedback to improve on their performance as an important feature of the simulation.

It is of great interest to note that the researchers do not seem to question two of the principles underlying their work. That is, it appears to be assumed that:

a) The degree of realism is important;
b) That students' respond to the simulation as though it were real.

Although a) seems to be self evident (although we may challenge this later), b) is clearly not. More than this, not only is it possible that students do not respond as if it were real, it is not really clear whether that actually matters. It could be argued that if the simulation has the desired effect (in this case of improving trainee teachers' skills at teaching spelling) then the degree to which the students treat the simulation as being real is immaterial. Alternatively, it might be the case that the ability of the computer to effectively simulate reality might be key to both the students' performance and more importantly their ability to apply what they have learned to the real world. As Grossman (2005) points out of similar research into simulation in ITE, *'Two studies suggest that computer simulations can be effective in helping prospective teachers develop targeted skills within the simulation. However, neither study looked at how the pre-service teachers might use these skills in actual classrooms.'* (p435) Questions that occur, then, are, 'To what extent do students using these kind of simulations 'buy into' the reality they are faced with?', 'What impact does their attitude to the simulation have on their learning?' 'What impact might this have on their teaching?'

Another question that was not asked at the time, nor apparently in any of Strang et al's later research, relates to the fact that these trainee teachers are not just students learning the skills and knowledge that they need to be teachers, but are also developing attitudes towards the pedagogy themselves. In the early 1980's it would have been inconceivable that within 20 years these students, barely halfway through their teaching careers, would be working in schools where computers were an everyday tool. It would not have been thought that pupils might attend knowing more about IT than teachers did and where the use of simulation techniques that new teachers once used as learners might be usable

by them as teachers. It is not surprising in this situation that the transference of students' attitudes to computer simulation in principle was not considered important or worthy of study. The attitude, then, of student teachers towards computer simulations as a pedagogic tool may be at least as important now as any notional gains in efficacy in relation to their training. Later work in the 1990's and 2000's has developed, although at a much slower pace that in other areas, the use of simulations for ITE, but very little attention seems to have been paid to this important question of student attitudes towards simulation for teaching *their* pupils.

Notwithstanding the issues raised above, at the heart of Strang et al's (1989) research is a more fundamental problem that faces those who would use computer based simulation as a tool for Initial Teacher Education. The approach taken to the development of that simulation is essentially a behaviourist approach. That is to say, there is an underlying assumption that in a given situation a particular response by a trainee will have a particular outcome. In the description of the research one of the major features of the simulation is reinforcement as a basic teaching tool. For example,

> 'The teaching simulation also offers reinforcement following a teacher's employment of an effective technique. As is commonly found in real classrooms, such reinforcement consists of a pupil's emitting a response that is desired by the teacher... if the teacher uses an effective classroom management technique such as mildly reprimanding the simulated misbehaving pupil or getting that pupil involved in the current spelling activity, the misbehaving pupil will immediately exhibit a compliant response.' (Strang et al, 1989, p145)

It would be easy to view such a simplistic approach to the simulation of a class full of pupils as simply the difficulty in providing a more 'fuzzy' response due to the limited nature of the emerging technology. However, it is probably as much to do with the prevailing attitude to education of the time. Perhaps it is no coincidence that the very positivist stance of the research is reflected in the design of the pedagogic tool being reported on.

As has been noted, simulation as a tool for learning has a long history and major areas where simulation has been used extensively and continues to develop are the areas of defence/military training and medical professional education. In each of those areas the rationale is often explicitly stated as being a way to save time and money. More implicit, although occasionally stated outright, is the ethical dimension. In the military ethical considerations relate to both the duty of care to the trainees and to civilians or non-combatants. In medicine the priority is the quality of care given to the patient. When looking at simulation in ITE there is evidence of some developments but these have not been as extensive as in other areas. The literature indicates that whilst the need to consider time and money are often put forward as a rationale, ethical considerations seem to be neither explicitly stated nor implicitly prevalent.

Much of the research is descriptive rather than evaluative in that longer term studies of the benefits of simulation as a teaching tool have not been carried out. Student attitudes to simulation have been studied but these have been very much of the, 'I liked it – I didn't like it', 'I thought it was useful – I didn't think it was useful' type.

Bligh & Bleakley (2006) have used simulation with undergraduate and post-graduate medical students and present a simple model (see fig 2.1) that may also be appropriate to ITE. They see computer simulation as a '*bridging activity*' or '*third place between classroom and clinic*' (p609).

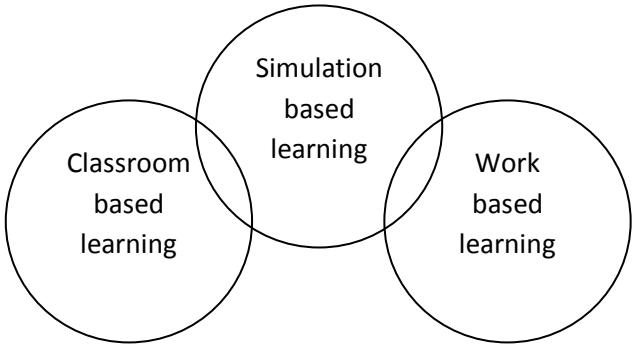

Fig. 2.1 – simulation based learning as the 'third place' between classroom and clinic – Bligh & Bleakley, 2006

It needs to be pointed out that this is their conception of where simulation fits in the relationship between classroom and work based learning rather than their students' view. Another possibility, not considered by Bligh & Bleakley, is that students see simulation more as a subset of classroom activity (see fig 2.2) than as a bridging activity – in which case the use of simulation has not helped to bridge the gap at all. It is even conceivable that the use of simulation may cause views of the divide to become entrenched as the activity may be perceived as 'pretending' to be a reality that it cannot hope to emulate.

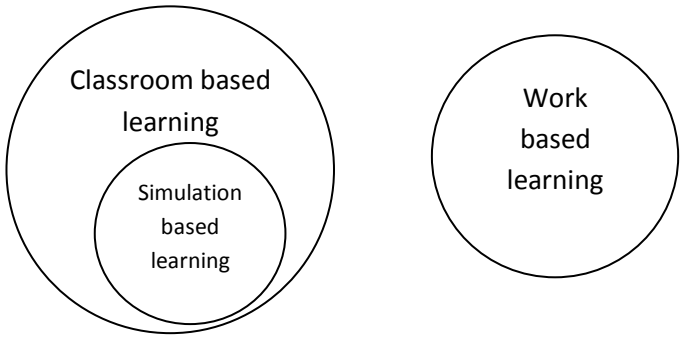

Fig. 2.2 – simulation based learning as a subset of classroom based learning

If this is the case then the use of simulation will do nothing more than give the students a better view of the faculty/practice divide – a reaffirmation of a pre-existing view that only in the trial and error approach of classroom practice can there be any real value.

This, then, is essentially the problem that is faced by those who would use computer simulation in ITE. Does it bridge the gap between faculty and school? Or is it merely another way of learning the 'theory' – a better vantage point for students to observe the theory/practice divide from but not a way to cross it?

Whilst several researchers have reported on student attitudes towards ICT and 'virtual environments' (Barbera, 2004, Dettori et al, 2006, Williams et al, 2007)

again it should be recognised that these have been focused on content management and communication systems (such as WebCT, Moodle etc) rather than simulations. Equally, some researchers have focussed on ITE students attitudes towards such use of ICT in the classroom (Sime & Priestley, 2005, Kirkwood & Price, 2005, Burnett, 2009). As shown above, most studies conducted on student attitudes to simulation focus on student learning of the skills, attitudes or knowledge intended. In fact I can find no studies that attempt to consider the relationship between pre-service teachers' attitudes to simulation and the use they themselves might make of it as teachers and no studies that really attempt to discover the way in which ITE students conceptualise simulation in terms of the theory/practice divide.

2.4 - Authenticity, reality and the suspension of disbelief.

Working and researching in health education, Reeves et al (2002) define ten characteristics of authentic activities, the first of which is that authentic activities must have 'real world' relevance. Further research into the use of authentic activities in higher education by the same researchers have found that a major factor in the success of any such activities is not the closeness to reality (fidelity) of the activity but the internal consistency of the activity. They relate this finding to the phrase 'willing suspension of disbelief':

> There is increasing evidence that in order to fully engage with an authentic task or problem-based scenario, students need to engage with a process that is familiar to moviegoers throughout the world – the suspension of disbelief (Herrington et al, 2002, p2)

The phrase ‘willing suspension of disbelief’ was first used by Samuel Taylor Coleridge in 1817 to describe the way in which a reader of literature could accept the fantastical nature or supernatural elements of a lyrical poem such as *The Rime of the Ancient Mariner* provided that this allowed the reader to engage with the human interest that was the true subject of the work. Whilst the phrase has come to be associated with a range of aspects of popular culture, perhaps the closest to Coleridge’s original intention is the way that it explains how science fiction films can deal with very human issues through fantastical contexts. For example *Avatar* (2009) used spaceships, virtual reality, cloning and alien beings to explore issues of colonialism and ecological destruction whilst *District 9* (2009) used similar fantastical elements to explore racism. What is interesting about these two films is that the much lower budget District 9 has less convincing special effects but is generally regarded as being no less effective in dealing with the human issues (Internet Movie Database). The ‘human’ elements of the film (Dialogue, acting, portrayal of emotion etc) are considered by many critics to raise the level of realism above that achieved by Avatar’s makers even though the level of fidelity is probably lower. This is an example where the suspension of disbelief has a greater impact. Essentially the ‘reality’ in the observers head is more important than the ‘reality’ presented on the screen.

Herrington et al’s (2002) research also concluded that suspension of disbelief was much more strongly connected with engagement than with fidelity. In their simulation studies with health education students the simulated characters, although originally planned to be photographic images, were actually presented as sketches. They were surprised to find that this did not appear to influence the levels of engagement. As one of the teachers stated, *’Our concern was that the sketches wouldn’t seem as real to the students. When we piloted it, it worked sensationally*’ (p5). They posit the idea that younger students in particular are so used to the blending of the real and the artificial that this was simply not an issue. The students became so immersed in the scenario that they treated the simulation as if it were real even though they knew that it was not. They also

identified the concept of ‘Delayed Engagement’ whereby the researchers found some students at first focused on barriers to engagement before eventually being ‘drawn in’. Such barriers included the novelty of the approach, the ‘messy’ nature of the learning and assessment procedures and any minor errors in the presented materials. However, all of the students in their study eventually engaged with the simulation although it is not clear from the reports whether this was a gradual process or attributable to a specific intervention. It is also not clear whether they identified degrees of engagement.

Bates (1994) is adamant that the most important aspect of a simulated character, if it is to have believability as ‘real’, is the simulation of emotion. He draws on the work of early film animators and, in particular, claims that much of the popularity of Disney films is the way that the animators are able to impart the characters with an ‘illusion of life’ through the portrayal of emotions (p2). If students are to suspend their disbelief, then an emotional connection seems likely to be necessary. Herrington et al (2002) tend to skirt around this principle, although there is some evidence that it may be connected to the delayed engagement reported. In that sense, it would appear to have taken some students longer to emotionally engage with the characters and this delay may have caused the general delay in engagement with the simulation as a whole.

Some research of school activity by children and its impact on success has found that more emotional engagement can be achieved by reducing the power imbalance between student and teacher. Milne & Otieno (2007) found when teaching high school chemistry, for example, found that, ‘*If power rituals drive classroom interactions, where the dynamic is asymmetrical in favor [sic] of the teacher, positive emotional energy and engagement are less likely to emerge.*’ (p546). Skinner et al (2009) have found that increased emotional engagement in class can also reduce disruption and behavioural problems.

Emotional engagement in ITE students is less well researched however there have been a few studies that also highlight its importance. Hargreaves’ (2000)

work focussed on ITE students' emotional involvement with educational change, teacher-student interactions and how they expressed their emotionality and as he himself says, *'Educational policy and administration, and most of the educational research community pay little or no attention to the emotions'* (p812).

Many of the more recent research papers (e.g. Judge & O'Banion, 2008, Kerawalla et al, 2006, Overstreet & Martens, 2006) continue to focus on the technological and cognitive aspects of simulation with no regard for emotion. However, in his studies on educational change, Hargreaves found that most elementary teachers derive the most 'emotional enjoyment' from interactions with students in the classroom. This is consistent with and follows directly on from the work of Lortie (1975), Nias (1989) and Dinham & Scott (1996) all of whom report that teachers gain the greatest rewards from working with children in the classroom. Lortie (1975) described these rewards as 'psychic rewards'. For Lortie, psychic rewards are related to the pleasurable experiences that teaching brings that create a sense of intrinsic motivation and engagement from the business of being a teacher. As opposed to extrinsic rewards (e.g. salary) and ancillary rewards (e.g. shorter working hours), psychic rewards seem to be the most significant. In a survey of teachers attitude to rewards he found that when asked to describe their major source of work satisfaction, '*76.5 percent chose psychic rewards compared with 11.9 percent selecting extrinsic rewards and 11.7 percent ancillary rewards'* (p104)

Whilst predominantly connected with ITE students views of classroom practice, emotional engagement also impacts on faculty based work. Taplin & Chan (2001) worked on a problem solving approach to the training of mathematics teachers and found that many students went through a process of change in emotional state. Most common was that students would experience negative emotions when first confronted with a new challenge. However, after discussing the issues with their peers the sense that they were experiencing similar emotions seemed to act, for most, as a catalyst to move forward and begin to feel more positive. Of particular interest is the fact that the few students who subsequently failed to

engage with the task continued to express the same negative emotions throughout the task. As the researchers themselves state, 'it was not a planned aspect of the interaction between pre-service teachers and instructors or between pre-service teachers themselves to discuss this particular issue' (Taplin & Chan, 2001, p300), however in the course of the research this emotional aspect became increasingly seen to be fundamental.

A related feature of student engagement with faculty based tasks is Csikszentmihalyi's (1990) concept of 'Flow'. Csikszentmihalyi hypothesises that there are times when a person's engagement in an activity is such that 'normal' behaviours temporarily cease to occur. At such times people are apt to lose track of time, to lose a sense of self consciousness and even ignore basic biological functions such as the need to eat and drink. Flow is a state of intrinsic happiness – essentially an emotional state – that has been likened to religious meditative states and Eastern mysticism. However, as a description of how one maintains a level of engagement beyond what might normally be expected it has clear implications for a range of human endeavours from sport to education. Anecdotal evidence from discussions with ITE students suggests that on occasion many of them approach such a state in the classroom. They have reported the fact that they 'don't know the time has gone' and that they 'forgot to have lunch'. This is clearly an area that needs greater study.

If the level of emotional engagement is seen, or perhaps it might be better to say 'felt', as important to ITE students when in the school situation, it may be that here is an explanation for why many students seem to implicitly place less value on faculty work. If faculty work does not give them the 'emotional hit' that interacting with children does then this might help to create or perpetuate the view that faculty based learning is somehow less valuable. If it is true that students are responding to the issue of the faculty/practice divide on an emotional level rather than a cognitive one, this will have very different implications for further developments and point the way forward for more success in the use of simulations that might be able to exploit the emotional needs of the students.

2.5 - Literature Review: Conclusion

The continued move towards a more practice based approach to Initial Teacher Education over the last thirty to forty years has apparently done little to address the ongoing and persistent view amongst students that time spent in school is considerably more important than time spent in faculty. The theory/practice divide appears to be as wide in the minds of students as ever it was and there is clear evidence that, for many students, this opinion is formed before ITE commences and not significantly impacted upon during. In attempts to bridge the divide a range of problem and scenario based approaches have been taken often with limited success.

The use of computer simulation is being seen by some as the best chance yet to enable students to see more value in the work done in faculty. This is partly because most ITE institutions place a high emphasis on reflection on practice leading to reflection in action. One of the major difficulties faced by ITE providers is the fact that up until now is not possible to provide the same experiences for all students to reflect upon. A similar problem is encountered with an apprenticeship approach as all students learn from different 'masters' each with different skills, attitudes and abilities. Simulations have been used in some cases to try to tackle these problems and the possibility of computer simulations offers a greater degree of fidelity in these simulations than was possible before.

Although the majority of research into this area focuses on the technical and cognitive issues relating to computer simulation there is some indication that the emotional side of any interactions is very significant. This has led to the beginning of an understanding that the fidelity of any simulation, whilst important to 'draw in' the participant, may not be the most important aspect after all. Where students

have become highly engaged in simulation activities they report this engagement in ways that perhaps relate to Csikszentmihalyi's notion of 'Flow' whereby the participant becomes engrossed in the activity to the extent that they become unaware of the flow of time. Students who were able to 'suspend disbelief' appear to have reduced the barriers leading to such a state. Anecdotal evidence suggests that a similar state of flow may exist for students on teaching practice and that it is the fact that this is the feeling that intrinsically valued that causes students to place such a high value on time spent in school.

One of the advantages of simulated activities in ITE might be that they create the conditions necessary for students to experience a similar 'flow 'sensation during faculty work. If this is true, then the use of simulation may prove beneficial in bridging the gap between theory and practice. On the other hand, if students' emotional engagement with simulations is similar to their engagement with other faculty based work, simulations may be seen by students as merely 'better presented theory'.

The problem, then, is, through the questions posited in the introductory chapter, to try to understand students' responses to a simulation approach to ITE and to discover what emotional component there is to that response. In order to explore that problem, the key theoretical ideas that need to be taken forward into the research design and subsequent analysis are:

- Third Space – the idea that computer simulation might be different from both 'faculty' and 'practice'.
- Suspension of Disbelief – the question of whether a level of engagement can exist whereby inevitable 'unrealities' do not 'spoil' the experience.

- Flow - Csikszentmihalyi's idea that, in the right circumstances, engagement can become 'engrossment'.
- Emotion – the way in which the students feel about the characters and situations in the simulation.

Chapter 3 – Research Design Part 1: The Virtual Case Creator

3.1 – Introduction

In this section the specific computer simulation that the students in this study engaged in will be explained. Background relating to its creation for use with medical students will be followed by an explanation of how it was adapted for ITE students. The actual scenarios will be presented in sufficient detail that the reader is able to appreciate what was required of the students as they proceeded and thus give a clear context to the data presented in later chapters.

3.2 Background to the VCC

The Virtual Case Creator was originally developed by staff from the Faculty of Health, Birmingham City University (Formerly UCE Birmingham). It aims to provide,

> deliberately unstructured, non linear scenarios that aim to facilitate the safe development of a range of cognitive skills... Scenario cases are described primarily by illustrated representations of aspects of practice. These aim to encourage learners to develop and apply their observational skills and aim to ensure that learners adopt a learning approach that best prepares them for real world practice. (Birmingham City University, 2008)

Each scenario consists of one or more ‘cases’, a word that betrays the medical nature of the software as originally conceived. Each case is made up of a range of information sources presented in a variety of ways (text, .pdf documents, websites, animations, pictures, videos etc.). These sources must be processed by the student in way that prioritises important information and sets aside

irrelevancies (which are deliberately included). They then take part in a problem solving activity using the information that they have deemed most useful.

> The information presented within each VCC case hasn't, therefore, been pre-digested or pre-prioritised by a teacher, as often occurs with more traditional approaches to case study presentation and on line simulations, but provides the learner with the opportunity to decide, as they would in practice, how they would identify decisions most relevant, and discount potential decisions less relevant to the case in question. (Birmingham City University, 2008)

Students access the simulation via an Internet enabled PC. The large amount of video footage in some scenarios means that a broadband connection is essential. Some sessions, in particular introductory ones, are carried out in faculty computer rooms. Much of the time spent accessing the VCC is carried out in the students 'independent study' time where they can use faculty computers or their own. There are login procedures to allow for the tracking of students usage and maintain control of copyright.

Although each case is different, the scenarios developed by the team in Health follow a similar pattern. As has been said, a large amount of un-filtered information is included for the student to sift through and prioritise for themselves. In each scenario there is a decision making exercise that asks them to select fifteen 'correct' items from a potential forty five. These items might be particular procedures that need to be carried out (for example, checking blood pressure or temperature), adaptations that need to be made (for example, raising the height of a bed) or the selection of statements for a report. (see fig 3.1). Some of those decisions can be virtually carried out on the screen. For example, hovering the mouse cursor over the bed rail in fig 3.1 will pop up a message saying, 'Do you want to raise the bed rail?' If the student chooses 'yes', the image changes to one with the rail raised and the choice is registered.

Fig 3.1 screenshot from Intensive Care Paediatric Simulation

In the spring of 2007 a chance encounter between myself and the principal developer of the VCC led to a conversation concerning the possibility of expanding the use of the VCC to the Faculty of Education. This thesis concerns a line of enquiry that became interesting to me over the course of that collaboration, but it must be stated clearly from the start that the research that follows does not have the intention of being an in depth evaluation of the success of the collaboration that followed or the efficacy of the training provided to the ITE students by the VCC. Both of those issues will be dealt with elsewhere. During the various discussions that ensued it became apparent that there was a fundamental difference between using the VCC for health students and ITE students. The designers of the VCC were only interested in the impact that the VCC had on their students' skills and knowledge and understanding of the issues focussed on in each case. However, with ITE students there is the further dimension that the simulation had the potential to impact on their attitude to the pedagogy. Whilst health students undoubtedly would have opinions related to the pedagogy, this is unlikely to impact on the quality of the healthcare they provide in the future. However, the attitude to the pedagogy by ITE students seemed to

me to be highly relevant to the way they would use simulation as teachers. This, then, was the starting point for this study.

3.3 - Adapting the VCC for use with Initial Teacher Education students

Following an initial meeting between the developer and myself where it was decided to explore the possibility of creating a scenario for use by education students. A small working group was set up that included myself, the developer, two other members of Education academic staff and a technician from Health.

At the first meetings held between the Health and Education Staff, a range of possibilities were explored. Interestingly, much of the early discussion did not centre on the VCC itself as it became increasingly apparent that the mores, experiences and expectations of the educational professionals were substantially different to those of the health professionals. Much time was spent discussing anecdotal evidence concerning student attitudes to placement (Nurses from Health, Trainee Teachers from Education). It soon became clear that there were two major differences in approach:

a) health professionals did not accept 'trial and error' as an acceptable way for students to learn professional skills whereas this was seen as the predominant method used in Initial Teacher Education and
b) the relationship between health professional/patient was considered a one-to-one relationship whereas the relationship between teacher/child was generally perceived as one of group interaction.

Although subsequently considered to be of great significance by myself, the first issue was deemed by the group to be less important than the second. This was probably due to the practical issues that became apparent once discussion of how group interactions between a teacher and class might be handled by the software commenced. Through a series of discussions a consensus emerged that the scenarios developed would focus on one particular child and, rather than be pedagogic in nature, focus on interactions with other adults concerning the child. This would allow the students a simulated experience of the kind rarely achieved in reality pre-service but that often occurs for practising teachers.

Over a period of approximately six months the ideas of the group coalesced into the final scenarios as presented below.

3.4 - The Educational Simulation Scenarios

As a member of the team with a particular interest in e-learning generally and, increasingly, simulation in particular, I took a lead role in the process of adapting the VCC for use with ITE students. It was decided that two scenarios should be developed for use with an upcoming taught module that had, at its core, an aim to develop students' understanding of multi-agency working in light of the Every Child Matters Agenda (DfES, 2005). To support this aim the two scenarios presented two sides of a problem often faced by teachers – interaction with parents and interaction with other professionals. In order to facilitate this, a 'virtual school' was created. A staff list was drawn up, policy documents written and graphics of the school exterior and interior were created. An Ofsted report was also created to lend an air of authenticity and support the students in relation to suspension of disbelief. It was felt that the more 'real' elements were incidentally included, the more the students would 'buy into it' (as the team phrased it throughout). The scenarios would be set within a Year 2 class in this school with the student accessing the simulation taking on the role of the class teacher. Amateur actors were employed to take on various other roles and video footage was shot of a variety of situations/discussions (See Appendix 1). The ability to use amateur actors was essentially a stroke of fortune as one member of the team was an amateur actor herself. However, upon contacting various members of the company it was realised that several of them worked within education. We were therefore able to cast 'real' people in the roles of Special Educational Needs Co-ordinator, School Nurse and Educational Psychologist. Once again, we felt that this would add to the sense of reality and support suspension of disbelief. Still shots of the actors were then used by the graphic artists to represent the characters in drawn format.

3.4.1 – First Scenario

In the first scenario (see screenshots appendix 1) a child, Ashley, has recently arrived in a Year 2 class. At the point where the scenario starts, the head teacher (acted by a retired real primary head teacher) informs the class teacher that Ashley's mother has made an allegation of bullying. The head teacher wants the class teacher to provide some information about how Ashley is doing both educationally and socially. The student's job is to explore the graphic images, clicking on hot-spots to access information including comments from other children, records of achievement, samples of work, previous school reports etc.

The student is then presented with forty-five possible statements that could go into a report to the head. Of the forty-five statements, fifteen were designed to be those that might be considered to be a true reflection of the information as presented, whilst the remaining thirty are not justified by the information available. Several of the statements were deliberately emotive – for example, 'The next time Ashley bullies anyone, he should be excluded'. By attempting to elicit emotional responses, or at least offer students the opportunity to recognise them as such, we once again hoped to create a sense of reality. The student selects the fifteen statements they consider to be correct. They are then given a score out of fifteen. The student may return to the scenario at any point and modify their selection in the light of further investigation.

3.4.2 – Second scenario

In the second scenario (see screenshots appendix 2) time has apparently moved on and the head teacher is still concerned about Ashley. The head teacher informs the student (still acting as class teacher) that he has called a meeting involving the mother, Special Needs co-ordinator, Educational Psychologist, School Nurse and Inclusion Co-ordinator. He then informs the student that he will be unable to attend. The students at this point were not informed that this is quite an irregular (although not unprecedented) chain of events. One of the criteria for the written assignment is to discuss whether or not such a meeting should actually have happened.

The meeting is presented as a series of video clips. The actors playing the parts were all genuine professionals and all but one had some experience in amateur dramatics. Each clip is selected by choosing a question and a respondent. For example:

To Mother: When did you first notice Ashley's problems?

The actors were filmed having been asked the questions and a variety of answers were forthcoming, ranging from a valuable insight to an angry or defensive outburst. The actors were informed of the question but asked to improvise a response which was then filmed. By not scripting the responses it was felt that a greater sense of reality would be achieved. Each actor was asked to try to portray particular characteristics without being overly 'dramatic'. Ashley's mother for instance was asked to be mildly aggressive in places and the educational psychologist was asked to be a little pompous.

In addition to the information gleaned from the responses, hot-spots on items such as the School Nurse's diary allowed access to a range of documents including for example, the job description of the person, recent research, information of medical conditions etc.

The students also had access to a series of videos representing 'talking heads' descriptions of the main characters and Ashley's family from their own perspective. Again, these were mostly unscripted with only general pointers about the nature of the person and the situation given to the actors.

The scenario was completed by the student after deciding on the fifteen most suitable question/respondent combinations at the meeting.

3.4.3 – Education in an Urban Environment

The scenarios described above were embedded into a 12 credit module at level 6 (final year BA course) that covered a range of issues related to 'Urban Education' including dealing with parents, ethnicity, gender, health language and culture. For the assignment students were asked to write a 2500 word essay focussing on one aspect of the module. The success of the student in successfully completing the scenarios was not taken into account for the assessment and was not in any way used to calculate the grade achieved. The essays were submitted and marked (anonymously) in the usual way. The decision making exercises within the scenarios were designed to be formative in nature, encouraging students to engage with the wider issues presented rather than to be seen as merely a contextualised puzzle to be solved. In this sense it was clearly part of the design process that the students should not see the decision making exercise as 'merely a game'. This is an essential point in relation to this research because whether or not the students view the exercise as a simulation of reality or as simply a game is either irrelevant or essential depending on one's point of view. If the sole purpose of the VCC is to impart some knowledge or develop some skills (such as

decision making, tact etc.), then it does not really matter what the student thinks of the process by which it happens. It may be seen to be more motivating or engaging (‘making learning fun!’), but so long as the student learns, other considerations are not really relevant. Essentially this is the approach taken by the designers of the VCC to the teaching of medical students. The difference with Education students is that approaches to pedagogy used *on* them may well impact on approaches used *by* them. In other words, if the students see value in it as a way of learning, they are more likely to see value in similar approaches when considering teaching.

Chapter 4 – Research Design Part 2: Designing the empirical study

4.1 – Introduction

In this chapter I will review the questions that have emerged so far and attempt to explain how these questions are to be answered in relation to the key theoretical ideas that underpin the study. Questions of ontology and epistemology will be considered so that the reader is aware of my current position and may better understand the methodological decisions taken. The actual methods for collecting the data will then be explained together with some justification of their usage but in light of the way in which the research developed, I will present key criticisms of the approach in a later chapter. Discussion of how the data was analysed will be included at the beginning of the results chapter. Triangulation is a difficult issue in such a small scale study and so that issue is also dealt with here, as is the ethical stance taken where, in particular, I must justify my decision not to share with the students my part in the development of the scenarios.

From the review of the literature, several key themes emerged. Firstly, there is the fact that computer based simulation has not been exploited in Initial Teacher Education to the degree that it has been in other areas of initial training – in particular in the areas of defence and medicine. The rationale for this which, as has been discussed above, is rarely explicitly stated is that a 'trial and error' approach to learning is not seen as acceptable in areas where 'error' might lead to loss of life and/or extreme financial loss. The way in which teacher training is organised indicates that such a rationale is not often adopted in ITE. The fact that any 'damage' (educationally speaking) done to children is seen as being minor or potentially undoable by an experienced teacher following on is probably the overriding reason why the defence/medical position is not taken in education

(assuming, of course, that the other possible reason, that of lack of care, is not the explanation). Such a study of trainers' and trainees' attitudes to the ethical implications of learning 'on the job' was unfortunately not considered to be a key part of this research in the initial stages. Wider reading throughout the process of developing this study has indicated that this is an important area and so will be the focus of a later study outside of this thesis.

A further theme that arises from the review of the literature is that of the efficacy of simulations in the teaching of skills to pre-service teachers. As reported, some research has been carried out in this area although this is necessarily limited by the small numbers of ITE providers that appear to be using computer simulation as part of their programme. Similar issues have also been noted in the literature relating to medical usage. Again, the value of the simulation under consideration in relation to the teaching of the skills that it purports to teach will be reported elsewhere following a longer term study.

A third theme that arises is the attitude to the use of simulation by trainees and the impact that that might have on their own practice in the future. This is the theme that will be at the heart of the empirical study that follows. The review of the literature has shown, in particular, that trainee teachers have traditionally felt that there exists a gap between the theoretical and practical aspects of their training. The use of the Virtual Case Creator simulation is an attempt to address such concerns. In order to determine whether or not this might have the desired effect, students' attitudes need to be explored both before and after exposure to it. Of equal importance is the impact that student attitudes towards simulation have, not only on their own learning, but on their teaching. This is, of course, very difficult to measure. However, what can be ascertained is what impact their attitudes to simulation as learners might have on their attitudes to it as teachers. This in turn will impact on the use they make of such technologies as and when they become financially viable in the primary school environments where they will be teaching. Such a study of attitudes towards the VCC is something that the creators of the software have barely considered in the past. The medical

education background has meant that the focus of research has mainly been on student attitudes and engagement with some limited analysis of its efficacy in relation to medical skills. Whilst a study of attitudes, focussing on trainee teachers, may prove to be illuminating to the designers who may wish to consider why it appears to be more successful with some students than others a key focus will be on these students as future teachers as well as present learners.

4.2 - Research Questions

The questions presented here are those that were formulated at the end of the introduction and were the subject of the literature review. In this section there has been some slight re-ordering to reflect the sequence in which questions were put to the students. As has been discussed above, much research of the past fifty years has identified a gap between the value students place on time spent in school and the time spent in faculty. The very existence of the VCC project in a faculty of education is testament to the fact that the policy makers consider this to be the case in this instance and that the introduction of the VCC to a teacher training programme is seen as a valuable tool in making the time spent in faculty seem more relevant to the students.

The first questions to be asked, then, are:

What proportional value do these students place on time spent in school and time spent in faculty? and

To what extent do students consider the VCC enhances the value of time spent in faculty?

It is considered by many faculty staff, as is reported in some of the literature, that many of the current generation of pre-service teachers are extremely ICT literate and technically competent, and that this pre-disposes them to ICT based pedagogies. However, informal conversations with staff also indicate that many are worried that some students, who are not so technically minded, are in danger of being left behind and disadvantaged by an ever increasing move towards the use of ICT to support all aspects of the training programmes. However, no actual survey or analysis of the extent to which students do integrate technology into their lives has been carried out in the faculty so no pre-existing data can be called upon.

The second question therefore is:

What access to ICT do these students have and for what do they use it?

In the discussions in preceding chapters it has been pointed out that computer simulations have much in common with some computer games. One might assume that any student who enjoys simulation style games (for example, Sim City) might be pre-disposed to value simulation as a pedagogic tool. Alternatively, this may give them a negative view of simulation as 'only a game'.

Another subset of questions, then, is:

Do the students play computer games? If so, which types? Is there any relationship between those who play simulation games and those who have positive attitudes to computer simulation as pedagogy?

It seems self evident that a student teacher's attitude towards a pedagogic tool will both at once impact on their own performance when subject to that pedagogy as a learner and their willingness and commitment to its use as a pedagogy for their classroom as a teacher. Whilst some studies have been carried out regarding the use of simulation as a pedagogy in the areas where it has been most used to this point (see military and medical applications above), the fact that this remains a relatively new area for Initial Teacher Training means that, inevitably, little research has been carried out to ascertain whether the preceding statement is in fact true. This important because it seems inevitable that teachers will be expected to make more use of simulation in the future. This can be seen in the Rose (2009) Review of the Primary Curriculum which was published during the period of this study. It proposed that ICT should be, alongside mathematics and English, at the core of the curriculum. Although subsequently dropped due to a change of government, the Science & Technological Understanding draft programme of study explicitly stated that children should be taught, "Using simulations to predict outcomes of experiments and explore environments, parts and products that are hard to access in reality." (p2) A couple of examples of such tools that are already freely available on the Internet are The Night Sky Simulator (Nixon, 2009a) and The Light Pollution Simulator (Nixon, 2009b). Whatever the outcomes of the current review of the primary curriculum, it seems hard to envisage any government not wanting to put increased emphasis on ICT applications such as these.

The final, and perhaps hardest, question to ask then is:

What relationship, if any, exists between a student teacher's attitude to computer simulation as a pedagogy for themselves and as a pedagogy for the children they will teach?

4.3 - Ontological & Epistemological Considerations

It should be stated clearly and from the start that the epistemological position taken by myself in relation to this research is one of critical realism. (Bryman, 2008; Pring, 2004; Oliver, 2010). The view is taken that, although concepts such as 'attitude' are not immediately open to direct view (as would be required of a positivist approach) they may be considered the '*generative mechanisms'* (Bhaskar, 1978) that that create observable effects. There is no attempt in this study to evaluate a 'theory' of attitude to simulation. As Bhaskar (1986) says, *'criteria for the rational development and assessment of theories in the social sciences cannot be predictive and so must be explanatory'* (p101)

However, I equally reject the view that such explanations *cannot* lead to valuable and important knowledge about the subject. The attitudes that the students have, in relation to the use of simulation as a pedagogic tool both for their own learning and for their use as a learning tool in their classrooms are real and are therefore open to scrutiny. I take the view that,

> 'there are structures producing social phenomena analogous to the causal mechanisms of nature [and] the openness of the systems within which such phenomena occur does not undermine the feasibility of either retroduction from manifest phenomena to generative structures or retroduction from resolved components to antecedent causes' (Bhaskar, 1986, p108)

In other words, part of this study will be an attempt to describe student attitudes to simulations for their own learning and to see if it is possible to theorize a link with their attitudes to simulation as a pedagogy for others.

In the conclusion there will be a tentative attempt to predict what impact certain attitudes might have on practice in certain situations. These are necessarily tentative because, as Bhaskar (1986) again observes, *'Social phenomena must be seen, in general, as the product of a multiplicity of causes'* (p107). There will be a wide range of reasons why a new teacher may or may not use simulation in

their own classrooms (time, availability of resources etc.) and attitude towards it will be only one. The observable effects themselves, being the application of computer based simulation in the classrooms of the prospective teachers by those teachers throughout their careers are not part of this study, not because they cannot be (again, as a positivist would argue) but simply because of the practical limitations of a study of this size. In fact, the tracking of the students into the future is being considered as a future research project. This study, then, sets a benchmark or the groundwork for such a future study.

4.4 - Methodology (including triangulation)

The methodology adopted here stems directly from the stated position of critical realism. Methodological positions are often associated with the perceived dichotomy between positivist and constructionist epistemologies. A simple view is that whilst positivists favour quantitative approaches, constructionists favour qualitative approaches and there is little need to rehearse the arguments for and against such stark positions here. Much has been written on the subject and whilst many standard texts currently espouse this either/or view of the nature of research (Burton et al, 2008; Creswell, 2005; Mackenzie & Knipe, 2006) there are also many who describe this as a 'false dualism' (Wellington, 2000; Johnson & Duberley, 2000; Gorard & Taylor 2004). One of the principal advantages of the critical realist stance is that it allows one to take a step back from these extreme and entrenched positions and to more easily consider such extremes as such a false dualism and ignore, '*much of the silliness which many of the writers on educational research expose us to.*' (Pring, 2004, p58)

Without the weight of an entire paradigm on one's back, a critical realist stance enables the picking and choosing of methods as appropriate to the question under investigation. Hence, in some situations an analysis of numerical data may be of the greatest use, whereas in others in depth interviews relating to particular cases might be more appropriate.

The use of a range of tools is often described as a 'mixed methods' approach (Wellington, 2000), however, whilst this may be valuable shorthand to discuss the kind of approach being taken here, it does actually help to reinforce the false dualism being rejected. For if one asks the question, 'What is being mixed?' the inevitable reply is, 'methods from each paradigm'. For the purposes of this research, then, a *range of methods* will be applied to both collect and interpret the data required to try to gain an understanding of the issues underlying the research questions.

The use of a range of methods is also central to the view that I take of triangulation. Triangulation has been described as, '*a procedure that can contribute to the credibility of a research account'* (Opie, 2004, p72). Opie's view of triangulation, similar to many others (e.g.Cohen, Manion & Morrison, 2007; Wisker, 2008) is based on the idea of corroboration through looking at the same thing from different viewpoints. Indeed Opie explicitly ties the usage of the word triangulation in educational research to its origins in cartography: '*a better map of a landscape can be obtained if one uses more than one line of sight'* (Opie, 2004, p72).

Perhaps a more useful view of triangulation is provided by Gorard & Taylor (2004) who see it in terms not of trigonometry but of perspective. If one looks an object from one perspective, one may see only a circle. From another perspective the view may appear to be that of a rectangle. It is only by combining the information gained from each perspective that one comes to a realisation that the object is in fact a cylinder. (Gorard & Taylor, 2004, p44) An interesting feature of this metaphor is that at no point does one 'see' the cylinder. The presence of the cylinder is logically deduced by interpreting the data provided. In this sense the view of triangulation as complementarity rather than validatory in nature fits in well with the critical realist stance being taken. This is provided one accepts an assumption that the 'object' being observed does not change over the course of the observations. In relation to the research questions about the attitudes of the students towards the use of computer simulation this is complex, because part of the research was to see if any changes did occur over the period when the students were using the VCC. However, at each stage of the research it can be assumed that the views of the students were relatively stable. That is, it is assumed that the views of the students being interviewed did not alter significantly during the interview nor alter significantly from when they completed the second questionnaire. This is the view that is taken.

These methods, and the justification for their use, are discussed in more depth in section 4.6 below.

4.5 - The Sample

The sample chosen for the study consisted of a group of students in their third and final year of a BA (Hons) programme in Primary Education with Qualified teacher status. The course is divided into those focussing on the 3 – 7 age range (approx. 1/3 of the cohort) and those focussing on the 5 – 11 age range (approx. 2/3 of the cohort). For the purposes of this study the students were not divided or treated differently according to their chosen age phase although in hindsight it may have been useful to establish whether the age range choice showed any correlation with any of the other attitudes under investigation. This is a point that is already being considered for further study.

The data collection took place following their final teaching practice. The cohort consisted of 135 students. All students present at a year meeting were invited to take part in person following a very brief introduction. Approximately 100 students were in attendance of whom 74 (6 males & 68 females) returned both parts of the questionnaire. Following the second questionnaire 8 students were identified for the follow up interviews using the criteria previously outlined. In addition, 2 other students were invited to interview as 'back-up' in case others were unavailable. In fact, all 10 students made themselves available to be interviewed allowing for two students to be used as 'dry runs' so as to follow Bryman's (2008, p209) advice and, '*to train yourself to follow the procedures and advice provided'* on conducting interviews.

Although there is a wealth of research evidence to suggest that attitudes to ICT based pedagogies may have gender specific elements, the small sample size made it unwise to consider that issue here. As the 8 case study students are indicative rather than representative, gender will be noted, but not explored in the analysis.

4.6 - Methods for data collection

4.6.1 - Timing

In order to answer the questions as stated above data were collected in three stages as outlined below. Stage One was completed before the students had engaged with the VCC as part of a taught module on urban education. At this point the students had been briefly introduced to the VCC during a whole group lecture. Explanations of its practical use (such as logging on, accessing the correct information, making choices using drop down menus etc) had been given but no detail concerning either the content of the simulated scenarios or the reasons why this was being applied to this module was discussed. Stage Two was completed after the students had accessed the VCC for several weeks, had completed the module and submitted the written assignment. The use of the VCC was seen as an integral part of the module and presented to the students by the course team as such. Stage Three was undertaken approximately two weeks following stage two. This was carried out before the students' assignments for the associated module were returned to them.

4.6.2 – Stage One: Pre-experience Questionnaire

Stage One consisted of a self completion questionnaire. (See appendix 4) These were distributed to the students following a brief introduction at the end of a whole cohort meeting. At his point the students were given the introductory letter and informed consent form (see section 4.7).

Section One consisted of 4 items collecting background information including name, gender, ethnic background and age. Whilst the relatively small sample size made it unlikely that any meaningful correlations between gender, age or ethnicity and any other item could be made this was collected on the basis that it might provide some interesting pointers for future research. Although the data is presented as anonymous it was necessary to have a system whereby 'before' and 'after' responses could be matched and, after considering a range of possible coding solutions, it was deemed that the simplest way of managing this was via the students name which could then remain un-reported (see section 4.7)

Section Two contained a series of items designed to gauge the students' access to and usage of ICT. This included personal, work related, entertainment and practical applications of software, hardware, computers, games and gadgets. The lists of possible uses of ICT was devised during a small 'brainstorming' session involving myself, two other tutors and two students not connected with the programme in question. The final list was considered by the group to be reasonable reflection of the kinds of uses that might be expected from the students. A similar process was undertaken in relation to types of computer games, however as a list of types of game developed by Crawford (1982) was taken as a starting point for the discussions. It was decided to focus on the most commonly understood types of game within the group, the main stipulation being that one of the categories had to be simulation. The use of this small group was considered to be a useful compromise between an extensive period of trialling (which was impractical in this situation) and relying on my (inherently biased) personal views and expectations.

Section three began with an item specifically designed to elicit a response that would establish whether or not the students placed higher value on time spent in school than on time spent in faculty. As this is such a value laden topic, and as

such has the potential to be dramatically skewed by researcher bias in the question design, a method was devised that allowed the question to be asked in as neutral a way as possible. In discussion with the group of students mentioned previously it became apparent that this simple division of faculty/school was too simplistic. 'School' implies a range of activities including learning by experience, trial and error approaches, collaborative teaching, discussions with experienced teachers and other professionals, feedback from same and so on. Similarly, 'Faculty' also covers a range of activities including lectures, tutorials, seminars, group work, assignment writing etc. A list of activities was produced by the group and this was then divided into those that predominantly occurred in faculty and those that predominantly occurred in school. Through a process of combining and synthesising it was possible to arrive at four statements that covered, in general terms, most of the original activities. The first two summarised activities carried out in faculty:

- Learning from lectures/taught sessions
- Learning from peer discussion

Whilst the second pair summarised activities carried out in school:

- Learning by practising in the classroom
- Learning from discussions/observations with teachers/mentors

In the item students were asked to indicate a 'percentage value' that they placed on each statement adding up to 100% for all four. It was decided that should any student make a mistake in their calculation and not have all four totalling 100% a further calculation would be carried out later to adjust the scores accordingly whilst at the same time maintaining the students' proportional value of each item. In the event, no student made a mistake on the calculation and all provided values totalling 100%.

The final part of the questionnaire contained ten items aimed at eliciting the students' attitudes and dispositions towards the use of computer simulation. This was arranged as a Likert scale, with five responses ranging from strongly agree to strongly disagree. In this section, items 1, 2 and 3 asked students to consider simulation in relation to developing QTS skills. Items 4 and 5 were designed as key indicators regarding student attitudes to simulation in relation to reality and preparation for being a teacher. Item 6 concerned motivation and engagement. Items 7 and 8 required the students to consider whether simulation ought, or was likely to, become increasingly used in Initial Teacher training. Items 9 and 10 required the students to consider whether simulation ought, or was likely to, become increasingly used in primary education.

By carefully structuring the questionnaire and avoiding irrelevancies it was possible to contain the questionnaire on four sides of A4 without cramping the presentation, thus hopefully reducing 'questionnaire fatigue' and supporting a high response rate (Bryman, 2008, p221).

Due to the timescales involved it was not possible to carry out a full pilot of the questionnaire with a cohort of students. However, I was able to share my work with a small tutorial group of students involved on another course. I was teaching this group about the problems and challenges of carrying out research including questionnaire design and used my first draft as an example to explore. Following these discussions I did not consider that there was any need to make changes other than one typographical error.

4.6.3 – Stage Two: Post-experience Questionnaire

The post-experience questionnaire (See appendix 5) consisted of one set of Likert scale statement items matched explicitly to section three of the pre-experience questionnaire. Essentially, the only difference made was in the tense used in the items related to the students' experience of the VCC itself. For example,

> I think such a simulation can be a close approximation to reality

on the pre-experience questionnaire became,

> I think the simulation was a close approximation to reality

on the post-experience questionnaire.

Other items that were about attitudes were not altered but presented in the same way both times. For example,

> I expect computer simulation to become increasingly prevalent in primary school education

By keeping the statements as similar as possible between the two questionnaires it was possible to make direct comparisons.

4.6.4 – Stage Three: Post Experience Interviews

A series of eight semi-structured interviews was carried out following the analysis of the data from the first two stages. Five general areas were chosen and a schedule (see appendix 6) constructed around those areas. The areas were:

- The value students place on different aspects of the course
- The students' access to and general usage of ICT
- An exploration of the students' thoughts about the use of computer simulation in their training
- An exploration of the students' thoughts about the use of computer simulation in their future classroom
- Possible reasons behind any changes of attitude over the period of using the VCC

It was only after the interviewing process had been completed that I became much more concerned with the issue of 'emotion'. In retrospect it would have been significantly better to have had some questions explicitly designed to elicit responses about that issue. However, the emerging realisation of the importance of emotion served as a lens through which to re-view and reappraise the comments made by the students and as such, the general section concerning an exploration of the students' thoughts about the use of computer simulation in their training did produce some interesting evidence in this area.

The criteria for choosing the participants were based on changes of attitude to the principle of using computer simulation in teacher education. Essentially four different indicative cases were selected and two of each 'type' were invited to participate. The types were:

Type N-N A student who had generally negative attitudes beforehand and these attitudes remained basically unchanged afterwards

Type N-P A student who had generally negative attitudes beforehand but whose attitudes afterwards had become more positive

Type P-P A student who had generally positive attitudes beforehand and these attitudes remained basically unchanged afterwards

Type P-N A student who had generally positive attitudes beforehand but whose attitudes afterwards had become more negative

In the results section, the eight students are coded as N-N:1, N-N:2, N-P:1, N-P:2, P-P:1, P-P:2, P-N:1 and P-N:2.

An additional two students were chosen to be used as a pilot, to ensure that the questions were appropriate and to allow a practice at the process given that this was the first time that I had carried out such interviews.

4.7 - Ethical Considerations

This research was designed and carried out following the guidance provided by the British Educational Research Association (BERA, 2004).

Following discussion and approval from the ethics committee, a covering letter and consent form was designed (see appendix 3).

As the participants were students enrolled on a course at a faculty where I was a member of academic staff and knew some of them personally through taught modules and professional and personal development tutoring, there were clearly several issues to be dealt with.

All the students present at the initial meeting were invited to take part. It was made clear verbally, and in writing this was optional and that they could withdraw their participation at any point. This needed to be stressed because the usual academic/student power relationship was not appropriate to maintain in this research. I was able to use the fact that they too would be engaged in research as part of their final project to both make clear the expected relationship and, hopefully, to encourage participation.

The taught module that the Virtual Case Creator scenario had been attached to was a module that I did not teach on and therefore would not be called upon to mark assignments. This was made clear to the students, to reassure them that their final result could not be influenced by anything they said in the questionnaire or interview. This was particularly important as, as was mentioned previously, the students names would be attached to the questionnaires so that before and after attitudes could be compared.

The students were provided with two copies of the covering letter and consent form at the same time as they were given the initial questionnaire. They were

invited to sign and return one copy of the consent form with the questionnaire and keep one copy for their reference.

At this point it should be mentioned that a specific piece of information was deliberately withheld from the students. This was in regard to the part that I had played in the development of the scenario. I did not want to risk the possibility that students might, consciously or unconsciously, indicate a more or less favourable attitude towards the VCC given the amount of time and effort that I had spent on its preparation. To give them this information would have been to introduce an element of bias that could easily be avoided. It is occasionally necessary to withhold information from research participants in order to try to alleviate potential 'please the teacher' bias and I decided that this was warranted in this case. The omission of this piece of information in no way affected the principle of 'do no harm' because knowing the information could not have benefitted the students in any way. At first sight, it may seem that it would be 'only fair' to inform the students afterwards, however I decided that I would not tell the students afterwards either, on the grounds that, if they had made particularly negative comments they might feel guilty or worried. As Sikes (2004) observes, '*This is not a simple and straightforward matter and no answers are applicable in all situations either'* (p32). I made my decision on the grounds that, on continuing to withhold this information I was acting in the best interests of the students.

Chapter 5 – Discussion of the Results

5.1 – Introduction

The results below are at first presented and analysed by theme rather than chronologically. Each of the three stages produced important information in relation to the research questions and, upon reviewing the data, it became apparent that whilst a chronological approach might be simpler it would risk losing the essential threads that permeate the study.

Where necessary I have indicated the phase from which the data emerged if this is not clear otherwise.

By approaching the data by theme there is the possibility of missing some of the nuances in each of the case study students' 'story', so a following chapter will consider each of the indicative cases holistically. A disadvantage may be that there is some repetition, however this will be avoided wherever possible and the potential benefits of this approach seem to me to outweigh the disadvantages.

It is necessary here to say something about the ways in which the data was analysed. This is particularly important as this study uses both quantitative and qualitative methods.

5.1.1 – Analysing the quantitative data from the pre- and post-experience questionnaires

MS Excel was used to create a spreadsheet of all the data collected in the pre- and post-experience questionnaires. Students' names were used to match responses. Where a range of responses was available to students, numerical

values were assigned in accordance with level of response. For example, question 6 on the pre-test questionnaire asked students about how important their computer was, the value of the response representing the highest value: 'Essential – I couldn't manage without' was assigned a numerical value of 5. The lowest value response; 'Unnecessary – I'd rather not have one' was assigned a numerical value of 1.

Similarly, the responses to questions that were presented as a Likert Scale were coded from 1 – Strongly disagree to 5 – Strongly agree.

Where a yes/no response was elicited, no was given a value of 0 and yes a value of 1.

The creation of this spreadsheet allowed to data to be analysed in three key ways. Firstly, use of the chart tools allowed different parts of the data to be compared and allow any underlying patterns to emerge. This made it relatively easy, for example, see if there appeared to be a relationship between those who played games and those who valued the use of simulation for educational purposes. Secondly, some simple statistical formulae (such as calculations of means and medians) were easily applied to the data to gain some understanding of key issues as they related to the whole sample. For example, this kind of analysis makes it possible to see whether, on average, the sample of students was more positive about the use of simulations before or after experience of the VCC. Finally, the spreadsheet allowed before and after comparisons to be made for individual students. This was an essential part of the study as that data was used to select the indicative cases for the qualitative aspects of the study.

5.1.2 – Analysing the qualitative data from the indicative case semi-structured interviews.

The semi-structured interviews were recorded using a digital audio recorder. I was then able to convert these to mp3 files and transfer them to a portable device

that usually stores music. For the first few weeks after the recordings were made, I listened to them in my car whilst travelling to and from work. As there was no-one in the car I did not consider that this would create any ethical issues even though it had not occurred to me beforehand that this was an option and had therefore not informed the participants that I would do this.

Although I arranged for the recordings to be transcribed verbatim so that I would have paper copies, as I had access to the original recordings at all times I did not feel the need to use a structured coding system for issues such as volume, speed, emotive expressions etc. I have drawn attention in places to some of these issues in the following commentary and this is based on my analysis of listening to the recordings rather than reviewing the transcripts.

I adopted an iterative approach to the analysis of the interviews. Firstly, I used a simple content analysis procedure to look for key themes related to the research questions. A simple colour coded highlighting was applied to instances where a particular feature was noted, for example, any comment appearing to relate to 'sense of reality' was highlighted yellow. A time index was then added using Windows Media Player as a guide. Secondly, as issues began to emerge, and in some cases appear to be less important than at first suspected, those sections highlighted were found on the recordings and re-examined. I was then able to re-listen to specific sections of interviews again and focus in on key issues that emerged from the way in which students spoke. In this way I hope to have achieved some level of nuance in the interpretation I have given to both what was said and how it was said.

5.2 – Faculty-school divide

The results of the phase one question about the value students placed on time spent in faculty (see fig. 5.1) were consistent with other research (Foster, 1999; Brooks, 2006; Jones et al, 1997) in this area in finding that a faculty-school divide exists in the mind of the students.

All figures as % to one decimal point	Relative value of faculty time: lectures/ taught sessions	Relative value of faculty time: talk with peers	Relative value of faculty time: Total	Relative value of school time: practice	Relative value of school time: talk with mentors	Relative value of school time: Total
Mean	19.4	14.7	34.1	44.9	20.9	65.8
Std Dev	6.9	6.1	10.5	13.5	8.1	10.3
MAX	40	25	50	75	50	85
MIN	10	5	15	20	5	50
Range	30	20	35	55	45	35

Table.5.1 – attitudes to different aspects of training (n=74)

Students generally considered time in school as being nearly twice as important as time spent in faculty (see Table. 5.2). However the standard deviation for time spent in school practicing is quite high at 13.5 and this also has the widest range or responses. This indicates that although, in general, students place the highest value on practice, there are significant variations that could be explored later.

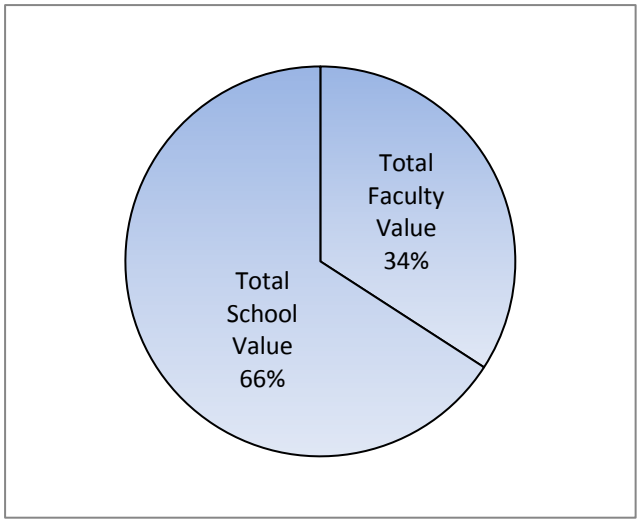

Fig.5.2 – Overall value placed on faculty and school experiences

It is interesting to note that the make-up of these figures from the four components given is not evenly spread between the two components for each part (see fig. 5.3).

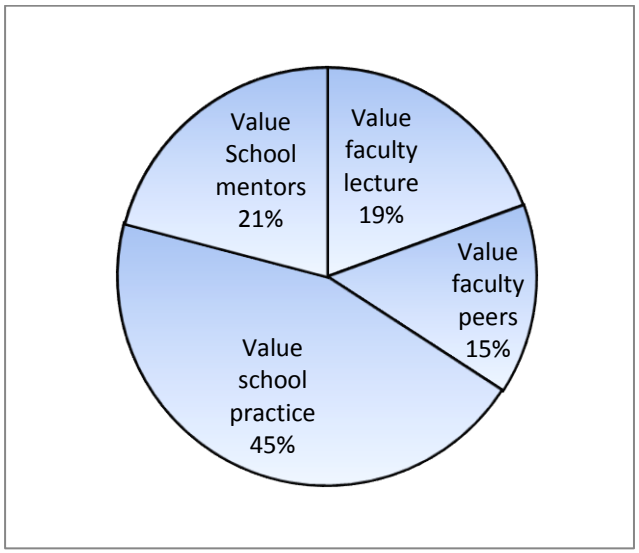

Fig.5.3 – attitudes to different aspects of faculty and school experiences

Clearly the biggest value is given to the practising of teaching in the classroom, making up 45% of the total. Interestingly, the values placed on discussions with

existing teachers in school and learning from lectures is quite similar (21% and 19% respectively) perhaps indicating that the students do not necessarily perceive lecturers to be 'out of touch' as is sometimes reported in studies. Whilst not conclusive, this does open up another avenue for further investigation. Another striking feature of the results of this question is the relatively low value placed on peer discussions. These students attend a faculty where great value and emphasis is placed on a co-operative learning, social constructivist approach to learning. Most lectures are in fact taught in groups of around thirty where students sit at tables of six (similar to common primary education practice) and discussion is a key feature of the sessions. The fact that they do not generally regard this as a major part of their learning process might be indicative of a 'teaching is telling' or transmission view of education. This was further indicated during one of the interviews when one student made the following statement about the value of the work done in sessions:

> "I think you learn a lot more when you're in school than when you do here [sic] 'cause lot of it is paper based – a lot of it is to do research – like constructivism: when am I going to use that to teach year one in the schools?" (P-P:2)

Although not always stated in such extreme terms, *all* interview respondents clearly expressed an attitude of giving high value to time spent in school and in doing so, perhaps surprisingly, most indicated a similar transmission view of education at odds with a constructivist pedagogy that is seen as permeating the course. For example, (note the italics – my emphasis, not the students')

> "you learn much from school experience, obviously you can *get told* a lot through classes and assignments but I think when you're actually there you are experiencing everything that goes on." (P-P:1)

and

> "I think when you are in a school context you learn more... and in faculty you just get the *information delivered*." (P-N:1)

Even in cases where students took a balanced view, there was a tendency to perceive the balance in terms of 'school is doing, university is being told' – for example:

> "Obviously *we are told* how to do things... putting that into practice you still need to relate back to what you're taught in faculty. I don't think you should do the practice if you haven't put some theory into it."(N-P:1)

The attitude displayed by these students towards what has been called the 'faculty/practice' divide is not apparently complex. In general terms they take the view that one can only really develop as a teacher by teaching. This seems to indicate that the students have a narrow view of what it is to learn to be a teacher similar to those discussed in the review of the literature.

In none of the interview responses did the word 'emotion' or other words or phrases with emotional connotations occur. In retrospect there are certain instances where, had I been aware of the importance I would later ascribe to this, I might have pushed further. For example, when a student (N-P:2) said,

> "you can learn so much in here but you are only learning what the lecturers are teaching and I don't think you will know exactly what it's like to be teaching until you are standing in front of that class"

I could clearly have followed this up with a request for clarification on her use of the words 'exactly what it's like' to see if this has an emotional component. Similarly, student P-P:1 came closest to expressing an emotional reflection on practice with,

> "I think when you're actually there you are experiencing, um, everything that goes on, all the problems, all the good things, the bad things and, um, it's just being hands on"

Notice, too, how this student is beginning to express a sense of being 'in the moment'. Further exploration might have helped to establish whether or not this links ideas of reflective practice to the idea of Flow. However, it is in the nature of

analysis of interviews that afterwards one can see more clearly what the interviewer should have done, but did not. Limitations in the way the study was carried out are dealt with in more detail in chapter 7.

5.3 – PC Ownership and usage

5.3.1 – Ownership

As was stated previously, it is sometimes stated in the faculty that the move to more ICT based training methods, such as the VCC, might be detrimental to those students who do not have access to up-to-date equipment. Although such equipment is freely available in the faculty, in relation to this study, it seems likely that a student not having access to a broadband Internet connection might create an antipathy towards the VCC itself and hence towards the use of ICT approaches in general. It might also be indicative of a pre-existing antipathy to technology that could also be explored during the follow up interviews. To ascertain the actual ownership and usage of ICT equipment amongst the students several questions were asked in the first questionnaire. (see Table 5.4)

I have home access to a computer with broadband internet access	100%
I have home access to a computer with dial–up internet access	0%
I have home access to a computer with no internet access	0%
I have no personal ICT equipment in my home – I use public equipment (library, faculty etc.)	0%

Table 5.4 – computer ownership amongst students

To further probe the attitude to ICT in general, students were asked to indicate how important having their own computer (laptop or desktop) was to them. The results were again overwhelmingly positive (see Table 5.5)

Essential – I couldn't manage without	74%
Important – It would be a big problem if I didn't have one	26%
Neither important nor unimportant – I can take it or leave it	0%
Unimportant – I don't really need one	0%
Unnecessary – I'd rather not have one	0%

Table 5.5 – student appreciation of necessity of computer ownership

Finally, in this section, students were asked about the amount of time they spent using a computer:

Every day	89%
Most days	8%
About 3 or 4 times a week	3%
About once a week	0%
Less than once a week	0%

Table 5.6 – time spent using a computer

As can clearly be seen, this is evidence that fears over students' reluctance to own and use ICT equipment are largely unfounded with this group. All students in the group have home access to a computer with broadband Internet connection with the vast majority of them using it on a day to day basis as an essential part of their life. This should be qualified slightly however, as this sample does consist of a group of students willing to take part in research into ICT and hence there

may be some inbuilt bias. However, students with strong anti-ICT views would presumably have been as likely to agree to take part as those strongly in favour and clearly there were no such students in this group.

Looking at the overwhelming numerical data, it seems in retrospect that it was hardly necessary to follow this up during the interviews. However, by listening to the case study students it became quite clear that whilst the students find ICT an essential part of their lives it is not something that they think about a lot. It does seem to be a case of 'that's how it is'. In fact, it was quite difficult to get some of the students to talk about their general use of ICT. This seems to be partly because of its ubiquitous nature but it also highlights an issue with the research methodology. I had assumed that the students would be willing and able to talk freely about the issues that they raised. However, my telling them what my focus was (use of ICT in ITE) as part of the ethical requirement to ensure informed consent, caused them to focus more narrowly than I had intended. Several of the students assumed I only wanted them to talk about ICT in relation to the course even when I was being more general. The following exchanges with student N-P:2 highlight this point well:

Interviewer	Do you use it when you're not involved in teaching? Is it part of your everyday life?
Student	Yes
Interviewer	What else do you use it for?
Student	Networking
Interviewer	Social networking, Facebook?
Student	Facebook and, I don't know, some research I guess, not to do with anything particular
Interviewer	No, you haven't got any particular type that you go to?
Student	Apart from Facebook, no.

This indicates that the use of ICT is unremarkable to the student, and in fact, is not really used much at all. What is remarkable is that upon pushing a little further, the student revealed the following:

Interviewer	Ok. Are you the kind of person that as soon as you get home you turn it on and check your email?
Student	Yeah
Interviewer	That's something you do
Student	Yeah, I go on the computer, check my uni email then my home email, then Facebook then any other thing...
Interviewer	OK
Student	Dancing sites...
Interviewer	Dancing sites? So you're - When you say dancing sites what would that involve?
Student	Ballroom dancing, Dancesport, checking for partners, dresses, competitions, things like that
Interviewer	Right. Those are specific sites that are part of your, are you part of some national association or something like that?
Student	Yeah, there's different ones, at least three that I would go on
Interviewer	Ok. Right, ok, so you do have a special interest in...[laughs]
Student	Yeah but I don't know whether that's common?
Interviewer	How do you mean that's not common? Why is that then?
Student	It's not really like; I don't know if that's relevant, it's something separate.
Interviewer	Separate to?
Student	School

So it is clear that the use of ICT is such a major part of this student's life that she is not even aware of it. Many years ago I attended a training course where the presenter, alluding to the Stevenson Report on ICT in education (Stevenson, 1997), said that he thought that ICT would only really become an integral part of education when turning the computer on had the same status as turning the lights on. It would seem that, for this student at least, this point has been reached.

5.3.2 – Usage

Before going on to look at games specifically, a series of questions asked the students about the usage they made of their computer. At the point at which the questionnaire was designed it was not known that every student had access to broadband and it therefore seemed sensible to split these questions into online and offline usage. The previous results and later discussions with the case study students seem to indicate that this distinction is becoming blurred and is not necessarily one that is shared by the students. Usage statistics are shown (fig. 5.7).

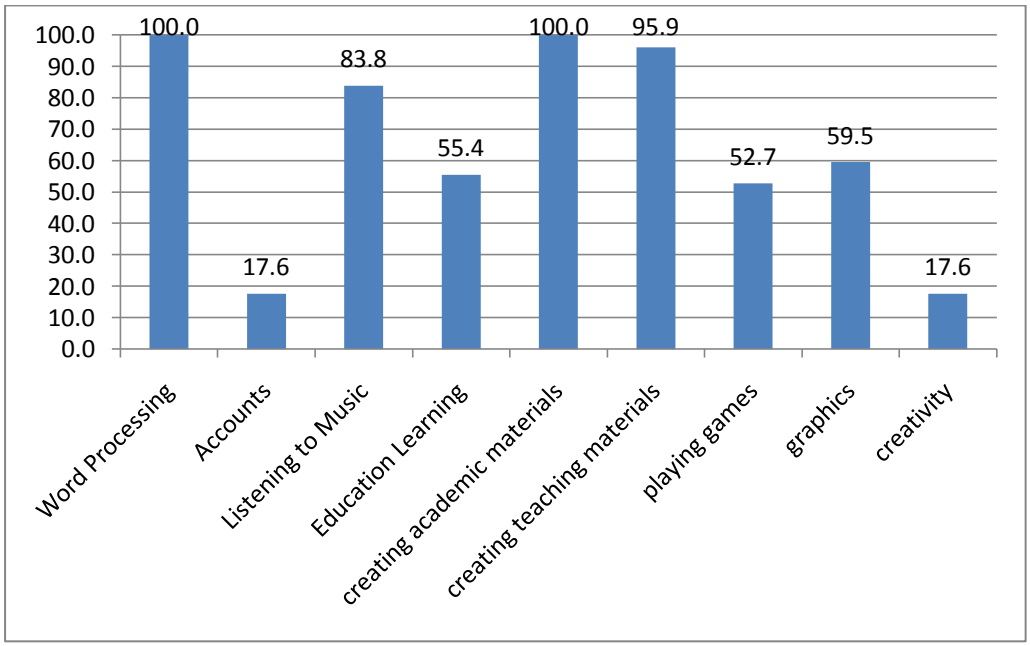

Fig.5.7 – offline computer usage – as a percentage of students answering (n=74)

All students reported that they used the computer for word processing and creating academic materials (likely to be assignment writing and lesson planning). The other most popular categories were unsurprisingly creating teaching materials (95.9%) and listening to music (83.8%).

The lowest scores came from accounting and creativity (both 17.6%) – two activities with little in common and suggesting of no particular interpretation. The creativity result is, however, consistent with recent research (Crook & Harrison, 2008) that suggests the majority of teenagers in the UK do not tend to use digital technologies for the creation of new artefacts as many enthusiastic proponents of technology would have us believe (for example, Green & Hannon, 2007).

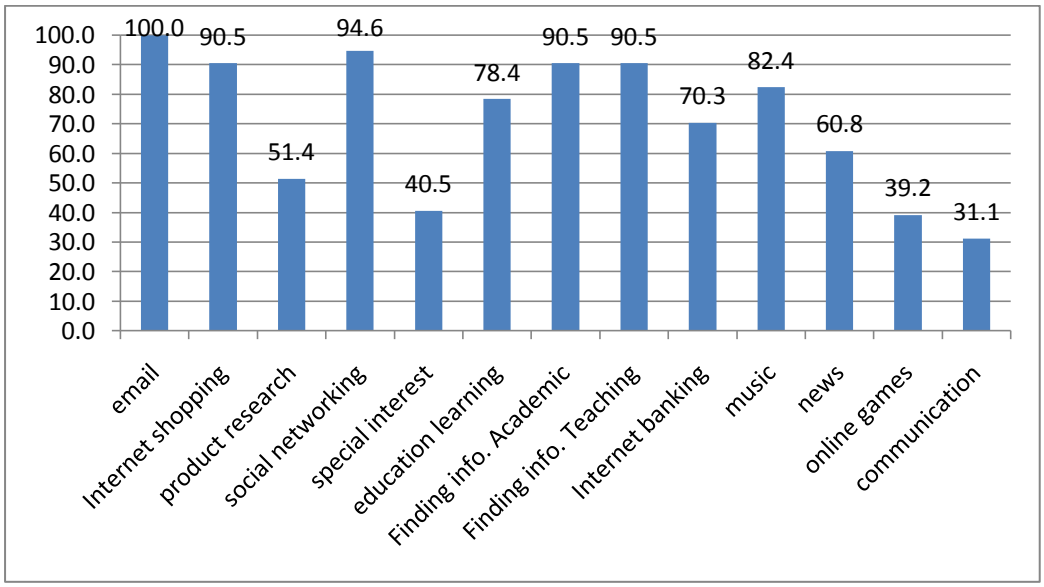

Fig.5.8 – online computer usage – as a percentage of students answering (n=74)

Clearly when considering on-line applications (see fig. 5.8) the most common amongst the students was email with all students claiming to use that. Other popular uses included social networking (94.6%), Internet shopping (90.5%). Academic and professional usages again feature highly with special interest/hobby websites scoring much lower.

The importance of having personal use of ICT equipment was confirmed during the case study interviews with no noticeable difference between those chosen for their positive attitudes and those indicating negative ones. All the students

mentioned the use of the computer in both academic and school work and for social reasons. In fact, the most commonly discussed usage in the interviews was communication and social networking, confirming the high score in the questionnaire. For example:

Student	At the moment I don't have a telly so I spend time watching stuff on the laptop...I do tend to watch a lot of DVDs
Interviewer	Are you the kind of person that would always, as you come home, click it on, check your email- that kind of thing?
Student	Yes
Interviewer	What else do you use it for?
Student	Emails, Facebook, BBC News (N-N:2)

and

Student	I am always on the computer looking for different resources and ideas... checking emails, ebay..." (P-N:1)

and

Student	I use it obviously to write assignments, planning for school, research, lesson plans...
Interviewer	and do you use Facebook?
Student	Yeah, every day {laughs}
Interviewer	Every day?
Student	Yeah, about five times! (P-P:1)

Real time communication (Skype or Webcams were given as the examples on the questionnaire) was the lowest scoring item here but even so, nearly a third of the group said that this was something they engaged in. It is interesting to compare this with the prevalence of social networking which emphasises asynchronous communication indicating perhaps that the students are more disposed to a system of communication that does not keep them tied to one place.

Another interesting low score, especially given the focus of this research, was the relatively low number of students who claim to play online games. At 39% this compares to 59% who claim to play offline-games.

5.3.3 – Games

The questions on games gave some interesting results. During the design of the questionnaire it became clear that not all terms were likely to be understood equally. To help with this issue, two or three examples of the most common examples in each genre were given. The results are shown in fig.5.9.

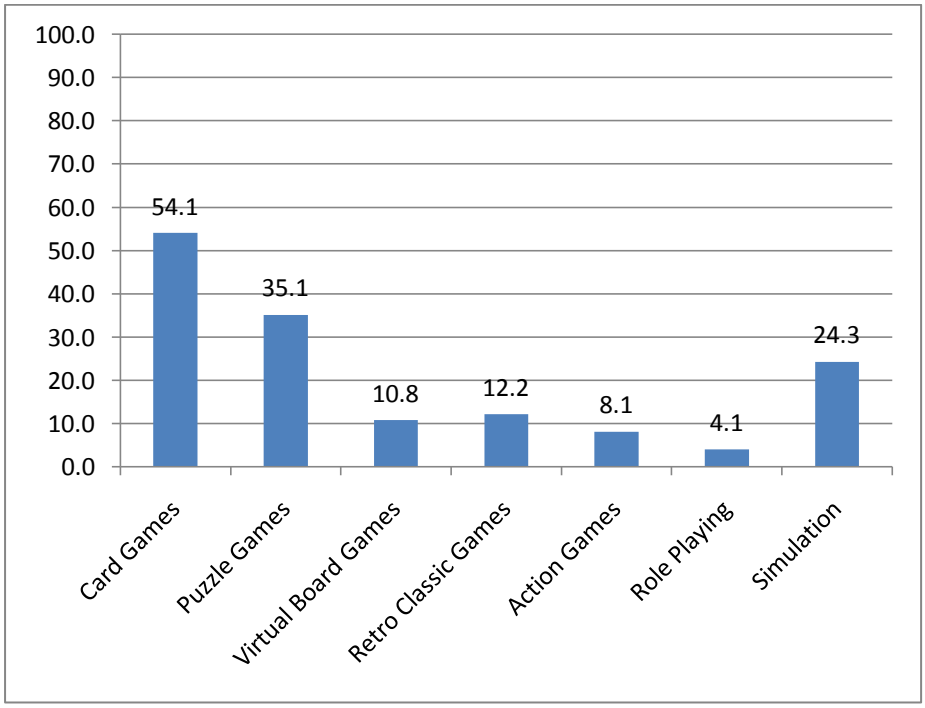

Fig.5.9 – types of computer games played by students

Clearly the most popular games are card games of the type general pre-loaded onto computers when purchased (54.1%). This includes games such as solitaire,

hearts and freecell which were the examples given. Puzzle games scored highly (35.1%) again perhaps because these tend to be part of a package. The difference between role play and simulation needs to be clarified at this point. A role playing game (such as Warhammer or Runescape) involves the user in an immersive situation where essentially they take on the persona of a character within the game. Generally this character is pre-defined by the game. In some games one might be given a choice of characters, but the personality and defining characteristics are pre-determined by the game designer. In a simulation game (such as Sim City or Populous) the user brings their own character and personality to the game. In a sense, the user sits 'outside' the action, controlling other characters, adjusting certain parameters and managing the environment (Johnson & Wiles, 2001) to 'see what happens'. These games are sometimes called 'God Games' because of this detached, looking down from above, approach. The distinction between these two types of games is becoming blurred as games become more intelligent and offer more options. The psychology of engaging in a situation where one may be both involved and, at the same time, detached from the experience is a rich vein for psychologists to explore but is beyond the remit of this study. It is briefly mentioned here because simulation games would appear to be significantly more popular than role playing games. In relation to the VCC, if it is perceived to be a game by the student, then the type of game that it is perceived to be might have consequences for both engagement and outcome and this points the way to one avenue of further study.

During the interviews the use of computers for gaming was barely mentioned. Again, if this was to be repeated this might have featured more in the questioning but it is at least indicative of the value that the students place on games that it was not discussed under general questioning.

The data were analysed to see if correlations existed between the amount of time students spent playing games and their attitude towards simulation games for educative purposes. More importantly, any potential link between students

engaged in simulation games and their attitude to simulation for education was looked for. These are reported on in a later section.

5.3.4 Other access to the Internet

Little significance was found from the answers to this question, the only point of note being that no student claimed to access the Internet via a pda/smartphone.

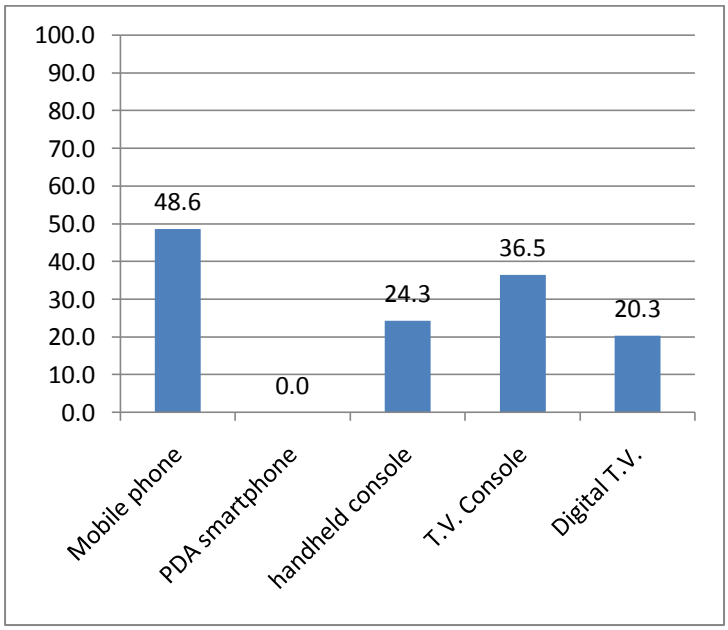

Fig.5.10 – ways of accessing the Internet other than by computer

This is interesting because the initial data collection occurred before the release of the Apple iPhone. Anecdotal evidence suggests that such a device has become extremely popular in a very short time. This highlights a significant

feature of research into ICT aspects of education which is the difficulty in keeping pace with both computer technology and social trends.

5.3.5 - Attitudes towards ICT in Education

The items from the final section of the questionnaire form the core of the quantitative exploration of students' attitudes to the use of ICT in Education. The statements were presented as a Likert Scale with levels of agreement ranging from strongly agree, agree, neither agree nor disagree, disagree to strongly disagree (see appendix 4).

As described above in the methods section, this section was slightly re-worded so that it could be applied after the experience of the VCC so that any changes of attitudes could be examined.

The results below are generally displayed as bar charts. Raw numbers rather than percentages are given (n=74).

4.3.5i – Usefulness in relation to own learning

The first three questions focussed generally on respondents' view of teaching and learning. Each question focussed on one of the three aspects of the QCA standards for ITE:

- I believe that computer simulation can be useful for teaching professional attributes.
- I believe that computer simulation can be useful for teaching professional knowledge & understanding.
- I believe that computer simulation can be useful for teaching professional skills.

Given the previous data that emphasise the fact that the students see practising in the classroom as the most important part of their training, one might expect that the score for "I believe that computer simulation can be useful for teaching professional skills" would be significantly lower than for "I believe that computer simulation can be useful for teaching professional knowledge & understanding" at least before the experience of the VCC. A more even balance, or just a higher score generally afterwards might indicate that the students have appreciated that the simulation could have more use than expected. An increase in the values relating to skills would indicate that the simulation might be being seen as a bridge between theory and practice – the 'third place' of Bligh & Bleakley (2006).

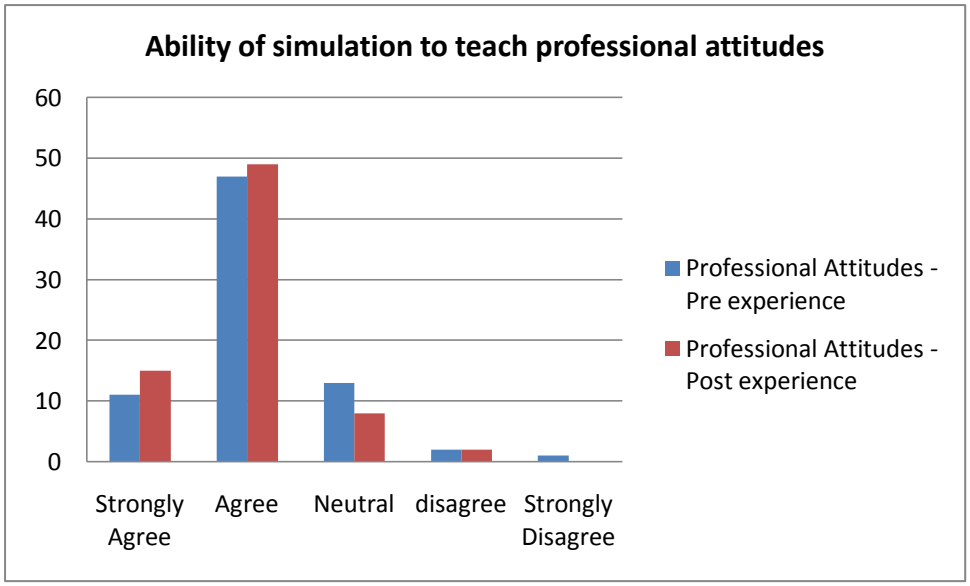

Fig.5.11 – simulation's ability to teach professional attitudes

Before the experience of the VCC, the results were generally positive (fig 5.11) with most students agreeing that simulation could support the teaching of professional attitudes (mean = 3.9, mode = 4, median = 4). Following the experience there was a slight, and not statistically significant, change towards the positive (mean = 4.0, mode = 4, median = 4). No one afterwards disagreed strongly and analysis of the raw data indicates that the one student who strongly disagreed beforehand moved all the way to 'agree' following the experience. This is of particular interest because this student was highly negative in relation to 'reality' (discussed below) both before and afterwards and was one of the students chosen to be invited to interview (N-N:1).

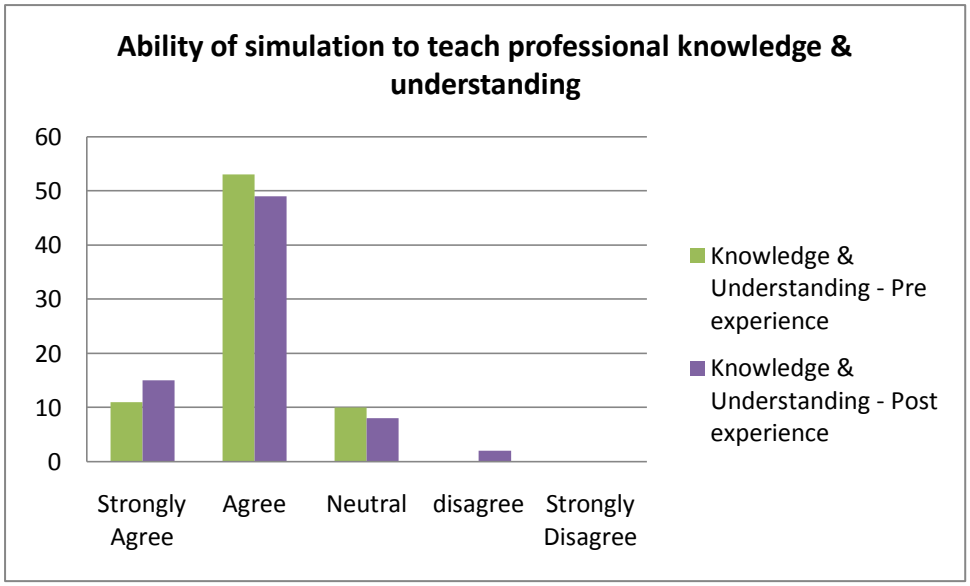

Fig.5.12 – simulation's ability to teach professional knowledge and understanding

With knowledge and understanding (fig 5.12) students were again generally positive before (mean = 4.0, mode = 4, median = 4) and after (mean = 4.0, mode = 4, median = 4) the experience of the VCC. Analysing the graph shows that, although the average distribution stayed the same, there does appear to be a slight polarising effect of the experience. Some of the students who agreed with the proposition strengthened that view causing the agree column to go down and the strongly agree column to rise. This is confirmed by looking at the standard deviation for these data. Before the exposure to the VCC this item had an SD=0.536 which afterwards rose to SD=0.650 (rounded to three decimal places). The effect is quite small and would need to be confirmed, but it does look as though this might be a fruitful avenue for further investigation by the creators of the VCC.

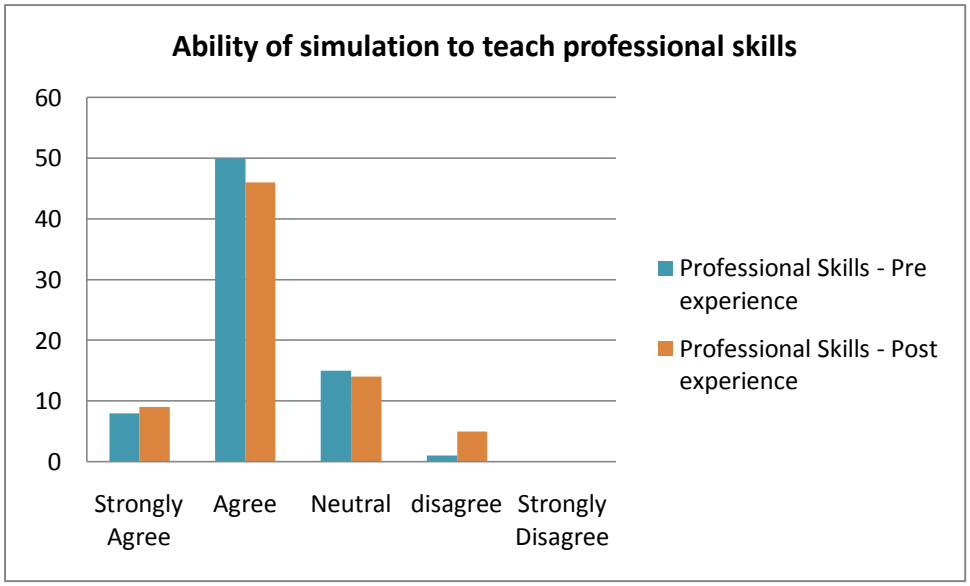

Fig.5.13 – simulation's ability to teach professional skills

In relation to professional skills (fig 5.13), students were again generally positive before (mean = 3.9, mode = 4, median = 4) and after (mean = 3.8, mode = 4, median = 4) the experience of the VCC. Again the polarizing effect appears to apply to this section. Although no students strongly disagreed, the number of students disagreeing was significantly more (from 1 student to 5 students, n=74). Again, the standard deviation rose following the exposure to the VCC going from SD= 0.596 to SD= 0.740 (rounded to three decimal places). More significantly, analysis of the raw data indicates that all 5 students who disagreed following the experience *agreed* with it beforehand. In other words, for these students, not only did the simulation not have a bridging effect, it appears to have created a negative impact. A possibility here is that expectations were not met, a theme I will return to later.

There is evidence to suggest, then, that whilst many students remained positive throughout, a minority seem to find the experience less valuable than they expected. As was stated at the start, the main function of this thesis is not to evaluate the effectiveness of the VCC in teaching the students, however further research in this area will be carried out and these results indicate the importance

of that research having an interpretive, case study, element to it. Otherwise students such as these might be ignored if overall, average, gains are found.

5.3.5ii - Approximation to Reality and Preparation for the Real World

This section contains findings in relation to the key question concerning the extent to which the use of the Virtual Case Creator was seen to be a useful preparation for the real world of Primary Education.

Two key statements were proposed for the students to evaluate:

- I think such a simulation can be a close approximation to reality and
- I think such a simulation can adequately prepare me for the reality I will face as a teacher

Again these were re-phrased into the past tense for the post experience questionnaire (see appendices 4 & 5). At the planning stage it was considered that these two statements might be significantly similar to be condensed into one. At this point an important consideration was the layout and presentation of the questionnaire. Fortunately the decision was made to keep them both in the final draft – a decision that highlights the part that chance can sometimes play in educational research, as the distinction between the two statements became a key part of the analysis.

Agreement with the statement that the simulation could be a close approximation to reality was generally on the positive side of neutral (mean = 3.3, mode = 3, median = 3) before the experience. As can be seen from the graph (fig 5.14),

although a neutral attitude predominates, there were many more positive responses than negative.

In relation to the students expectation that it could prepare them for reality, the students were generally slightly more ambivalent (mean = 3.1, mode = 3, median = 3) with a move even balance between agree and disagree.

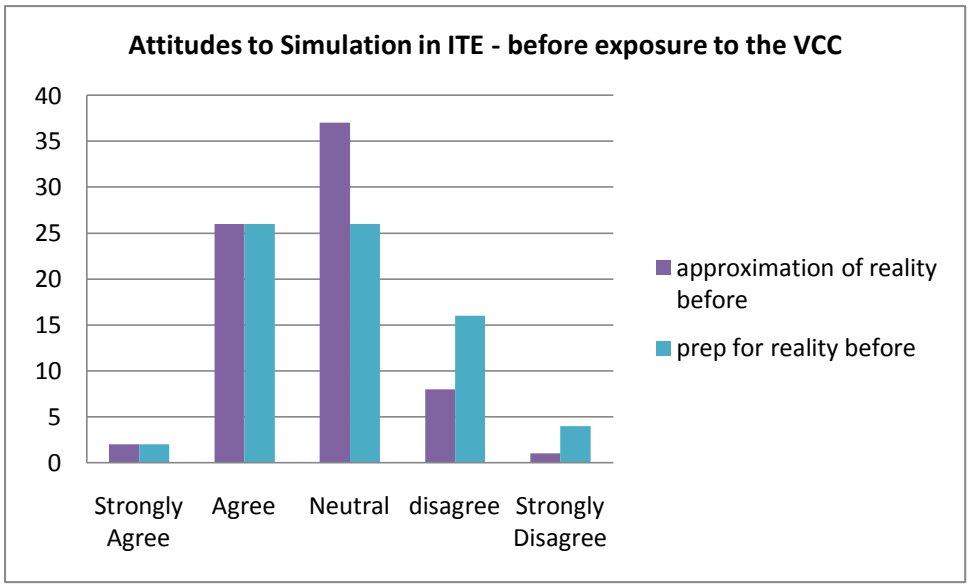

Fig.5.14 – attitudes to simulation usage in ITE – before VCC usage

After exposure to the VCC (fig 5.15) attitudes to both approximation and preparation had generally become more positive with the number of neutral responses down and the number of 'agree' responses up.

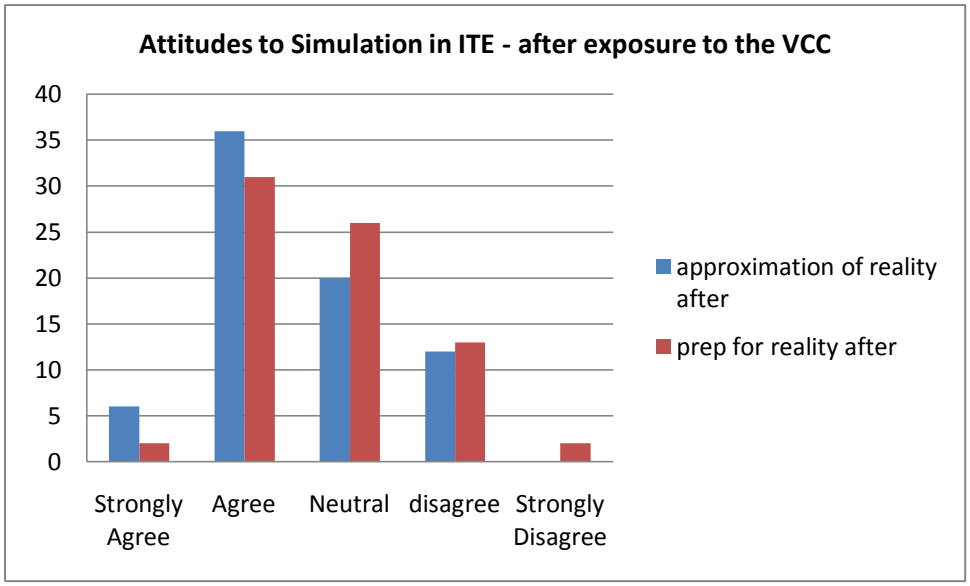

Fig.5.15 – attitudes to simulation usage in ITE – after VCC usage

From this initial look at the data it would appear that exposure to the VCC had had a positive impact on the students' attitudes towards simulation in their own learning. However, by comparing the changes in attitude to approximation and preparation together (fig 5.16 and 5.17) an unexpected difference can be noted:

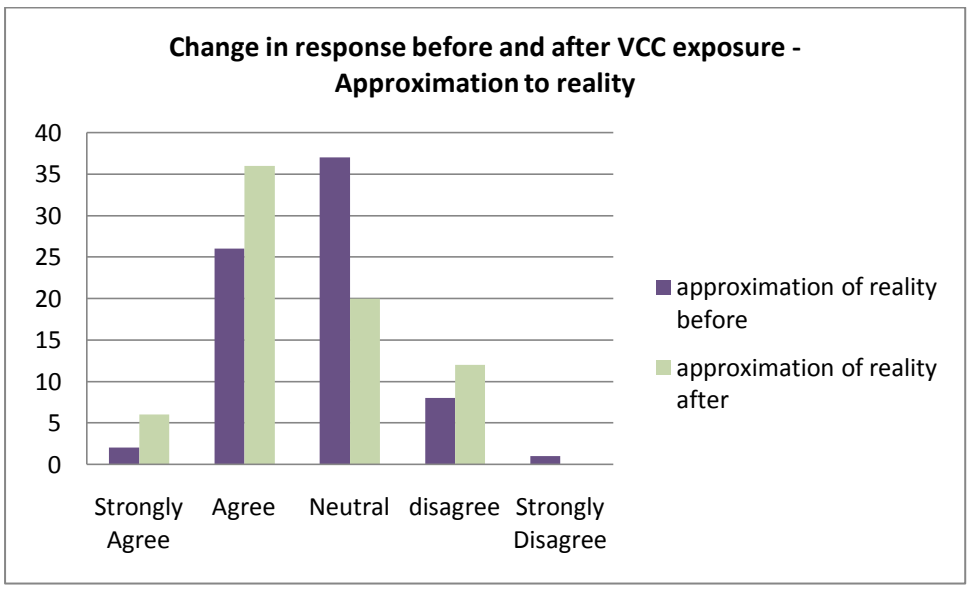

Fig.5.16 –change in attitudes to approximation to reality after VCC usage

When considering changes in attitude towards the approximation to reality that the VCC gives, there is a noticeable move towards the positive. However, when looking at preparation for reality, very little such movement is noticed:

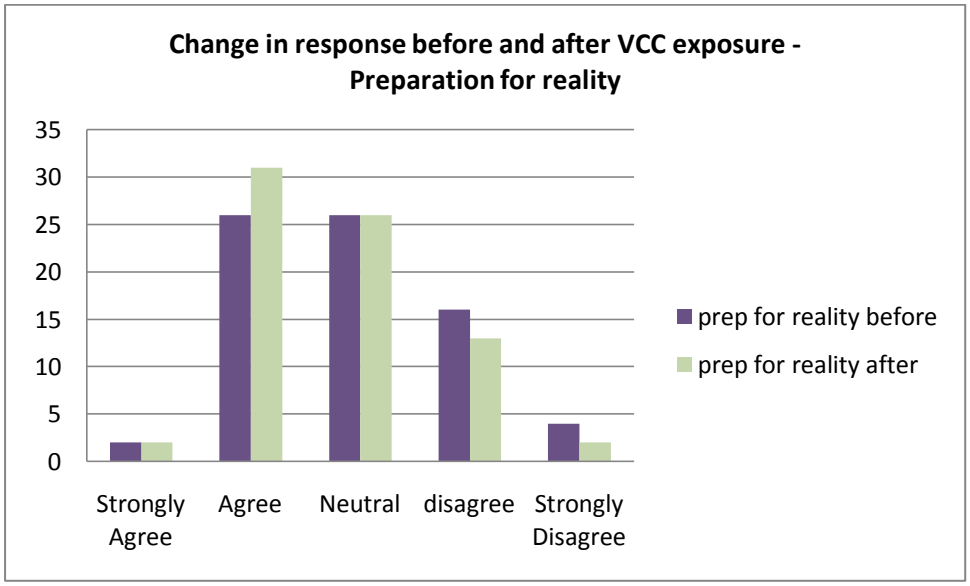

Fig.5.17 – change in attitudes to preparation for reality after VCC usage

If this was simply because the students felt that the VCC was not a particular good example of simulation in education, then the interest and engagement score might have been expected to go down.

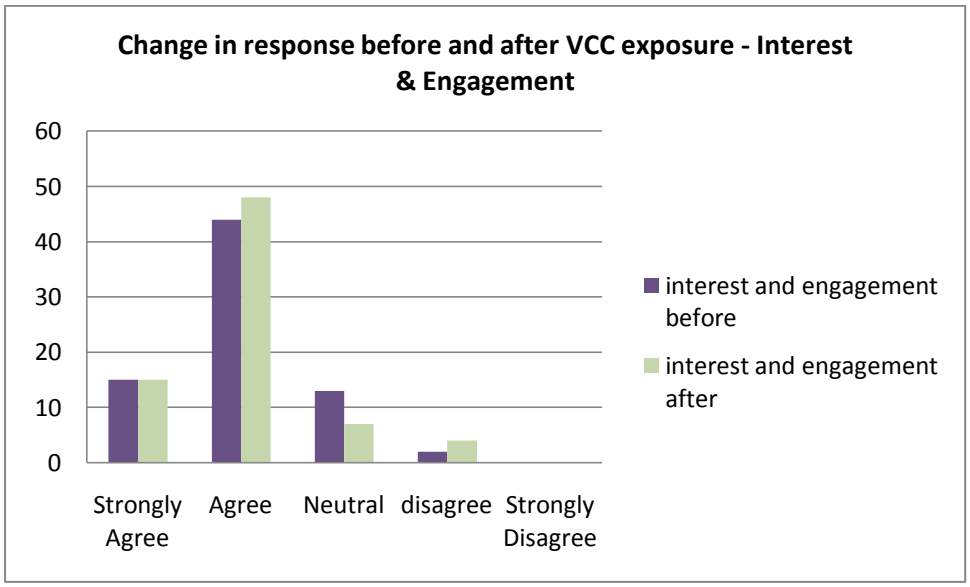

Fig.5.18 – change in interest and engagement – before/after VCC usage

However (fig 5.18), it did not – there were slightly more agrees and disagrees and slightly fewer neutrals.

These findings, then suggest a problem may exist when designing virtual scenarios for ITE. In this instance several students generally enjoyed the scenario and considered it to be close approximation to reality and yet still did not 'buy into it' as a preparation for reality.

The conclusion, then, is that for many students the embedded view that only in the real workplace can they find value in training was not significantly altered by a positive experience of computer simulation learning.

In order to try to understand in more detail the attitudes towards the VCC in relation to approximation to reality and preparation for the real world, these topics featured significantly in the stage three interviews. Although statistics can tell an interesting story in overview, it was felt that studying some indicative cases of students who had strong opinions or who significantly changed their opinion a deeper understanding of the attitudes and dispositions of the students might be gleaned.

Those students who were initially positive about the VCC were so for a variety of reasons. A theme that was touched upon by two of them was the idea that this was something new and different. *'Initially I thought it was really, really a good idea. I was quite excited to do something different'* (P-P:1) *'You straight away thought, "oo, this is exciting, there is a lot here that you can learn".'* (P-N:2). One student may have had high (perhaps unrealistic) expectations due to the use of the word 'virtual' which may have set him in mind of virtual reality machines. *'When you're on a fairground, you sit in a simulator, how real it all is.'* (P-P:2). An insightful comment from one student identified part of the rationale behind the use of the VCC.

> *'I was thinking from previous experiences when you're into school you come across things, for instance, child protection or healthy eating, but you're not really told how to go about it or dealing with parents and when you're in school as well, even though you're acting as a teacher,*

> *the actual teacher are still in close contact with parents and things so you sort of push back so you don't get the chance to actually try and see how it would work with the parents or with different people coming in like psychologists, so with having that I was thinking well, I'd be able to find out how I go about that cause that's what I felt, from experience, I hadn't got enough on that.'* (P-N:1).

It is interesting to note that the two students chosen to represent those who became more negative in their attitudes after using the VCC both focussed on the content of the learning in their initial judgements. The previous comment also highlights the 'teaching is telling' view held by this student: '*you're not really told how to go about it'* and *'I'd be able to find out how I go about that'* seem to imply the expectation that the VCC provides tutors with a better way of telling the students what to do, rather than giving the opportunity to actually do it. The whole point of a simulation is that the users' responses are 'real' even though the outcome is 'pretend'.

Similarly, the reasons given for becoming more negative reflected a feeling of constraint or limitation in what was possible.

> *'there were certain things that I would liked to have asked and obviously I couldn't ask. They weren't there, they were just – It was limited in the fact that the responses - to certain things I would have liked to have been able to ask....'*(P-N:2) ,
>
> *'I was expecting to have a bit more information and because we'd got the head teacher's report and then the [short pause] the meeting, I was thinking that we'll, it was going to inform me of well, what came up, how I would go, who I would go to, where was these people already sitting on the table who I already knew who I should have contacted where as I'd have liked to say, well who would I get involved.'* (P-N:1).

It was put to the student that in the 'real world' one does not always have all the information to hand, or know why decisions are taken and that this was an attempt to create a scenario that felt real. The response is quite illuminating:

> *'Um, yeah but I think with- If I knew more about each role and all the different people who could help then I think I would have been able to say, well I think this person needs to get involved because of... whereas I didn't have that opportunity to say it because they were already at the meeting.'* (P-N:1).

This seems to imply that the student feels that having all the information in advance is necessary in order to make decisions. Such an approach would seem to be consistent with her previous statement that, *'By going into school you can put everything you have learnt into practice and you learn different things as well from that'*. (P-N:1). Although this student places more value on faculty based learning than some students do, she clearly perceives the 'Faculty/School' divide as equivalent to a 'Theory/Practice' divide. In other words, she does not expect to learn anything practical in faculty – she expects to learn the theory that she can later apply in the real world. She does imagine that she could learn practical skills outside of actual practice.

In both cases where the students remained positive, the perceived reality of the situation was cited as a contributory factor.

> *'I really got into it, I don't know if I passed it or not [laughs] but I got me head round it. It had some good things into it. But mostly I thought it was positive 'cause you could see Ashley, you could see his mom, you got all them people including the psychologist, you got all them in the room, they were all real people, they're giving interviews and that's the kind of words they'd come out with, the kind of language, the emotions as well cause Ashley's mom, if you asked them the wrong question, she got "I'm not answering that", so it was real.* (P-P:2)

The use of the word emotion here is interesting because, as has been discussed previously, the elicitation of an emotional response is often seen as the key to effective engagement in games (Conati, 2002). This also equates with Strang et al's (1989) finding that one of the key factors in the simulation in reality is the 'authenticity of response'.

Equally, for those students who were negative after the experience, the lack of authenticity was cited as an issue. For example.

Interviewer	*Did he feel like a real child to you?*
Student	*No*
Interviewer	*Can you explain why that is?*

Student	*Because they keep replaying him, I don't know, I know it's obviously very hard to get a real child to say all the things you want them to say in the video clip but it was so disjointed it didn't feel real because it felt like a ten year old trying to remember fifty things and what to say rather than an actual child. (N-N:2)*

One of the recurring themes of the interviews with the students with more negative views after using the VCC was the inability of the software to simulate the reality of the complex social interactions inherent in the school situation.

> *'It's not just to do with them, it's to do with everyone and there's lots of other factors that impact on it'* (N-N:2) ,
>
> *'the home life, I wasn't too sure on that 'cause some of the information that was given to me couldn't really use them, I wasn't really convinced of the school, the home life of it.'*(P-N:1)

and

> *'it wouldn't be real but I just think that the situations that could come up online are very formulaic and yes it's going to be like this, it's going to be like this but I think that real life situations are going to be far richer experiences to get feedback from.'* (N-N:1)

When probed about the preparation for reality that the simulation provided, opinions were generally similar. Irrespective of positive or negative views generally, the students all expressed a belief that simulation could not replace actual experience in school as the place for learning in ITE.

This seemed to be held to be true even by those students who appreciated that it is not possible for students to have experience of all possible eventualities during the necessarily limited time spent in school. The following longer extract from the interview with N-P:2 exemplifies this issue.

Interviewer	*Did you have a sense of him as a real person?*
Student	*No.*
I	*Why was that?*
N	'*Cause we weren't told enough. We were told other people's opinion of him, we got a short video looking at what he was saying but you don't know him. I don't think you know someone until you talk to them.*

I	*Ok. Is that, is that a limitation of that piece of software or a limitation of the principle, do you think, of virtual reality or virtual scenarios?*
S	*I don't know if it makes a difference still, but then again if you are told more information that's a bigger picture.*
I	*I mean, could you imagine a piece of software that was much more powerful that might be able to do that or do you think you'd never get to that point, you think it'd never be the same as a real child?*
S	*No, It'd never be the same. I don't think it'd ever be the same.*

Similar views were expressed by all students – other examples include:

N-N:1

Interviewer	*Do you think if universities and places that did teacher training developed more of these sorts of things that would shift somebody like your perception, this, you know, eighty: twenty school to faculty, do you think that would be shifted by this kind of, this kind of technology?*
Student	*Yes but not a great deal, I don't think just to, like, introducing us to lots of things, as a lot of things in the faculty are such as introduction to history, introduction to science teaching and things like that, yeah, it would act as a good introduction but again I don't feel there is any substitute or adequate substitute for the real thing.*

The idea of 'shifting the balance' towards a more even appreciation of the value of both faculty and school based experiences was put to all of the students. Similar responses were noted as to N-N:1 above. That is, there was a general feeling that simulations would increase the value of faculty based work but never could replace it.

In other words, whilst some students saw more value than others in the use of the simulation, none of the students saw the simulation as a bridging activity between faculty and school. Due to the iterative nature of this research, I had not considered the bridge metaphor myself before the interviews took place and it is interesting to speculate on whether, had the metaphor been presented directly to

the students, they would have recognised or understood it. Once again, this points the way to further research.

5.3.5iii. Hopes and expectations

One of the key questions that this research attempts to answer is whether or not there is a relationship between the students' attitudes to the use of computer simulation as a learner and how this might impact on them as a teacher. Analysis of the items in the pre and post experience questionnaires, and the case study interviews, which relate to hopes and expectations, should begin to answer that question.

In the pre-experience questionnaire there was a range of responses to those questions. In fact, other than the question about relative value of time spent in faculty and time spent in school, they produced the widest ranges of any of the items in the study indicating perhaps that these questions elicited the strongest opinions.

When looking at for a potential correlation between the students attitudes to usage of computer simulations for their own education and for children's' education, there is a notable difference in the responses before and after the experience of using the VCC. A scatter plot was produced of the students' responses to the following two statements:

- I hope computer simulation will become increasingly prevalent in teacher training
- I hope computer simulation will become increasingly prevalent in primary school education

The plot from the responses gathered in phase one (fig 5.19), before the students had the VCC experience, show a slight positive correlation (R^2 = 0.0642). However, when asked to respond to exactly the same statements after the VCC experience (fig 5.20), the correlation became much more pronounced (R^2 = 0.5794). The most reasonable way to account for this change is that when answering the question beforehand, there was a lack of understanding of what the question actually meant. That is, perhaps students did not really know what was meant by 'computer simulation'.

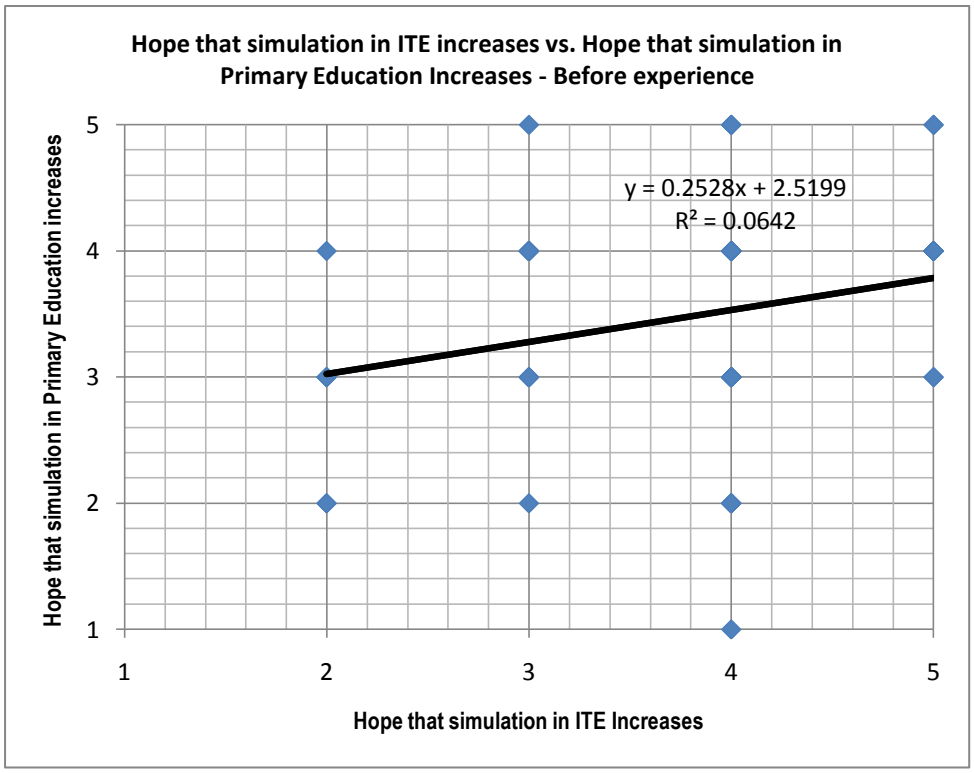

Fig.5.19 simulation in ITE versus simulation in Primary Education - before

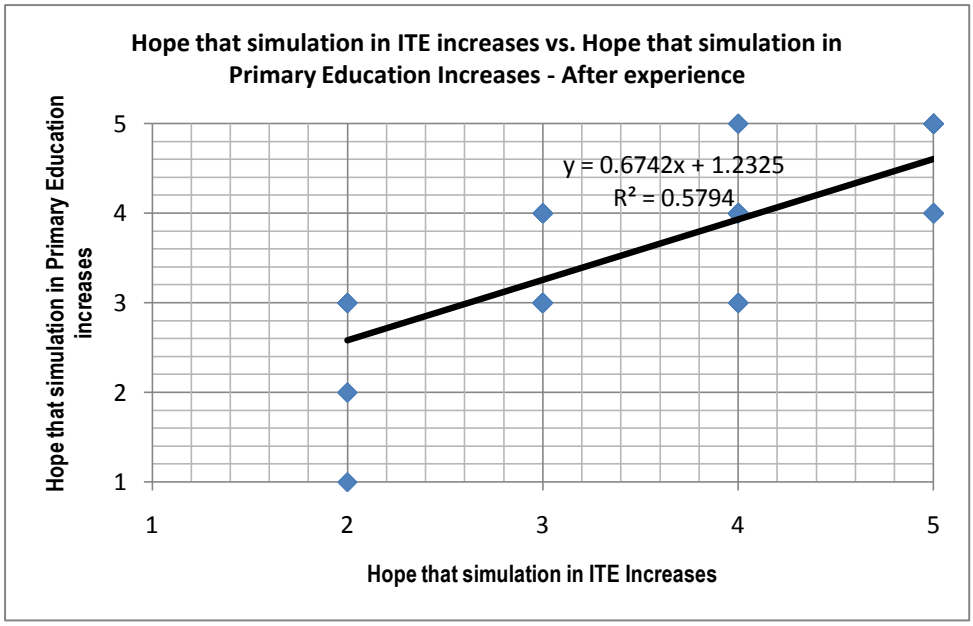

Fig.5.20 - simulation in ITE versus simulation in Primary Education - after

It is equally possible that the experience of the VCC made students think more carefully about the question. It may have given them pause to think more deeply about the principles involved.

Analysis of the indicative case interviews would appear to suggest that this is true for some students and not others. One of the more positive students clearly had not given it much thought, as this exchange with student P-P:1 shows:

Interviewer	*Do you think there are particular aspects of the curriculum where it might be useful?*
Student	*Um, (pause) maybe in English would be good (pause) and maybe like PHSE to talk about bullying and if they had a bullying scenario that would be good to see that actually (trails off) ...*
I	*Ok. Are there any particular areas you would be quite resistant to?*
S	*Um , [short pause] probably certain subjects you couldn't really do like Art [slight laugh]*
I	*Ok*
S	*I don't know really. Haven't thought much about it.*

Conversely, student N-P:2 was much more thoughtful and reflective:

Student	*Obviously computers are getting better but I don't think you can replace – there are certainly things a*

	computer can't replace so you have to have a balance.
Interviewer	*Such as?*
S	*Well, science, for example, how are you going to learn how to make a circuit on a computer without actually doing it?*
I	*And yet there is software out there now that does virtual circuits.*
S	*Yeah, I'm sure that can help but it can't really replace making a circuit and seeing a light bulb light up. A child can do it on the computer and I say, oh well done fantastic, but if that child makes that light bulb light up, ~ they're going get that they're not going to get from the computer.*
I	*[Laughs] The way you are moving your hands around and the way you have become animated implies to me that you are very passionate about it. This is quite important, that it doesn't become a virtual world for the children.*
S	*Really important.*
I	*Why?*
S	*Because I am picturing it all and that's the computer over there, it's almost as if they are away from the real world.*

Those two examples demonstrate the extremes exhibited in the interview but the general view that came across from all the interviews was similar to the attitude to their own learning – that simulation may have a place but that it should not replace 'real' experiences. It was quite difficult to get the students to focus on principles rather than practices and in hindsight I could and should have pushed some of the students further to try to unpick their thinking. At the time I was wary of asking leading questions that would 'put words in their mouths' (Bryman, 2008) but I probably could have gone further than I did. I did give some simple scenarios, such as the 'virtual circuits' example, but these were thought up on the spot in response to the students' discussions. I could have designed some more specific scenarios beforehand. For future research, it might be possible to create a set of scenarios/vignettes of children engaged in simulated activities. These could be designed to range from something that clearly couldn't be done in the real world (for example, a simulated person where one could 'make them' smoke, drink too much alcohol etc. And then see how their health changes) to something

that could easily be done in the classroom (for example, a simulation of playing un-tuned percussion instruments). The students could then decide which of the simulations were 'good' for the children to participate in. This would require them to think more deeply about the principles involved.

The fact that the more open questions that I asked did elicit responses that focussed on the practical rather than the philosophical is interesting, though, in its own right. Most of the students clearly found theoretical considerations less important (hence the value placed on school experiences over faculty ones). There is, as the extract above exemplifies, a general feeling of 'real isn't as good as simulated', but the position seems to be one of dogma rather than reflection because when some were challenged on this, the question put to them was often misunderstood (or not understood at all). For example (N-P:1):

Interviewer	*As technology gets cheaper and cheaper, at one point somebody's going to come to you, in the next few years, when you are a teacher and say we've got this really good idea for virtual learning in the primary classroom, what will you be thinking when that happens?*
Student	*VCC*
I	*Will you welcome it, will you think, ohh that would be really good or do you think, oh I'm not sure about this or how would you...*
S	*(interrupts)Do you mean with the children or?*
I	*With the children. To teach children things, virtually as opposed to...*
S	*(interrupts) I guess that can be anything couldn't it?*

There is very little evidence in the interviews of the students responding to questions about whether computer simulations should be used with children from the point of view of pedagogy. There is some talk about motivation, fun etc. but almost nothing about whether it is good for learning in terms of developing skills, problem solving developing concepts etc. The motivational aspects for children were mentioned by some of the interviewees particularly those who were generally negative in their attitudes. Some examples include:

N-N:1	*I think that would be really good. I think the children would engage with a lot more*
P-N: 1	*I just think older children will be more engaged and interacting in having access, even if they have to sit down with the computer, they wouldn't find that a chore as such as sitting down and writing.*

Perhaps most interesting about this is the fact that a 'computers are fun' attitude does not permeate the discussions. Much of the research in the use of ICT with children highlights the motivational effects, but as children are becoming more 'digital natives' (Zevenbergen, 2007) and computers are now commonplace this effect is decreasing. Most of these students seem to be implicitly aware of that.

Returning to the issue of real versus simulated and the extent to which this impacts on the students view of the use of computer simulation, student N-N:2 was quite adamant about the importance of the classroom for social reasons as the following exchange shows:

Student	Interaction with other children is really important and if they just sit on the computer whole day and just be virtual children or stuff like that, it stops them being, having fun with other people and their social relationships and stuff like that.
Interviewer	So you wouldn't be keen on one of these things as a program where children sat at their computer with headphones on all staring at the screen?
S	No. That's not why I went into teaching [laughs]
I	So why did you go into teaching?
N	I like having the person to person interaction but if they are always behind a screen you don't get that kind of personal feeling with children, you don't get that interaction because they'll want to spend the whole time on the computers, that's pretty much what they do at home anyways, like they spend their whole day at school on the computer and they go home and spend the whole night on the computer.

Clearly this student has not considered the fact that use of simulation software *could* include a social element. Such an element could be in person, for example class or group discussions following a simulated experience, or via technology – perhaps synchronous or asynchronous discussions via the Internet.

This could have implications for the way in which computer based simulations are used, both in ITE and with children. If teachers are negative towards the usage of these technologies, it might be due to a pre-disposition to see them in a particular way – in this case as an 'anti-social' medium. If this teacher could have been given an experience that shows that the tools could be used in such a way that goes with rather than against her views on socialisation, she may have developed more positively towards it.

5.3.6 – Games and attitudes

The relationship between the games that students play on computers and their attitude to the use of simulation as a pedagogic tool will now be examined. The literature has shown convergence between simulations and games. This has been particularly true in the area of military and defence training and the question to be asked here is whether or not students who play simulation type games are more pre-disposed to think of them as pedagogically valuable. It is equally possible, of course, that students who play these games for entertainment purposes may see a very clear distinction between the value of games for entertainment and education creating a negative correlation.

The measure chosen for this analysis was the students hope that computer simulations will become increasingly used in Primary Education as this would seem to be a good measure of the value they place upon it (Table 5.21). In fact, there is little correlation between those who play simulation games and those who hope simulation is increasingly used.

Players of simulation games (n = 18)	Mean value given to 'I hope computer simulation will become increasingly prevalent in primary school education' **before** use of the VCC	3.44
	Mean value given to 'I hope computer simulation will become increasingly prevalent in primary school education' **after** use of the VCC	3.50
Non - Players of simulation games (n = 56)	Mean value given to 'I hope computer simulation will become increasingly prevalent in primary school education' **before** use of the VCC	3.72
	Mean value given to 'I hope computer simulation will become increasingly prevalent in primary school education' **after** use of the VCC	3.84

Table 5.21 - attitude to simulation of players of simulation games

Both groups (players and non-players of simulation games) had a slightly higher average following the use of the VCC and generally players of simulation games were marginally less likely to want to see more simulations in primary school. None of these changes are statistically significant and with such a small cohort and such minor changes in average scores, any conclusion must be tentative at best. What is perhaps clear is that there is no definite unequivocal correlation here. Any assumption that students who play simulation games will be naturally pre-disposed or naturally opposed to the use of computer simulations in their teaching is not borne out by these data. This is clearly another area that would benefit from further investigation and research.

The extent to which students might see the VCC as 'just a game' was touched upon in several of the case study interviews. One of the students with positive attitudes to simulation (P:P-2) implied in that he was very focused on 'getting the

right answers' – by which he meant selecting the right questions from the drop down menu in scenario two. This might have indicated a sense of 'playing the game' rather than learning, but this was denied when this was probed:

Interviewer	*You said you were concentrating on trying to get the right answers, does that mean it was about getting the right answer as much as it was you learning something about situation, did that...?*
Student	*(interrupts) No because I think they went hand in hand. You needed to get the right answer because when I first started it I thought you had to get say thirteen or fifteen or the eight out of ten to pass but you didn't, did you, so... but with answering all them questions and working out which ones were right I could have thought, yeah, how you could ask them questions and why they were relevant so I think it went hand in hand, I think they both worked out well.*

It may well be that the way the simulation works encourages a view of 'winning' and 'losing' which emphasises the game like nature of the simulation. In the extract above, the student talks about getting the right number of responses to 'pass'. The software actually tracks the responses or choices of the student and offers feedback. This feedback is quite simple in that it simply repeats the choices that the student made and indicates how many of the choices are 'appropriate'. Appropriateness is pre-defined by the designers. In each scenario there are up to forty five choices with fifteen designated as 'appropriate'. A similar response was forthcoming in the interview with students N-P:2. In this extract the student is again indicating a 'play the game' approach to the simulation:

Student	*Loads of people found it very hard to get full marks. Because you can justify it in your head but it wasn't right according to the thing and I think I ended up not really thinking about Ashley and just having a system to find out how the answer circuit worked 'cause you thought you needed to do that for the assignment and then you're going off the point 'cause the point is to get to know this child and to learn about assessments and I don't think I did that.*
Interviewer	*Ok. So, you, and again I have to be careful not to put words in your mouth, so this system, this idea of having a system of getting it, would that, I hesitate to use the word but did it almost become a game to you, that it was like getting the right score?*

Student	*Well a game kind of but not a nice game – one that you have to do and you're always doing and I knew it was probably not good to use this system but then, according to everyone else, that's what they were doing and it's going one in one out just to try and get the right answer and it completely knocked the point of the assignment to do that but, because there's the fact that we have to write about it, that in itself was important to get and you have to get the statement before you could write the assignment and then you're not thinking about the child itself.*

An interesting comment in that extract is the comment, '*Well a game kind of but not a nice game*'. This seems to indicate that what the designers have in mind as an engaging activity has become a chore, or at least not 'fun'. The reason seems to be in the perception of the student of the relationship between the simulation and the module assignment. The assumption on the part of the designers is that by implicitly and explicitly linking the VCC to a module, students are more likely to engage and get more out of it. This students experience would seem to indicate that this is more complex. If one was to track the amount of time spent on the scenario by this student it is quite likely, from what she has said, that it will be extensive. The question becomes one of value – spending more time on an activity that the student sees as less valuable would not be what the designers were expecting or hoping for. This is supported by the way the conversation continued:

Interviewer	*That's really interesting. So, are you saying then that, if it wasn't attached to an assignment - you didn't think that there was an assignment grade at stake - would you have approached it differently?*
Student	*Oh yeah, I think I would have learnt more.*
I	*What would you have done differently?*
S	*Well I would have explored the classroom more and thought more about Ashley and the pictures more about the child rather than trying to head towards this goal of getting every sentence right. I think if we hadn't had the statements and we'd just to write the assignment I might have approached it in a different way but the statements seemed to take over, it ended up with you listening the, um, the multi agents, you were listening to all the answers and just pressing them all just to see what they'd say*

and you knew if you were wrong, you see, and said that's not an appropriate answer, um, question to ask. But I wasn't thinking about Ashley, I was just thinking; oh well cross that one off the list. It would have been completely different if we didn't have the statements.

This raises the question of the student's perception of the relationship between the assignment and the VCC and how this might be at odds with the designers'. It appears that the student values the numerical feedback given very highly. There is plenty of research to indicate that this might be the case, as often students have been found to pay less attention to written formative feedback than summative numerical feedback (Williams & Kane, 2009). However, the following comment is intriguing because it points to an interesting assumption based on the way the software works, and perhaps the wording used:

Interviewer	*And yet the number of statements that you get correct from the scenario doesn't impact your grade in terms of...*
Student	*(interrupts) They* ***said*** [on the audio, this word is clearly emphasised] *it didn't impact but if you got all these statements wrong, then you started asking why. For Ashley if it was important – If you started trying to justify that, of course you wouldn't get a higher mark 'cause it's not appropriate to ask that sort of question. So, um, yeah, I thought it was important that you got them right before 'cause why then would you have to do it if it didn't matter?*

The use of the word 'appropriate' seems to have had a significant impact on this student. Knowing that she has to write an essay with justifications of how she would interact with a range of agencies, she was clearly concerned that her views must coincide with the marking tutors and that the marking tutors would coincide with the VCC. Clearly in a Level 6 piece of work there would be need for analysis of the issues being raised. In this case it would be much more important for her to consider why some responses are considered appropriate or otherwise rather than that they are or are not. The intention of the designers of the VCC to find a way to encourage students like this one to become reflective and analytical within the simulation appears to have been less successful than anticipated because of

this ‘play the game’ attitude that has developed. This is borne out by the conclusion to this exchange:

Interviewer	*It brings me back to what you’ve done on the questionnaire, you said that you find it quite interesting and engaging as a task but you remained negative about the value of it so is that fair? That seems to be what you’re saying – you’re not sure...*
Student	*Yes, I said it was only because I had to, I was all focused on the assignment. If I hadn’t been focused on the assignment I would have looked around the classroom and get to know the boy and try to picture him and things related to that, then it would have had more value I think.*

5.4 – Other possible correlations

This section looks at some of the other potential correlations between different factors highlighted in the research. In the gathering of a wide range of data, as happened here, analysis of the data can suggest questions that were not even considered at the planning stage (Bryman, 2008). In some senses this is a tentative attempt to see if it is possible to begin to develop a theory regarding the use of computer simulation as a tool for Initial Teacher Education. It is necessarily tentative due to the significant number of factors (and interrelationships of factors) that come to bear on any of the data collected. Some of the correlations are explored in order examine pre-existing assumptions that I may have had. Others were suggested by an analysis of the data – particularly statements made during the indicative case study interviews.

A simple linear regression model will be applied, however, as Yang (2010) points out it is necessary to, 'always check the plot when using a linear regression model' (p85), so the scatter plots will be included.

No attempt will be made to state or imply a causal relationship in any of the following analyses, however some do point clearly towards the need for further, more in-depth research.

5.4.1 – Correlation between attitude to simulation as a tool for ITE and student success on the accompanying module assignment

It might be assumed that a student who has a positive attitude to the use of a computer based simulation would necessarily be more engaged and hence do better on a module that uses such a simulation as its primary teaching tool. Equally, students with a more negative attitude might be expected to perform less well. In order to test those assertions data from two variables were plotted.

In the first instance, each student's score in the accompanying assignment was plotted against the value they gave relating to engagement and enjoyment. Three plots were made:

i) Grade versus pre-experience expectations of engagement and enjoyment

ii) Grade versus post-experience opinion of engagement and enjoyment

iii) Grade versus difference between expectation and reality

5.4.1i - Assignment Grade versus Pre-experience expectations of engagement and enjoyment

The scatter plot for Grade versus Pre-experience expectations engagement and enjoyment (fig 5.22) indicates a small positive correlation between those two factors (R^2 = 0.076).

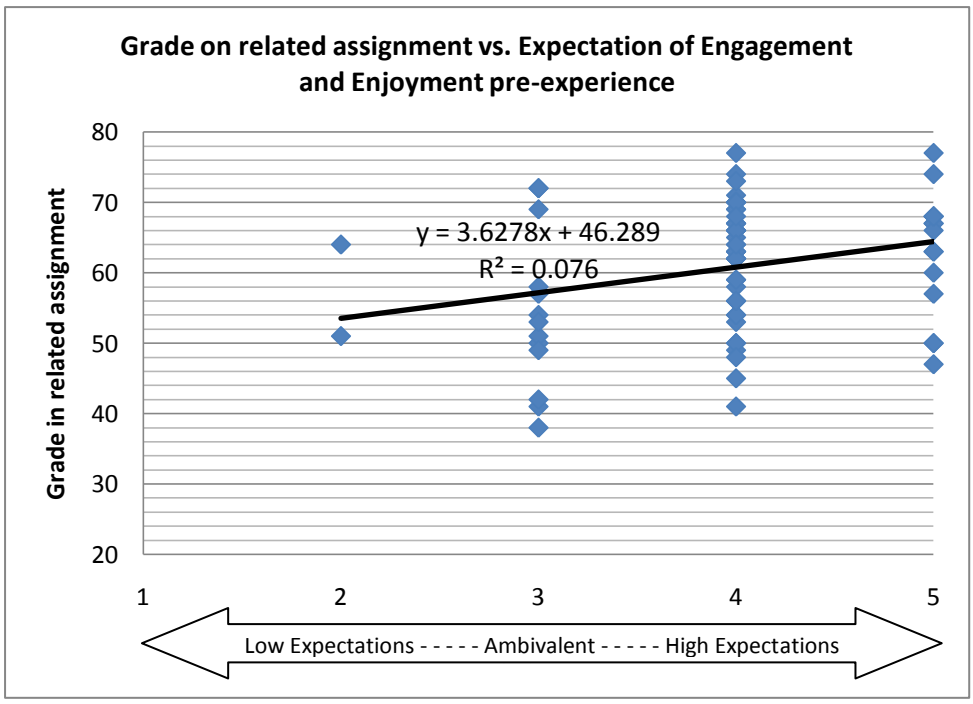

Fig.5.22 – grade versus expectation of engagement and enjoyment

The plot seems to indicate that students who were generally well disposed towards the use of the simulation before the module started tended to do better on the associated assignment. This would appear to coincide with the common sense notion that students who are more actively engaged and enjoying their studies will do better.

5.4.1ii – Assignment Grade versus Post-experience opinion of engagement and enjoyment

When looking at the plot based on the students final assessment of their enjoyment and engagement with the VCC (fig 5.23) , the result becomes much less clear. In this case the small positive correlation has reduced to the point where it is not significant (R^2 = 0.0086). In other words, those who felt they had a poor experience (and the use of the VCC did not interest and engage them) scored similarly to those who had a positive experience (and did enjoy it and were engaged).

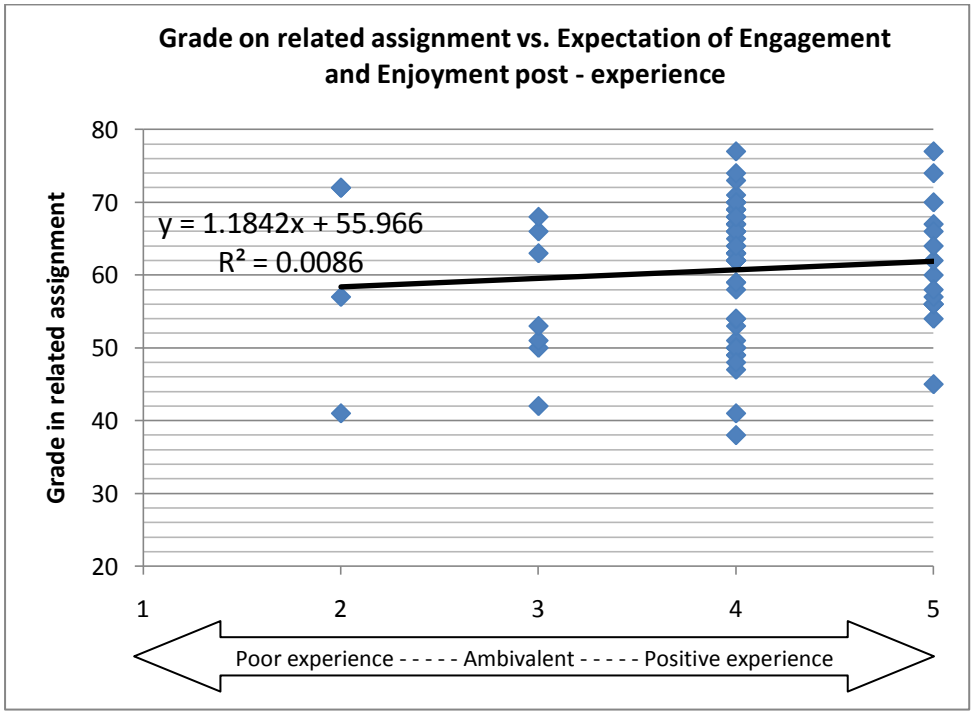

Fig.5.23 – grade versus experience of engagement and enjoyment

This is, for the designers of the VCC, a more surprising result that clearly calls for more research. One could hypothesise that those who did not enjoy the use of the VCC particularly were still able to make good use of the materials that it presented them with thus enabling them to score more highly than might be expected. It is also possible that those who engaged fully and enjoyed it the most

may have become distracted or more engaged with the mechanism of 'playing the game' (as described by some students) and actually spent less time on the academic study required of the assignment, thus making them score less well than might be expected.

5.4.1iii – Assignment Grade versus Difference between expectation and reality

By seeing whether students' value concerning expected enjoyment and engagement was different from their actual, post-experience, perception, one can determine a value for change in this variable. A student whose expectations were lower than their post-experience value might be described as 'pleasantly surprised', whereas a student whose change was the opposite of this might be described as 'disappointed'.

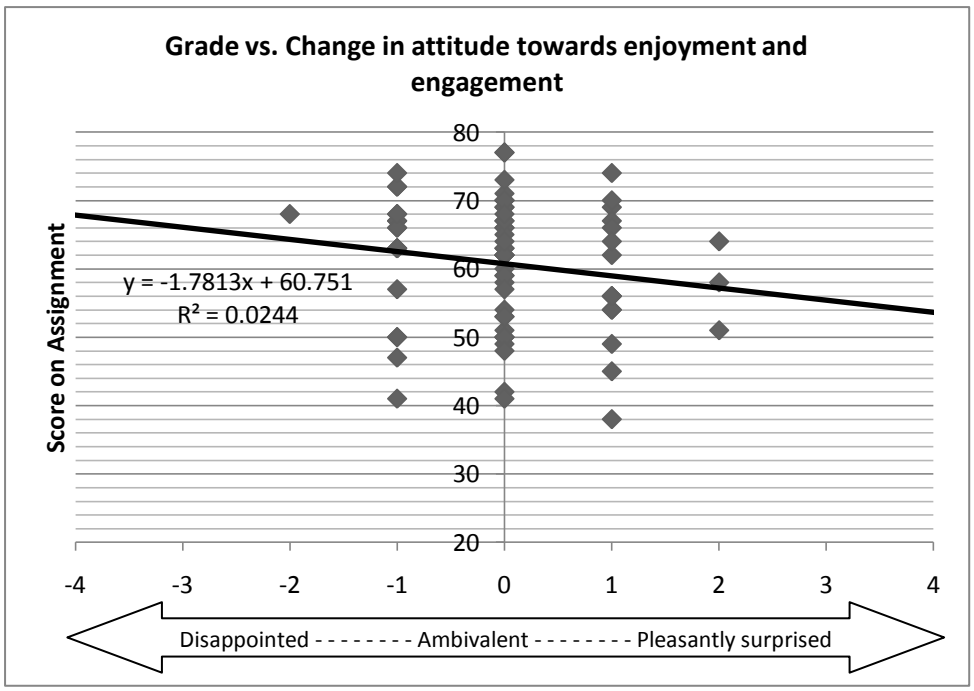

Fig.5.24 – grade versus change of attitude to engagement and enjoyment

When plotting this value against the assignment grade (fig 5.24) something quite interesting is noted. In this case the correlation appears to be a slightly negative one. It appears that generally speaking, the students who were disappointed in the way the VCC engaged them tended to do better in the assignment than those who were pleasantly surprised by it. Again, it would be far too simplistic to assume a causal relationship here and none is inferred. However, it would be interesting to try to understand this result in more detail. Perhaps students who have high expectations which are then not met are able to use the VCC as much as is necessary and then complete the assignment in the usual way. Those students who are pleasantly surprised may become engaged with 'playing the game' more than they expected which might impact on the time spent on academic study, thus having a detrimental impact on their result.

If the above hypothesis could be established, through further study, this would have quite significant implications. It might be that the novelty value that increases interest, enjoyment and engagement is a double edged sword – capable of inspiring some students to achieve more but distracting others away from the necessary academic study.

5.4.2 – Correlation between the relative value that students place on school experiences and the extent to which the VCC prepares them for the reality of teaching

As has been clearly demonstrated, these students generally place a much higher value on school experiences than faculty experiences. However, individual students can have quite different views of just how significant each component is. Two extremes among these students are shown in table 5.25

As can be seen, both students place a higher value on school experience, but student B clearly holds a more extreme view than student A.

	Relative value of faculty time: lectures/ taught sessions	Relative value of faculty time: talk with peers	**Relative value of faculty time: Total**	Relative value of school time: practise	Relative value of school time: talk with mentors	**Relative value of school time: Total**
Student A	25	20	**45**	25	30	**55**
Student B	10	5	**15**	75	10	**85**

Table 5.25 extremes in views of relative value of faculty/school based learning

It might be assumed that students who place the highest value on time spent in school would be those least likely to consider that the VCC could adequately prepare them for reality.

Taking the percentage value of the relative value of school time: Total as an indicative measure and plotting it against the value given by each student for 'preparation for reality' before and after the experience did not show such an expected correlation.

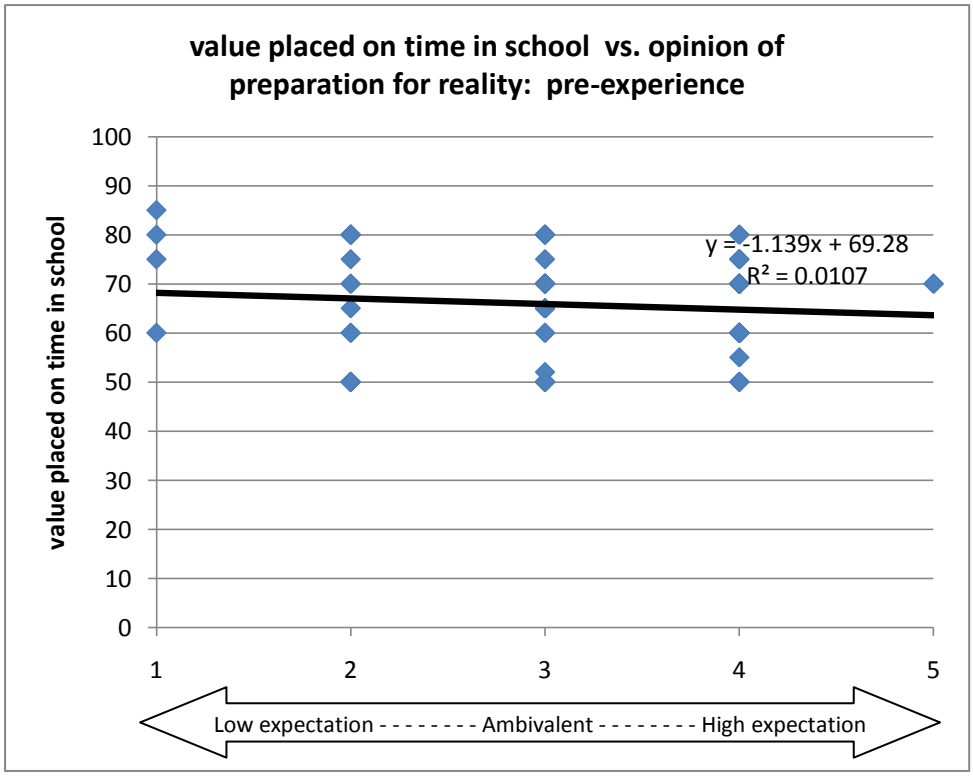

Fig.5.26 value of time in school versus preparation for reality – pre experience

In fact the plot for before the students had the experience (fig 5.26) showed a very slight, not significant, correlation. Students who placed the greatest value on time spent in school were only marginally more inclined (R^2 = 0.0107) to a negative view about how well the VCC could prepare them for reality. After the experience of the VCC (fig 5.27) the correlation was virtually non-existent (R^2 = 0.0009).

It is difficult to know what, if anything can be read into these findings. Perhaps the most important point to note is that student attitudes to these issues are complex and one cannot make assumptions about simple relationships that may seem obvious when looked at in overview.

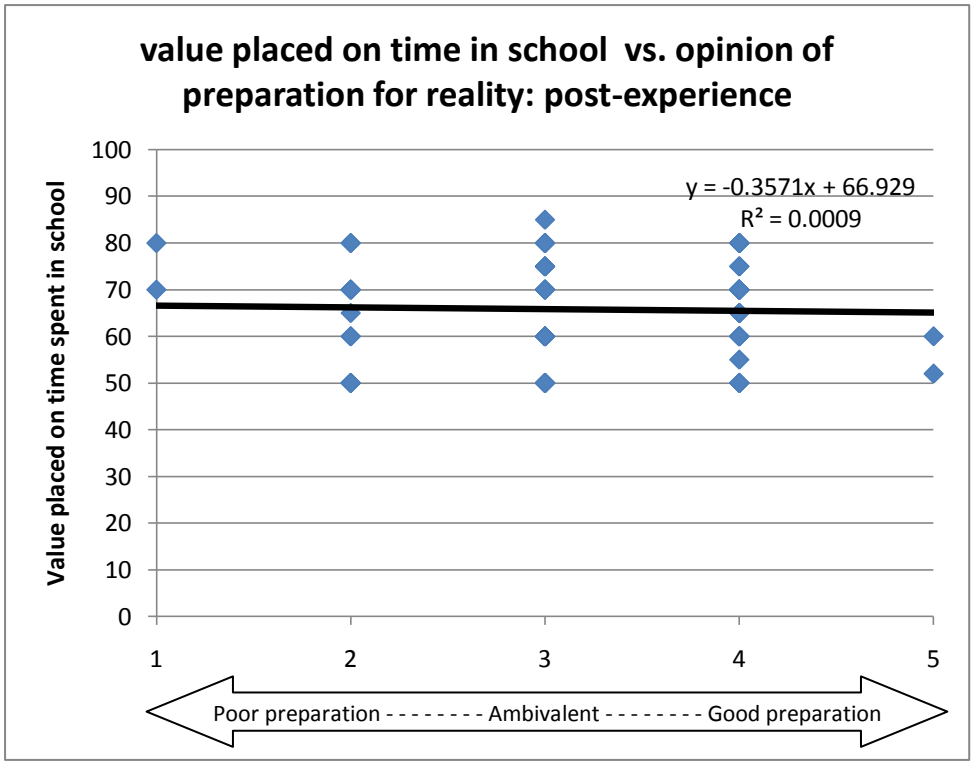

Fig.5.27 value of time in school versus preparation for reality – post experience

5.4.3 – Age

Data were collected regarding the age of the students who took part in the study. A common conception amongst faculty staff is that younger people are more likely to feel comfortable with computer technology and that this might impact on the results of a module that used computer technology as the principal teaching medium. With such a small group of third year undergraduate students, the age range was generally in the 20 – 21 yrs range, however the course does attract several more mature applicants so whilst one must be extremely cautious of over generalising here, a plot can be made of age against their success in the module. In fact, the plot of age versus assignment grade (fig 5.28) shows no significant

correlation (R^2 = 0.0029). Again, it is dangerous to over-generalise from such a small sample, but this may be more evidence (alongside the fact that all students, irrespective of age, have home access to a computer with broadband Internet access) that the idea that 'older' students are less au fait with 'modern' technology is a hangover from the 1980's/90's and is no longer the case.

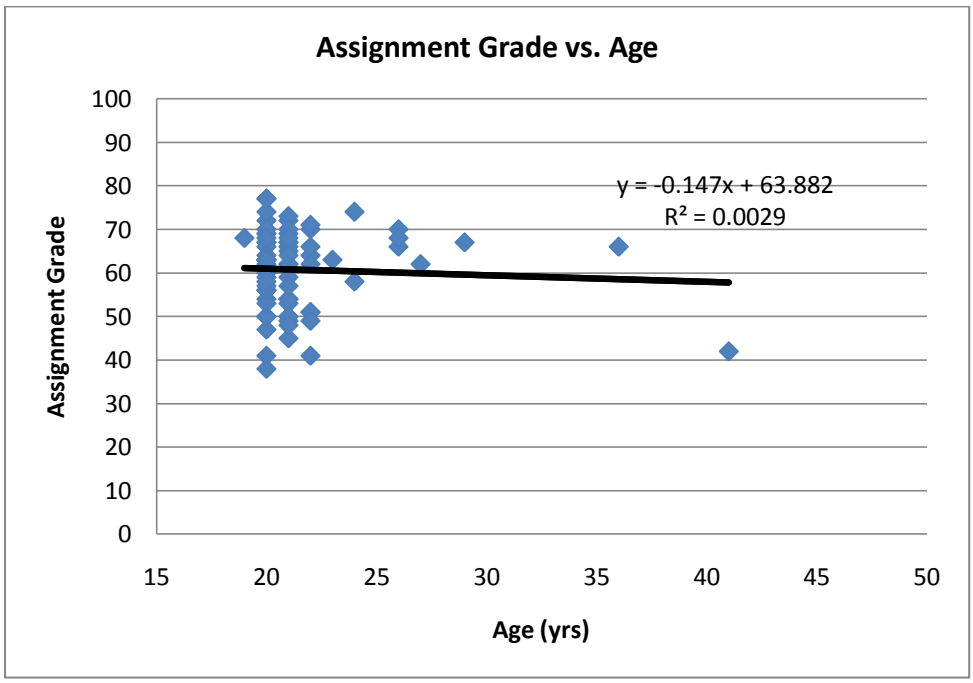

Fig.5.28 age versus assignment grade

Chapter 6 – Further Discussion of the Illustrative Cases

6.1 Introduction

The illustrative cases have been used in the preceding discussions to highlight key points. In particular, the focus has been on the pre-determined questions that the questionnaires were designed to focus on. By following through on key themes patterns have emerged that have been explored and these will be drawn together in the conclusion and help to point the way forward for other research.

This chapter will look at each of the eight indicative cases in turn and explore one or two of the key moments of the interviews to see what further can be learned. In particular, it will be valuable to try to discern, as far as is ever really possible, why it is that some students are negative towards the use of simulations, why some are more positive, and why some changed their minds during the use of the VCC and others did not.

Much of value has already been drawn out of the interviews, however, in analysing the data by theme, several key moments/discussions during the interviews have been somewhat skated over. The adaptation of a critical realist stance to the study has enabled me to look deeper than merely focussing on the pre-determined questions might allow.

This thesis is presented as a linear narrative. From introduction to literature review to the design and implementation of the empirical study through to the conclusions, the implication is that each section existed in a more or less finished form before the following section was started. However, because a critical realist stance was taken, the interpretation of the interviews led the research into areas not considered at the planning stage. This has then been fed back into the literature review section. Through listening to the students discussing their attitudes to the simulation it became apparent that there is some significance to be placed on the role of emotion in those attitudes to computer simulation.

Although it seems inconceivable to me now, at the time of the data collection phase, I had not considered this at all. I take comfort in the fact that further study of the literature reveals that I have not been alone in this: few studies of computer simulation in ITE have considered this point at all either. Once it had emerged that there might be an emotional element to the student attitudes, I was able to use this as a 'lens' through which to view, or rather to re-view, the collected data. In some cases it was easy to see that emotion was playing a part in the responses of the students, and that where this was true, it related to a positive attitude or experience. In other cases there are some indications that there is an emotional element, but I am careful not to 'over-interpret' and essentially read things into conversations and statements that may not be there. In other cases the role of emotional engagement is missing from the interviews entirely. As will be discussed later, this part of the research, rather than providing clear cut answers, opens up a new area for exploration and further study.

6.2 - Negative before, negative afterwards (NN)

6.2.1 - Student N-N:1

Student N-N:1 is a 29 year old male of white British ethnicity.

N-N:1 values time spent practising teaching most highly (50%) with peer to peer discussions rated very low (5%). See fig 6.1

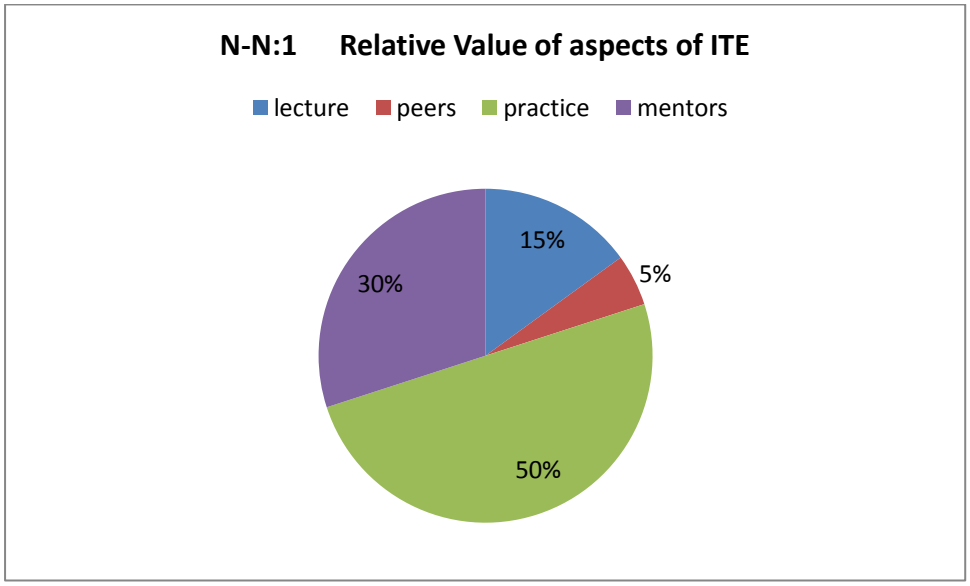

Fig.6.1 N-N:1 Relative value of aspects of ITE

The key responses are shown before (fig 6.2) and after (fig 6.3) exposure to the VCC. This student was chosen because, although in some respects he had become more positive about computer simulation, his profile is quite unusual. After the use of the VCC he was ambivalent in relation to how well the simulation could approximate reality and this was a significant shift upward as he was very negative about that beforehand. However, in relation to his opinion of how well the VCC could prepare him for the reality of school he remained strongly negative. In other words, it was a much closer approximation to reality than he

expected, but he still did not appear to consider this a valuable preparation for that reality.

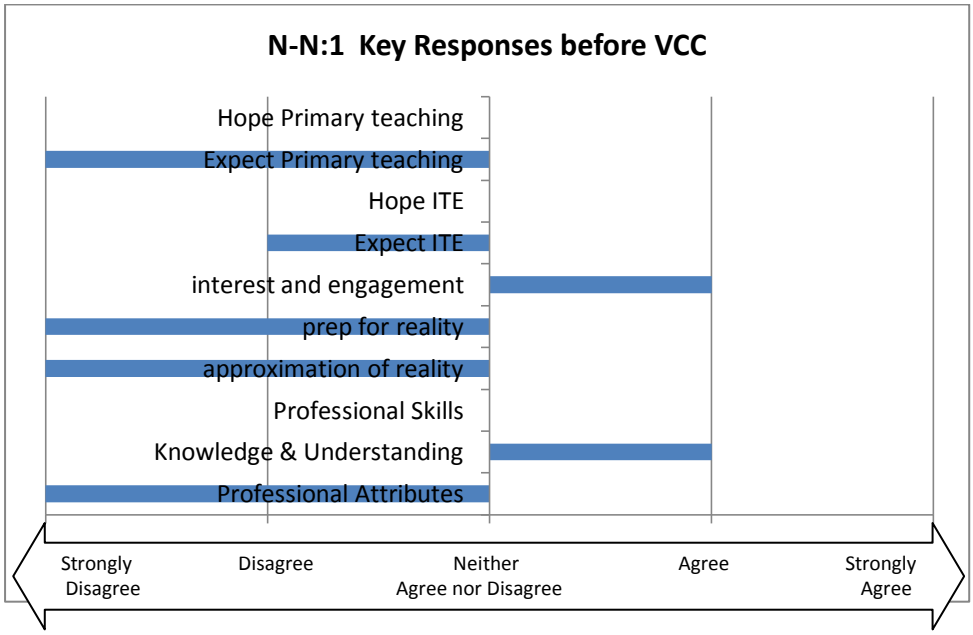

Fig.6.2 N-N:1 Key responses before VCC

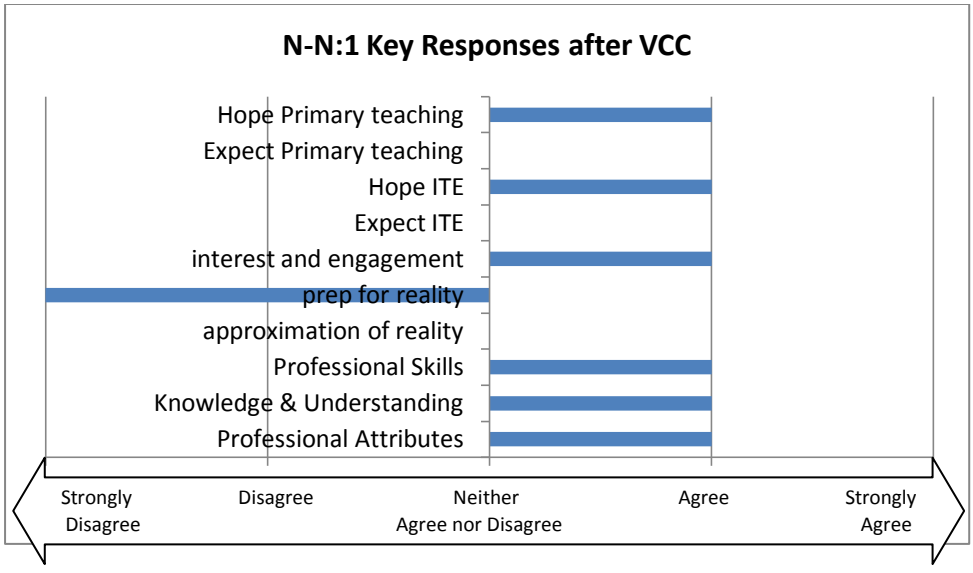

Fig.6.3 N-N:1 Key responses after VCC

This apparent discrepancy between the closeness of the approximation to reality and its value was a key part of the discussion during the interview and was

touched upon very early during the discussion of his relative value profile for aspects of ITE.

Student *Personally I think the practical skills of actually being in the classroom, teaching real life children, I don't think there is any substitute that comes to, uh, the real thing in terms of online things. I think that is good for learning certain things but the actual real life experience will make you more employable, I think it is much better to have practical in school. The subject knowledge you know, that backs it all up and underpins everything but I think, as the role of a teacher, I think the actual physical experience of doing it, in terms of employability, I think is far more valuable than anything else.*

From this statement it seems that he sees a clear difference between what is done in faculty and what is done in school. Clearly he views practice as not just most important but as the place for learning all he needs to be employable. His statement about 'subject knowledge backing it up' indicates something quite interesting. It implies that his view is that the majority of what is done in faculty is subject knowledge based. Whether his view of subject knowledge is narrow or the much wider usage that includes pedagogic knowledge (Leach & Moon, 1999) is not clear and this would have been useful to have followed up on as it is a common thread of several of the interviews.

I probed a little more deeply regarding the value of faculty work to see how deep this conviction was:

Interviewer *Are there any aspects of being a teacher that you don't, that you think you can get from being in a classroom?*

Student *(to himself) Any aspect you can't get from being in a classroom (pauses). (Tentatively)I suppose you, I'm thinking in terms of research as in, you know, something like you're doing or something that is abstract from actually being in the classroom. That, I think, you can get a lot out of but I just think the best experience and the best, you know, you can get is actually doing the job.*

When pushed he was able to indicate some value in research, it is not exactly clear what he means by that and it is at least possible that this was brought to

mind more by the fact that he was engaged in a research interview than any real conviction. He soon abandons that train of thought and returns to the conviction that only by actually doing the job can one really learn how to do it. He returns to this frequently throughout the interview. For example, when discussing the approximation to reality of the VCC the following exchange took place:

Interviewer *Before you took part in the module, you were asked about the potential of computer based scenarios of what you're learning and you said at the time you weren't sure if it would be a close approximation to reality and you didn't think it would prepare you adequately for reality. Can you remember why you thought that? Can you tell me more about that?*

Student *I just think, going back to the first thing I said, which was the actual experience of being in that real life classroom with real life children, I don't think anything can compare to that.*

Here I felt it was important to really establish whether this was a point of principle or a practical issue. This discussion was interesting because it seemed very much as if he was thinking on his feet – that is we were probing philosophical areas that he had simply never considered before.

Interviewer *Would you say then that's a practical issue about the quality and the ability of the software or would you say it's a point in principle?*

Student *Hmm, I think it's more of a point in principle for me anyway 'cause I know a lot of people can get a lot from an online thing but for me, personally, for me experience counts*

At this point I was reasonably certain that this was such an entrenched dogmatic view that I was surprised when the answer to my next, and I thought final, question in this area wasn't a simple 'No':

Interviewer *So, however good the software was, it wouldn't be what you want?*

Student *Ok.... I have just suddenly have an image flash in my mind of those old virtual reality things in the nineties and stuff where actually walking around..... hmm.... I think maybe that because it is more tactile then and you can get more involved instead of just sitting in front of a computer or*

you've got to actually walk over there and speak to that child or everything like that.

I *Right, so you're concerned about the actual interface as opposed to the principle...*

S *Yeah*

I *I am just interested in where the principle stops and where the practicalities come in. Could you envisage that in sometime in the future, maybe long after we're dead but there might be such a virtual system that would allow the kind of interaction you want?*

T *Yeah, I could envisage that happening in the future but I think with the technology that we've got at the moment doesn't provide a realistic enough thing. Children, how do you create a very accurate computer model of a child? Every child is individual, just like all humans as well but their behaviour is far more, what's the word I'm looking for, sporadic and unpredictable than they are for adults.*

It appears, then, that what seems at first sight to be a dogmatic view might not be quite so entrenched. Perhaps one of the lessons from these series of exchanges is that issues such as these were not discussed as part of the module. It would seem that some level of meta-analysis on the part of the students would form a valuable part of the module for students such as this, because it would begin to allow them to see that it does not need to be entirely realistic in every detail to have a value.

6.2.2 Student N-N:2

Student N-N:2 is a 20 year old female of white British ethnicity.

N-N:2 values time spent practising teaching most highly (70%) with all other aspects rated equally lowly (10%). See fig 6.4

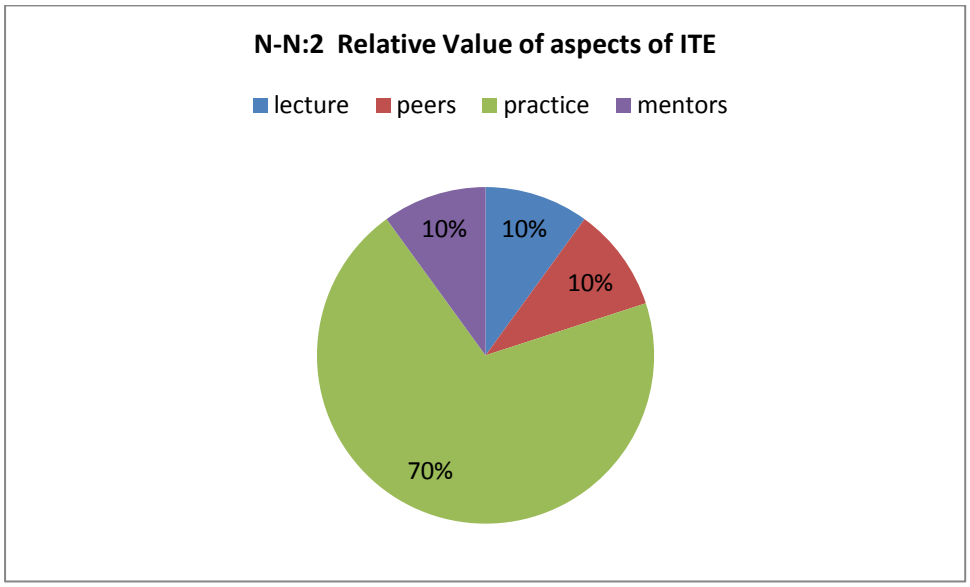

Fig.6.4 N-N:2 Relative value of aspects of ITE

The key responses are shown before (fig 6.5) and after (fig 6.6) exposure to the VCC. This student was chosen because although she has quite a mixed profile of before and after responses, two key areas – approximation to reality and preparation for reality remained constant with her disagreeing with the statements both before and after exposure to the VCC.

From the discussions during the interview it became apparent that this negative view started from a perception of the course in general and how this related to the specific use of computer simulation. In essence, this student felt that the course was somewhat 'experimental'. The students in this cohort were the first ones to go through this particular course as it had been written and validated for their first

year. Previous to this three year course the faculty had provided a four year course. The main changes related to the dropping of a 'subject specialism' and a reduction in the number of teaching practice blocks (from five to three – although the total number of days spent in school was similar).

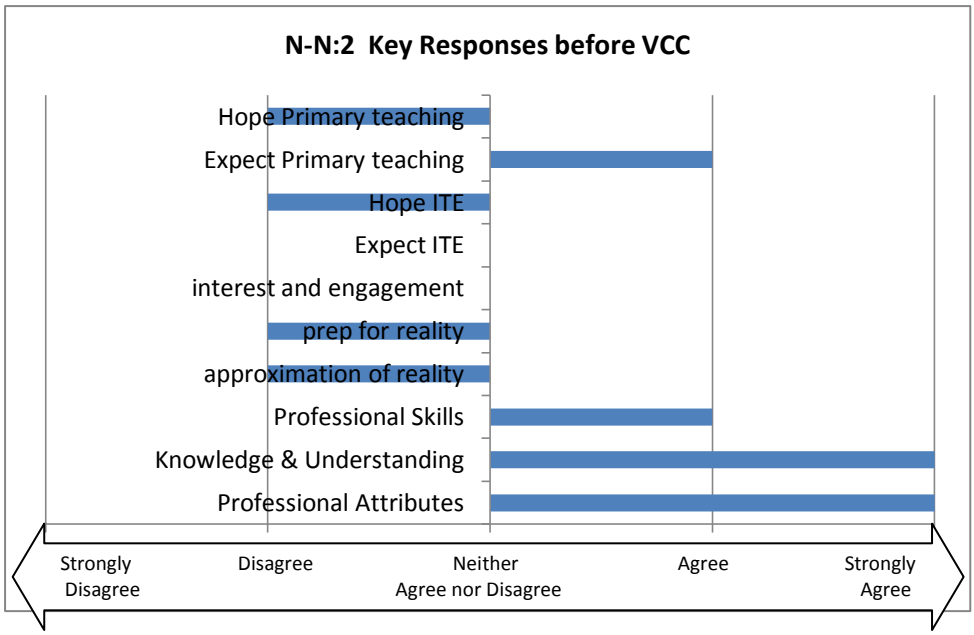

Fig.6.5 N-N:2 Key responses before VCC

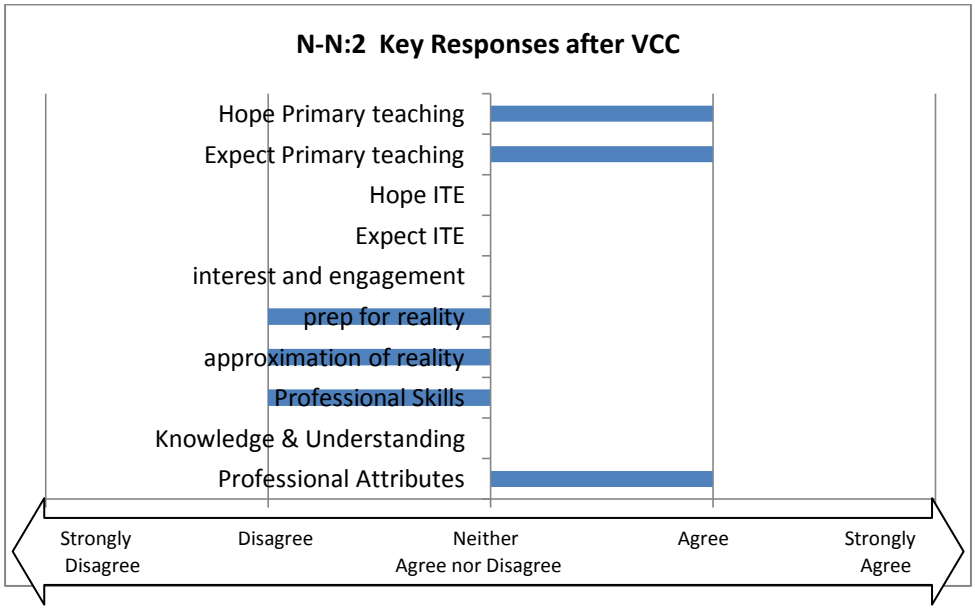

Fig.6.6 N-N:2 Key responses after VCC

Anecdotal evidence suggests that many students had a sense of the new course being somehow 'lesser' than it had been, not helped by occasional comments from tutors along the lines of. 'on the old course we...' etc. This perception is exemplified in the following exchange:

Student	*I think when we first got introduced to it in the lectures I think it came across as quite a, hmm we haven't really tried this out but, you know, degree classification is going to be this, you know, it doesn't matter, if this bit doesn't work don't worry about this bit it might, because we were guinea pigs for that assignment and I think a lot of people felt negative towards it just because it hadn't been done before and there were so many things tested on our year that hadn't been done before and, uh...*
Interviewer	*Ok. Do you think it's only your year that is being experimented on?*
S	*Not just our year but I think slightly more than others, obviously, because we are the first years on our course and I think a lot of people have the feeling that the first year was really well planned and from then on it wasn't well planned. Obviously we don't know [laughs].*

This highlights an issue that had not really been considered beforehand. The fact that introducing computer simulation in ITE is innovative was noted by the designers and the module team. However, in an attempt to allay any concerns that the students might have if the technology did not work as expected – as can often be the case with new technology – the tutors actually made the matter worse by confirming an already held perception.

This is perhaps at the root of this student's approach to the second scenario when she found herself disagreeing with some of the decisions about what were appropriate and inappropriate responses:

Student	*Yeah, well, I found it, in a way it became an onerous task just finding the right answers instead of actually thinking about it because you were just, it was just a test like trial and error, basically, because I looked at everything I could have looked at, I decided which ones I felt were the right answers from my professional experience and they weren't the right*

answers, well they weren't all fifteen right, they were twelve or something.

Interviewer *So your response to that was to..? - How did you respond to that, did you go back and do some reading in a particular area or did you try and change things...?*

Student *Well I read everything that was on there, I read all the documents and everything that popped up, I asked all the questions in sequence, I looked at everything that popped up, all the responses, all the questions, wrote it all down and then from that still only probably got thirteen. And so I found it was quite stressful in a way, it took me about two weeks going on it, like, every day, working with other people and stuff like that because loads of people were having, just couldn't find the right answers. They was a rumour going round that there weren't fifteen. [Laughs]*

I *Did it worry you that thirteen out of fifteen was a bad score? I don't know if it's quite a high percentage...*

S *Well they did say at the meeting that if you didn't get all fifteen that was fine. I didn't worry about that, I just worried that I was missing a really key one. I thought these were fine but what if there was ones that was really important and they put down and they want everyone to write about because it did feel it was less our opinions but more what the people who made the VCC wanted us to say from it.*

This exchange makes it very clear that the student is much more focussed on the passing of the assignment than on what she is learning from it. This seems to indicate a particular view of the nature of the assessed elements of the course and their relationship with practice. It is one of the key aims of the course to make, wherever possible, all assignments have value in relation to practice. In this instance, the assignment essay was to enable the students to show an understanding of the ways in which different professionals work together for the benefit of the child. The actual learning from the VCC was intended to be related to the simulation of multi-agency meetings, the nature of other adults' roles and the way in which those adults interact. It was not necessary to 'score' fifteen out of fifteen on the in-built task, and yet clearly this has become a focus for this student and is tied up in her negativity towards the simulation.

Throughout the discussion with this student, there was no sense at all that she had made any emotional engagement with the characters in the simulation. What is difficult to ascertain, and would clearly benefit from further research, is the extent to which the lack of emotional engagement is the *result* of the emphasis

the student places on the administrative issues of ‘getting it right’ and ‘passing the assignment’ or whether this is an existing pre-disposition.

6.3 - Negative before, positive afterwards (NP)

6.3.1 Student N-P:1

Student N-P:1 is a 20 year old female of white British ethnicity.

N-N:1 values time spent practising teaching most highly (40%) with time spent in faculty not far behind (35%) and discussion with peers and mentors rated much lower. See fig 6.7

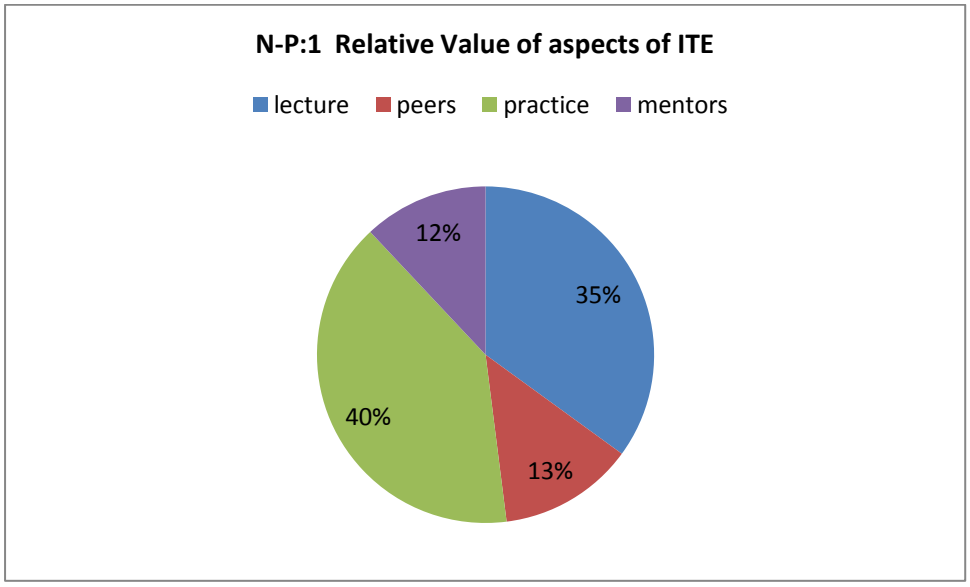

Fig.6.7 N-P:1 Relative value of aspects of ITE

The key responses are shown before (fig 6.8) and after (fig 6.9) exposure to the VCC. This student was chosen because before exposure to the VCC she was generally ambivalent to computer simulation in ITE and was negative in respect to increasing its use both in ITE and in Primary education. Following the VCC module, she was much more positive. She was chosen, therefore, as a student representative of any who became more positive of computer simulation through its usage.

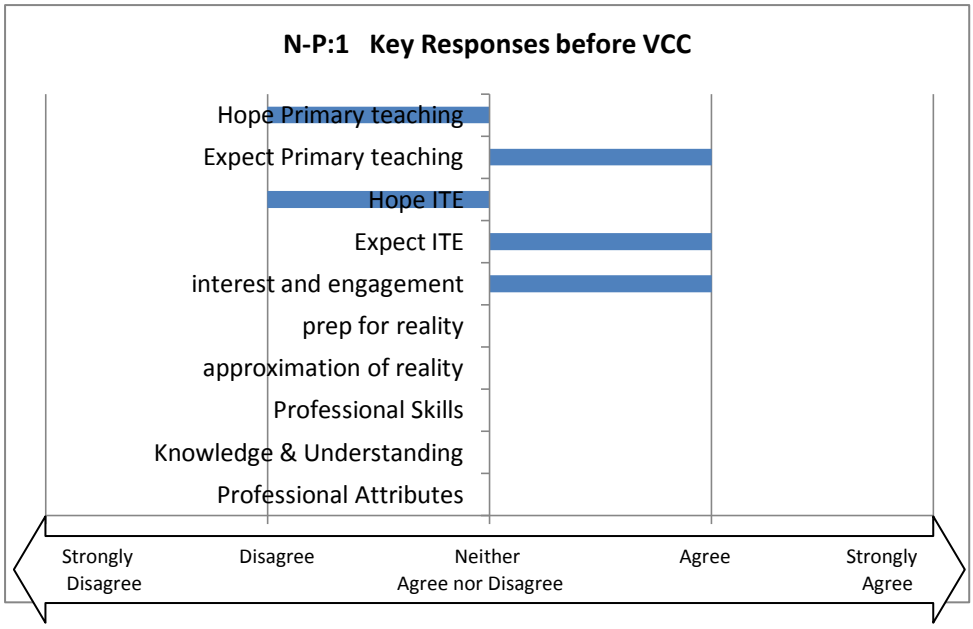

Fig.6.8 N-P:1 Key responses before VCC

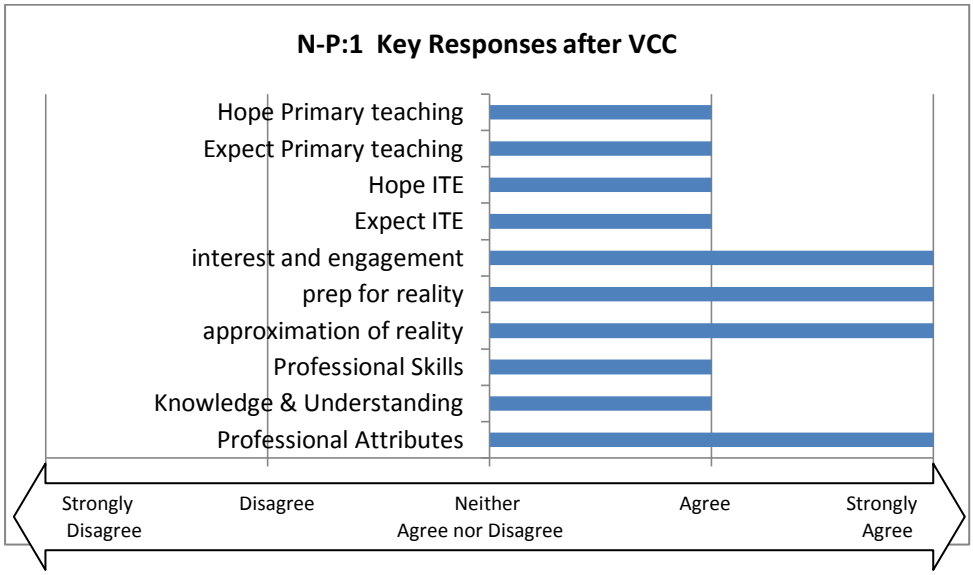

Fig.6.9 N-P:1 Key responses after VCC

When asked about her feelings before the use of the VCC her response indicated that the main reason for her ambivalence was a lack of understanding of what it might entail. This is summed up in the following exchange:

Student	*I think it's 'cause I didn't know what to expect, sorry I'd never seen one before, um, so I didn't really know how it would work. Um, but after doing it I think the scenarios were quite good, it prepared you for little things, issues that you probably wouldn't have experience in on teaching practice*
Interviewer	*Such as?*
S	*Like the core relationship with parents. If you've been in pretty good schools then it might not be something you've experienced.*

This exchange exemplifies the expectations of the designers of the VCC. Here the student has shown an awareness that school experiences are necessarily limited to one situation, although her definition of a 'pretty good school' as being one where a parent does not need to come to a multi-agency meeting might raise issues outside the remit of this study.

During the interview she stated that she had found the module to be interesting and engaging (as also shown on the questionnaire responses). On probing this, she identified two ways in which the module was better than others:

Student	*I think it was more interesting, it was different. It wasn't just writing two thousand words, it was broken up so made it, like, easier and I think that was the best thing for me. The fact that it was broken into three different sections so it was easier to work on than you would if you were focussing on the one thing.*

The implication of this, though, is that it is not necessarily the use of the computer simulation that has led to the increased enjoyment and engagement, but the structuring of the module around it that has created a different pattern of study to the one she is used to.

This student was also able to identify, after a little thought, a use for computer simulation to enhance the student experience:

Interviewer	*Can you see other places, other parts of the course where we might need something like this?*
Student	*Um, can't think of examples but I don't think it'd be a bad thing. I am not saying the whole course should just turn into that, you need to have a little balance*

> *but I don't think it is a bad thing to do. And especially the first year before you go to school because it could kind of prepare you for things you might experience that you might not be aware of*.

This exchange indicates that the student not only sees the simulation as an opportunity to have experiences she would not otherwise have, but has begun to see simulation in much the same way that it is seen in military and medical training - not as a replacement for experience, but as a practice for it. This attitude was not really exhibited in any of the other interviews and in retrospect it was unfortunate that I did not pursue that line of enquiry further. This is clearly an area that can and should be explored further. Similarly, because no specific discussion was started relating to emotional engagement, it is difficult make any judgements in this case. However, it is worth noting that where, in other cases, emotional engagement did become part of the discussion, this came from the student, not the questioning. It seems, then, that in this case the positive attitudes generated have little to do with emotion. It is possible that this is indicative of the view that computer simulation can be a preparation in terms of knowledge and understanding only.

6.3.2 - Student N-P:2

Student N-P:2 is a 20 year old female of white British ethnicity.

N-P:2 values time spent practising teaching most highly (35%) with time spent in faculty and talking to mentors in school rated not far behind (25%). Discussion with peers is rated much lower. See fig 6.10

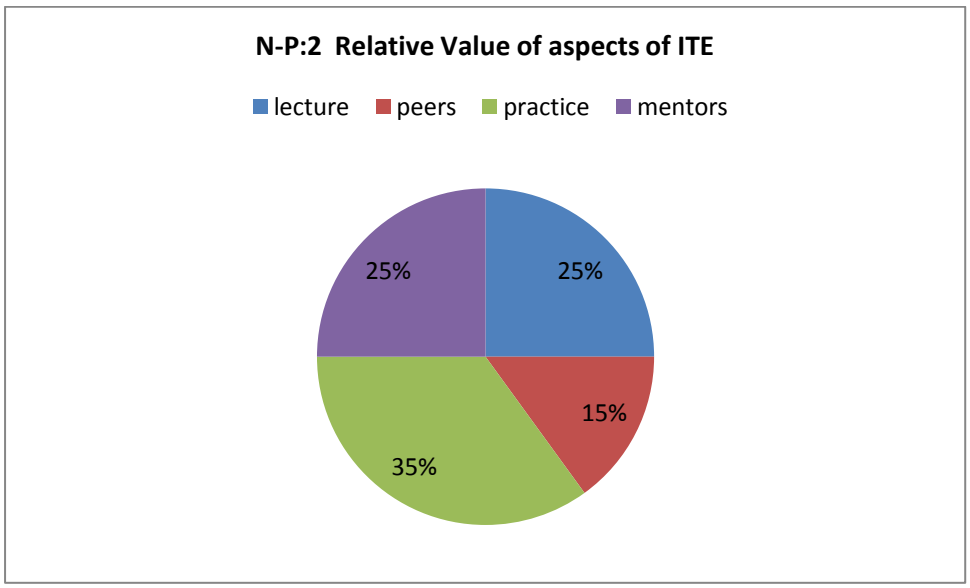

Fig.6.10 N-P:2 Relative value of aspects of ITE

The key responses are shown before (fig 6.11) and after (fig 6.12) exposure to the VCC. This student was chosen because although she expected to find the experience of the VCC interesting and engaging, she did not expect it to be a good approximation or preparation for reality. After using the simulation she reported that she had found it as interesting and engaging as she expected and she did not consider it to be a good approximation to reality. She had, however, become more positive about the way it had prepared her for reality and in her hopes and expectations for its increased use in ITE and Primary education.

Given her responses to the question about the relative importance of different aspects of the course, one might expect a balanced attitude when asked about this in the interview.

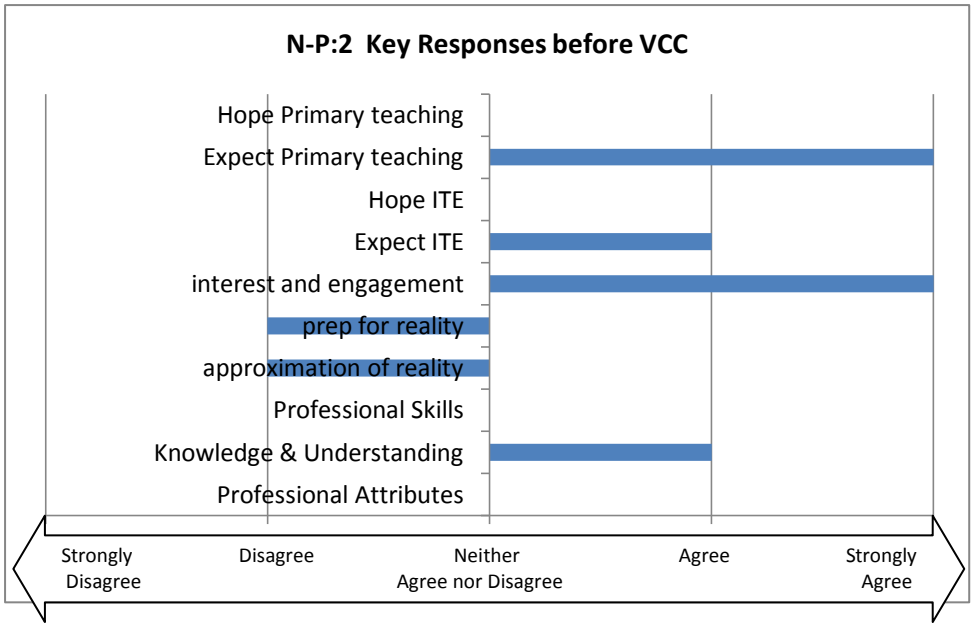

Fig.6.11 N-P:2 Key responses before VCC

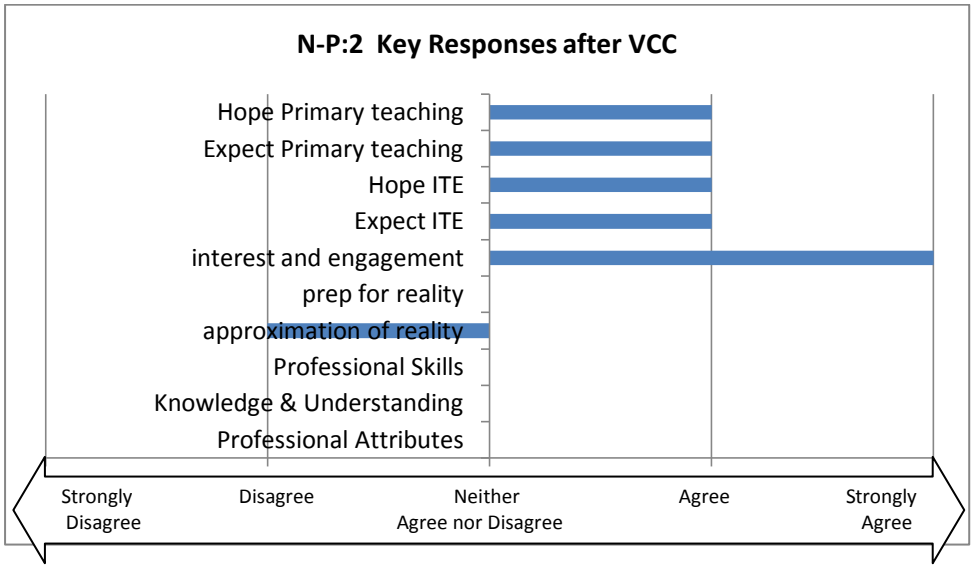

Fig.6.12 N-P:2 Key responses after VCC

In fact, she is much closer to the 'practice is everything' camp:

Student	*Things that you learn on practice, you can learn so much in here but you are only learning what the lecturers are teaching and I don't think you will know exactly what it's like to be teaching until you are standing in front of that class.*

Following this discussion she spoke at length about her personal sense of unpreparedness for her first year teaching practice and in particular how much of what she learnt in lectures started to make sense after that experience:

Student	*It was year two, after I'd done the teaching practice then I could start to think, oh that's how it's done in the classroom. I just think you learn more in school.*
Interviewer	*Do you think that changes then as you go through the course? Do you think the theory and practice balance becomes more important or?*
S	[interrupts] *Yeah, it does become more important because you can see in your head how it's going to work. Um, again, I still think the more in school you are the more you learn because you can learn about assessment but you're only going to learn it properly to do it and you can assess these pretend children but you can't because you don't know those children and to be able to assess a child then you've got to know them, haven't you, so if you're in your class you can assess those fine and in Uni it's almost like it's not real and in school it is.*

This use of the word 'real' is telling because it appears to underpin her expectations and experiences of the simulation. She returns to this idea several times throughout the interview, for example in this extract when discussing the fact that she uses her own computer in all aspects of her social and professional life but does not appear so well disposed towards it in her learning to be a teacher:

Student	*Because how can you get to know this child if you can't talk to them? I don't know, that's how you get to know children, you talk to them and you see them every day.*

This view of the simulation stayed with her throughout its use:

Student	*You're just being told select things about this child and you can't make judgements on a child with some statements that they've written and, like, when we were doing that decision making thing, we were getting it wrong every single time. Loads of people found it very hard to get full marks. Because you can justify it in your head but it wasn't right according to the thing and I think I ended up not really thinking about Ashley and just having a system to find out how the answer circuit worked*

As part of the discussion about the reality of the scenario she comes close to expressing an ethical opinion:

Interviewer	*And you think that sense of it being real is what drives it, makes that more important?*
Student	*Yeah, it gives that motivation to get it done and it it's not real then you think, what's the point, and in school, it's those children you have to make them progress...*

It is also interesting to note the contention that she '*ended up not thinking about Ashley'*. Note that she uses the character's first name rather than 'the child' and that 'ended –up' implies that she started by thinking about Ashley as being real. It seems that she may have been emotionally engaged to begin with but the limitations of the software have had an adverse effect.

Given the comments that this student made throughout the interview, it became increasingly difficult to see why her responses on the questionnaire had become more positive. It seemed as though she was not at all positive about the value of computer simulation and that this negativity seemed firmly entrenched due to the issue of 'reality'. At one point I asked her if it would be possible to imagine a simulation that could ever create the sense of reality she clearly needs. Her response was, '*No, It'd never be the same. I don't think it'd ever be the same*'.

When discussing the application of simulation software to Primary Education she accepted that there might be some value in some situations, but found it difficult to express what those might be:

Interviewer	*Could you see any value in it at all? Is there any situation where you might use it and thinking that it's real or is it just a general principle?*
Student	*Yeah I think there is always going to be a situation. I don't know whether I can name off the top of my mind but I think real experiences are helpful but then again you can use computers for role play or something and you could have them in English, like being a journalist or something and that is going to have more of a value than writing a journal article in their books and learning it out, because you've got the experience of using a computer to do it but*

there's always going to be a computer that can do it better...

The tone of the response and the general nature of the discussion actually imply that she does not really see much value in the use of computer simulation. In essence, then, this student was chosen to be an example of a student who was negative before but became more positive, however the inconsistency between her post-experience questionnaire and the interview leave the question of her actual opinions open to debate.

This highlights both an important aspect of this research and an issue faced by all engaged in mixed methods research. Internal consistency between the different data collection techniques cannot always be assumed or guaranteed. There is little that can be done about that other than to acknowledge it as a limitation but also to note that inconsistency is a fundamental part of the human interactions we seek to study and that any conclusions are inherently 'fuzzy' (Bassey, 1999, p12).

6.4 - Positive before, positive afterwards (PP)

6.4.1 Student P-P:1

Student P-P:1 is a 20 year old female of white British ethnicity.

P-P:1 values time spent practising teaching most highly (40%) with discussions with mentors in school rated not far behind (30%). Discussion with peers and faculty taught sessions are rated much lower. See fig 6.13

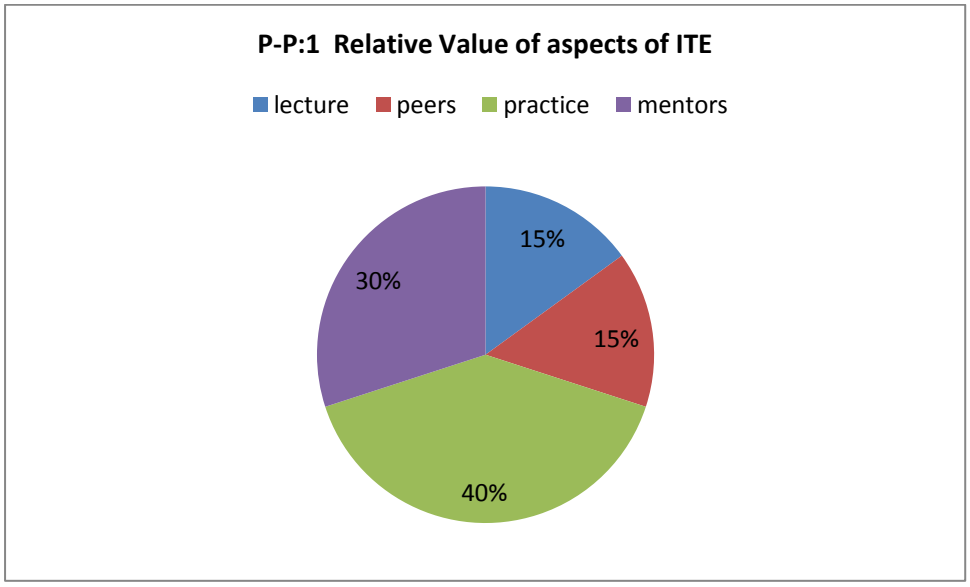

Fig.6.13 P-P:1 Relative value of aspects of ITE

The key responses are shown before (fig 6.14) and after (fig 6.15) exposure to the VCC. This student was chosen because she was generally, although not overwhelmingly, positive towards simulation before exposure to the VCC and became even more so afterwards. In particular, whilst she was very positive about the potential for the simulation to teach professional knowledge and understanding, she was ambivalent towards it in terms of professional skills. Following the use of the VCC she was much more positive.

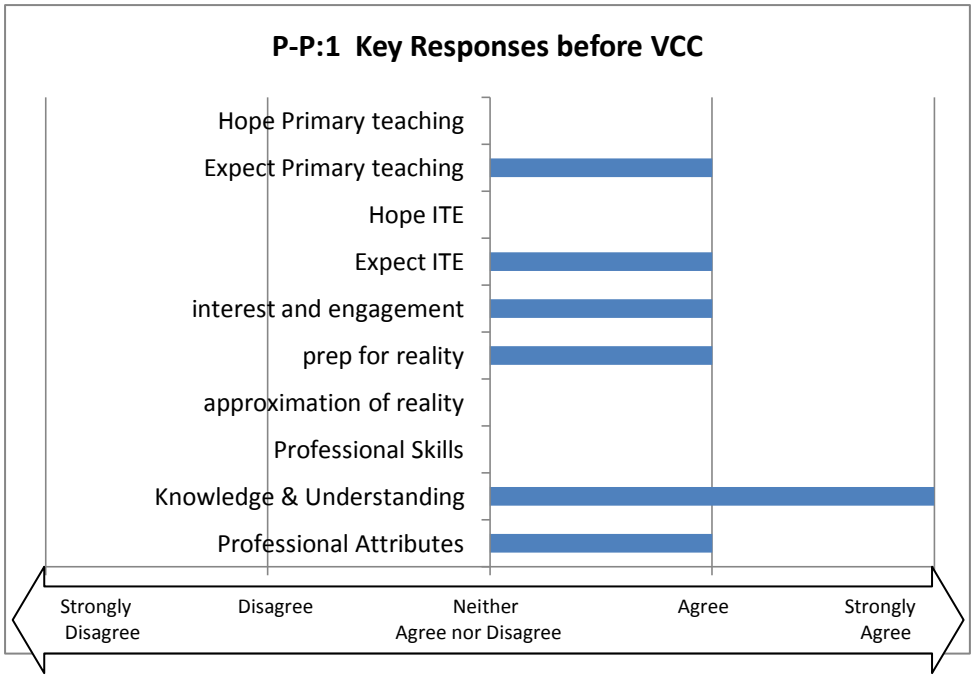

Fig.6.14 P-P:1 Key responses before VCC

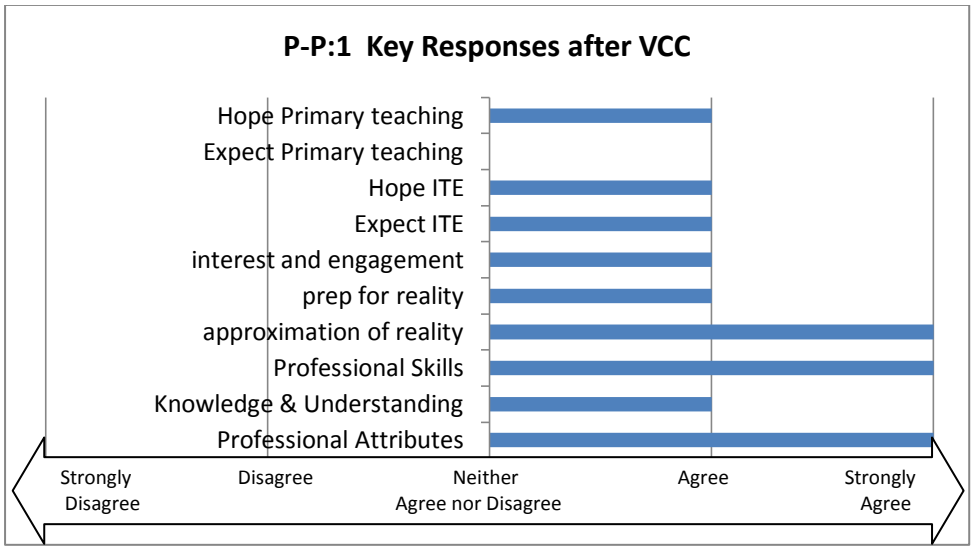

Fig.6.15 P-P:1 Key responses after VCC

This student, as all students in the study, values time spent in school most highly. The reasons she gives for this are interesting, because it points to the reason why, although generally positive about the computer simulation beforehand, she did not expect it to be particularly valuable for teaching

professional skills. When asked about the value she placed on school experience she explained it in the following way:

Student	*I think that you learn much from school experience. Obviously you can get told a lot through classes and through assignments but I think when you're actually there you are experiencing, um, everything that goes on, all the problems, all the good things, the bad things.*

What she appears to be saying is that it is the multiplicity of differing experiences, and the interactions between those experiences, that make the school experiences so valuable. This is why, perhaps, that she was less sure about the VCC beforehand – that it would not be able to replicate the multifaceted nature of reality. This is borne out by the following exchange:

Student	*Initially I thought it was really, really a good idea. I was quite excited to do something different. I thought what I saw first off was really good. Um, now obviously it is limited, you can't, there is only so much you can go into on there and so I think, I don't know, maybe I thought that not everything would be covered that I wanted to maybe, that was* [tails off]...
Interviewer	*So would you say that your doubts were about the technology or about something else?*
S	*I didn't really think about the technology, to be honest. I think it was more about what was put in there, whether you covered everything we would have thought of because obviously you can't think about what two hundred people are going to think of, you can't put in what you think.*
I	*Right. You were expecting it to be quite limited?*
S	*Yeah, I didn't know what to expect, to be honest, I just thought it looked like a good module to have.*

So this student's general air of positivity seems to be tied up with the novelty value, '*I was quite excited to do something different. I thought what I saw first off was really good'*, rather than anything specific about the computer based nature of the simulation. It would appear that this student had not, either before or after, really considered any of the fundamental questions about the principle of using computer simulation in ITE. This is confirmed as she was the student who said,

when asked about other possible uses of simulation, '*I don't know really. Haven't thought much about it*.'

What seems to have confirmed this student's view that it provided a positive experience is connected to her idea about the variety of experiences within the module. For example, when discussing the reality of the simulation, she made the following points:

Student	*It was also good to have to, obviously, go on there and use what you had to get your answers for writing letters and reports and I thought that was a good way to kind of think about what we might have to do as teachers as well, and it was nice to just kind of get to know the family, Ashley's family through that way cause obviously we would do that in our teaching as well eventually.*
Interviewer	*In that sense do you feel there was reality to it - that it felt real?*
Student	*Yeah, I did think it was quite real. Um, I think in the interviewing bit with the different multi agencies and Ashley's mom, I think that was a bit limited at times with some of the answers that they gave for some of the questions weren't appropriate and, but I think* [trails off]...
Interviewer	*And do you feel the issues that it's brought has supported you and made it useful for you as a teacher?*
Student	*Yeah, it's made me aware of some of the things that I really didn't know about – filling in the CAF for example I wasn't really aware of that and that kind of made me research it more, look into it and look into the multi-agencies and see how everything, and kind of made it a bit real that the situations that you may have in school obviously, either family and the difficulties that, you know, children do face.*

A section of the interview with this student highlights a common issue with research into educational settings. This research is attempting to focus on the students' attitudes towards the use of computer simulation but these attitudes are wrapped up in the whole experience of being a student on that course. This work was allied to one specific module, but the students were taking several modules at the same time and the interaction, in terms of amount of time available, pressure of assignments and so forth inevitably impacts on the students' overall

perceptions. As was noted with student N-N:2, it is not really possible to separate out elements of the student experience:

Student	*I think it was really useful, something different. I think people like having something different to do rather than just assignments all the time.*
Interviewer	*So there is a motivational aspect at the same time?*
Student	*Although I think the division of where it was wasn't maybe the best because we had so many assignments to do and everybody was like, 'oh I just want to get it done', and I think it would be beneficial if it was done in the first term because it is not really an assignment that needs, you don't need to have the knowledge really before hand, you probably would just get that from just having it in the first term anyway. I don't think I would have struggled more if it was back then 'cause you kind of learn as you go, we don't really know much about multi agencies, most people don't, I didn't at the time so where it would be placed would not really make a difference.*
Interviewer	*And it wouldn't matter if this was before or after teaching practice, for example?*
Student	*No, I don't think it would.*

So here, the pressure of other assignments could have had a negative impact on the students' perceptions of this one. The statement from the student implies that this is the case with some of her peers.

6.4.2 Student P-P:2

Student P-P:2 is a 36 year old male of white British ethnicity.

P-P:2 values time spent practising teaching most highly (55%) with discussions with mentors in school next most valuable (20%). Discussion with peers and faculty taught sessions are rated much lower. See fig 6.16

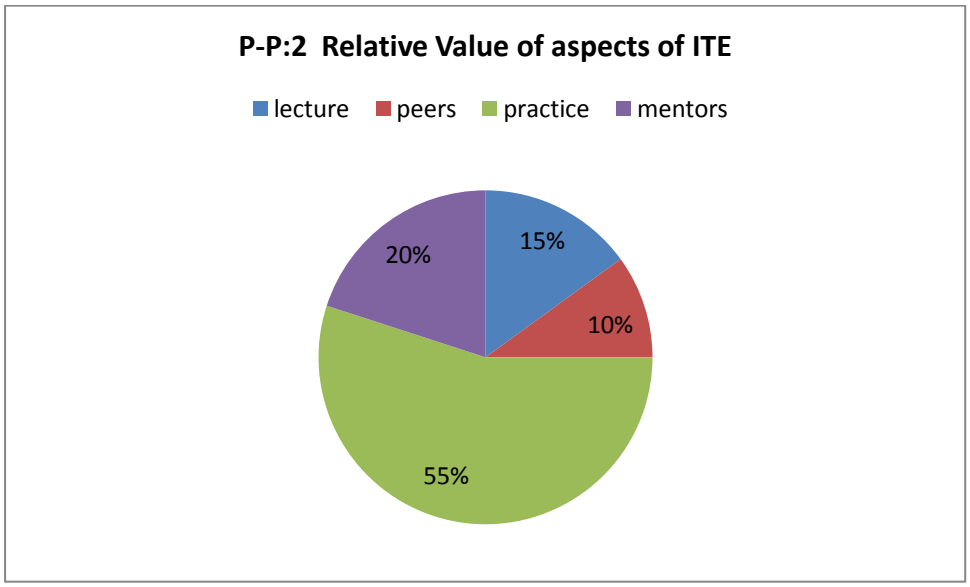

Fig.6.16 P-P:2 Relative value of aspects of ITE

The key responses are shown before (fig 6.17) and after (fig 6.18) exposure to the VCC. This student was chosen because he was generally positive towards computer simulation beforehand and remained so, in some ways more so, afterwards. There is also an interesting discrepancy in the before and after data in that whilst he has generally remained positive, his response to the question about hoping computer simulation becomes more used in ITE has moved from neutral to negative.

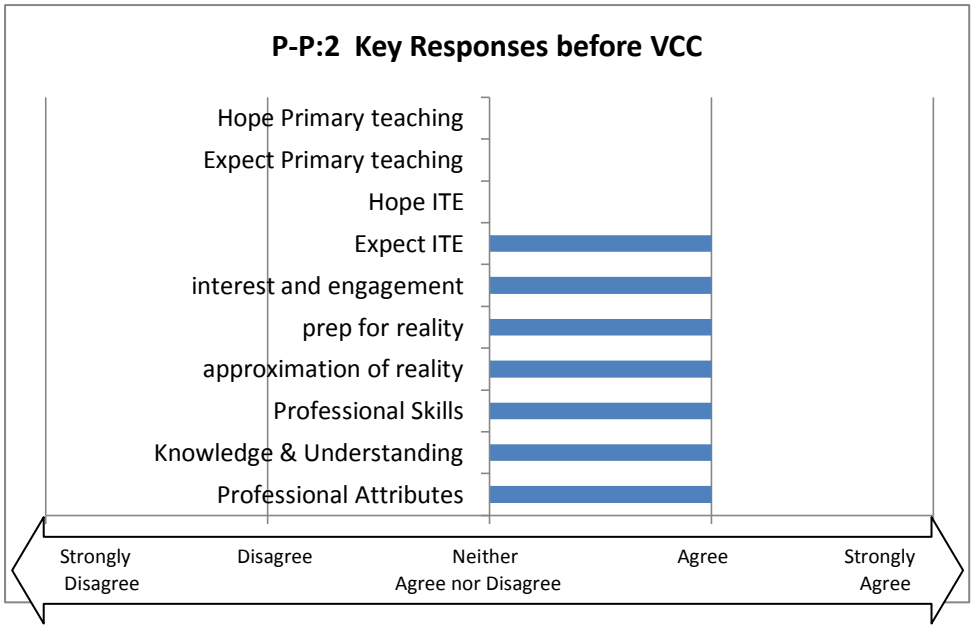

Fig.6.17 P-P:2 Key responses before VCC

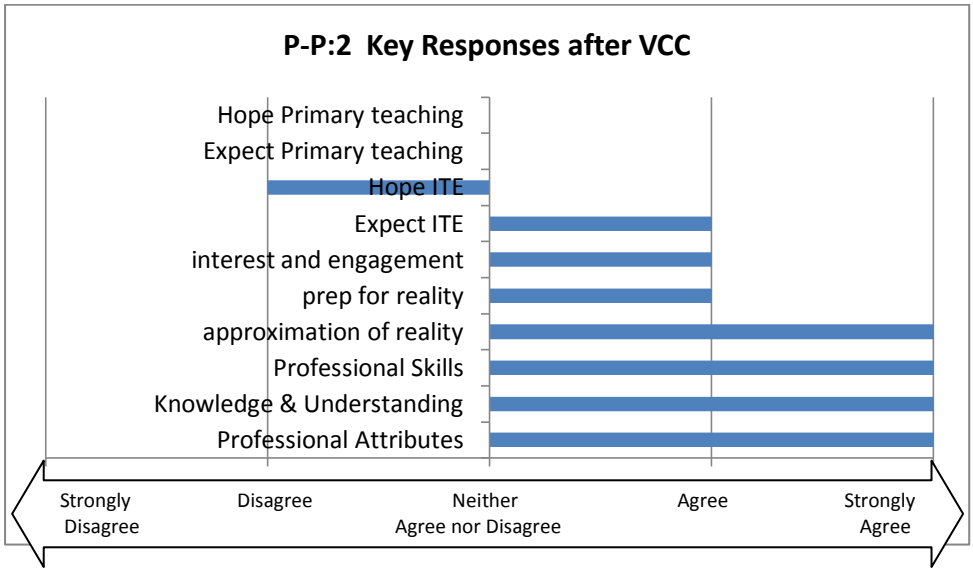

Fig.6.18 P-P:2 Key responses after VCC

From the beginning of the interview it became clear that this student holds clear views about the relative value of what is learnt in faculty and what is learnt from practice. This is clearly summed up by the following:

Student *I think you learn a lot more when you're in the school than when you do here cause lot of it is paper based; a lot of it is to do with your research. Like constructivism, when am I going to use that to*

teach that to year one in the schools? Although your elicitation and them methods are good for assessing and knowing where it's come from and how to teach children, I am never going to do anything on constructivism again with them really when I am teaching year ones. I am just going to go into the lesson, naturally do the assessment but I'll probably never do constructivism again, if you see what I mean. I think there is too much emphasis on the assignments, I know they've got to be academic but we're doing primary teaching, I think it should be more about that - the ways of teaching- so that's why I think you learn a lot more in the school than what you do in the faculties.

Essentially this student holds the archetypal 'theory is irrelevant' view. He sees nature of teaching only in practical terms with no interest in why things are done how they are. It is interesting to note that the profile given from the pre-experience questionnaire (fig 5.16) is not particularly indicative of such an extreme view – indeed many of the students in these case studies had not dissimilar profiles and whilst still clearly valued practice most highly could not really be seen in the same category as this student.

Given the student's views on the value of theory and practice, it is not surprising that his views on the VCC are heavily informed by (or at least related to) that position. His given reasons for being positive seem quite unrealistic and given this, one might expect a degree of disappointment that was not in fact evident:

Student	*Just as, you know, I know it's totally off the scale but general games, although I don't go on them a lot my wife plays on, I know what they can bring out. When you're on a fair ground you sit in a simulator, how real it all is, so it's going to be and I was right actually to think it, what they can do now is make it a real life situation, you know, for all aspects of learning and that's what they did and that's why I thought it will be helpful.*
Interviewer	*And afterwards you were still positive, in fact even slightly more positive*
Student	*I thought it was good. I thought it was a really good module. I really got into it, I don't know if I passed it or not [laughs] but I got me head round it, it had some good things into it.*

When pressed on why he was so positive about it he cited the reality as the main reason. This is interesting, because, in relation to 'fairground simulators' clearly the VCC does not have the same level of immersion and fidelity. The sense of reality for this student, then, comes from his perception of how the people in the scenarios corresponded to his own views of what they would be like in reality; as is evident here:

> Student — *Mostly I thought it was positive because you can see Ashley, you could see his mom, you got all them people - inclusion officer, the SENCO, the psychologist, you got all them in the room , they were all real people, they're giving interviews and that's the kind of words they'd come out with, the kind of language, the emotions as well cause Ashley's mom, if you asked them the wrong question, she got "I'm not answering that", so it was real. And it taught you things like that if I was in that situation where I ask her what's her life like with her husband, do I need to know and it got me thinking and I thought it was important and really well worked out.*

A particularly interesting point is the use of 'emotion' here. For this student the reality, and hence the value because he mostly values 'real' learning rather than 'paper' learning, comes from seeing real people using the language he expects. At this point it would have been interesting to ask if he had ever met a real educational psychologist to see whether this perception is founded in reality or assumption. This sense of reality was the intention of the designers and the reason why the responses were improvised and this appears to have been successful in this case.

In several parts of the interview this student loses focus and has a tendency to pause then repeat himself. It is not always easy to interpret his responses. This was the case when discussing why he seemed to be more negative about the use of computer simulation in ITE after having expressed such a positive attitude. It is possible that the ticking of the 'disagree' box may have been an error or that it indicates a general wariness of anything that is not the real classroom, but it is not really possible to say.

6.5 - Positive before, negative afterwards (PN)

6.5.1 Student P-N:1

Student P-N:1 is a 19 year old female of white British ethnicity.

P-N:1 values time spent practising teaching most highly (70%) with each of the other three components rated equally low (10%). See fig 6.19

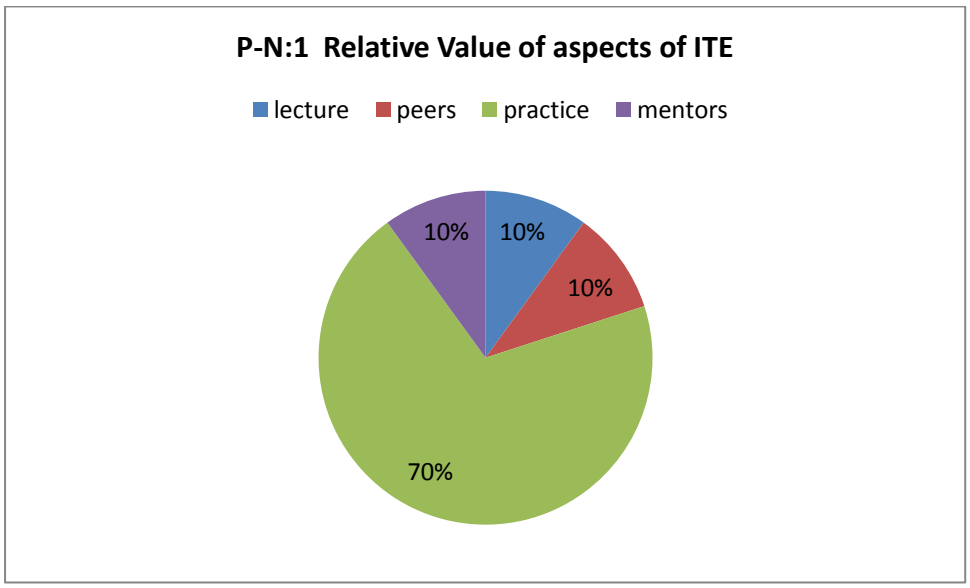

Fig.6.19 P-N:1 Relative value of aspects of ITE

The key responses are shown before (fig 6.20) and after (fig 6.21) exposure to the VCC. This student was chosen because two key indicators had significantly reduced between the pre and post experience questionnaire. Beforehand this student was very positive in her expectations of the approximation to reality and positive in terms of preparation for reality. By the post-experience questionnaire, both of these had reduced to the neutral stance.

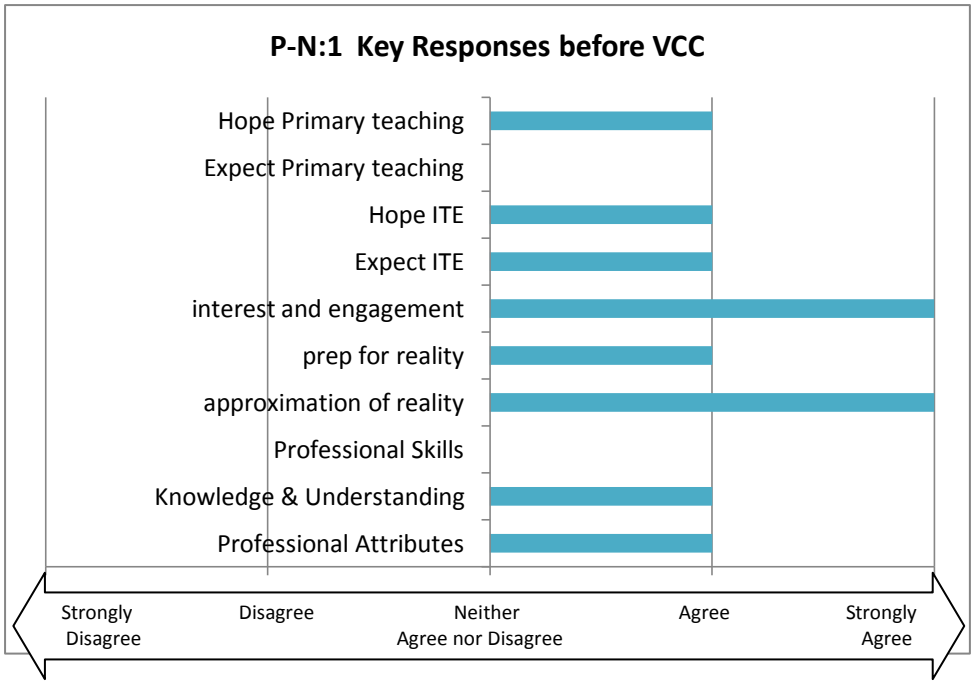

Fig.6.20 P-N:1 Key responses before VCC

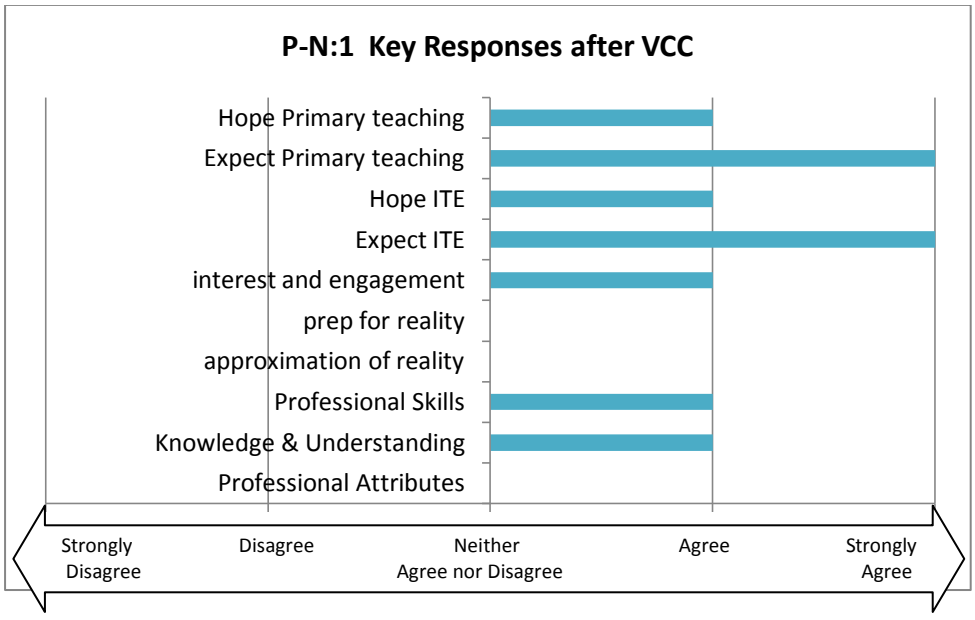

Fig.6.21 P-N:1 Key responses after VCC

The initial positivity appears to have been generated by the content of the module as a whole rather than the use of computer simulation in its delivery. This is not surprising, in fact it is more surprising that it did not feature more prominently with others, as the rationale for the module and the use of the VCC was given to the

students before they took the pre-experience questionnaire. Her statements about her expectations are very much in line with what they had been told about the module:

Interviewer	*Before you started working on this urban child scenario you were quite positive ... and you said that you thought it probably could be a close approximation to reality and that it could help you to prepare for that reality; do you remember why you thought that?*
Student	*Um, because I was thinking from previous experiences when you're into school you come across things, for instance, child protection or healthy eating, but you're not really told how to go about it or dealing with parents and when you're in school as well, even though you're acting as a teacher, the actual teacher are still in close contact with parents and things so you sort of push back so you don't get the chance to actually try and see how it would work with the parents or with different people coming in like psychologists, so with having that I was thinking well, I'd be able to find out how I go about that cause that's what I felt, from experience, I hadn't got enough on that.*

The student has clearly recognised the reasoning behind the use of this computer simulation, that is, to try to give experience of situations and scenarios that they will face as a teacher but not as a student.

When asked to explain why she was more ambivalent towards it following the module, her response indicates that she also had expectations that were not met, in particular in relation to the background to the people in the scenarios:

Student	*When I was going through it as well, I was expecting to have a bit more information and because we'd got the head teacher's report and then the* [short pause] *the meeting, I was thinking that we'll, it was going to inform me of well, what came up, how I would go, who I would go to, where was these people already sitting on the table who I already knew who I should have contacted where as I'd have liked to say, well who would I get involved.*

This raises an interesting issue in relation to realism. Part of the attempt to make the simulation realistic, and the reasoning behind the original development of the

VCC in the faculty of health, is to create 'messy' scenarios where the student does not always have all the information or where people do not behave in a 'textbook' manner. The idea of the scenarios presented in this module was to allow the students to interact with a situation *without* knowing all the facts. Indeed, the very fact that the head teacher calls a meeting and then fails to attend was designed to be an example of poor practice – as was inviting an outside agent (the educational psychologist) to a meeting for a child who had not been formally placed on the SEN register.

When this was pointed out to this student it was clear from the way she responded, with pauses and 'ums' and drawn out 'yeahs' that she had not considered the possibility that the VCC might present anything other than an idealised view of practice:

Interviewer	Do you think there's a realism, though, in the fact that in the scenario you kind of got dumped in the middle of it without any information; do you not think that was a real thing?
Student	[pause] *Um* [pause] *...yeah... but I think with* [pause] *If I knew more about each role and the different people who could help then I think I would have been able to say, well I think this person needs to get involved because of* [pause] *whereas I didn't have that opportunity to say it because they were already at the meeting.*

The interview returns to this theme later on when discussing information that was available but not needed (again, a deliberate part of the scenario) where the student has perhaps begun to realise the 'messy' nature of the simulation is deliberate, something she hadn't appreciated before:

Interviewer	*When you said 'not convinced' you mean, do you mean it wasn't useful to you or do you mean it was irrelevant or do you mean...?*
Student	*It was bits that were irrelevant,* [pause] *which I knew were there to try and* [tails off]*... but....*
I	*So you think it was deliberately irrelevant do you think in there?*
S	*Yeah* [pause] *but also I was thinking with the home life, I was going to get more of a wider picture actually but some*

of the things they were saying was just already what was said at the beginning so it wasn't.

There is some indication in the interview that this student has somewhat missed the interactive nature of the scenario and sees it as merely a more technological way of presenting information – essentially a 'better lecture'. This is partly indicated in the extracts above where she is concerned about not having all the information she needs and some information appears to be repeated. It is also evident in the following section where she was asked if there were other aspects of ITE computer simulation could be used for:

Interviewer	If you think a faculty like ours was to create more of these kind of virtual scenarios along different lines or similar lines, looking at different aspects of teaching, do you think that the ratio that you talked about at the beginning which was eighty: twenty - the value of school to faculty, do you think that could be shifted?
Student	It would change. Yeah I think it would change. I think sometimes – it's like when you watch just TV and you see an action, you see what's going on, that's what I'd like to see, that kind of, so I think if you've got the virtual world as well and different aspects, I think that would help.
I	Right then, what sort of scenarios do you think would be useful?
S	Um, maybe an actual teaching one, like on Teacher's TV you see a teaching activity and pulling out bits of that so you can see what sort of makes a good teacher and how you can do different things.

The student seems to be implying that the value in the scenarios is in the ability to see the people talking about their roles. She would also like to watch actual lessons but the interactive nature of the simulation seems not to have been considered. When discussing the use that computer simulation might be put to in Primary Education she again exhibits this view when she misunderstands a question about the use of ICT. In the following extract she has previously made a distinction between 'active' learning and 'book learning' and has said that active learning is more important for younger children:

Interviewer	Where do you think, then, this kind of virtual learning fits in with that, with this difference, perhaps, that you are identifying between activity based learning and sitting down, sitting at the desk kind of learning, where does virtual scenarios on computers fit into that?
Student	*Hmm*... [pause] *no...* [pause] *I think* ... [pause] *I just think older children will be more engaged and interacting in having access, even if they have to sit down with the computer, they wouldn't find that a chore as such as sitting down and writing.*

It appears that one reason why this student does not see a value in computer simulation may be a misunderstanding, or lack of understanding, of what it is and what it is trying to achieve. It might be that if part of the module itself was devoted to some kind of meta-analysis of the learning and teaching methods employed in the module, students like this might have a more positive experience.

6.5.2 Student P-N:2

Student P-N:2 is a 27 year old female of white British ethnicity.

P-N:2 has one of the most evenly balanced profiles in terms of valuing different aspects of the course. She values time spent practising teaching and discussions with mentors in school most highly (30% each). Discussions with peers and faculty taught sessions are rated lower (20% each). See fig 6.22

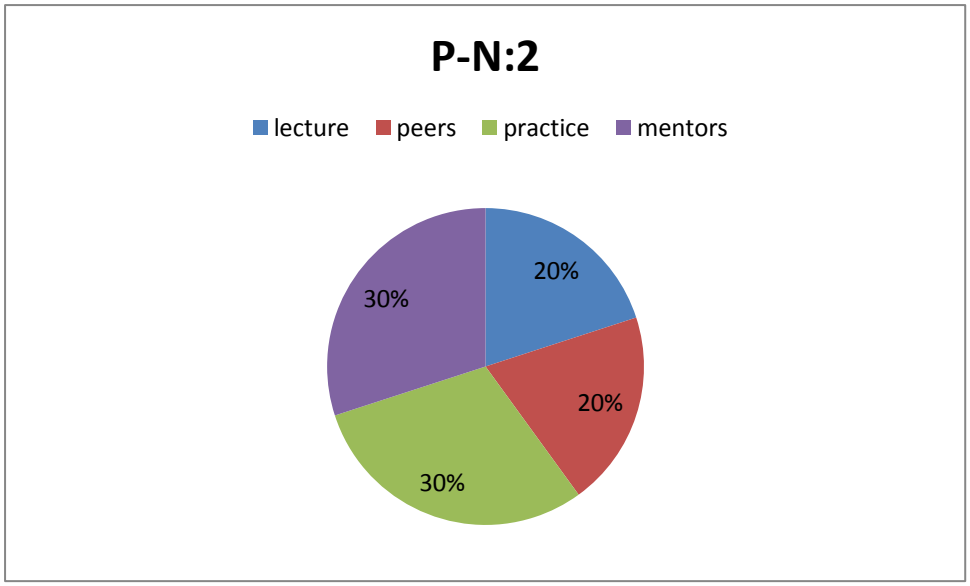

Fig.6.22 P-N:2 Relative value of aspects of ITE

The key responses are shown before (fig 6.23) and after (fig 6.24) exposure to the VCC. This student was chosen because although most of the responses indicated a generally positive attitude towards computer simulation both pre and post experience, two key indicators had reduced. Both approximation to reality and preparation for reality had moved to the neutral, 'neither agree nor disagree' position.

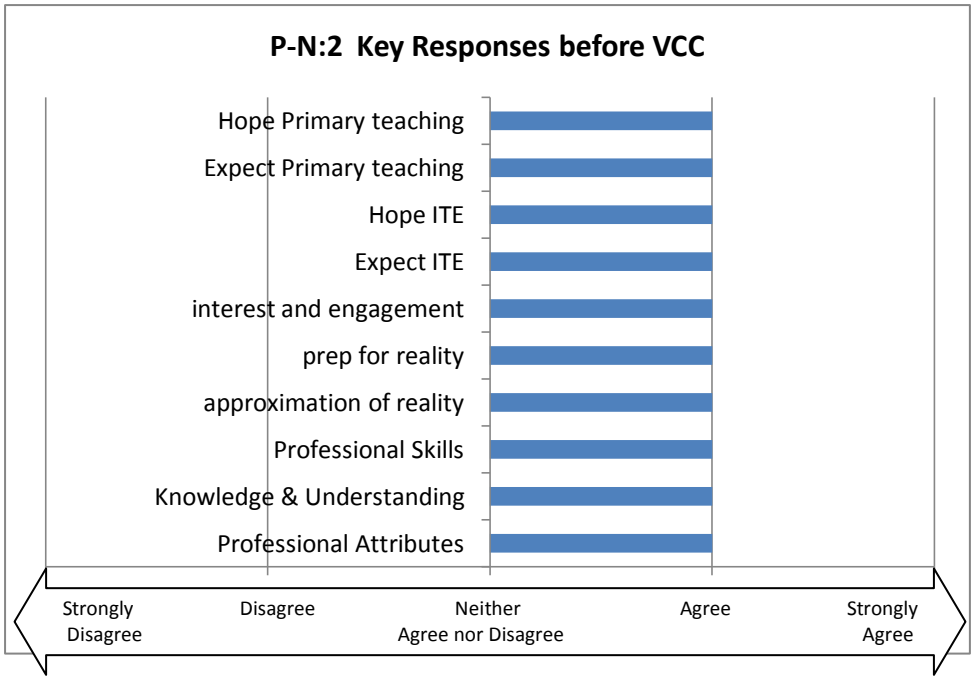

Fig.6.23 P-N:2 Key responses before VCC

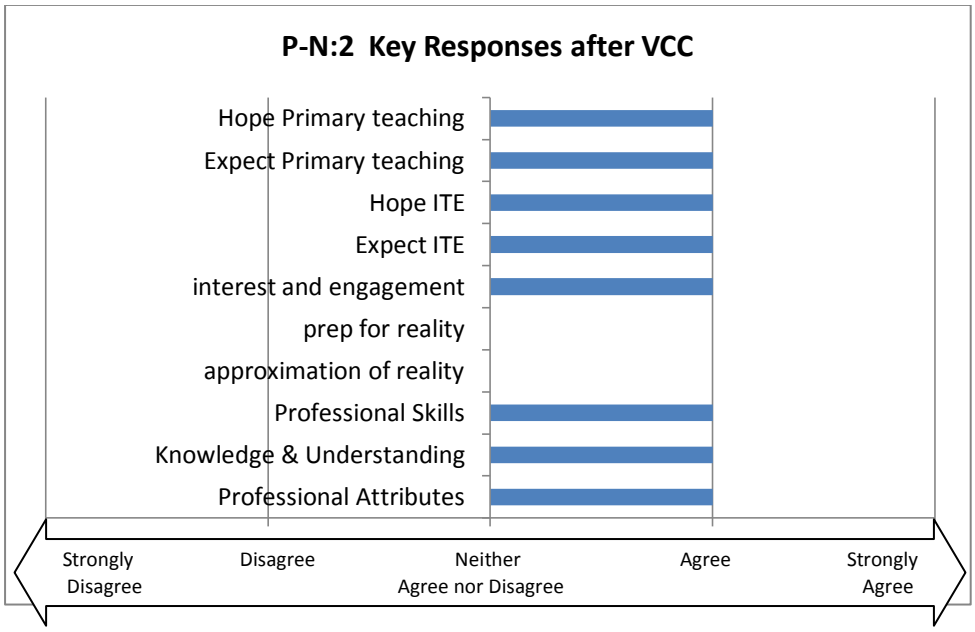

Fig.6.24 P-N:2 Key responses after VCC

This student's general impression that the simulation would be valuable appears to be based on the initial view of the interface rather than any reflection on the principles involved. The motivational aspect of having a module taught in a

different and innovative way also appears to have supported this view, as is apparent from these comments early in the interview:

Student	*Before I started it, when I had the brief initial look around, everything like that, um, it really, the actual - First of all, the look of it really does straight away put you in mind of what was like on the teaching practice and what it could be like on teaching practice. There's the fact that you can click and look at different documents and things like that that would be in a classroom and displays for example, just literally that half an hour that we had to look around, I straight away thought, 'ooo' this is exciting, there is lot here that you can learn, that maybe you don't even notice if you went to observe a classroom with a teacher and there were things there that, just by dragging your mouse around, you can look at, that, perhaps, you wouldn't notice if you were looking in another person's classroom.*

This is quite a different response to other students in that she is saying that the simulation gives you the ability to see things that are not prioritised (perhaps due to time constraints) in a real school experience. An important point to note is how, for this student, the sense of it 'being real' is tied up with it 'looking real'. This is a major advantage that a computer simulation has over more traditional paper based simulations discussed in the literature review. The student doesn't cite the visual presentation, or any disappointment in it, as the issue that causes her to become more ambivalent towards it. For her, completely opposite to student P-N:1, the issue is the lack of 'openness' in the interactivity. Whereas student P-N:1 seems not to consider the interactive elements important, it is the fact that the simulation has a limited interactivity that is disappointing here:

Interviewer	*Afterwards you were slightly less positive about it, your response would indicate that perhaps it didn't quite live up to your expectations, is that fair?*
Student	*Um, there were certain things that I would like to have asked but obviously couldn't ask. They weren't there, they were just – It was limited in the fact that the responses perhaps to certain things I would have liked to have been able to access.*
I	*Do you think it needs to be a bit more open, is that what you're saying?*
S	*Yes more open. Yes. I think also it would be interesting then to see how people used the*

information in their assignments. I think - I don't think it was directed so that people, you know, they would then get fed the answers. It wasn't like that. It was still open but it could have been even more general I think, could have been more things that could have been asked, things like that.

So, although this student is slightly more negative towards the computer simulation, there appears to be a clear recognition of its value to her own learning. This is borne out when she is able to clearly identify a further scenario *and* identify the interactive elements needed:

Student *You could show how behaviour management, for example, there could be a one on that or it could be about assessments could be used. I mean we get taught stuff and told about it through our lectures and I went to all my, I was only away from one week during the whole three years. I was always at the lectures and I do find them really, really helpful. But it's when you're on teaching practice that you actually put them into places, it doesn't work out that VCC could actually virtually put them into place. Try out, perhaps, certain, um, assessments, formative assessments, maybe a child's doing a lesson, maybe some responses, some discussions, the children could do discussion and it could be what you've picked up from their discussion, how you've managed to formatively assess that child and that could then be, something that could be progressed in the lecture itself. So, yeah, it could be used in that way.*

This student, then, is quite different from several of the others in the interviews. She has clearly reflected on the way in which the computer simulation has supported her learning and, as a result, appears to have got more out of it than some others. Once again, this highlights the advantage of using a qualitative technique in conjunction with the quantitative approach (Freebody, 2003, p47). This student, who according to the raw numerical data, represented a somewhat negative view of the simulation, has, in fact, proved to be one of the most positive cases.

Chapter 7 – Conclusions

In this section I will deal with three key issues. Firstly, I will return to the questions that this study has attempted to answer and consider what has been learned about them. Secondly, I will critically examine the approach taken, the decisions made and the tools used to answer those questions and suggest ways in which the study could have been more effective. Finally I will try to offer some, appropriately tentative, suggestions about where this research might be taken in the future.

7.1 – Reflections on the questions posed and answered

The use of computer simulation in Initial Teacher Education is a relatively new and unexplored area. This study has looked at one attempt to introduce computer based simulation into an ITE undergraduate course with the specific intention of eliciting and describing students' attitudes towards it.

This is a small scale research project that hopefully has a high level of relate-ability to professionals in similar situations. By taking a critical realist position, a range of methods, both quantitative and qualitative, were used and there is no attempt to generalize from the data produced however the unexceptional nature of the cohort of students implies that the issues raised here will be similar in other institutions.

As might be expected, the students in this group displayed a range of attitudes towards the use of computer simulation. What is also clear is that any two

students might have completely different reasons for answering any particular question in the same way. In this sense the mixed methods approach has been successful in uncovering some of the underlying issues that a purely quantitative approach would have missed.

In relation to the question of how much value students place on different aspects of the course, almost without exception, the students placed a higher value on time spent in school than on time spent in faculty. The results of the study in relation to faculty/school divide indicate clearly that such a divide does exist in the minds of these students as was predicted from reading the literature. What has emerged here, though, is the indication that the roots of this perception may lie in the students' view of education itself. A fuller exploration of this issue needs to be carried out, but it may be that it is not enough that tutors expect students to infer from the constructivist nature of the course that that is a pedagogy that is being promoted to them. The irony, of course, is that whilst the perception of tutors is that the course is, through its use of small group sessions, discussion and reflection, promoting such an approach, it is being done through a discovery approach rather than a social constructivist one. The implication is that tutors not only need to model the pedagogy, but be much more explicit about what they are doing and why they are doing it.

An inability of some students to recognise value in faculty work seems not to have impacted on their initial perceptions of the use of the simulation as much as might be expected. Students with a low opinion of the value of faculty based work appeared to have similar expectations as those with a more balanced view. The reasons for these views could be quite different. Those who had a very technicist view of education (and value practising in the classroom most highly) also tended to adopt a behaviourist pedagogy. For these students, initial reactions to the VCC seem to have focussed on the novelty value and motivational aspects of a module being taught in a different, unusual or 'fun' way. Students who do not 'buy into' a social constructivist view of their own learning appear to be less likely to evaluate the use of computer simulation in those terms. The result of this is that

students who are less reflective and constructivist in their views tended to express similarly (on the surface) positive views to those who are more reflective and constructivist. For these reasons, students were equally likely to value the computer simulation. If tutors are not concerned with why the students value a computer simulation approach then this would appear to be a win-win scenario. However, this study indicates that beneath the surface of any statistical evidence that such an approach is valuable, there may be issues of a more profound nature.

With regard to the questions concerning fidelity, for most students the 'degree of reality' was important in informing their view of the VCC's value. However, the way in which they decided on how 'real' it was differed. For some it was about the look of the interface. The images of the classroom, the meeting room and the home were designed to have a genuine look to them. The fact that much of the presentation, particularly in scenario two was through talking heads video also supported this sense of it 'looking real'. For others reality was more about the language used by the people and the emotions shown in the videos. Again, all of this was designed in to support the sense of reality. In some cases an aspect of reality that seemed to have a negative impact on student attitudes was the 'messy' nature of the scenarios. The fact that some information was repeated, some was missing and some of the practice implicit in the simulation was not 'best practice' was sometimes misunderstood (or not understood). There is an issue here in relation to managing student expectations. In one sense, the approach taken by the tutors is a 'throw them in and hope they swim' approach. This is meant to simulate the reality of a new teacher in a situation that they are not prepared for. However, if student attitudes can be affected by not understanding that this has been done, tutors need to consider how the simulation is introduced to the students. If students do not understand the principles behind our pedagogy for the use of simulation, it seems likely that some will misinterpret and have a poorer attitude towards it that they might otherwise have.

Whilst the students involved in this study had a range of attitudes towards the usefulness of the simulation, the main conclusion to be drawn is that they did not generally see the simulation as a bridge between faculty and reality. There was not a sense that they could see the simulation as a way to develop 'real' skills because the simulation itself was not real. Some seemed able to suspend disbelief sufficiently to engage in the simulation as a useful learning tool, but even these did not appear to view it as kind of practice. In as much as they thought about the philosophy of the approach at all, there was very much a sense, even amongst the most positive, that the only way to really learn how to teach is a 'trial and error' or 'do it for real' approach.

When exploring the use of the VCC with ITE students, the relationship between students' attitudes to their own usage of simulation as learners and the use they might put it to as teachers was of fundamental importance. In fact, the clearest correlation found in the research was between a student teacher's attitude to computer simulation as a pedagogy for themselves and as a pedagogy for the children they will teach. Those who felt positively towards it for themselves generally felt that it would have a place in Primary Education. It should again be remembered that this seems to be independent of the educational view of the students. Students who saw the VCC as a fun or novel way of learning something – a better way of telling – tended to apply this reasoning to the children. In other words, if the student thinks it is fun, then they suppose the children will too. Equally, those who exhibited a more constructivist view of the VCC could see the value in that for the children too. It appears, then, that the use of the computer simulation speaks to the students' views of learning in different ways and the students then apply that to their view of teaching. From this evidence, it does not appear that the use of computer simulation impacted greatly on the students' views of learning or their pedagogy.

Anecdotal evidence within the faculty where this study takes place indicates that many tutors hold the view that any computer based approach to work in the faculty, including computer simulations such as the VCC, may be unfair to some

students due to the fact that access to equipment is variable. This why the questions concerning the students' access to, and use of, computer technology were included. In this study every student claimed to have home access to a computer with broadband Internet access. During the interviews it became apparent that these students see having such a connection to the Internet as an essential part of their lives. Indeed one student went so far as to say that she didn't have nor need a television because she used her computer. Apart from usage for academic and teaching work, the most common usage was for social networking and communication. Ofcom (2008) found 49% of 8 -17 year olds using social networking sites. In this study, only four of the seventy four students denied using such sites. In other words the use of Internet capable computers, as part of their lives, is ubiquitous.

As the research proceeded, the issue of the relationship between the playing of computer games and the students' attitude to the VCC seemed to become less relevant. Research is an organic process that changes as it proceeds and what at first appeared to be a major issue became increasingly sidelined. Few of the students played simulation games and when looking for any potential correlation between those students and their attitudes towards computer simulation by comparing data on the pre-experience questionnaire, none was apparent. For that reason, that line of questioning was not included in the interviews. In principle it would have been possible to select some specific cases to explore this issue in more depth but with the time constraints imposed, it was deemed sensible to put this to one side and focus on other areas.

Another area that became increasingly important throughout the study is the area of ethics. At first this was not considered as one of the questions and hence no items on the pre or post experience questionnaires were directed towards it. Analysis of the interviews led to reflection on this issue and a wider reading of related literature. This led to a reflection on the difference between the views of educators in medical and military fields. A re-evaluation of the original process of setting up the VCC project indicates that the issue of whether a 'trial and error'

approach to teaching children is acceptable was briefly discussed by the development team but was not followed through. It is simply 'accepted' that a trainee medical or military practitioner should not practise on real cases until they have demonstrated some competence in a simulated environment. It is also 'accepted' that trainee teachers should go and practise on real children at the earliest possible opportunity. This view seems to be rarely if ever questioned by either students or providers.

The use of the computer simulation, then, raises philosophical questions that in the future may need to be addressed by ITE providers. If we are now beginning to develop a technology that allows for the simulation of teaching experiences, should we not use this to ensure that trainees demonstrate some competence 'virtually' before they do it for real? The faculty where this study was carried out now has a piece of software that effectively simulates one particular case conference. Should all our trainees be made to show a level of competence in its use before they are allowed to attend a real case conference? Certainly it would be all but impossible to arrange for them to attend a real one. Use of the VCC and similar simulations may only be the beginning in Simulated Initial Teacher Education. As ITE providers we need to find a way to measure the impact of student teachers on the children they teach. There is plenty of anecdotal evidence that exists from teachers who have reported both positive and negative impact on the children, but there is almost no research base in the field and what there is, is almost exclusively secondary school related (Price & Willet, 2006). A few studies have looked at potential benefits (Cunnah, et al, 1997, Boyd, 2002) but these seem aimed at downplaying any potential drawbacks, and those that are discussed relate to 'the school' generally (taking up mentors time etc.) If it turns out that some students have a detrimental effect on children then the application of virtual simulations may be a positive step forward.

Whilst the issue of the relationship between simulation and games became less important, the issue of the emotional engagement of the students became increasingly important. The technology to create immersive, high fidelity

simulations of teaching scenarios may be some way off in the future, but in ten or twenty years time ITE may reach the point where other applications are now. To return to the military applications of simulation discussed previously, if a pilot, as part of the training, lands an aircraft in a computer simulator, can one say that he has 'really' landed an aircraft. The obvious answer is 'No' – because he has yet to land a real aircraft on a real runway. However, the cognitive and physical responses are the same in both cases. The same decisions must be made. The same buttons must be pressed and levers pulled. Because of the *relatively* simple problem of modelling the physical world (relative to the problems of simulating human behaviour), the quality of aircraft simulations now available means that the only effective difference between simulation and reality is the consequence of failure. In the virtual environment one can merely try again, whereas in the real world one is dead. As the cognitive and physically challenges are the same, the essential difference is that of emotion. The pressure of doing it for real may affect the ability to be successful. If we thought that emotion played no part in such a difficult and dangerous activity, we would not care if our own pilot had never 'really' landed an aircraft before. However, we know that emotion can impact on cognitive and physical ability, and so we would be uneasy to think that our pilot had never done it 'for real'. For this reason, it seems unlikely that Virtual Teacher Training could ever fully replace 'teaching practice' even if the problems inherent in modelling human interactions could be solved. It might, however, fundamentally change the way we see ITE and the processes we make students go through before we allow them to practise on children.

7.2 – Reflections on the approach taken

In general terms the adoption of a mixed methods approach to the study of students' attitudes to the use of computer simulation has been successful. Much of value has been learned and the results of this study highlight key issues faced by those engaged in the use of computer simulation in ITE.

Equally, as a new researcher in the field, I have learnt much about the difficulties and challenges of the research process and there are several ways that, in hindsight, the research might be improved.

To begin with, more time could have been given to the development of the questionnaire. The timescale meant that a full pilot was not possible and the small trial with a tutorial group only really focussed on technical and typographical issues. In particular, the questions in the final section relating to the use of simulation use the word 'teaching' rather than 'learning' or 'teaching and learning'. Each different wording has different connotations and that may have impacted on the responses in ways that are not clear. The use of a Likert scale used in the final section is not unproblematic and whilst I have attempted to make use of the data by treating the responses as ordinal values it does not reveal as much as I had presumed that it would. A more nuanced approach, such as perhaps a sliding scale or open questioning, might have been more appropriate. In the end, the main value in that section was that it allowed me to very easily select the indicative case studies.

With regard to the semi-structured interviews, a balance always needs to be achieved between allowing the respondent the freedom to express their own opinions and asking leading questions to ensure appropriate data is elicited. In this instance, I have begun to feel that I was slightly too cautious in the structuring of the schedule. In particular, I could have paid more attention to the theoretical

framework that was developed through the literature review section and tried to ensure that more discussion took place concerning key issues such as the place of emotion and the willing suspension of disbelief. Part of the reason for this relates to the iterative nature of the research process, as what seem like minor considerations near the start of the process sometimes become central as one approaches the end. In this case, I came to both Csikszentmihalyi's (1990) concept of 'flow' and Bligh & Bleakley's , (2006) 'third space' somewhat later than the linear narrative of the thesis might suggest and whilst I was able to use these ideas in the analysis of the data, in hindsight I could have made more use of them in the research design.

Although I piloted the process of conducting a semi-structured interview with two students, I focussed on the technical aspects, in particular ensuring a clear recording, practicing not interrupting etc. I have now realised that it would have been extremely valuable to have also piloted the analysis procedure as this would have helped me better direct the interviews. For example, at one point during an interview, one of the students talked about the need to ensure children make progress. In hindsight there was a clear opportunity to explore ethical issues that could have been taken but I did not recognise this at the time.

7.3 – The way forward

As was stated at the beginning, it was never the intention of this research to try to evaluate the efficacy of the VCC project in terms of the students developed understanding of the knowledge skills and understanding required in relation to multi agency working. Such a study is under consideration with a further a cohort of students.

In addition to this, the research presented has highlighted several clear areas for further research. Multiple studies over many years have shown that a) the student perception of the practice/faculty divide is strongly held and b) for all the work on making curricula and assignments relevant, it shows no sign of decreasing (Allen, 2009). The results of this study are entirely consistent with this finding. However, much of the research seems predicated on the view that faculty and school learning are polar opposites and that students perceptions exist somewhere on the continuum between them. In medical education, simulation has come to be seen as a 'bridge' between classroom based learning and work based learning (Bligh & Bleakley, 2006) and that was essentially the approach taken by the designers of the VCC. Such a proposition was not put to these students and the VCC was presented as a new approach to faculty work. Although the tentative conclusion of this study is that the bridge metaphor is not one shared by the students, it would be interesting to find out whether that metaphor is one that the students could accept if it was presented directly to them and if so, what impact that might have both on how they view the simulation and on how valuable they find it. For example, if the general disposition is one of only in the real world there is value then ITE providers may have to work with that rather than against it. If students see simulation as 'practice for' rather than 'replacement of', they may be more prepared to acknowledge its value. If the use of simulation can be presented as such a bridge, this may positively impact on the value placed on it.

In this sense, the follow up needs to be more action-research in nature. With a further cohort of students, the introductory presentation could cover more of these philosophical areas rather than the practical ones that currently fill this session. It would then be possible to see if this impacts on the students views of the simulation and the value they derive from it.

Such a line of questioning could form part of a wider study into the students understanding of why the faculty uses particular approaches, including simulation, as part of the course they are on. Students' understanding of the principles behind our pedagogy for use of simulation was not explored fully in the present study and yet there were indications that this was impacting on their attitudes towards the simulation.

Another area due for much further consideration is the place of emotion in the students' acceptance of the value of the simulation. As previously stated, this issue has emerged slowly from the piece of research in an organic way. My original conception was to look at the use of simulation from a cognitive viewpoint. Sometimes one has to acknowledge the part that chance plays in the research process. Had I not chosen the mixture of methods that I did, had I chosen simply a quantitative methodology, then this key issue would almost certainly never have arisen. Perhaps 'chance' is the wrong word here, for it is surely one of the key advantages of a critical realist approach that it highlights the 'generative mechanisms' that lead to physical actions. Whilst it had not occurred at the start of the process that the ability of the simulation to elicit and emotional response would be one of those mechanisms, the approach itself was instrumental in bringing it to light.

The possibility that emotion plays a vital part in student attitudes towards simulations has clear implications for both the initial design of any future simulations and the way they are presented. Emerging from this thesis is the importance that some students place on the emotional 'kick' they get from teaching. The way in which the simulation needs to be made real, then, might not

be in the fidelity of the presentation – the video, the responses, the images etc. But in the way it makes the students 'feel'. In this case a much more detailed case study of an individual student, tracking their emotional responses to a range of ITE processes (teaching, tutorials, lectures, simulations etc) would give a real insight into this area.

Another important part of a new study should be a focus on ethical questions. In particular, it would be interesting to find out student perceptions of the nature of the 'trial and error' approach to learning to teach that is at the centre of ITE today. This would need to be coupled with a detailed study of the impact that students have on the classes they teach. It is possible to envisage such a study taking many forms, from a statistical comparison of SATs results of students who have either had or not had a student teacher, to a case study of particular teachers who have reported negative and positive benefits.

The voice of as many stakeholders as possible should be heard in this study, including children and parents, for the purposes of ensuring validity through the triangulation approach described previously (Gorard & Taylor, 2004).

Such a study would serve to continue and open up the debate that hopefully the current study will start. Even as I am writing this thesis, at the faculty where I work we are beginning to develop more interactive simulations with a higher degree of fidelity. We are beginning to film characters against 'green screen' backdrops so that we may insert them into realistic computer generated backgrounds (appendix 7). Some of the lessons learnt through this research have already been applied to these new simulations. In particular, we are paying much greater attention to the emotional engagement we can achieve. This work needs to be developed further and will hopefully form part of the context to the future research described in this section.

We are now moving into the position of being able to effectively simulate several aspects of the teacher's role as part of Initial Teacher Training. Soon the question is no longer can we, but should we and how should we? From the research that I

have undertaken and reported here I believe that those working in ITE should make use of simulation technologies, but that they should also be prepared to accept that the relationship between the simulated and the real worlds is not straightforward or unproblematic.

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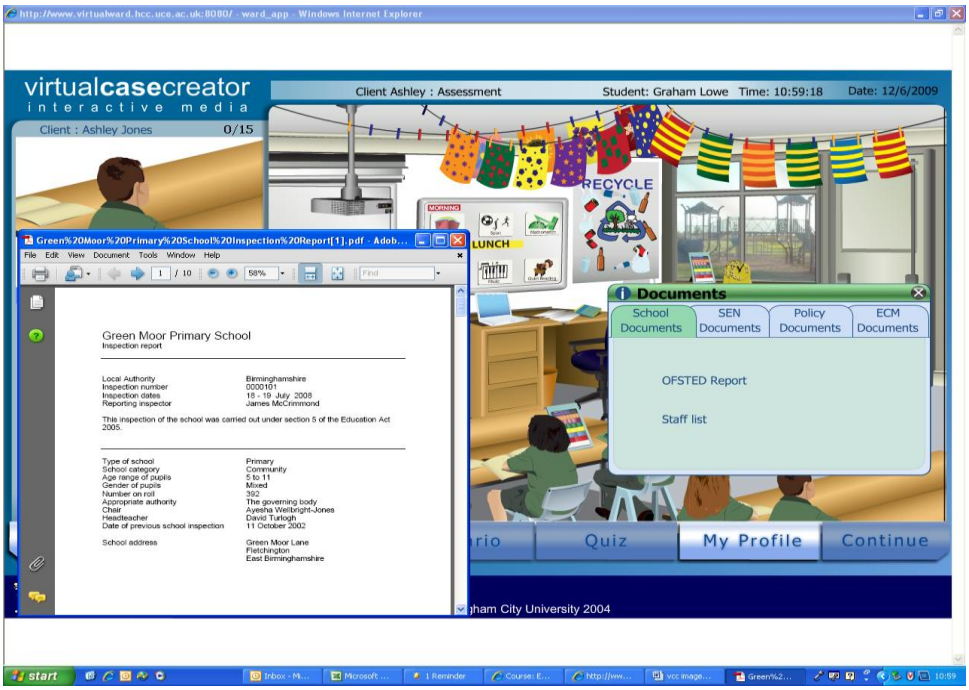
Appendices

Appendix 1

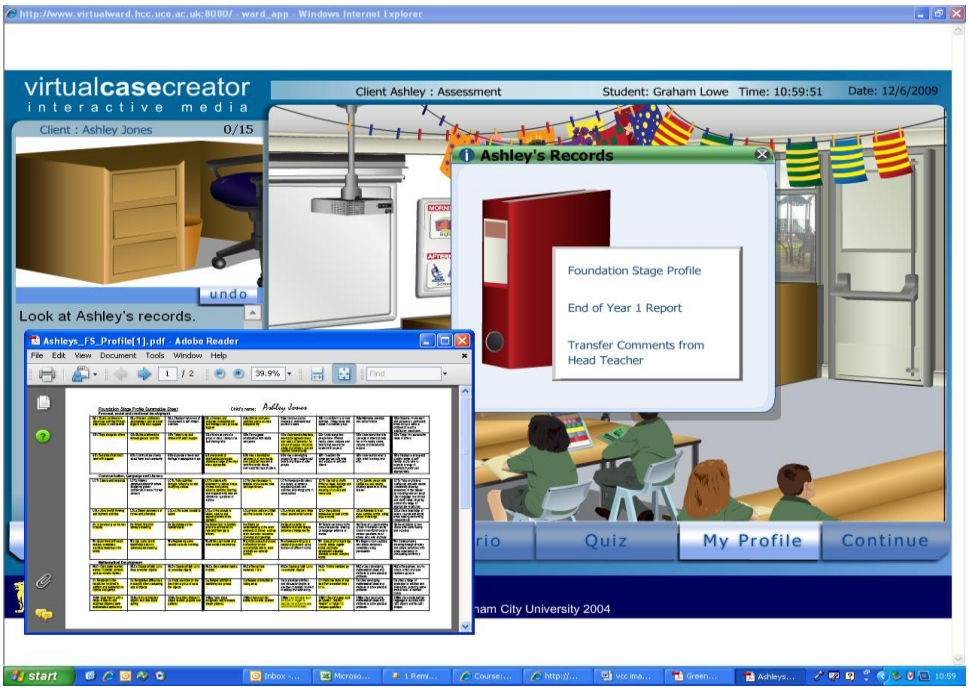
VCC Scenario One

This image represents the classroom from the child's point of view. Clicking on different children brings up comments about Ashley.

Clicking on the teacher's laptop brings up a multitude of documentation.



Documentation, such as the school's Ofsted report and policy documents can be accessed in .pdf format.

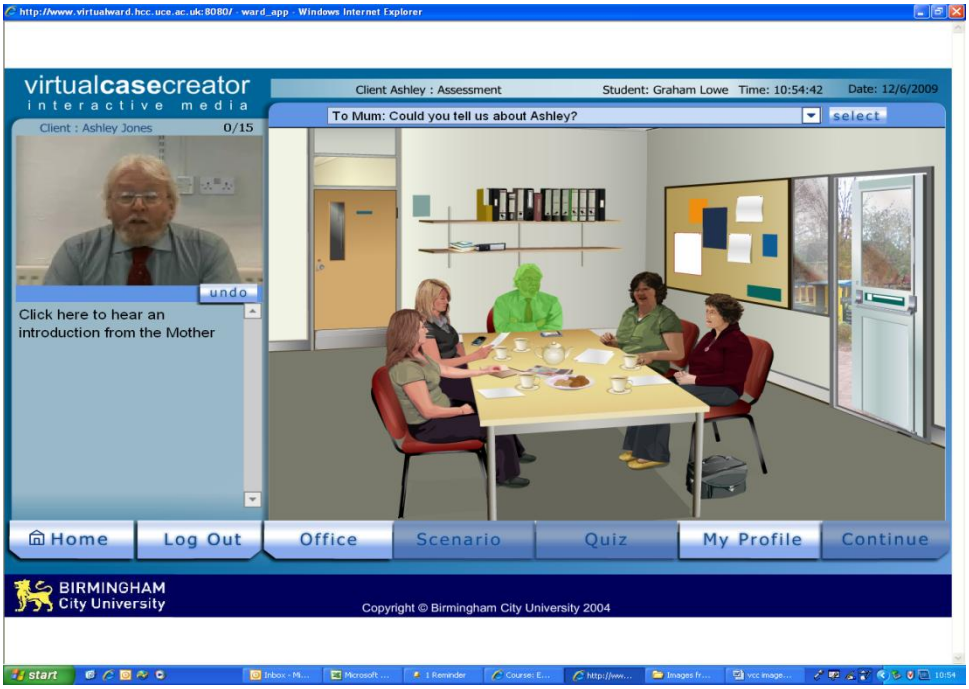


Ashley's file contains records of achievement as would be expected of a child his age.

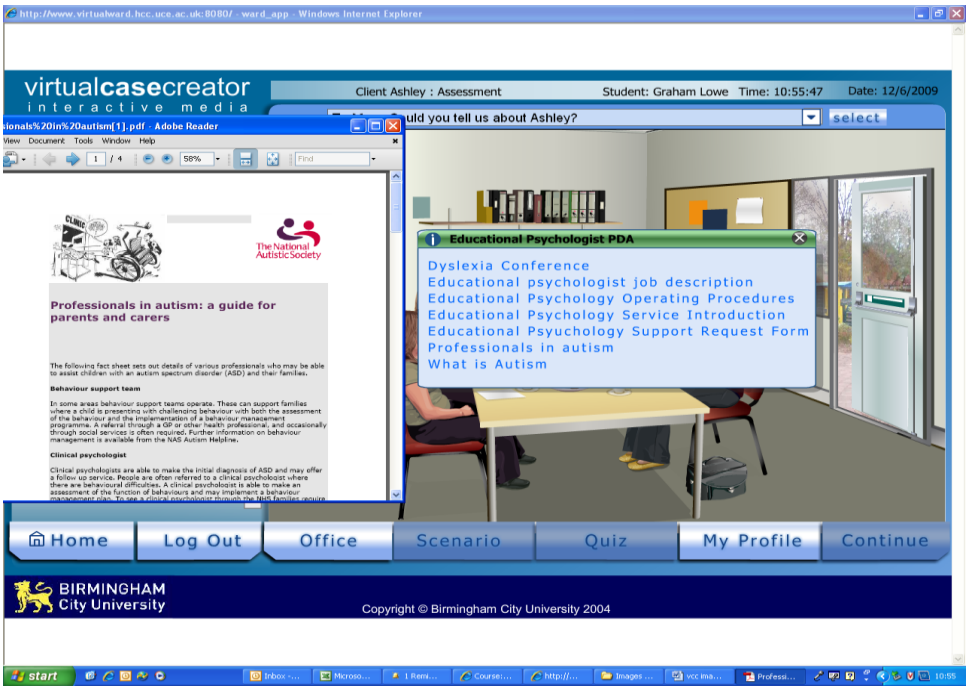
Appendix 2

VCC Scenario Two

This is a representation of a meeting with key professionals. The student teacher accessing the scenario is assumed to be present at the near end of the table.



By clicking on a person 'hot-spot' – in this case the Educational Psychologist – a video of that person introducing themselves plays.
A drop-down menu contains a list of questions to ask to individuals. Clicking on a question causes a video of that person answering to play.



Clicking on the Educational Psychologist's PDA brings up a list of related documents. These are in .pdf format and can be read or printed by the student. Each participant has a similar set of files.

This image represents the family home of the child in the scenario. Clicking on various 'hot-spots' causes additional information, introductory videos and 'clues' to appear.

Appendix 3

Letter to students indicating the nature of the research and the ethical considerations.

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November 2008

Re: Educational research into the use of ICT to support Initial Teacher Education

Dear Student

I am asking all BA Primary QTS Y3 students if they would be prepared to take part in a piece of educational research.

The purpose of this research is to try to answer some key questions regarding the use of ICT as a teaching and learning tool as applied to module EM0A59 - Education in an Urban Context.

This research will require you to spend a few minutes filling in a questionnaire before you start the module, and again at the end. I would also like to interview a small number of students following the module to gain deeper insights into some of the answers given.

Please be assured of the following:

This research will be carried out following the British Educational Research Association's *Revised Ethical Guidelines for Educational Research* (BERA, 2004)

- Any information you provide will be handled in the strictest confidence. In particular, please know that I will not share any individual information with tutors teaching or marking assignments that relate to this study. You will be asked to provide your name so that 'before' and 'after' responses can be matched to see whether opinions/attitudes have altered over time but these names will not be reported in the research.

- I myself will not be part of the teaching or marking team and your responses to these questions will have no impact on the assessment.

- Marion Harris (Head of school of Primary and Early Years Education) has given permission for this research to be conducted. I can be contacted at the address above. If you would like to contact my research supervisor, details can be provided on request.

- You will be in no way prejudiced by not agreeing to take part and neither will you gain any advantage by agreeing to take part. If you agree to take part you may withdraw at any time and any data collected will be destroyed.

You are provided with two copies of this letter. If you agree to take part, please sign both, return one with the initial questionnaire and keep one copy for yourself. If you have any questions regarding this research, please do not hesitate to get in touch.

Yours truly,

Graham Lowe

I have read and understood the letter above and agree to take part in the research as outlined. I understand that I can withdraw my consent at any time.

Signed (Student) _____
Date _____

Please indicate here if you would prefer not to be contacted to take part in a further interview: ☐

Appendix 4

Pre-Experience Questionnaire

Educational research related to the use of ICT to support Initial Teacher Education

Section 1 – Background Information (please tick ☑ where appropriate)

1. Your Name _____ 2. Gender _____

3. How do you describe your ethnicity?

☐ White British ☐ Mixed Race (specify_____)
☐ Black British (specify heritage _____) ☐ White European (specify _____)
☐ Asian British (specify heritage _____) ☐ Gypsy/Roma

☐ Any other ethnic background (specify _____)

☐ I do not wish an ethnic background category to be recorded

4. Please indicate your age _____ yrs

Section 2 – Personal ICT usage (please tick ☑ where appropriate)

5. Which of the following best represents your personal computer (desktop or laptop) equipment (choose one):

☐ I have home access to a computer with broadband internet access
☐ I have home access to a computer with dial–up internet access
☐ I have home access to a computer with no internet access
☐ I have no personal ICT equipment in my home – I use public equipment (library, faculty etc.)

6. How important is it that you have your own computer (desktop or laptop)?

☐ Essential – I couldn't manage without
☐ Important – It would be a big problem if I didn't have one
☐ Neither important nor unimportant – I can take it or leave it
☐ Unimportant – I don't really need one
☐ Unnecessary – I'd rather not have one

7. How often do you use a computer? (choose one):

☐ Every day
☐ Most days
☐ About 3 or 4 times a week
☐ About once a week
☐ Less than once a week

8. Which of the following do you use a computer for? (choose as many as apply):

When not online:

☐ Word Processing
☐ Accounts
☐ Listening to music
☐ Playing games
☐ Graphics (e.g. organising photos/videos)
☐ Creativity (e.g. creating music/animation)
☐ Education/Learning (e.g. CD-Rom encyclopaedia)
☐ Creating presentations/materials as a student for academic purposes
☐ Creating presentations/materials as a student-teacher for teaching purposes

When online:

☐ Email
☐ Internet shopping
☐ Product research
☐ Social networking
☐ Special Interest/hobby websites
☐ Internet banking
☐ Downloading & listening to music
☐ News/Current affairs websites
☐ Playing online games
☐ Audio/Visual Communications (skype, webcam etc.)
☐ Education/Learning (online encyclopaedia etc.)
☐ Finding/collating information for presentations/materials as a student for academic purposes
☐ Finding/collating information for presentations/materials as a student-teacher for teaching purposes

9. If you have indicated that you use the computer to play games (either online or offline), which of the following types do you play most often? (choose as many as apply):

- ☐ Card Games (eg. Solitaire, Hearts, FreeCell)
- ☐ Puzzle games (e.g. mines, tetris)
- ☐ Virtual board games (e.g. chess, monopoly, scrabble)
- ☐ Retro/classic games (e.g. space invaders, pac-man)
- ☐ Action Games (e.g. Halo, Star Wars)
- ☐ Role Playing/Second Life Games (e.g. Warhammer, Runescape)
- ☐ Simulation (e.g. Sim City, Populous)

10. Do you have access to the internet or play games using any of the following technologies:

- ☐ Mobile Phone
- ☐ PDA/smartphone
- ☐ Handheld game console (e.g. gameboy, DS, PSP)
- ☐ T.V. connected console (e.g. Xbox, Playstation, Wii)
- ☐ Digital Television (e.g. BBCi, SKY)

11. How much time, on average, do you spend playing electronic games?

- ☐ None
- ☐ Less than 1 hour per week
- ☐ More than 2 hours per day
- ☐ 30 – 60 minutes per day
- ☐ 1 to 2 hours per day

Section 3 – Attitudes to ICT in teacher training

12. Please use the following table to give an indication of the relative value you place on different aspects of the teacher training elements of your course. Estimate using percentages, so that the total is 100%. A higher percentage indicates that you place a higher value on that aspect.

Aspect		Relative value
In faculty -	Learning from lectures/taught sessions	
In faculty -	Learning from peer discussions	
In school -	Learning by practicing in the classroom	
In school -	Learning from discussions/observations with teachers/mentors	
		100%

During the module EMOA59 - Education in an Urban Context, you will engage with a simulation of a school based scenario. You will be presented with information via a computer and be asked to make decisions based on that information. The information will include electronic documents and video footage of teachers, other professionals and children. The software will allow you to engage with a situation that you are likely to meet as a qualified teacher, but are unlikely to deal with as a student.

13. Please rate the following statements according to the scale from strongly agree to strongly disagree. Please indicate ☑ one response per statement:

Statement	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
I believe that computer simulation can be useful for teaching professional attributes	☐	☐	☐	☐	☐
I believe that computer simulation can be useful for teaching professional knowledge & understanding	☐	☐	☐	☐	☐
I believe that computer simulation can be useful for teaching professional skills	☐	☐	☐	☐	☐
I think such a simulation can be a close approximation to reality	☐	☐	☐	☐	☐
I think such a simulation can adequately prepare me for the reality I will face as a teacher	☐	☐	☐	☐	☐
I expect to find this use of a computer simulation interesting and engaging	☐	☐	☐	☐	☐
I expect computer simulation to become increasingly prevalent in teacher training	☐	☐	☐	☐	☐
I hope computer simulation will become increasingly prevalent in teacher training	☐	☐	☐	☐	☐
I expect computer simulation to become increasingly prevalent in primary school education	☐	☐	☐	☐	☐
I hope computer simulation will become increasingly prevalent in primary school education	☐	☐	☐	☐	☐

When you have completed the module, you will be asked for your opinions again. In order to effectively track changes in response over this period it is important that your 'before' responses can be compared to your 'after' responses. In order to do that, please confirm your name in the box below. All information in this study will be treated in the strictest confidence. Results will be published anonymously and individual responses will not be shared with the teaching or marking tutors.

Name		Date	

Thank you once again for your participation.

Appendix 5

Post - Experience Questionnaire

Attitudes to ICT – After the use of a computer simulation

During the module EMOA59 - Education in an Urban Context, you engaged with a simulation of a school based scenario. You were presented with information via a computer and asked to make decisions based on that information. The information included electronic documents and video footage of teachers, other professionals and children. The software attempted to allow you to engage with a situation that you are likely to meet as a qualified teacher, but are unlikely to deal with as a student.

10. Please rate the following statements according to the scale from strongly agree to strongly disagree.

Please indicate ☑ one response per statement:

Statement	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
I believe that computer simulation can be useful for teaching professional attributes	☐	☐	☐	☐	☐
I believe that computer simulation can be useful for teaching professional knowledge & understanding	☐	☐	☐	☐	☐
I believe that computer simulation can be useful for teaching professional skills	☐	☐	☐	☐	☐
I think the simulation was a close approximation to reality	☐	☐	☐	☐	☐
I think the simulation has adequately prepared me for the reality I will face as a teacher	☐	☐	☐	☐	☐
I found this use of a computer simulation interesting and engaging	☐	☐	☐	☐	☐
I expect computer simulation to become increasingly prevalent in teacher training	☐	☐	☐	☐	☐
I hope computer simulation will become increasingly prevalent in teacher training	☐	☐	☐	☐	☐
I expect computer simulation to become increasingly prevalent in primary school education	☐	☐	☐	☐	☐
I hope computer simulation will become increasingly prevalent in primary school education	☐	☐	☐	☐	☐

In order to effectively track changes in response since the original questionnaire it is important that your 'before' responses can be compared to your 'after' responses. In order to do that, please write your name in the box below. All information in this study will be treated in the strictest confidence. Results will be published anonymously and individual responses will not be shared with the teaching or marking tutors.

Name		Date	

Thank you once again for your participation

Appendix 6

Semi-Structured Interview Schedule

Interview Schedule

In the pre- questionnaire, you put the relative value of school based to faculty based work at [*percentage from pre-experience questionnaire item 12 here e.g. 70/30 etc*.] – could you tell me more about that? (value of faculty work, peer discussions, actual practice, talking to 'real' teachers etc.)

You said that you have a computer with broadband internet access and you described that as [*important/essential*] – why? (what do you use it for, how often etc.)

Before the Urban Child scenario you were [*quite positive/quite negative/ambivalent etc*] about the potential for computer based scenarios to support your learning – you said that you thought it [*could be/could not be etc*.] a close approximation to reality and that it [*could/could not*] adequately prepare you for that reality – can you remember why you thought that?

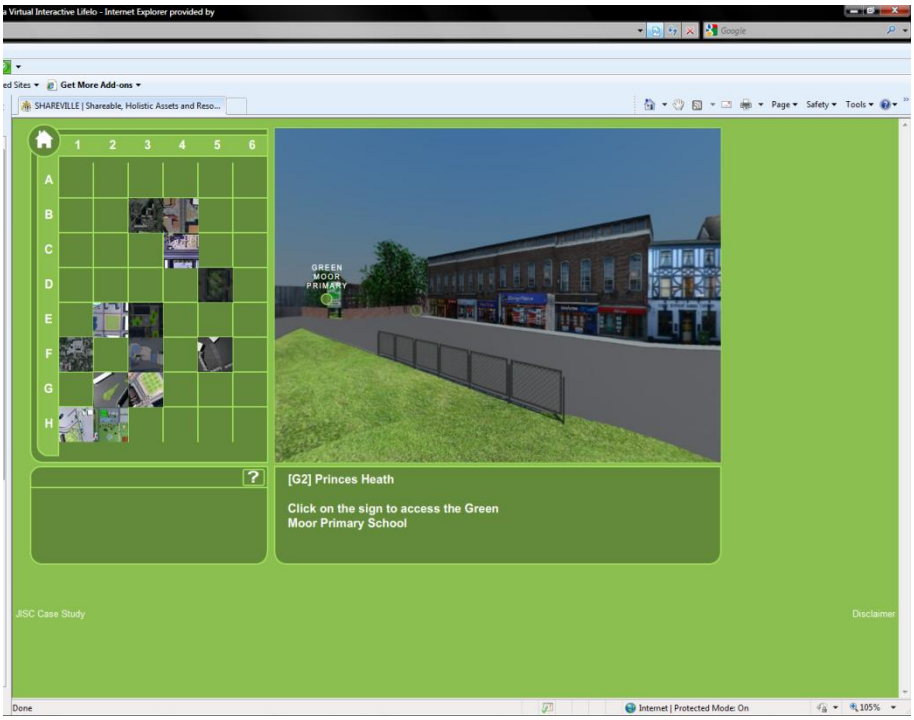
Afterwards, you [remained positive/ negative, were more negative/positive] – why is that?

Could more virtual scenarios like this shift the faculty/school value ratio [*reference to first question above*] towards faculty?

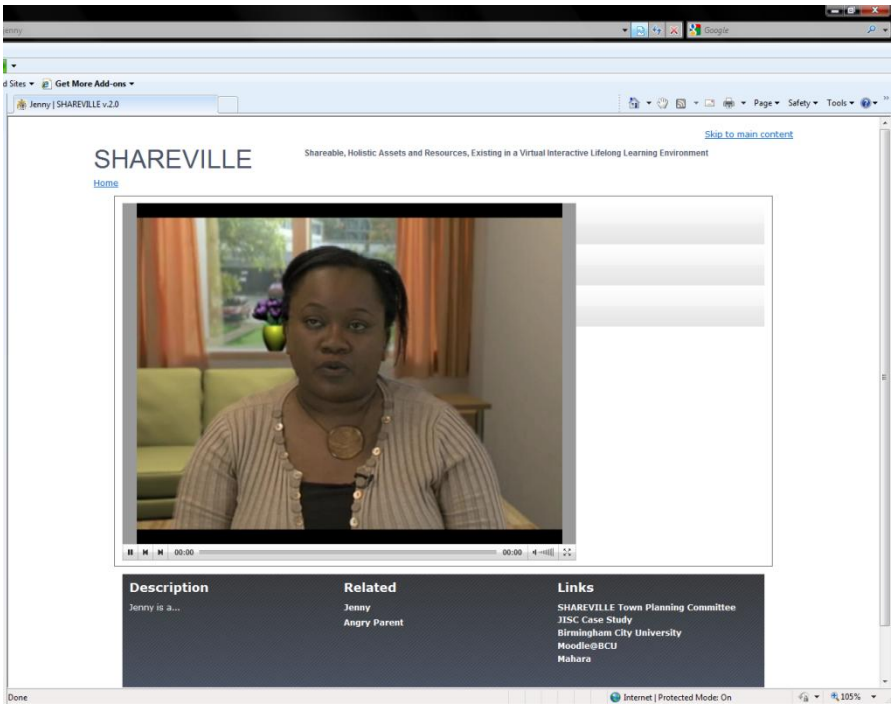
Do you think that this kind of virtual scenario will become part of primary education? What do you think about that?

Appendix 7

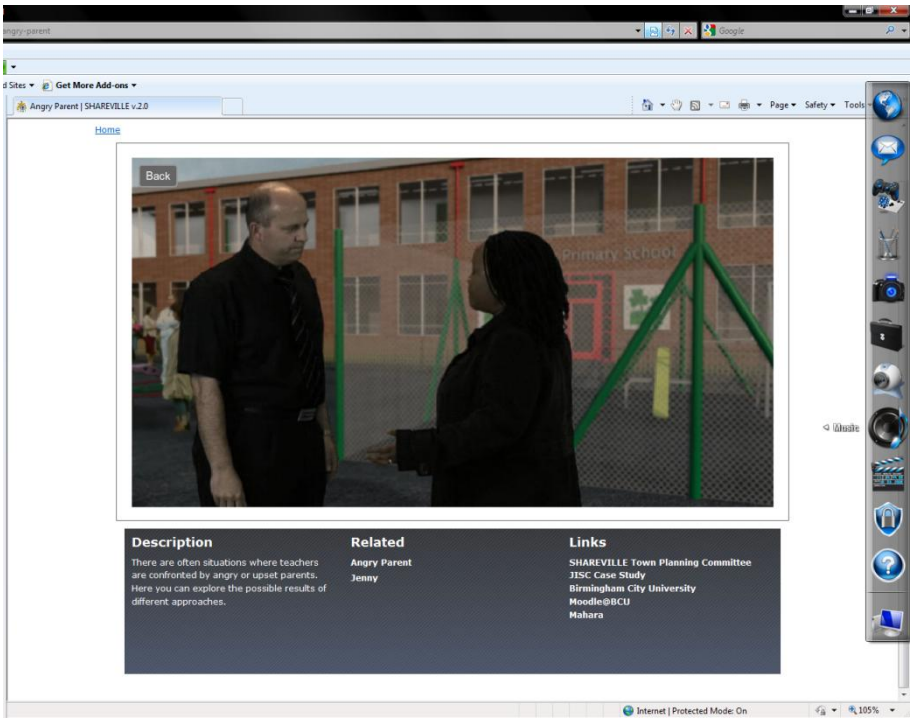
Shareville – the next generation of simulations



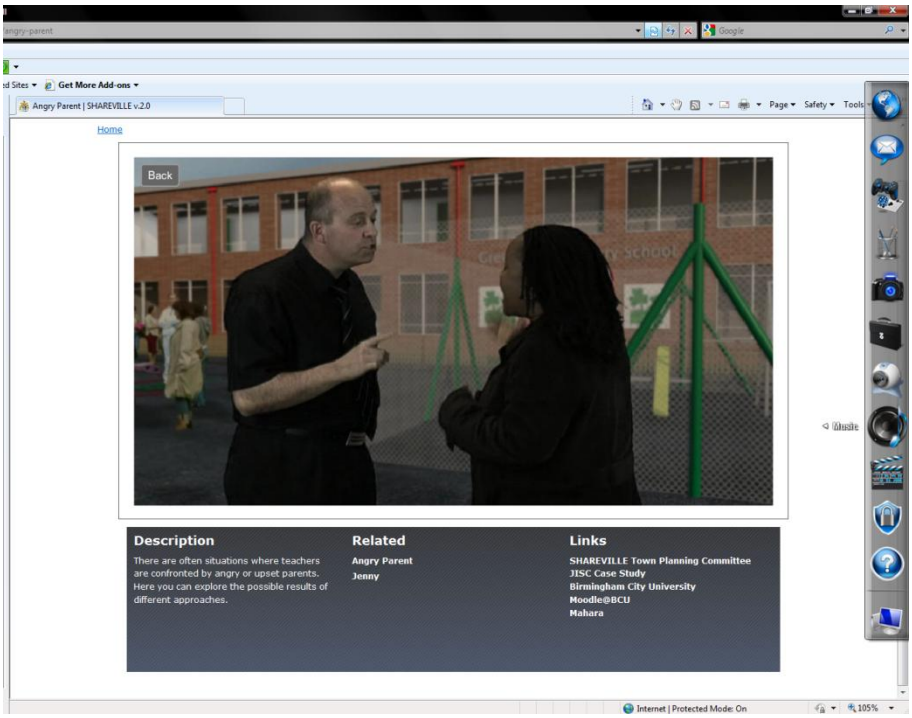
Shareville: Shareable, Holistic Assets and Resources, Existing in a Virtual Interactive Lifelong Learning Environment



The actor is filmed against ‘green screen’ allowing them to be positioned against a computer generated backdrop.



In this scenario, an angry parent confronts the head teacher in the playground.



Different outcomes are filmed depending on how the head teacher handles the situation. Lessons from the VCC have been applied here to try to achieve emotional engagement. In this version, the conversation descends into an inappropriate shouting match.