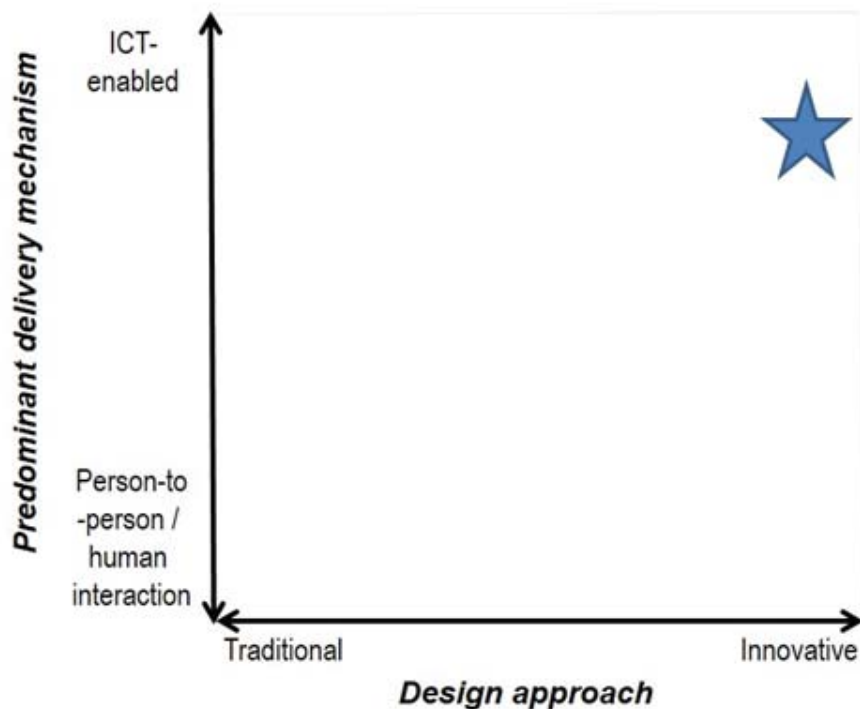Chapter eleven

Real World Cases in Virtual Environments: Blending Environments, Bringing Teacher Training to Life

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Introduction & Background

This chapter reports on a project involving simulation-based case studies and the emerging and experimental field of computer simulation in Initial Teacher Education (ITE).

Throughout the chapter the terms 'simulation-based case study', 'simulated case studies' and 'simulation' are used interchangeably. However, according to the definition presented by Leigh and Collier (this volume), the simulations being discussed here would fit their definition of simulated case studies.

By virtue of being a simplified yet realistic model of the real world, a simulation *"can support authentic enquiry practices that include formulating questions, hypothesis development, data collection, and theory revision."* (Rutten *et al.*, 2012:136). Note the use of the word 'authentic'. The key to the success of any simulated activity is the authenticity of the responses elicited. This is related to, though not solely dependent upon, the authenticity of the presentation of the simulation (Bland *et al.*, 2011; Pike & O'Donnel, 2010). Although popular in a range of professional training situations, in particular Initial Nursing Training (Berragan, 2011; Garrett *et al.*, 2011; Hope *et al.*, 2011; Ricketts, 2011), simulation as a tool in ITE has its roots in the work of Kersh in the 1960s.

> *"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, 1962:109 cited in Tansey, 1970:283)*

This work was started long before the use of computers was a possibility. Much of Kersh's work involved students observing 16mm projections of filmed incidents involving a fictitious class, accompanied with contextual information in the form of paper notes. In these cases, students would discuss and debate appropriate approaches. Other early simulations also included a mix of film and paper documentation including simulations related to behaviour management (Cruikshank & Broadbent, 1968) and teaching styles (Garrison & Kersh, 1969).

In a review of the literature of the time, Cruikshank (1971) sums up the prevailing view that simulation would become an increasingly important part of ITE. Indeed, it was predicted that *"It can be assumed that vastly superior, more sophisticated simulations can be developed as computer availability for training purposes increases."* (Cruikshank, 1971:200).

In reality there was very little move towards increasing the use of simulation, and the use of computer simulations in particular, in ITE during the next forty years. The underlying reasons for that, whilst interesting in themselves, lie beyond the remit of this paper. Rather, this article reports on the early stages of a recent move at Birmoingham City University, UK, to find ways to use more sophisticated simulations in its ITE provision.

The use of computer simulation in ITE is a relatively new and under-explored phenomenon. Yeh (2004, 2007) reports on using computer simulations to develop critical thinking skills. Passig and Moshe (2008) have used a simulation to enhance pre-service teachers' understanding of pupils' test-anxiety. In both cases the researchers, using control groups, found evidence for the success of the simulations. However, in both cases there is also a sense in which assumptions are made regarding the transferability of the skills from the simulated world to the real world. In the case of Passig and Moshe's work, subjects use Virtual Reality helmets to create a truly immersive 3D environment. However, rather than find themselves in a school hall taking a test, as might be expected from the subject matter, the subjects find themselves in *"the entrance to a small, dark, narrow basement, whose walls are made of tightly packed dark red bricks"* (Passig & Moshe, 2008:264), and are expected to complete a task relating to the appearance of some bouncing balls. The aim of the simulation is to give the student *"the experience of wandering aimlessly while under pressure of time"* (ibid). Whilst the metaphor is easy to appreciate, it is not clear to what extent the ability to understand or interpret the metaphor impacts on the efficacy of the activity. Although less extreme in nature, Yeh's work requires participants to consider that a computer screen with twelve cartoon-drawn faces represents the reality of teaching a class of children. We have found from previous work (Lowe, 2011) that the willing suspension of disbelief by participants is an important issue. Trainees generally found it easier to see the value in a simulation, and treat it as though it were real, if they considered it to be realistic; the more real it seems the more likely the reactions are to be authentic.

Although computer simulation in ITE is very much at an embryonic

stage, in the last ten years or so simulation has become ubiquitous in the training of pre-registration nurses. In some respects, nurse education and teacher education are similar. In both cases practitioners are now expected to be educated to degree level where previously they were not. Both types of training programme involve a mixture of faculty/classroom based work and on-the-job training. Both require trainees to engage in reflective practice and both involve an element of caring for people in one's charge.

An examination of the literature surrounding the use of computer simulation in nurse education has provided a starting point for its consideration in ITE. For example, Bligh and Bleakley's (2006) description of simulation as 'the third place' that helps students see the link between faculty and work based learning is a useful way to conceptualise the simulations being discussed here. The view amongst trainees that there is little connection between theory and practice, commonly called 'the theory-practice divide', is just as common amongst trainee teachers as it is amongst trainee nurses (Hatlevik, 2012; Allen, 2009). The idea that simulation work can help bridge the divide and help trainees see more value in faculty-based learning has helped to inform both the type of simulations developed and the way in which they are presented.

Rationale for and Brief Description of the Simulations

The rationale for developing these simulations was essentially twofold. Firstly, through analysis of the literature and discussion with colleagues working in both education and nursing, it had become increasingly clear that the 'ethical driver' behind the use of simulation in nurse training is largely absent from ITE. One reason for developing the simulations was to give trainees the opportunity to fail, and learn from that failure, in a way that does not cause harm either to children, parents or the trainee themselves, as might happen should they fail in the real world. Secondly it had also become clear through discussions with colleagues in schools and the trainees themselves, that although trainees on ITE course are spending increasingly more time in schools,

they are often protected from certain events. Simulation enables the trainees to encounter a range of experiences related to planning, teaching and assessing children that they would not see in school. Situations such as dealing with an angry parent, writing reports that are actually sent home and meeting parents at parents evening are not something that the trainees can expect as part of school experience training.

The simulations used in the research project reported here were therefore all connected with working with parents. The simulations formed part of a taught module on a post-graduate Primary ITE course. In each case the teaching involved a mixture of direct input (lecture), use of the simulation (individual) and discussion (small group).

The simulations are situated within a virtual primary school, Green Moor Primary, which exists within Shareville©, a virtual environment created at Birmingham City University. Shareville hosts an increasing number of realistic locations and simulation-based case studies, organised as if they were existing in a real town's districts. It is accessible over the Internet and presents users with a simple navigation system. Using a mouse, a left-click and drag navigates around computer-generated images and 360° panoramas, whilst left-click hot-spots give access to the simulations, other resources and provides a mean to jump between locations.

Green Moor Primary has been created as a 3D environment (see Figure 1) based on 360° panorama photographs of a real school.

Figure 1: Shareville's Green Moor Primary School is a 3D Virtual Training Environment.

Digital models were then made of those panoramas to create a realistic setting including entrance hall, classrooms, playground, Physical Education (PE)/dining hall etc. In order to populate the school, volunteers act the parts of key roles such as parents, teachers and other adults. Scenes are filmed against 'green screen' backgrounds and 'dropped in' to the 3D environment. Additional realism is created by giving the school appropriate documentation such as school policies and an Ofsted report (Ofsted is the Office for Standards in Education, Children's Services and Skills, and produces accreditation reports for the UK government).

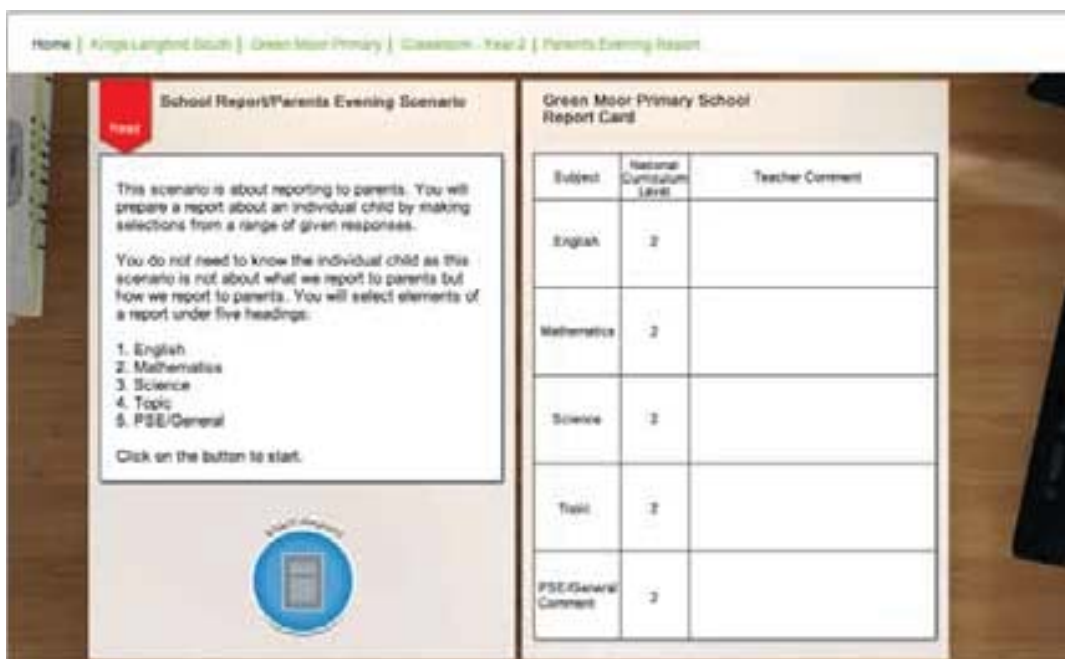There were three simulations used as part of this module and referred to in this research.

Simulation one: 'The Angry Parent'

In this simulation the trainee takes on the role of a teacher witnessing a confrontation in the playground between a parent and the head teacher. The action freezes at a certain point and the trainee is asked

to select a response from the head teacher. The trainee then witnesses the results of that approach. As well as the initial confrontation, four different endings were filmed based on four different responses. The trainee can see the consequences and back track and see the results of other approaches. In group discussions the trainees can debate which approach was the most appropriate and why.

Simulation two: 'End of Year Report and Parents' Evening'

In this simulation the trainee takes on the role of a newly qualified teacher. The trainee is presented on screen with a basic end of year report pro-forma divided into sections (see Figure 2).

Figure 2: Interactive School Report form in Green Moor Primary School.

For each section the trainee is also presented with three versions of the same written report section. It is made clear to the trainee that this scenario is not about the content, which would relate to assessment,

but about communication. The trainee selects what s/he considers to be the most appropriate version and drags that text into the named section. Upon completion of the report the trainee is able to print out the report and bring it o the discussion group. The trainee will then witness a short filmed scene set at the start of parents' evening where the parents have just sat down to discuss the report. Five versions of this scene were filmed with responses ranging from being quite angry to very positive depending on the amount of educational jargon and spelling mistakes included (parents are happier with less) and the extent to which the language is specific and supportive (parents are happier with more). Following the group discussions, trainees are able to repeat the process using their new understanding to improve the response from the parents.

Simulation three: 'Parental Opinions'

In this simulation the trainee takes on the role of a teacher who is asked by the head teacher to listen to the concerns of some parents regarding changes in the way the school swimming pool is used. In the scenario the school is required to find more money for the upkeep of the pool, which was built through funds by parents as part of the Parent Teacher Association. Several potential solutions are suggested including taking money from other curriculum areas such as Mathematics and English, hiring the pool out in the evenings, and allowing other schools to use it during the day thus reducing time available for the school's own children. The trainee listens to the views of some parents and is required to make a recommendation to the head teacher. The trainee is then told the results of the decision by the head teacher. In all cases the trainee is blamed for suggesting a solution that has angered certain parties. The trainee is able to try again but following group discussions should realise that this simulation is designed to show that it is not always possible to please everyone; sometimes the reality is that difficult or unpopular decisions have to be made.

Method

A cohort (n= 190) was selected of students following a Postgraduate Certificate in Education Primary ITE course. These trainees used the three scenarios described above as part of a course module which concerns the following issues related to working in partnership with parents:

a) Managing situations involving angry or upset parents

b) Communicating in writing through the annual report to parents

c) Taking into account individual parental concerns when making decisions affecting groups of pupils.

In each case the students were exposed to the virtual simulation on an individual basis followed by a group (approx. 30 sub-divided into smaller groups of six people) seminar to discuss the issues raised, their responses and the outcomes and implications.

A mixed methods approach was taken and students were invited to complete questionnaires before and after the module with the aim of uncovering both their attitudes towards the use of computer simulation and the degree to which they considered their skills and understanding had been affected. 184 students completed the initial questionnaire and 123 completed the follow up questionnaire. Where appropriate and possible, questions on the follow up questionnaire mirrored questions on the initial questionnaire. Data was collected anonymously so it is not possible to track individual changes in perception of changes to skill levels and understanding of the issues.

Both questionnaires were similar in presentation with two main sections. The first set of items consisted of statements that the students needed to respond to using a 5-point Likert scale graded from Strongly Agree to Strongly Disagree. In the initial questionnaire, students were given the option to expand on the Likert scale questions, particularly if they wished to explain any strong responses.

The second section set out the three main issues being focused upon and asked the students to write comments regarding their concerns

and/or feelings of preparedness to face these issues in the real world. These comments were subjected to an iterative, free-coding process aimed at determining common themes or issues.

Students were also asked to grade their feeling of confidence by giving themselves a 'score out of 10' whereby 0= very nervous/ worried and 10= totally confident and prepared.

Based on several comments presented during the initial questionnaire, a short section was added to the follow up questionnaire to elicit the student's understanding of the drivers behind this project.

Results

Several items were completed before the scenarios were created (as shown in Table1) and after the scenarios were created (as shown in Table 2) with the aim of eliciting the student's attitude towards computer simulation in ITE in general. In some cases exactly the same questions (with appropriate changes of tense) were asked to see if exposure to the scenarios had had any significant impact overall.

Initial Questionnaire (n=184)	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
The use of computer simulation can help support my professional development.	42.9	52.7	4.3	0.0	0.0
Computer simulation should be an important part of ITE	29.3	53.8	16.8	0.0	0.0
Learning by 'Trial and Error' is the best method for developing new teachers.	29.9	48.4	16.3	5.4	0.0

Initial Questionnaire (n=184)	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Virtual professional experiences may supplement but never replace real experiences.	49.5	45.7	3.8	0.5	0.5
Ability to 'perform' during virtual experiences should be assessed before students are allowed 'do it for real'.	6.0	29.9	31.0	29.3	3.8
The development of Virtual Professional Experiences should be a priority for those delivering ITE	6.0	42.4	40.2	10.3	1.1

Table.1. Initial Questionnaire: Likert scale values presented as percentages to one decimal point

Post- Scenario Questionnaire (n=123)	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
On the whole, this use of computer simulation has helped support my professional development and ability to work with parents.	37.4	56.9	4.1	0.0	1.6
I feel more confident now, as a result of these experiences.	22.8	57.7	13.8	4.1	1.6
These simulated experiences had greater value than I was expecting.	38.2	40.7	18.7	1.6	0.8
Using these simulated experiences was engaging and enjoyable.	39.0	48.0	10.6	1.6	0.8
I would have preferred a more traditional approach (more lectures, academic readings, watching videos etc.) to this aspect of my development.	1.6	4.9	21.1	53.7	18.7
I would have preferred to be, 'thrown in at the deep end', and learn these skills by trial and error with real parents as and when they arose.	0.0	5.7	8.9	56.1	29.3

Post- Scenario Questionnaire (n=123)	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Simulated experience is a 'Third Place' that links Faculty Based Learning and Real World Learning.	13.0	56.9	27.6	1.6	0.8
The use of simulation, where mistakes don't have real consequences, is more ethically sound than trial and error.	18.7	51.2	22.8	6.5	0.8
Computer simulation should become an increasingly important part of Initial Teacher Education.	19.5	61.8	15.4	1.6	1.6
The development of virtual professional experiences such as these should be a priority for those delivering Initial Teacher Education.	13.8	49.6	29.3	4.9	2.4
The ability to 'perform' during virtual experiences should be assessed before students are allowed 'do it for real'. (As is required by aircraft pilots for example)	6.5	33.3	16.3	34.1	9.8

Table 2. Follow-up Questionnaire: Likert scale values presented as percentages to one decimal point

Just under half of the students (n= 70) wrote at least one comment in the space provided to expand on the Likert scale items. These comments tended to be related to one of four types:

a) Generally negative – 'cannot replace real life' (n= 15)

b) Mixed – some value but not as useful as real life (n= 15)

c) Wait and see (n= 4)

d) Generally positive (n= 36)

Students understanding of the drivers of this use of computer simulation are shown in Table 3.

Post- Scenario Questionnaire (n=123)	A 'Main Driver'	Important Consideration	Valuable Point	Not Important
It might make learning more enjoyable	32.5	50.4	16.3	0.8
It could save time	10.6	43.9	35.0	10.6
It could save money	8.1	34.1	43.1	14.6
It is more ethically sound	19.5	43.1	33.3	3.3
It might develop trainees' skills more effectively	43.1	43.9	11.4	0.8

Table.3. Student perceptions of drivers for development of simulations (values as percentages to one decimal point)

The students were asked to quantify their confidence and skill level by giving themselves a 'score out of 10' in each case (Table 4). Minimal guidance was given as follows: 0= very nervous/worried, 10= totally confident and prepared.

Student estimation of self-confidence in each area; 'score out of 10'. Figures in parenthesis represent the Standard Deviation.	Before (n=184)	After (n=104)
School Reports and Parents Evenings	5.2 (1.9)	7.1 (1.3)
Angry or Upset Parents	5.0 (2.2)	7.2 (1.4)
Considering Parental Opinions	6.4 (1.8)	7.0 (1.6)
Total (to one decimal point)	5.5 (1.5)	7.1 (1.0)

Table.4. Student quantification of confidence and skill level (values as percentages to one decimal point)

Some (n= 77) students added comments to the follow-up questionnaire and these which were coded as previously described. The results are shown in Table 5 in which only issues raised by 2 or more students are included Numbers are given to indicate how many students gave comments relating to that issue.

Code	Description	Notes
U+	Skills/ Understanding increased	Some (n=30) students felt the scenarios had improved their understanding of 'how to' engage with parents. A smaller number (n=4) felt more confused and less sure as a result.
U-	Confusion	
R+	Reflection	Some students (n=27) commented on how the scenarios had given them the basis for reflection on the issues raised and that this had supported their development.
S-	Too Short	Some students (n=17) commented that the scenarios were either too short or needed to be developed further and include more information or higher levels of engagement.

Code	Description	Notes
T-	Technology	Some comments related to technological aspects, in particular difficulties with Internet connections and bugs in the software (n=13). Where technological issues were raised this was generally in a negative context.
C+	Confidence Increased	Some students (n=9) reported that their confidence had been positively affected by the use of the scenarios. No student's commented that the scenarios had knocked their confidence.
W	Missing the point	Some comments (n=9) clearly indicated that students had 'missed the point' of a scenario. The most common example related to not being able to find 'the right answer' when the point was to make them realise that there are some situations where one cannot please everyone.
P+	Sense of 'Practising'	Some students (n=6) commented on the simulations in terms of practising. Where students considered the scenarios to be a type of 'teaching practice' they tended to be positive. No students specifically commented that this was not a form of practice, although other comments implicitly indicate that some do not recognise it as such.
A+	Good level of Authenticity	The degree to which the scenarios felt 'real' was commented upon. In general positive comments (n=5) were related to a strong feeling of authenticity whereas if students felt the scenario was not authentic (n=4), this was seen as a negative thing.
A-	Poor level of Authenticity	

Table.5. Issues arising from follow-up questionnaire qualitative responses

Discussion of the Findings

The first conclusion to be drawn from the data is that, overall, student perceptions of their own self-confidence in dealing with parent-teacher relationship issues has increased through the use of these simulated experiences. It is, of course, not possible to determine the exact relationship between the students' perceptions of their own abilities and their actual abilities, but the nature of the reflective comments of many students following the module indicate that a degree of professional development has indeed taken place. In the following commentary the evidence we offer typifies the student's anonymised responses about each issue.

Firstly, when the students were asked to quantify (Table 4) their own self-confidence before and after use of the simulations this elicited a clear and noticeable increase In fact, expression of improved confidence was the most common issue to emerge from the coding of the qualitative data:

"This was good. I didn't expect parents to become that angry in the playground – I feel more prepared now."

"I definitely feel more confident with writing reports after this scenario."

"I understand the value of parental opinions now & feel more confident to take these into account."

Secondly, the next most common type of qualitative comment following the module related to how the simulations had given them a useful experience to reflect upon. With the emphasis placed on reflective practice in ITE, the fact that many of the students applied the language of reflection to these simulations can be seen as a positive indicator. Comments such as the following indicate the value this gave to these students.

"I thought that this highlighted the difficulties well and gave me lots to consider."

"Really helped me to think about my own practice and how I would deal with a real situation."

"Good scenarios and got me thinking …"

An important point to note is that the value attributed by the students to these simulations is often related to a sense of authenticity. Before the students used the simulations a very common point raised was that it could not be as real as real life. In previous work, Lowe (2011) has shown that where students become engrossed in simulated experiences they are able effectively to suspend their disbelief and treat the simulation as if it were real. The number and type of comments requesting that the scenarios should be extended further indicate that authenticity is important because many of the comments made relate to developing a sense of reality by providing a greater breadth of experience. The following examples typify the feedback.

"Very useful responses to have available to me. Very beneficial. Maybe as a development, have further discussion options?"

"Could have been developed further in responses. Overall, very good nonetheless.'

"This was a valuable experience, but it might have been more worthwhile if it could have been extended further. So if we could have read more about the child, seen marks etc."

Both positive and negative comments relating to authenticity indicate that some students see that as being a very important consideration:

"I did not think all reactions were entirely true to life."

"Very useful due to visual responses of parents."

"Good scenarios – realistic."

However, there is evidence from the follow-up questionnaires that deficiencies in the technology are potentially a major hindrance to this process. Where technology was mentioned at all it was almost always in a negative context. Comments such as the following were common amongst those few who did discuss the technology:

"Difficulty navigating around scenarios – not very user friendly to find options."

"The report based one was not as effective and the video clip took over 1 hour to load."

"Computer kept crashing."

It was also noted that although students often gave multiple comments relating to different issues, the coding process found no student who had both positively commented on authenticity and negatively commented on the technology.

Ethics is an important issue that has emerged from the research and this warrants further research. The drive towards the use of computer simulation in other spheres of initial training (particularly medical and transport) is largely an ethical one. It is clear that the welfare of the patient or the passenger is paramount and the use of simulation means that mistakes have no consequences other than being learning experiences. As previously stated, a review of the literature in Initial Teacher Education reveals little discussion of the ethical considerations of an approach to training teachers. Indeed, recent developments such as Teach First and School Direct seem to run counter to any consideration of the ethics of having teachers trained 'on the job'. Perhaps one should consider whether one would be happy with a hospital that ran an 'Operate First' training programme, or an airline with a 'Fly First' policy for its pilots!

The initial questionnaire deliberately omitted use of the word 'ethics' in the Likert scale statements (see Table 1). The intention was to see if any student would recognise the relationship between the virtual simulations and one of the key drivers of their development. The fact that initially 78.3% of students agreed or strongly agreed that trial and error was the best way to train teachers, that only 35.9% of students felt that simulations should be used as an assessment before being allowed to practise in real schools and that no students made any qualitative comments at all about ethical matters, indicates that such ethical considerations are not something many of the students were concerned with.

To see whether such considerations might be drawn out from the students if prompted, potential ethical considerations were made

purposely more explicit. in the second questionnaire. Firstly, ethics was presented as one of the potential drivers, along with enjoyment, money saving, time saving and efficacy and students were asked to decide which they felt were most significant (as shown in Table 3). Secondly, next to the Likert scale item about the use of simulation to assess trainees before real practice, the words 'As is required by aircraft pilots for example', were added (Table 2). Even with such prompting, understanding that ethics might be the main driver was limited. Although an ethical driver was considered to be more important than savings in time and money, efficacy and enjoyment were seen as more important.

With regard to using the simulations as part of an assessment, there was little change in the overall number of students agreeing. However, the number of undecided students decreased and the number disagreeing increased (see Figure 3).
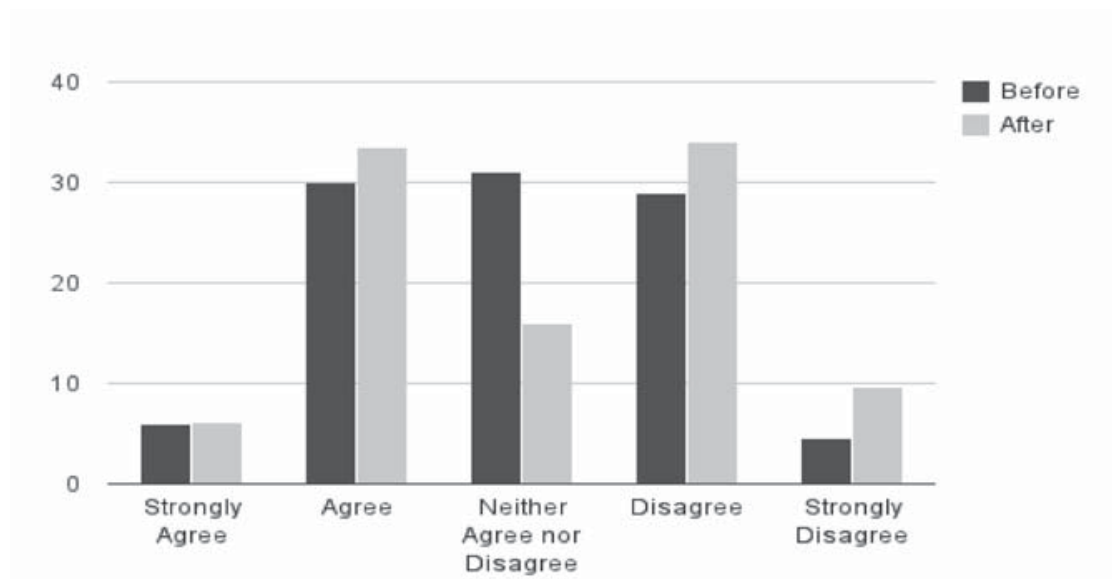
Figure 3. Change in student opinion in relation to simulation as a pre-'real world' assessment

It is interesting to note that the use of the simulations as part of the training has produced quite a polarised view amongst this cohort of ITE students. This suggests that, if a proposal was made to include the use of simulations in a summative assessment, it is unlikely that a

consensus view amongst trainees would emerge that this was a useful and valuable thing to do. Whilst the designers have no intention of using the simulations as part of a summative assessment framework, the small number of students whose comments indicated that they had missed the point of the simulation does give the designers pause for thought. Comments such as the following perhaps indicate the potential for problems to arise when these trainees are faced with the same scenario in the real world:

"This was good – but why wasn't there a final overall solution?"

"I found it difficult to listen to all the parents opinions and make a decision that would please them all. PTA meetings would mean parents can vote and the majority would get the vote."

"Have more options – a scenario that you can have a positive "WIN" in, rather than you always fail."

In such cases it might well be considered that the simulations have highlighted significant issues that ought to be addressed before the trainee meets a similar situation in the real world.

Conclusions and Recommendations

Simulation, through vehicles such as Shareville, has the potential to change the way students engage with case studies. There is the potential for multi-agency, interdisciplinary simulations that really challenge students in situations that they may only encounter infrequently and would certainly not see during their placement experience. Students are no longer simply observers; they become a virtual party to the case study, interacting with various components that are brought to life through the use of crafted characters, businesses and environments, enclosed in an episodic-style narrative.

"Shareville attempts to ameliorate against [the student being on the periphery] by showcasing a multi-agency approach, particularly in the areas of Health and Social Work. The initial philosophy behind the development of the environment was that of seeing

resources that already existed online in a number of areas within the university, in a more realistic context." (Hollyhead, 2010:14)

We believe that there is a need for future development of case based teaching innovations like Shareville to focus on character-driven cases that are holistically embedded within learning activities shared across faculties and schools. Further research is needed to evaluate the effectiveness of this approach in encouraging students to engage with their own subject, enhancing their understanding of how their field of study fits in with the bigger picture, and allowing for the collaboration with other students from different academic studies as we seek to help shape student experiences that result in them becoming better professionals.

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