

## **Working Together in Open Wonderland: Collaboration in a Virtual World by Trainee Teachers Working on Group Portfolios of Teaching Resources**

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### **Abstract**

As their course proceeds, post graduate trainee teachers spend increasing amounts of time teaching in schools rather than studying at the university. During the course they are required to collaborate in the production of group portfolios of teaching resources. An Open Wonderland (OWL) virtual world was set up for them to 'meet' online and work together on their portfolios. They worked in groups of four or five and although they were physically in different locations, they were able to talk together and interact simultaneously on computer screens inside the virtual world editing the documents on which they were collaborating. They could watch the progress of the rest of their group working on another computer screen in OWL, interacting, commenting or helping as needed just as if they were all together in a dedicated workroom on campus.

This paper examines these students' use both of the OWL and of other tools they used for collaboration (Skype and Google Docs) and analyses their evaluations of the different means of communication they used in this collaborative process. Their written evaluations and a series of focus group meetings were used to gather information about their reactions to and feelings about this collaborative learning space. Their thoughts about the use of OWL, about their experience of group work in their own learning and in their teaching practice are discussed together with their suggestions for the further development of OWL and its use in teaching and learning both for themselves and for their pupils.

### **Keywords**

open wonderland, collaborative learning, online distance learning, collaboration and cooperation, initial teacher training. collaboration in virtual worlds

### **INTRODUCTION**

This paper reports on a case study of students working collaboratively in a Virtual World environment; part of a larger project aiming to research and develop pedagogical approaches for blended learning using immersive environments in conjunction with other software. Motivation for the broader project was based on the pedagogical need for extending collaborative learning opportunities beyond face to face

seminar and laboratory sessions, especially where students spend part of their course on teaching-practice or are professionals studying part-time. The main aim is to investigate the pedagogical potential for immersive environments to support blended learning where students work collaboratively in groups with various types of tutor support and teaching. In the study reported here 20 trainee teachers of Computer Science used the virtual world environment to develop group portfolios of learning/teaching resources. The research aimed to investigate students' perceptions of learning in an immersive environment and of collaborative learning more generally and how they saw the design implications for immersive environments as part of online provision for blended learning both for themselves and for pupils in schools.

## **LITERATURE REVIEW OF COLLABORATIVE LEARNING AND VIRTUAL WORLDS**

Significant positive effects of collaborative learning on achievement have been demonstrated in face to face settings (Johnson et al. 2000). However findings of the SPRinG (Social Pedagogic Research into Grouping) project suggested that while group work and collaborative learning could be beneficial they were underused and underdeveloped in English schools (Kutnick et al. 2005; Blatchford et al. 2006). Collaborative learning is taken to mean students working together to accomplish shared learning goals in ways that provide support for developing understanding and skills, including many variations depending on factors such as the degree of interaction, symmetry of contributions and synchronicity (Dillenbourg 1999). There is increasing evidence that online environments can also enable collaborative learning (Resta and Laferrière, 2007) but supporting students to interact constructively online is challenging (Nussbaum et al, 2004). Research also suggests that the study of computing and computer programming can be enhanced by online collaboration (Ramollari et al, 2011).

Virtual, simulated practice and experience has long been used for training in physical skills like flying, driving and surgery and more recently immersive experiences have been developed for a wider range of learning especially in science and technology (eg Dede, 2009) and language learning (Molka-Danielson et al, 2007; Derrington, 2013). However evidence for effective pedagogical approaches, especially to support collaborative learning in immersive environments, is still limited (Mikropoulos and Natsis, 2011). Findings suggest that teachers and students share a positive view of learning in virtual environments but there is a need to develop greater understanding of the effects of feelings of immersion and the importance of level of presence (ibid). Warburton's assessment of the potential of virtual worlds for higher education cited the "immersive nature of the virtual world, crossing physical, social and cultural dimensions," but suggested that "cooperation and co-construction need to be scaffolded, and building trust and authenticity are critical factors for successful group activities" (Warburton, 2009, p423). Furthermore, the minimal social networking tools available in SecondLife, at the time of his study, led Warburton to suggest the need for other tools such as wikis and blogs to support avatar interaction (ibid).

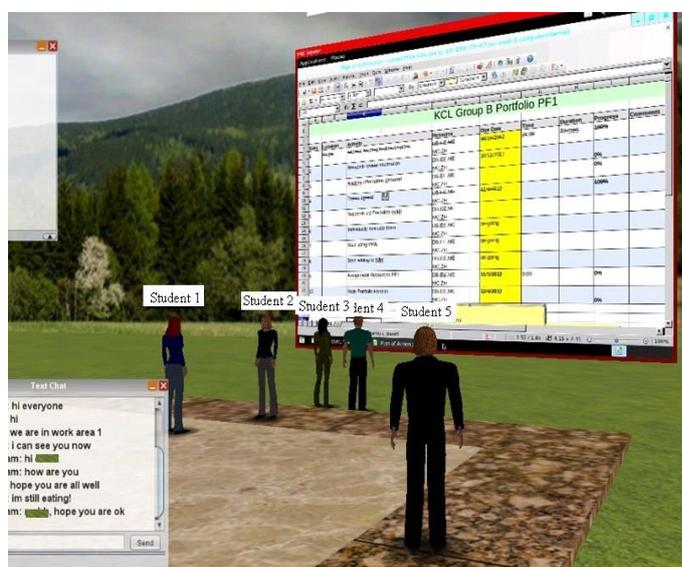
## **OPEN WONDERLAND FOR COLLABORATIVE LEARNING**

Following extensive reviews of research and experimentation with virtual world environments, including SecondLife and OpenSim, by members of King's College London Virtual Worlds Special Interest Group, Open Wonderland (OWL) was chosen as the immersive environment for the project. OWL is unique among Virtual Worlds in affording the possibility of in-world collaboration whilst interacting with software applications on a virtual network computer (VNC). Represented by avatars, a group of people can gather round a computer screen (a 'VNC-viewer') shown in-

world and can all interact with the software shown on the screen and they can chat to each other in voice or text at the same time. This software can be anything from a word processor or spreadsheet, to an interactive computer game or the console for writing a computer program; anything that can be shown on a computer screen and operated using a mouse and/or keyboard. This means that students can also interact through wikis and blogs within the world thus possibly overcoming the disadvantages mentioned by Warburton (2009). Furthermore these features make it a suitable platform for students to collaborate in the production of a group portfolio.

Sitting at their own computers in different geographical locations, it is as if participants are standing together in one room, in front of a large computer screen, and each able to reach out and control the mouse or keyboard while simultaneously conversing about what they are thinking and doing (see Figure 1).

OWL is still in an alpha stage of development (Yankelovich, 2012) but this free, open source software for building 3-D collaborative worlds has already been used as a platform for several educational projects including the MiRTLE and SIMiLLE projects (Gardner et al, 2011). There is a community of developers posting issues and solutions on a wiki and bulletin board. The world is built and hosted on a server and users log into this environment from their own computers. Access can be opened to all guests or secured requiring usernames and passwords. The users' input devices, (mouse, keyboard, microphone, etc) are then used to communicate with other participants and interact with objects inside the world. In the case of OWL, 'interact with objects inside the world' includes the ability to import created 3-D objects; to display pdf documents, all or part of the user's desktop, or videos on screens that appear in-world for that purpose; and uniquely and most importantly, to interact with 'VNC-viewers' showing the desktop of a remotely hosted virtual computer (Yankelovich, 2012).



**Figure 1:** Students in OWL chat in text and voice as they edit their portfolio plan

## METHODS

### Design, development and testing of the OWL environment

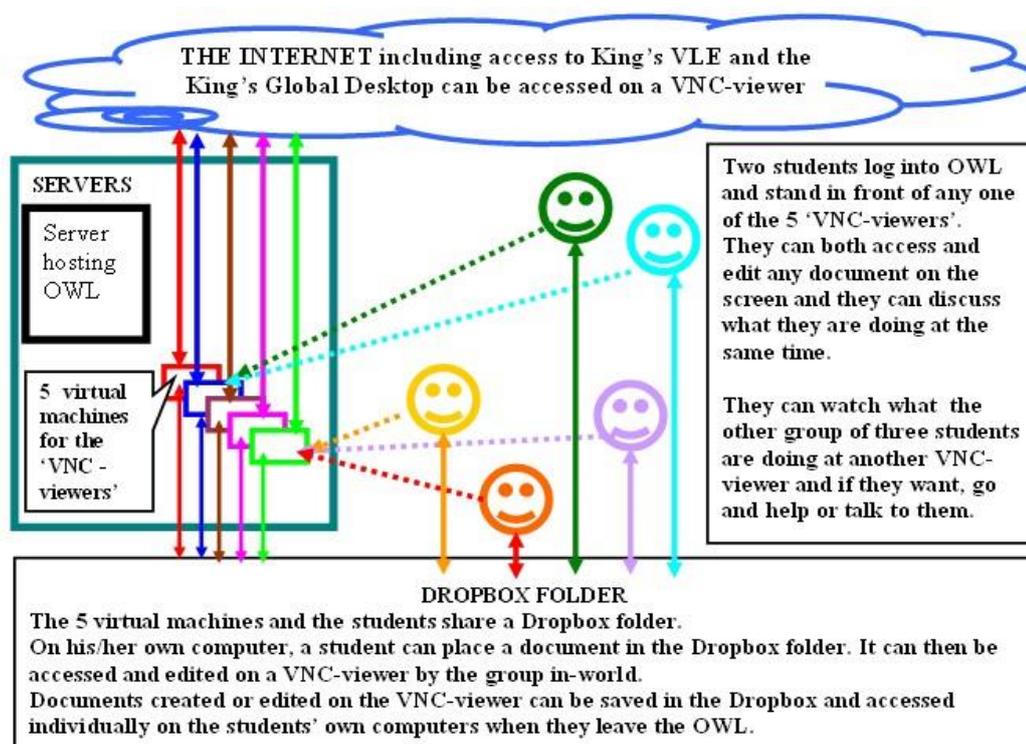
The developmental nature of the software and the limited research evidence of effective design of immersive environments necessitated a participatory design approach involving prototyping, trialling and discussion with users through several pilot studies (e.g. Fletcher, 2011).

In the summer of 2012 King's third and latest OWL was set up by WonderBuilders, a specialist company in the US run by Nicole Yankelovich, one of Sun Lab's original OWL development team. (WonderBuilders, 2012). We have administrative

rights and can remotely restart the servers both for the world itself and for the five virtual machines (VNCs) which host the Ubuntu desktops shown on the in-world screens called 'VNC-viewers'. These virtual machines are logged into Dropbox, and various software is installed including Open Office and an internet browser.

The Firefox browser installed on the VNC windows gives students access not only to the King's virtual learning environment (VLE) but also to the Kings' Global Desktop (KGD) which gives staff and students off-campus access to a remotely hosted Microsoft desktop with all the software licensed by the university and also to their own 'documents' folder on the campus network. Students can log into OWL from their own homes, and see their avatars standing around a screen in OWL interacting with all software that they use on campus... and they can talk to each other as if they were in class on campus, standing around a computer discussing their work. Furthermore they can walk or teleport to another VNC-viewer and as they approach another group the sound of their conversation becomes audible; a facility provided by the Voice-Bridge software (see Figure 2).

The OWL software, still in its alpha stage of development, is not always stable and various glitches and bugs are still present. The experience and knowledge of the WonderBuilders Team hosting our world was a major factor in getting the world operational and in solving some of the initial problems.



**Figure 2:** Using VNC-viewers in-world with Dropbox and the Internet

### Using OWL with beginning teachers

The new WonderBuilders OWL was first used before enrolment by student teachers who had been accepted onto the 2012-13 post-graduate programme. They were being encouraged to improve their subject knowledge before the course started and were added to a Skype Group so that they could chat and help each other and exchange resources and information. A few were given the URL for access to the new OWL. They ventured inside briefly experimenting, chatting and using a VNC-viewer, and immediately reacted with excitement and enthusiasm for this "amazing" new software.

Our students spend gradually increasing amounts of time on teaching placements at schools in different parts of London until during the second half of the course they are in school five days a week spending only occasional days together at college. During the programme they have various collaborative tasks to complete principally involving the creation, evaluation, self and peer assessment of teaching resources (Webb, 2012, p15). They work together in groups and collaborate at first by meeting face-to-face but increasingly by using various online/distance methods including email, cell-phones, the VLE, the Wiki, Skype, Google-docs, DropBox etc. in producing group Resource Portfolios on a course wiki. Peer assessment (both formative and summative) is used for this assignment so communication and collaboration is essential. In 2012-13 they were advised to use OWL (Webb, 2012, p16) as one of their methods of collaboration.

Training in the use of OWL was fairly informal: a brief initial introduction to the software during a workshop in college, and provision of a booklet 'Wander in Wonderland' (Derrington, 2012). They were also directed to online tutorials provided by the OWL-using community. These students were computing graduates and computer literate but their previous experience with computer games and Virtual Worlds varied considerably, covering the full spectrum from those who currently or in the past enjoyed games such as World of Warcraft or SIMS, to those who had merely heard of computer games and SecondLife and were suspicious and wary.

### **Research Methods**

Data was collected from the students' evaluations (both written and presented in class) of the environment and of their own progress and from a series of focus groups in which they discussed collaboration in teaching and learning. The data analysis proceeded in stages by identifying emerging themes from the evaluations, feeding those into the focus groups and discussing areas of agreement and contention.

## **DISCUSSION OF EMERGING THEMES**

### **Why use a Virtual World at all?**

The initial reactions of those first students using OWL before the course had even started, were very positive. They were amazed and excited by the possibilities they imagined for education and teaching. When the whole class was introduced to the software in a workshop class during the fourth week of the course, one or two computer games enthusiasts were distinctly unimpressed particularly by the appearance of the avatars and the scenery and objects in the OWL environment which they felt were graphically far inferior to those they were used to in computer games. The same students remained unimpressed, one saying in the focus group discussion, that he could not see the point of the virtual world when documents could be shared in Google Docs and simultaneously discussed in Skype. The group in which these two worked commented in the report on their collaboration in OWL that

While the concept of having a 3D environment in which to work is an interesting one, in practice it feels like OWL's world and the objects within it are a distraction and detract from its value as a serious teaching/discussion tool (Group D).

The same group thought that a virtual world was "good if you are using it as a tool for introducing a virtual scenario but not for doing actual work" and suggested that OWL might have some potential for use in distance learning with school pupils. Either the OWL environment appeared unsophisticated in comparison with the computer games they were familiar with, or its association with games stopped them taking it seriously.

Another group reported considerable benefits in sharing the tasks and then working side by side on different aspects of their group project;

In Open Wonderland, as a group we did not just engage in conversations but were also able to work on multiple activities at the same time. For example, two of the members worked on the review of the software used. Whilst one member worked on completing the minutes of a meeting the other member provided research data on the software. Within the virtual world, all members simply looked around to see each other's progress, asked each other questions by walking over (to) them, had unplanned brainstorming sessions when someone got stuck with the work and (OWL) basically allowed us to act as if we were all located in a dedicated team room (Group A).

Although they were geographically separated they were able to act as if they were together on campus. This is an advantage over the Skype/Google Docs combination. Just by turning (their avatars) and looking around, they could see the other team members' progress working on different elements of the task at different VNC-viewers. Similarly a tutor can observe the work of a class comprising several groups working at different VNC-viewers.

### **Security and Insecurity**

Although it is possible to restrict OWL access to authenticated users with passwords, in this pilot we continued to allow guest access and our beginning teachers all logged in as guests with any name they chose. This did mean that, an avatar encountered by chance in-world could be a fellow student, a lecturer, or indeed a complete stranger on a different course. The discussion in the focus groups showed that several of the students worried about interacting with people they met in-world, were concerned about possible dangers like stalking in this virtual environment and were nervous. This was especially the case before they met at the start of the course. Later, they felt much more comfortable meeting familiar colleagues in-world.

Another concern was that, by default, microphones were open at log-in. Unless they remembered to mute themselves, any noise or conversation in their surroundings would be broadcast in-world. It was also easy to leave themselves logged into OWL when multitasking and engrossed in other work on their computers, forgetting that conversations etc from their surroundings would continue to be broadcast in-world until they logged out of OWL. Students suggested the use of a 'push-to-talk button' as available in some other worlds but this might inhibit free discussion whilst manipulating software on the VNC-viewers.

### **Immersion**

Their written evaluations of OWL did not explicitly mention its immersive aspects but concentrated mainly on convenience and effectiveness; whether and how the software enabled them to work together despite their geographical separation and how it compared with Skype and Google Docs. But perhaps remarks like

(OWL) allowed us to act as if we were all located in a dedicated team room (Group A).

It is fun to work in the virtual environment it provides.... good if you are using it as a tool for introducing a virtual scenario but not for doing actual work (Group C).

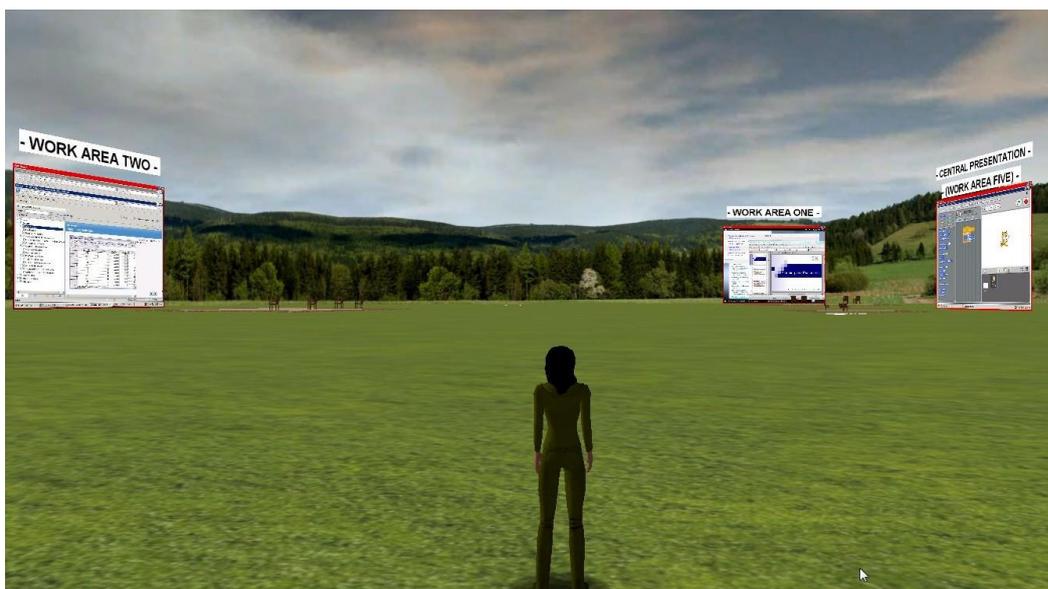
do imply some degree of immersion.

Feelings about immersion definitely surfaced when the question "How did you feel about learning in this immersive environment?" was raised in the focus group discussions. One (female) student announced that she had been trying NOT to feel immersed "owing to the risks..." Three others, all female, immediately agreed with her. They had heard about health risks and people becoming addicted to Sec-

ondLife, and had consciously tried to avoid any feeling of immersion in the OWL environment. Others (all male) said they felt quite comfortable with immersion; they were used to it from computer games. Their answers were emphatic and the gender divide strict but perhaps in such a small group (11) not significant. Further research will show whether these feelings are typical and lasting.

### The in-world environment

Some students said in the focus group that they were worried about “breaking things or messing them up” although others (male) who were used to computer games ran around confidently exploring. Our OWL consisted of a grassy plain surrounded by a perimeter of hills and trees. There was a central presentation area and four Work Areas each with its own VNC-viewer. As we explained, the rationale for this arrangement was to provide a calm natural space with few obstacles or distractions. The design was an initial prototype; the expectation was that students would discuss and redesign the environment. A tutor could use the central presentation screen for giving initial demonstrations and instructions to the whole class, who could then debouch from the central area to work in groups on the VNC-viewers at the peripheral ‘Work Areas’. The lecturer could remain at the centre and turn and see each of the groups and monitor their work. This arrangement had been adopted in line with a pedagogical approach used in many of the face to face sessions and in distance elements of the masters’ programme.



**Figure 3:** High tech screens in a rural environment.

Students felt that this scenery incorporated a dichotomy; ‘high-tech’ computer screens in a rural environment and suggested that more futuristic scenarios would be more appropriate; the inside of a spaceship or the surface of the moon. The suggestion of a classroom scenario was particularly popular, especially with female students because this is a familiar environment “taken seriously as a place for learning”. This might mean that the reservations expressed in their written evaluations by groups C and D could be overcome just by changing the OWL scenery, something which could have been managed by the students themselves. Their responses suggest somewhat conservative views of learning and teaching requiring further experience in immersive environments to engender awareness of their scope for learning: this is the subject of ongoing research. In a previous small pilot where student teachers were asked to design an immersive learning environment, some designed

traditional classrooms and lecture theatres but others designed futuristic structures, one group creating a 'learning lake' where groups of students worked on islands.

Some students wanted greater privacy whilst working in the OWL. Part of the problem was that they were unclear about how public the OWL was, and who besides themselves had access to it (hence the reservations about stalking).

### **Avatars**

Much of the discussion on avatars focused on the different 'views' that could be achieved and which felt most immersive (again suggesting that immersion was felt). The default 'view' is from behind the avatar and some felt that it should be the 'first person' view as in Call of Duty (the same as 'mouse-look' in SecondLife and Open-Sim) so the world is viewed as if through the eyes of the avatar. These different views can be experienced by selecting them from the View dropdown menu in-world.

### **Collaboration and cooperation**

Group A extolled the value of "communication which is informal and natural", talking in OWL and the intuitive method of sharing videos, images and pdf documents in OWL just by dragging them into the OWL window. However one of the members of that group suggested that more 'cooperation' had taken place than 'collaboration'. Responsibility for component parts of each task had been assigned to the most expert person who would complete the task to a high standard quickly and easily. If within the group there had been "a duty to teach each other", more learning could be achieved by assigning tasks "according to weakness rather than strength, forcing people to work outside their comfort zone" using each other as resources.

Asked whether collaboration was useful for their own learning, two of the class immediately agreed that of course it was, but others seemed less certain. Trainee A described a process of reaching the conclusion that other colleagues had helped him to learn

"I didn't think so at the beginning of the (course), at the beginning I was clueless about teaching, but the feedback we have been giving each other has been very useful."

Six others agreed with this. It was clear that the collaborative process of continual and repeated peer assessment within the groups which was an intrinsic part of the task had indeed resulted in learning within the groups. Some had found this easier than others and speculated on whether this depended on age/maturity or personality.

### **Ideas for use with pupils in school**

Some trainees had tried collaborative learning with their pupils with varying success depending largely on pupils' prior experience. One described how (at a selective girls' school) when she had divided the class into groups to cooperate in completing coursework, although they were instructed to divide the tasks and assign them, the girls had preferred to collaborate, sharing all the tasks. More trainees had tried paired work than group work. Some of them thought they would like to try taking their school pupils into OWL; indeed Group D had suggested in their written evaluation that they thought Open Wonderland more suitable for pupils than adults.

### **CONCLUSION**

In summary the main issues in relation to beginning teachers' perceptions of learning in immersive environments that emerged from this pilot study were: concerns about privacy and security; quite widely differing views on the nature and value of the immersive experience and how the design of the environment affected this; varying levels of understanding of the scope for collaborative learning and its im-

portance; and differing views on the value for collaboration of an immersive environment compared with other online learning opportunities. There are various ways of addressing these issues and some suggestions were made by the students themselves.

The system's openness worried the students: not only for their use with school pupils, where obviously restricted access and password protection would be necessary, but also for their own feelings of security. Implementing usernames and passwords would probably increase their own confidence. It would also enable them to grant temporary access to groups of pupils so that they could experiment with using OWL at school either in class or after-school computer clubs.

The desire for privacy is a pedagogical issue. There is a balance to be achieved between students' private working in their groups, making their thinking and products accessible to other groups, and enabling tutors and lecturers to monitor their progress and support them. In a face-to-face classroom situation teachers typically monitor groups by surveying the classroom using evidence from body language and snippets of discussions as well as direct questions from students to judge whether work is progressing well and to identify problems. Sometimes specific opportunities are organised to share progress between groups, but informal opportunities of sharing ideas also happen. How such pedagogical possibilities are managed in an immersive environment is the subject of ongoing research and discussion with these students.

Our students did find that OWL helped them to collaborate in the production of their Resources Portfolios, and they also agreed that they learnt from the process of collaborating, reviewing and assessing and from giving and receiving feedback. They also described a helpful process of working both collaboratively and cooperatively in OWL; a group of five working as individuals and pairs on related documents where they were easily able to see each other's progress and comment and assist. Although they were geographically separated, they worked as if they were together in sight and sound of each other in a dedicated workroom.

One of the problems cited for effective collaborative learning, was that pressing deadlines led to tasks being assigned within the group to those most able to accomplish them, and consequently learning opportunities were lost. Students suggested that giving the group a teaching responsibility for its members might push them into assigning tasks according to weakness, forcing themselves into greater collaboration and learning.

The design of the learning space was probably the most contentious issue. Students' prior experience was a major factor influencing their perceptions of the value of the space as a learning environment. Complex factors came into play including: their assumptions about the constituents of a learning environment based on prior experience of learning; the nature and purpose of immersive environments based on prior experience of such environments usually in gaming scenarios; the nature and value of collaborative learning in which few of the students had much previous experience; and the current experiences of learning and teaching in their school placements. In order to examine these issues further we believe it is important for beginning teachers to gain experience of a variety of approaches to learning in different immersive environments. In this way they can begin to understand their own and their peers' learning, evaluate the potential benefits of immersive and other types of learning environments and see how future students might benefit from integrating a range of different approaches in different ways.

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## Biographies



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