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Teacher perceptions of learning affordances of multi-user virtual environments

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Abstract

While the affordances of multi-user virtual environments (MUVEs) for teaching and learning are a subject of numerous experience reports, there is little research on educators’ perceptions of various MUVE affordances claimed in the literature. We investigate the educators’ perceptions of claimed MUVE affordances for learning by conducting in-depth semi-structured interviews with 22 educators (11 with experience in using MUVEs for teaching, and 11 with no MUVE experience). We analyse the resulting data by using the constant comparative method. Findings indicate that the perceptions of MUVE affordances for learning by educators with no experience in using MUVEs are similar to the perceptions of early adopters, and are overall positive, suggesting a positive outlook for eventual wider MUVE adoption. The rich descriptions of teacher beliefs and perceptions given in the article will be of interest to education managers and teachers considering MUVE adoption.

1. Introduction

1.1. Background

Multi-user virtual environments (MUVEs) are three-dimensional virtual worlds accessible via commonly available Internet-connected personal computers. MUVE users, represented by avatars, move and interact in shared virtual 3D space. In MUVEs, avatars are free to interact, explore and create, and are not guided to follow set scenarios or to pursue goals embedded in the environment (as is the case in computer games). Interactions of avatars with objects in virtual 3D space and with each other can be shaped as educational experiences for users behind the avatars.

The growing interest in learning and teaching in MUVEs is exemplified by the recent publication of special issues devoted to this topic in journals such as Computers and Education (Chittaro & Ranon, 2007a), ALT-J (Bell, Savin-Baden, & Ward, 2008), Innovate (Fischler School of Education and Human Sciences, 2009), Journal of Information Systems Education (Kruck & Harris, 2009) and Learning Media and Technology (Hunsinger & Krotoski, 2010). In 2009 and 2010, the British Journal of Educational Technology published two special issues devoted to learning and teaching in MUVEs: (Salmon & Hawridge, 2009) and (De Freitas & Veletsianos, 2010), the latter comprised of review articles.

We believe that the large number of publications on learning and teaching in MUVEs is indicative of a high level of interest in the topic. However, most of the articles are either conceptual and thus mainly express their authors’ opinions, or are experience reports detailing authors’ first-hand experience in conducting teaching in MUVEs, sometimes involving data collection via surveys or interviews. In a broad literature search conducted in March 2008, Hew and Cheung (2010) discovered 470 articles devoted to teaching in virtual worlds, but concluded that only 15 of them can be described as empirical research (as opposed to expression of opinion not directly grounded in data, or to reviewing literature). All 15 articles were devoted to exploring the learning affordances of MUVEs and included one designed experiment and 14 detailed experience reports.

Even though since March 2008 many new experience reports have been published (refer to the special issues listed above for numerous examples), existing research remains almost exclusively devoted to exploring learning affordances of MUVEs, with a focus on student experiences and perceptions. The perceptions and the beliefs of teachers are critical in determining how MUVEs are going to be used for teaching, and how broadly they are going to be adopted. Yet, we are aware of only three reports of empirical research on MUVE-based learning.
teaching focusing on teachers. Minocha and Reeves's (2010) qualitative study of design practices in constructing educational spaces in Second Life (a MUVE currently most commonly used for teaching, see Section 2.1 below) relied on data obtained in interviewing seven students, 10 designers and 22 educators involved in designing or using learning resources in Second Life. The study reported educator and designer perceptions of how various learning spaces designs in MUVEs influence student learning and engagement. Neely, Bowers, and Ragas's (2010) qualitative study of fit between constructivist teaching principles and the uses (and intended uses) of Second Life by educators for teaching was based on data obtained in an online survey of Second Life users. They used a convenience sample of 162 respondents (of the 2500 people they contacted). The study concluded that educators tend to follow constructivist principles when using MUVEs for teaching. Dickey (2011) conducted an observational qualitative study involving eight K-12 teachers learning to use Second Life and Active Worlds MUVEs to build learning objects. The study focused on analysing teacher interactions with the technology and on teacher perceptions of various pragmatic aspects of using MUVEs for teaching. None of the three studies investigated the perceptions of learning affordances of MUVEs by educators with no experience in MUVEs.

The ability of early adopters to successfully teach in MUVEs is not necessarily sufficient for MUVEs to emerge as a widely used teaching tool—the success of a new technology with early adopters does not guarantee that it will go mainstream (Moore, 1999). The theory of planned behaviour (Ajzen, 2005) and technology acceptance research (Venkatesh, 2003) suggest that a major belief influencing technology acceptance behaviour is performance expectancy or perceived usefulness. In other words, teachers will adopt MUVEs as a teaching tool not based on the MUVE affordances in promoting learning (and thus its usefulness as a teaching tool), but based on their perceptions of the MUVE affordances. The perceptions of a traditional classroom-based educator do not necessarily coincide with the perceptions of early adopters and technology evangelists. Hence, we take a view that teacher perceptions about learning affordances of MUVEs are an important research topic distinct from exploring the learning affordances directly.

1.2. Purpose

Even though there is a body of literature asserting various MUVE affordances, empirical research of teacher beliefs and perceptions about such affordances is lacking. In particular, there is no research on the perceptions of teachers with no experience of using MUVEs for teaching. The aim of the qualitative research reported in this article is to explore teacher beliefs and perceptions about learning affordances of MUVEs reported in the existing literature, and to explore the possible differences in perceptions between educators with no experience of teaching in MUVEs and early adopters of MUVE-based teaching.

The rest of this article is organized as follows. In the Method section, we discuss the selection of a MUVE and of research participants, and introduce the research framework, the questionnaire used in semi-structured interviews, and the data collection and analysis procedures. In the Results section, we present the results of constant comparative analysis of participants’ responses. We conclude the article with Discussion and Conclusions sections.

2. Method

We assume a naturalistic perspective (Erlandson, Harris, Skipper, & Allen, 1993) and emphasise richness and depth rather than statistical generalizability, leaving it to the reader to judge the extent to which our descriptions and interpretations apply to the reader’s particular circumstances. The naturalistic perspective guided our approaches to participant selection, data collection and data analysis, which are discussed later in this section, after we introduce the rationale for adopting Second Life as a representative MUVE.

2.1. Selecting the MUVE

Second Life is the MUVE that currently attracts most attention of educators as a potential teaching tool. Although Linden Labs released Second Life to the public in 2003 (Linden Lab, n.d.), the interest of educators in its potential grew gradually and came to the fore only relatively recently. While in the special issue on the use of 3D technologies in education published in Computers & Education in 2007 (Chittaro & Ranon, 2007a) Second Life is not mentioned at all, in the special issues that appeared later (see the Background section) Second Life features very prominently.

A search of the ERIC (Educational Resources Information Centre) database for “Second Life” conducted in June 2011 resulted in an output in which we counted 111 peer-reviewed journal articles devoted to the use of Second Life in education that appeared between 2003 and 2010. In comparison, a similar search for “Active Worlds,” an older MUVE often considered to be the closest rival of Second Life in terms of educational applications (Active Worlds, n.d.; Hew & Cheung, 2010), resulted in only six relevant articles. The dominance of Second Life as a multi-user virtual environment for teaching and learning justifies our choice to use it as a representative MUVE for this study.

2.2. Selecting the participants

The sample was largely a convenience sample, although we took care to select participants with as wide a range of characteristics as possible, to collect rich data given from a variety of perspectives. Two groups of participants were selected for the project: 11 educators with no experience in Second Life (or any other MUVE) (NoExp), and 11 early adopters—educators with experience of teaching or creating educational resources in Second Life (EA). Most of the participants were tertiary level educators, although there were some school educators in both of the groups. They taught a wide variety of disciplines, ranging from Greek history to English, Midwifery and Mathematics. Males and females were approximately equally represented, and the experience of the participants as educators ranged from 2.5 to 39 years.

2.3. Research protocol and research instruments

The data were collected over a series of semi-structured interviews: we interviewed the NoExp participants in person and interviewed the EAs within the Second Life environment (thus, the interviewer and the interviewee were represented by their avatars).
To create a common frame of reference, and, in particular, to give the NoExp participants an impression of Second Life capabilities, we demonstrated, before the start of each interview, a teaching environment in Second Life that we created specifically for this purpose. The environment included a virtual lecture theatre with a PowerPoint screen, a three-dimensional model of an abstract concept, and integration facilities with the Moodle learning management system (SLOODLE project, n.d.) allowing students to submit assignments and to answer quizzes from within the virtual environment.

We developed a schedule of 26 questions, based on the model of MUVE learning affordances presented in Fig. 1. These questions were used as a guide in the interviews (which took between 40 and 80 min).

The learning affordances model presented in Fig. 1 is based on a review of literature devoted to MUVEs and Second Life. The literature sources for the affordances included in the model are listed in the second column of Table 1. As shown in the figure, the affordances included in the model can be seen as broadly supporting two major educational paradigms: experiential learning (Dewey, 1997)—learning via experience gained in interaction with the environment, and collaborative “constructivist” learning (Fosnot, 1996; Vygotsky, 1978)—learning via social construction of knowledge in interaction with peers.

Table 1 compares the model we used with the models of learning affordances of MUVEs presented in two review articles: Dalgarno and Lee (2010) and Hew and Cheung (2010), which appeared after the data analysis for this study was complete. As seen in Table 1, the models are compatible.

Some differences have to be noted. Chittaro and Ranon (2007b) included the possibility of creating fully automated virtual learning agents as one of the learning affordances. We did not include this in our model because we found little evidence of such technology making an impact in practice and because of the difficulty with explaining the notion of such an agent (particularly, of its limitations) to study participants.

One of the affordances in the Dalgarno and Lee (2010) model, contextual learning, was not represented in our model. Contextual learning refers to learning happening in a context similar to that in which it is going to be applied, thus facilitating knowledge and skills transfer to real situations. Even though we found it difficult clearly separating (in multi-user virtual environment) contextual learning, as an affordance, from authentic 3D experiences and role-projection, contextual learning presents a valid perspective and explicitly covering it in the questionnaire may have improved the study. We note, though, that while additional learning affordances emerged from the interview data (see Section 3.2), contextual learning was not one of them.

Finally, Hew and Cheung (2010) distinguish modelling 3D spaces from acting on 3D spaces. We found little evidence for a need for such a distinction as modelling is always for the purpose of interaction of some sort, and we remain in this respect in agreement with Chittaro and Ranon (2007b) and Dalgarno and Lee (2010).

Full text of the part of the schedule of questions that was devoted to learning affordances of MUVEs is given in the appendix. The complete schedule included questions on educator background and experience (as an educator, in using Internet and video games, and in using MUVEs), and on adoption factors other than perceptions and beliefs about affordances. (The data we collected for such factors are not analysed here, and the corresponding analysis will be published separately.)

2.4. Approach to data analysis and measures adopted to increase credibility

To analyse interviewee responses, we employed the constant comparative method (Corbin & Strauss, 2007; Erlandson et al., 1993). This enabled the elaboration of the properties and dimensions of concepts corresponding to learning affordances of MUVEs and allowed other relevant concepts to emerge, along with their properties and dimensions. To improve the credibility of the analysis, we employed member checking and investigator triangulation (Erlandson et al., 1993).

Member checking was achieved by sending the results of the analysis to the participants for their comments to clarify any possible misunderstandings and to verify that the results were meaningful for the participants. Participant comments on the results were treated as an additional source of data.

To achieve investigator triangulation, two of the authors of this article analysed the data independently, then the outcomes were compared and, after discussing discrepancies, amalgamated into the final report.

3. Results

In this section, we analyse the NoExp and EA interviewees’ responses.
3.1. Teacher perceptions of the learning affordances of MUVEs

3.1.1. Flow
Educators in both cohorts, NoExp and EA, expressed opinions ranging from viewing flow as increasing student motivation to flow resulting in distraction from learning tasks. Overall, the EAs were more outspoken and somewhat more positive in their view of the role of flow.

One of the NoExp educators expressed a positive view of flow by noting that “it motivates them to enter the environment and stay there.” Another NoExp interviewee was sceptical and expressed the concern that “if the flow is directed mostly to the MUVE environment itself then the environment could be a distraction,” echoed by a suggestion by one more NoExp educator that “we have to provide guidance so that students will not get lost.” Thus (as perceived by the interviewee), educators will need to provide guidance and take precautions so that the learners will not become so deeply immersed in the environment that they are unable to focus on the subject.

Responses of the EAs varied along a similar dimension. The following are some positive comments: “As instructors we need to provide meaningful and challenging projects that will promote the experience of flow,” and “Students are concentrated and give much more effort on their tasks. They like their experience and they do not get easily bored.” However, there was a strong negative comment by an EA who believed that flow effect is actually “a hindrance rather than benefit of Second Life.” According to him, MUVE is a “means to pedagogical end…. I don’t particularly want students spending a lot of time in the environment.”

One of the EAs suggested that the flow initiated in a virtual environment can extend to the regular classroom and positively affect it: “As long as the learning experience outside of the fantasy maintains the in-game fantasy, the flow phenomenon can be maintained both in-game and out-game.”

None of the participants denied the existence of the flow phenomenon in MUVEs or its relevance to educational experiences in MUVEs.

3.1.2. Awareness, co-presence and emotional connection
Both groups were positive regarding the likely impact of student awareness of each other and student co-presence in a virtual world. Similar to flow, student co-presence was identified as improving learner motivation. Members of the NoExp group commented: “It will keep students motivated as they will find socializing entertaining as well,” and “[mutual awareness] may encourage student interaction which can be a good thing. In any environment students learn from each other.”

Other NoExp members emphasised that co-presence may allow distance students to participate in activities as if they were on-campus: “Geographically isolated students can now participate equally in group activities,” and “When you write an email, you have to compose the thing and ask the right question. But when you meet face to face even in the virtual world you can ask anything.”

The possibility of connecting students from different courses and universities, “especially between international students,” thus providing “opportunity for social contacts,” was noted by some EAs.

While co-presence in multi-user virtual environment frees the learners from geographical constraints, it was noted that it does not free them from time constraints: “this will tie them to a traditional time table” (a NoExp). Thus, some distance students might prefer other modes of e-Learning that do not impose time constraints. This can be contrasted with the views of one of the EAs, who noted the benefit that multi-user virtual environment provides by freeing students from time constraints: “Unlike the classroom at a university, that is only available during class hours, SL [Second Life] provides an enduring space where students can meet.” Clearly, this perspective indicates a less traditional view of education compared with the perspective of the NoExp educator who probably assumed that learning in a MUVE would occur at lectures and tutorials happening at set times, hence the comment “this will tie them to a traditional time table.”

Regarding teachers emotionally connecting with students in multi-user virtual environment, the NoExp educators were somewhat ill at ease with the idea. Even those who supported it did so with reservations.

Some of the NoExp educators felt that Second Life does not allow a sufficient degree of presence and control. One respondent acknowledged that it “allows more realistic feedback [than other modes of remote communication with students], however, it is only a limited subset of the real thing.” Another said: “It helps people who respond to personality, but there is nothing like the real face to face interaction,” and a third respondent identified that “students will not feel isolated” but “We will lose the personal touch. I cannot imagine not being seen by my students.”

Others found that teacher-student communication in multi-user virtual environment may entail some risks for the teacher: “Voice and gesture in (virtual) public might embarrass,” and “With large numbers it is very difficult to interact emotionally in a meaningful way. Probably in Second Life there is more room for misinterpretation than in a face to face situation.”

<table>
<thead>
<tr>
<th>Learning affordance</th>
<th>Brief explanation and literature support</th>
<th>(Dalgarno &amp; Lee, 2010)</th>
<th>(Hew &amp; Cheung, 2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow</td>
<td>State of high concentration while overcoming challenges (Deloweche, 2006; Takatalo, Nyman, &amp; Laaksonen, 2008)</td>
<td>Engagement</td>
<td>Communication</td>
</tr>
<tr>
<td>Awareness and co-presence</td>
<td>Feeling of “being there together” (Schroeder, 2007, p. 705; also Chittaro &amp; Ranon, 2007b)</td>
<td>Collaborative</td>
<td>Communication</td>
</tr>
<tr>
<td>Emotional</td>
<td>Ability to directly convey emotions (Chittaro &amp; Ranon, 2007b; De Lucia, Fransc, Passero, &amp; Tortora, 2009)</td>
<td>Collaborative</td>
<td>Communication</td>
</tr>
<tr>
<td>Authentic 3D experiences</td>
<td>Ability to model real objects in virtual environment (Chittaro &amp; Ranon, 2007b)</td>
<td>Spatial knowledge representation</td>
<td>Simulation of space, experiential spaces, Communication spaces</td>
</tr>
<tr>
<td>Artificial 3D experiences</td>
<td>Ability to create learning-relevant 3D experiences with no analogues in the real world (Chittaro &amp; Ranon, 2007b)</td>
<td>Experiential learning</td>
<td>Simulation of space, experiential spaces, Communication spaces</td>
</tr>
<tr>
<td>Role-projection</td>
<td>Support for assuming roles (e.g., ability to change one’s appearance as appropriate) (Deloweche, 2006; Jamaludin, Chee, &amp; Mei Lin Ho, 2009)</td>
<td></td>
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</tr>
</tbody>
</table>
One of the NoExp educators noted that teaching skills gained in a regular classroom may not be directly transferable to MUVEs: “When I am in a classroom I use my personality to help control the class.... In this environment I would have to learn a different way of doing that. I think that in this environment we have to use a different technique to manage a group.”

EAs, on the other hand, felt very positive regarding the possibility and the impact of teacher to student emotional connections in multi-user virtual environment.

Some of the EAs referred to their experiences of teaching in Second Life: “Emotional involvement enhances the personal perception of a caring teacher, and this leads to increased motivation,” and “Students become more engaged in learning when they feel that they have connected more closely with an instructor than would be possible through, for example, email, WebCT, or even instant messaging and chat rooms.”

Others referred to their experience in using Second Life, which led them to believe that meetings in Second Life can be very “real”: “I felt like I had been with her. I felt like two of us spent the afternoon together. That is what we are hoping to work for students,” and “Two of us can actually sit together and experience on the screen even though we may be sitting in totally different places in real life.”

3.1.4. Role-projection

Some of the NoExp educators recognized the potential of creating authentic experiences in multi-user virtual environment, and suggested applications: “This will help students to understand processes better. For example if water treatment is being taught, a real treatment plant could be shown instead of diagrams,” and “I like the idea of simulated business/enterprise environments. I go further and would require appropriate attire and work attitude/speech/behaviour.”

Others preferred to emphasise the limitations of MUVEs and expressed doubts that skills learned in multi-user virtual environment would be directly transferable to real life situations: “Simulation of the real world has its place, but there is still nothing like the actual experience through summer internships, part time jobs,” and “I wouldn’t like to have an injection from a nurse who had only learned how to do it in a virtual environment. It is an additional tool, but nothing replaces the real world.”

EAs were overall more positive, although some of them indicated challenges that needed to be overcome: “We can take people to different places and show them different things. And we can really be there.” But, to create authentic environments one needs to have access to relevant resources: “We will be able to provide an impact if we have the tools.”

One of the EAs emphasised the importance of creating authentic environments to put students at ease (rather than creating authentic environments relevant to the subject matter): “Ability to create environments which are familiar is important to ensure that the student recognises and feels comfortable.”

Another EA emphasised the use of 3D environments to manage risks and to allow easy and inexpensive repetition of training procedures: “This is important for nursing students as they can make mistakes without putting anyone’s life at risk,” and “If we make a mistake, we can go back and do it again.”

Only EAs commented on the ability to create 3D environments that represent something that does not exist in real life. All comments were positive: “The ability to interact in a sim of a molecule … or human genome is a great tool for interactive, discovery learning,” and “I feel the ability to create environments which are not possible in the RL [real life] such as inside of an organ of a body to show how disease affects it, is an area that I feel can enhance student learning.”

One of the EAs noted that there is a middle ground between modelling settings that actually exist and representing in 3D something that is fundamentally not a 3D structure inhabitable by humans in real life: “For my purposes, it is the re-creation of a ‘real world’ setting that has actually disappeared is the main appeal of the media-rich environment of SL.”

3.1.3. Authentic and artificial 3D experiences

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3.1.4. Role-projection

Some of the NoExp educators recognized the potential of role-play, and suggested circumstances under which they would use it: “Students will not be able to apply any of the usual social prejudices and role assumptions based purely on physical appearance,” and “My primary students will really love this. We can use this to do storytelling and in so many other things.”

Yet, a number of them voiced reservations, due to the following perceived problems:

- Role-play in multi-user virtual environment may be difficult to organize “This concept can be very contentious…. I can see application in an experiment investigating gender and racial discrimination—but managing such experiments will require process and procedure. Not for me!”
- There may be issues with controlling classes: “I reckon this is a drawback. It would be preferable if it is a real person,” and “There may be potential harassment issues…. I would be concerned about trying to control an environment where you weren’t sure who everyone was.”
- Role-play is a kind of a game, and is suitable only for very young students, not adult learners: “For some students. Not for my students.”

EAs exhibited a similar pattern of responses. Some of the EAs suggested applications for role-play in multi-user virtual environment:

- To explore different social roles: “A colleague of mine uses this unique opportunity in MUVE to explore issues of racism, sexism, prejudice and injustice.”
- To put a student in a customer’s or patient’s place to achieve empathic understanding: “This can help them to appreciate the difficulties experienced by others. It can be useful to teach values and attitudinal concepts. This is extremely important in nursing.”
- To teach behavioural skills associated with fulfilling particular roles: “It depends on what you learn…. In subjects like business communication role-projection is very important.”

Quite unexpectedly, some of the EAs shared the perception of role-projection as a game only suitable for children: “Yes this can be fun. But I don’t know how serious this is. As my students are mature I don’t think this is a big deal for them,” and “All my students are adults. I don’t think they are looking for role projection from SL.”
3.2. Related concepts that emerged in the analysis

3.2.1. Similarity and differences with computer games

A number of the educators emphasised the impact of the similarity between MUVEs and computer games. Some NoExp educators expressed the belief that present-day students are skilful at navigating computer games, which is likely to make multi-user virtual environment both easy to use and attractive to them: “For primary school students I use PC games to educate them. They barely can do 4 + 5. But they navigate through the game like pros.” Further positive consequences of being familiar with a virtual environment were noted by another interviewee: “Implications of familiarity are only good ones! A shorter time to adjust, higher expectations, leading to creative application/use.”

Some of the NoExp interviewees also believed that certain categories of students may be at a disadvantage if MUVEs are extensively used as an educational tool because of their relative lack of exposure to computer games: “This will depend on the age,” and “It would appeal more to males (who tend to enjoy gaming) than females so there could be a gender bias introduced.”

One of the NoExp educators noted that computer games create expectations with respect to the quality and type of experiences in multi-user virtual environment that educators may find difficult to meet: “The environment has to be same level of quality as video games they play. If the class you have created is not as good or exciting, then they will lose interest.”

One of the EAs also indicated that some of the expectations created via computer gaming may pose problems for educators attempting to use MUVEs for teaching: “Initially, a MUVE like Second Life can be disappointing to students who play online games … the action and visual effects are clunkier than most video games. On the other hand, the playful quality of the environment (if preserved) has a positive effect on learning.”

One of the EAs indicated that similarity between MUVEs and computer games is a factor in MUVE acceptance by teachers with gaming experience: “One of the reasons that Second Life appealed to me is because it had similarities to gaming environments. That was something I was familiar with.”

EAs and NoExp educators were in agreement that there is a need to differentiate students with different exposure to computer gaming, thereby making a distinction between students of different ages as well as between “digital natives” and “digital immigrants”—terms initially introduced by Prensky (2001). An EA noted: “If students are used to computer games I think they will pick up the movements very easily. However, persuading the older students may be different,” and “I expect that for digital natives it would be quite educational, intuitive, and fun.”

3.2.2. Shy students

Another theme that emerged in data analysis was the belief of both educator cohorts that shy students are likely to be more actively involved in interactions with teachers and with peers in multi-user virtual environment than in the traditional classroom because of a perception of safety due to the intermediation by avatars.

Some of the NoExp educators noted: “Here you got an avatar between you and everyone else. This will open people up to get over lots of emotional or social barriers that they might be having in a real classroom,” and “Students who are shy in classroom to talk to lecturer face to face will get an opportunity to talk to the lecturer.”

Some of the EAs asserted the same belief based on actual observations: “A student can feel safe and have confidence in SL with a degree of anonymity behind the avatar. A normally shy student is freer to experiment socially in SL … MUVEs allow teachers to connect in many areas that are not available in a classroom setting. This can be a highly motivating feature of instruction for students that are too timid, shy, or intimidated to speak up in the normal classroom,” and “Many reticent students contribute more in SL … In my experience it has enabled more reticent students to express themselves (sometimes quite flamboyantly) and to participate more substantially than in the RL [real life] classroom.”

One of the EAs expressed a broader belief that interactions in multi-user virtual environment are more honest and direct than in real life for all students (thus, the positive impact of intermediated communication is not limited to shy students): “Through the combination of limited (standard) emotional indicators, and the vaguely anonymous quality (hiding behind one’s avatar), I often find communication to be much more honest and direct in SL. People state emotional content more readily because they can’t share it with a facial expression AND [respondent emphasis] they are not afraid of negative consequences, because their avatar protects them. Student with student and student with teacher interactions are more equitable and forthright. Many reticent students contribute more in SL. And teachers can often find out more directly how a student feels about their work or work load.”

3.2.3. Other themes

In the analysis above we focused on the themes that were especially relevant to MUVE learning affordances. Here we briefly discuss some of the remaining themes.

Both educator cohorts were somewhat concerned that MUVE-based teaching may be misperceived by students and by management as just a game with no tangible educational outcomes.

Both groups expressed reservations that the bandwidth necessary to use MUVEs (in particular, Second Life) may not be available to individual students at home or to institutions.

There was a range of opinions regarding familiar teaching and communication facilities (such as PowerPoint and Twitter) available in MUVEs. While NoExp educators viewed the presence of such familiar facilities as a positive factor making it easy for teachers and learners to start using the environment, EAs were divided, with some of them asserting that familiar facilities may prompt educators to rely on familiar practices (such as PowerPoint presentations) that are not necessarily appropriate in multi-user virtual environment.

4. Discussion

Flow is a mental state of high concentration that may be achieved when an individual is performing an intrinsically rewarding activity with a clear goal, balanced with respect to the level of challenge (challenging enough, but not too challenging), and involving a high degree
of control over outcomes and immediate feedback (Csikszentmihalyi & Csikszentmihalyi, 1988). In prior research flow was shown to have an impact in technology acceptance decisions, in particular, in the acceptance of e-learning (Liu, Liao, & Pratt, 2009; Sanchez-Franco, 2010). In our study, educators in both cohorts, those with no experience in MUVEs and early adopters of MUVEs, ranged from positive to negative in their views on how flow in multi-user virtual environment may affect learning. Many of the educators believed that flow in multi-user virtual environment may focus learners on the features of the environment, thus distracting them from learning, or even result in addictive behaviour. The view that flow in multi-user virtual environment may lead to addiction is supported by some of the existing research on computer games (Grüßer, Thalemann, & Griffiths, 2006), and the view that interaction with technology may lead to distraction negatively affecting student learning is supported by some of the research on in-class use of laptops (Wurst, Smarkola, & Gaffney, 2008). Thus, the negative perceptions of some of the educators are supported by research. It appears likely that negative perceptions of the possible impact of flow will persist until there is a better understanding of how flow in multi-user virtual environment affects learning in specific learning scenarios.

According to the literature, users interacting with rich media, such as multi-user virtual environment, may experience the phenomenon of “presence”—the perception of disintermediation, of “being there” (rather than of using a computer to access the environment), and the perception of “co-presence”—of being aware of other users and of directly interacting with other users, a sense of “being there together” (Schoedler, 2007, p. 705). Thus, meetings in a virtual world may have the same quality as those in the real world—students can discuss and collaborate in a 3-dimensional physical environment, just as they would do in a classroom, while teachers can emotionally connect with students and use voice intonation and gestures to convey encouragement, approval, disapproval and so on (Chittaro & Ranon, 2007b). In our study, both NoExp and EA educators had an overall positive view on how student co-presence in multi-user virtual environment is likely to affect learning. They mentioned improved motivation due to social interactions and students learning from each other. On the other hand, NoExp and EA educators differed in their perceptions of the possibility of teachers emotionally connecting with students in multi-user virtual environment. NoExp educators doubted that MUVEs provide an experience that is rich enough, while EA educators, based on their actual experience, perceived emotional connections with students in multi-user virtual environment as a real MUVE strength. It appears that the scepticism of NoExp educators is due to insufficient information and lack of self-efficacy, and their perceptions are likely to change if they gain experience in using MUVEs.

In MUVEs, educators (directly or with the assistance of professional developers) can shape the 3-dimensional environment to create educational experiences that are difficult or impossible to offer in “real life.” On one hand, such experiences may replicate something that exists in real life, but is not available because of cost, safety or for other reasons. An example of such a re-creation is the use of a virtual Saami village in an archaeology course reported by Edirisingha, Nie, Pluciennik, and Young (2009). On the other hand, experiences that are not possible in real life can also be created, such as the reproduction (for medical students studying psychiatry) of hallucinations of a schizophrenia sufferer reported by Yellowlees and Cook (2006). In our study, both NoExp and EA educators recognized the potential value of replicating real life experiences in MUVEs for educational purposes. However, only EA educators recognized the potential of creating MUVE experiences that are not possible in real life. This was not because NoExp educators doubted that such experiences can promote learning, but because they found it difficult to suggest how to create such experiences for the subjects that they teach. In our view, the perceptions of NoExp educators are likely to change if they are presented with specific examples of how creating MUVE experiences that are not possible in real life can be used to promote learning in their subjects.

In MUVEs, users are represented as avatars that can assume appearances quite different from the actual appearance of the users. The literature suggests that this creates opportunities for learning via identity experimentation (Salmon, 2009), and for scenario-based learning involving role-play. For example, students can be assigned to avatars configured appropriately for a scenario to be followed, as described by Wang, Song, Stone, and Yan (2009). In our study, both NoExp and EA educators viewed role-play in multi-user virtual environment as potentially useful only for certain subjects and for certain categories of learners (such as very young children). Some of the NoExp educators voiced security concerns. It should be easy to demonstrate to NoExp educators that the ability of students to assume different appearances in multi-user virtual environment does not allow them to conceal their identity (as the system makes identity information available no matter what the appearance is). We note that the respondents in the study by Neely, Bowers, and Ragas (2010) did perceive role-play as important, possibly because the early adopters who self-selected in their study were particularly likely to explore the full range of capabilities offered by multi-user virtual environment.

The belief of both NoExp and EA educators that MUVEs may benefit shy students by offering an environment that such students would perceive as safe emerged as a strong theme in our data. Experience reports supporting this belief are available in the literature: (Deutschmann, Panichi, & Molka-Danielsen, 2009; Gao, 2009). Thus, it is likely that the perception that MUVEs may benefit shy students may become one of the factors favouring the adoption of MUVEs as a learning environment.

5. Conclusions

We examined the perceptions and the beliefs of two teacher cohorts, those with no experience in MUVEs and early adopters of MUVEs, relating to MUVE learning affordances. A six-dimension affordance model supporting the paradigm of experiential learning and the paradigm of collaborative and constructivist learning, and involving the dimensions of flow, awareness and co-presence, emotional connection, authentic 3D experiences, artificial 3D experiences, and role-projection framed our schedule of interview questions.

Educators in both cohorts (NoExp and EA) ranged from positive to negative in their views on the impact of flow. The two cohorts were overall in agreement that student co-presence in multi-user virtual environment is likely to benefit learning, but differed in their assessment of the possibility of emotional connections between teachers and students in multi-user virtual environment (with NoExp tending to be sceptical). While both NoExp and EA educators recognized the educational value of replicating real life experiences in MUVEs, NoExp educators found it difficult to suggest the educational uses of MUVE experiences that do not replicate real life. Educators in both cohorts saw mainly niche applications for role-projection in multi-user virtual environment, and educators in both cohorts suggested that MUVEs may offer benefits for shy students.

Overall, NoExp and NA educators tended to express similar ranges of opinions, were more in agreement than in disagreement, and were, overall, positive with respect to the usefulness of MUVEs as a learning environment. This is not surprising, as interaction dynamics in multi-
user virtual environments are similar to the interaction dynamics in real life, making it relatively easy to recognize the potential of the new environment even for educators with no experience in multi-user virtual environment. Thus, our research supports the view that MUVEs are likely to gain a wider acceptance as a teaching tool, as similarity between the views of early adopters and the views of teachers with no MUVE experience offers a foundation for further adoption. The rich descriptions of teacher beliefs and perceptions given in the Results section of this article offer a glimpse of the range of educator opinions one is likely to encounter when implementing MUVE-based learning, and will be of interest to education leaders and teachers considering MUVE adoption.

Appendix. Supplementary material

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.compedu.2011.06.015.

References

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