Ensuring student engagement in 3D virtual learning environments.

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Abstract

Internet and Web 2.0 technologies have contributed significantly to distance learning and completely changed how people interact online, and in turn, the role of the tutor as facilitator is given a new emphasis. According to the theory of Communities of Practice and the model of Situated Learning, learning is largely a social practice rather than something individuals do. With the increasing pressure to deliver learning at a distance, one particular technology, 3D Virtual Learning Environments (VLEs), is being investigated as a means to supplement campus-based learning because 3D VLEs enable a possibility for social engagement which other technologies do not. Research to date about student engagement and learning in 3D VLEs has tended to rely on anecdotal or epithetic evidence. There has been little measurement employed in the initial design of experiments and which have tended to be very technologically focused. Lots of assessments of learning were actually about assessment of technology. Even if there was initial measurement of educational outcomes and there was less technology-focus, experiments might not be scalable to other VLEs. In order to explore the opportunities for social engagement as well as technical engagement in 3D VLEs, this paper will investigate student engagement within virtual learning communities through the exploration of the proposed ideas about narrative and avatars, i.e. narrative creation is an imaginative and cognitive process and essential to student engagement; avatars are the animated agents that connect sociability and interactivity. In 3D VLEs, there is the possibility for community to be re-introduced that other technologies may have stripped out. In addition, the role of the tutor in virtual learning communities is further developed as a co-participant rather than simply a facilitator because in addition to the need for a tutor to provide scaffolding or even intervene in open-ended VLEs (e.g. Second Life) there is also peer negotiated and self-directed learning. A review of literature and directly observed case studies is performed. A model of learning that emphasizes an individual’s role within a socially regulated community will be used to analyse the existing use of virtual environments in order to measure different styles of engagement. As a result, this paper concludes that narrative is the mechanism that binds communities together and that avatars are the mechanism by which a personal narrative is implemented.
Introduction
The ubiquitous nature of Internet and Web 2.0 technologies (e.g. wikis, blogs, video online, social networks) has contributed significantly to distance learning and completely changed how people interact online, and in turn, a new learning paradigm evolves where tutors are facilitators. However, some social elements in traditional learning have been stripped out by the use of technologies. Lack of synchronous communication and multi-user online role playing activities in Web 2.0 may potentially reduce students’ experience and efficiencies in terms of Community of Practice. As a result, there is a push for the development of 3D VLEs, e.g. Second Life. The social elements once diminished are now embedded in 3D VLEs via avatars. The idea of tutor has been put back in and redressed because communication between students and between students and tutors is essential to collaborative learning (Veerman, Else 2001).

MIMESIS system, a 3D interactive narrative-based learning environment, created at NC State University, and a Second Life workshop for Religious Studies students at Newport School of Education will be evaluated based on the theory of Community of Practice.

Furthermore, when analysing student engagement, traditional research focuses solely on the tangible aspect of 3D VLEs, e.g. attendance. However, “participating in a learning community may have a salutary effect on academic performance” (Zhao and Kuh 2004) and this is regarding the quality of student engagement. Hence, it requires to have a balanced view and take both tangible and intangible aspects into consideration, through the “inner eye of the soul” (Ryan 2001), i.e. narrative; and the “physical eye of the body” (Ryan 2001), i.e. avatar, because a narrative is the glue that binds the community together and the way by which a Community of Practice develops; an avatar is the mechanism by which a narrative is implemented in-world.

Social Element and Student Engagement

Student Engagement in Traditional Learning Environments
According to the existing research (i.e. (Stovall 2003) (Krause, Coates 2008) (Bulger et al. 2008)), student engagement can be defined as students’ willingness to participate in purposeful academic activities over a period of time, which in turn positively contributes to expected learning outcome.

Quantitative measurement, i.e. attendance, dominated the way of how student engagement was measured before online learning gained significant ground (Douglas, Alemanne 2007). However, engagement and participation are fundamentally different. Although participation is one main indicator and has direct impact on student engagement (Douglas 2008), the non-quantifiable factor behind it, i.e. motivation, has been largely ignored. Motivation is defined as “an internal state or condition that activates behaviour and gives it direction” (Huitt 2001) (Beer 2010). Motivation is derived from students’ mutual engagement in the common learning activities (Wenger 1998). This leads to the theory of Community of Practice which has gained its popularity in recent years.

Accordingly to Lave and Wenger (1991), learning is largely a social practice rather than something that individuals do. In other words, Communities of practice are “groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger 2006). Communities of Practice can be regarded as “self-organizing systems” (Smith 2009) and the process of collective learning within them can be deemed as Self Regulated Community of Learning (SRCL), i.e. socially mediated rather than purely Self Regulated Learning (SRL), because SRL is “in relation to the environment” (Wan and Reddy 2009). Furthermore, according to Vygotsky (1978), a learner “first becomes able to subordinate her behavior to rules in group play and only later does voluntary self regulation of behavior...
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Ensuring student engagement in 3D virtual learning environments arise as an internal function” (Vygotsky 1978). Hence, “[t]heoretically and conceptually, the learning community appears to be a potentially powerful educational practice” (Zhao and Kuh 2004), because “[t]he increased opportunities afforded by learning communities for peer learning and interaction allow for the development of richer, complex ways of thinking and knowing so that students learn at a deeper level (Bransford, Brown and Cocking 2000)” (Zhao and Kuh 2004).

Recent analysis by Zhao and Kuh (2004) about first-year and senior students from 365 four-year institutions also indicates that participation in a learning community may have positive impact on students’ academic performance. For instance, “seniors with a learning community experience had higher grades compared with those who did not participate in a learning community at some point during college” (Zhao and Kuh 2004), but “no difference in the grades of first-year students” (Zhao and Kuh 2004). This finding resounds deeply with the learnability issues raised by Wan and Reddy (2009). Because according to the level descriptors of Northern Ireland credit Accumulation and Transfer System (NICATS), as the level goes down, students tend to be less capable of SRL, thus require socially mediated learning, namely SRCL. Although SRCL does not have immediate impact on the first-year student’s academic performance in the above analysis, learning communities have stronger impact on first year students than for seniors because “a learning community is associated with higher levels of academic effort, academic integration, and active and collaborative learning” (Zhao and Kuh 2004).

The model of Situated Learning rests in Community of Practice and is opposite to abstract learning, and learning occurs in a co-construction process in a contextualized environment (Lave, Wenger 1991)(Smith 2009). Situated Learning is directly related to the concept of narrative, which is defined as “a story that is created in a constructive format (as a work of writing, speech, poetry, prose, pictures, song, motion pictures, video games, theatre or dance) that describes a sequence of fictional or non-fictional events” (Wikimedia 2010). Narratives are everywhere. For example, students choose universities based on selected narratives in various formats, and subsequently being guided by other educational narratives throughout their learning process. These narratives are external to students, because traditional learning is didactic and instructional by nature. Although story-based Learning environments harness the creation of both formal and informal learning communities, the contextualized learning environment in traditional learning setting is created by tutors rather than by students themselves. Therefore, there is a potential for students to have more involvement in narrative creating process in order to “further develop their identity and discover their voice as well as to integrate what they are learning into their world view and other academic and social experiences” (Zhao and Kuh 2004).

Narrative-centred approach has significant impact on student engagement. In turn, it leads to in-depth student learning and individual development and educational effectiveness (Zhao and Kuh 2004).

However, traditional teaching and learning have limitations, because the population of students are getting increasingly large and people are economically restricted to where they can go and when they can learn due to their available time and geographic locations. Therefore, there is a demand for distance learning to be conducted over the Internet.

Student Engagement with Web 2.0

As discussed above, student engagement is entirely a social process. “Engagement is seen to comprise active and collaborative learning, participation in challenging academic activities, formative communication with academic staff, involvement in enriching educational experiences, and feeling legitimated and supported by university learning communities (Coates 2007)” (Beer 2010).

The ubiquitous nature of Internet and Web 2.0 technologies (e.g. wikis, blogs, video
online, social networks) has contributed significantly to distance learning and completely changed how people interact online, and in turn, a new learning paradigm evolves where tutors are facilitators. Nevertheless, current distance education still “has more in common with traditional classroom-based instruction than it does with what distance education can become” (Bronack, Riedl and Tashner 2006), because distance learning is still largely instructional.

“Learning occurs first on the social level and next on the individual one” (Vygotsky 1978). However, some social elements in traditional learning have been stripped out by the use of technologies. Lack of synchronous communication (e.g. face-to-face interaction between tutor and students, student and student) and multi-user online role playing activities in Web 2.0 may potentially reduce students’ experience and efficiencies for learning. As shown in Figure 1, traditional learning and web 2.0 learning each represents a quarter of the entire learning scope. Blended Learning is “the organic integration of thoughtfully selected and complementary face-to-face and online approaches and technologies” (Garrison, Vaughan 2008). However, Blended Learning is still unable to cope with the entire spectrum of distance learning, and in turn there is a push for the development of 3D Virtual Learning Environments, e.g. Second Life. As a result, those social elements once diminished are now embedded in 3D VLEs via avatars. Blended Online Learning caters the needs of distance learning because it is the combined effort of all sorts of technologies, including Web 2.0 and 3D VLEs, which covers almost the entire scope of online learning, as show in Figure 1.

One important feature of learning in 3D VLEs is that the idea of tutor has been put back in and redressed because communication between students and between students and tutors is essential to collaborative learning (Veerman, Else 2001). In addition, recent analysis by Zhao and Kuh (2004) about first-year and senior students from 365 four-year institutions shows that for both classes, members within a learning community were “strongly linked with active and collaborative learning and interaction with faculty members” (Zhao and Kuh 2004). As a result, tutors should be active participants (or co-participants) rather than simply facilitators in Blended Online Learning and 3D VLEs are more capable of fostering learning communities compared with the employment of Web 2.0 alone. This is called “3rd-party Directed Learning (3DL), where the tutor and VLEs co-exist” (Wan and Reddy 2009) and learning is regulated by both learning environments and virtual learning communities. The transition from Web 2.0 to the integration of Web 2.0 and 3D VLEs can be deemed as techno fix for techno problems.

In 3D VLEs, educational narrative is defined as “story-telling for purposes of education, training, or entertainment in which a user interacts with a computer system to experience a story as an active participant” (Young, Riedl 2003) and is usually created by a tutor. This is similar to Massively Multiplayer Online Role-playing Games (MMORPGs) which is plot-driven and narratives are pre-defined. It is worth noting that the word narrative in this paper refers narrative in a non-traditional sense, i.e. non-textual narrative, because MMPORGs and 3D VLEs by nature are non-textual worlds and here, non-textual refers to that there is no deliberate design on the part of somebody, rather than saying that letters or words are omitted.
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When analysing student engagement, traditional research focuses solely on the tangible aspect of 3D VLEs, e.g. attendance. However, “participating in a learning community may have a salutary effect on academic performance” (Zhao and Kuh 2004) and this is regarding the quality of student engagement. Hence, it requires to have a balanced view and take both tangible and intangible aspects into consideration, through the “inner eye of the soul” (Ryan 2001), i.e. narrative; and the “physical eye of the body” (Ryan 2001), i.e. avatar, because a narrative is the glue that binds the community together and the way by which a community of practice develops; an avatar is the mechanism by which a narrative is implemented in-world.

Narrative

Narrative creation is a (meta-)cognitive process, is essential to student engagement. When the system revolves around human input, as in the case of 3D VLEs, “every visit to the system actualizes a different narrative path” (Ryan 2001). Eventually all such sequential events will fit the looser pattern of episodic narrative. Therefore, the efficacy of student engagement in 3D VLEs will be multiplied.

As discussed in the previous section, built-in narrative is vital but external to students because they are tutor-created. However, this is only one side of the coin. In 3D VLEs, Second life in particular, narratives are co-created by students and narrative co-creation process is essential to the development of Community of Practice. This also represents the shift in higher education setting, i.e. from instructional learning to 3rd-party directed SRL, “where learning content can either be defined by the environment (e.g. a tutor or a thematic game), or by the students themselves (i.e. user generated content)” (Wan and Reddy 2009) or both. In other words, the advantage 3D VLEs has over Web 2.0 is the holistic approach of social interaction, because “learning communities operationalize a constructivist approach to knowledge (Cross 1998), whereby knowledge is not simply “discovered” but is socially constructed” (Zhao and Kuh 2004). Therefore, the efficacy of the so-called guided learning environments (e.g. MIMESIS) need to be re-evaluated based on the theory of Community of Practice, i.e. do gated or semi-gated learning environments promote or hinder the development of SRCL?

The activities in both MMORPGs and 3D VLEs have heuristic value because “the creation and exploration of imaginary worlds
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can be an instrument of self-discovery” (Ryan 2001). Nevertheless, 3D VLEs have more potential for higher education than MMORPGs do due to their open-ended nature. It is noteworthy to mention that the word, open-ended, is a relative term because Second Life is actually a platform and has the capability to host both gated environments such as MMORPGs and educational games, and open-ended virtual learning environments.

The difference between narrative in gated learning environment (e.g. interactive narrative-based systems and MMORPGs) and open ended learning environment (e.g. Second Life) is that the former has predefined narratives which has “a structured sequence of events” (Young, Riedl 2003); the latter offers “the ability for users to create their own narratives from the ground up” (Meadows 2008) and is “a prospective point of view, without knowledge of their outcome” (Ryan 2001). The depth of student engagement in both is accomplished by plot-driven. However, the former is a story unfolds; the latter is mainly about the co-creation process of a story.

In addition, although an interactive narrative system creates structured narrative at run time by taking “a user’s ability, interests, previous experience and other contextual factors” (Young, Riedl 2003) into account, it has significant disadvantages compared with open-ended environment such as Second Life. For instance, MIMESIS system, a 3D interactive narrative-based learning environment, created at NC State University, solely focuses on the interaction between student and the computer mediated learning environment, thus has ignored the social aspects of learning, i.e. “community building, and social interaction” (Hoog, Falkner and Seifried 2007). In other words, MIMESIS system might be a success from IT perspective, but it is definitely a failure in reference to the theory of Community of Practice, because it fails to meet the basic requirement of student engagement, e.g. active and collaborative learning, formative communication with tutors, as addressed at the beginning of section 2.2.

Although narrative co-creating process is the core of student engagement, the importance of the design of 3D VLEs should not be overlooked, because when a student enters a 3D VLE, she has to deal with a world that has already had some sort of built-in narrative though the build-in narrative is not aimed at any specific individual. Like ‘Alice in Wonderland’, a student walks into a built-in narrative script or story and automatically becomes a character. She cannot be fully engaged with the virtual environment until the boundary of the first person and third person perspectives gets blurred or diminished. This will be further explained in the next section with the use of avatar. As a result, a tutor is responsible for creating such an inspiring environment for students, especially for those who are novice or naïve.

The observation of a Second Life workshop for Religious Studies students at Newport School of Education in December 2009 further proves the importance of design, because the virtual religious sites visited by the students are unable to foster learning community due to lack of required built-in narratives. After all, those virtual sites are not designed for educational purpose.

A 3D VLE such as Second Life is a virtual world that “stretch[es] in space, exist[es] in time, and serve[s] as habitat for a population of animate agents” (Ryan 2001). Hence, it is an ideal place for academic practice, theoretically the expected depth of student engagement can be achieved because the aforementioned three dimensions “correspond to what have long been recognized as the three basic components of narrative grammar: setting, plot, and characters” (Ryan 2001).

Moreover, what 3D VLEs are really unique about is Multi-user Online Role Play via avatars which contribute to both spatio-temporal and emotional immersions and subsequently shared experience.

Avatar

Avatar is “an interactive, social representation of a user” (Meadows 2008), the animated agent that connects sociability and interactivity. Some literature defines avatar as
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the virtual representation of self. However, according to Ignatius, the self is “an indivisible ‘compound of body and soul’ (Exercises, 136)” (Ryan 2001). In 3D VLEs, body has been conceptualized as being virtual as “we would experience an expansion of our physical and sensory powers; leave our bodies and see ourselves from the outside; adopt new identities” (Ryan 2001) in the form of 3D avatars. An avatar by itself has far less meaning than a ‘self’ does. Avatars allow us to observe the roles played by us through the lens of third person. Therefore, avatars are the virtual representation of the characters not ourselves, until the moment that the boundary of the first and third person perspectives gets blurred or diminished, strictly speaking, when emotional immersion is accomplished.

The increased level of immersion in 3D VLEs is due to the increased level of fidelity, because “3D virtual environments (VEs) make use of the third dimension to increase the participant's sense of reality” (Scheucher et al. 2009), namely the geographical metaphor which was a “defining element in computer games” (Aarseth 2001). 3D VLEs are “richly rendered general purpose platform[s]” (Balkin, Noveck 2006) through which “spatial representation and negotiation” (Aarseth 2001) is achieved. The 3D added value is accomplished by the employment of avatar, which is an additional layer of the communication in virtual worlds. In turn, community building is a direct result of increased self-awareness and awareness of others.

Avatars have a significant impact on virtual identity, because students will not engage in the process of learning unless they feel that they are engaged in the community of learning. Therefore, in 3D VLEs, “the motive is to define the boundaries of identity rather than the boundaries of land” (Meadows 2008) because “avatar is a specific persona, and different identity, of the driver” (Meadows 2008). Behavioural rituals “require specific sort of personalities” (Meadows 2008) and “give archetypes meaning and expression, and vice-versa. The visual representation that a person chooses for their avatar has something to do with their role in the society” (Meadows 2008).

Some people claim that learners can be distracted from what intended to be as the focus because there are too many new experiences to be dealt with at once. Thus, 3D VLEs would not be effective learning environments if they were lack of familiar Real World features. Although this kind of “mimic ethos” (Kirriemuir 2007) has received lots of criticism over years, this view is not completely wrong or obsolete as it does have some positive impact on learning in 3D VLEs, e.g. in the case of avatar appearance and virtual identity. Avatars can “present valuable identity information solely by appearance” (Schmeil, Eppler 2008) and affect “the quality of interaction between tutors and tutees” (Fedeli 2009), because the appearance of an avatar is one indication of students' perception of their tutor’s professionalism, as research shows that students indeed re-evaluate their tutor based on her avatar appearance (Fedeli 2009). Simply put, real life appearance or similar will increase the trust and create instant affinity between students and their tutor. As suggested by Casanueva et al. that “the awareness of collaborators and their actions can be significantly enhanced by more realistic representations of persons” (Casanueva, Blake 2000). Furthermore, according to the poll done by Zogby International at the behest of the U.S. Congressional Internet Caucus Advisory Committee, 44.2% of the respondents prefer to “[k]eep me just about the same as I am” (Reuters 2008) regarding the question on their avatar appearance. In addition, real life appearance or similar can offset the confusion caused by the naming convention in Second Life. Naming convention in Second Life also has direct impact on virtual identity, but this will not be discussed here due to the focus of this paper.

Conclusion

Because most work done in 3D VLEs is still exploratory, so their efficacy for learning and teaching remains largely underexplored. In order to better understand the academic
potential of 3D VLEs, Second Life in particular, it is essential to evaluate the factors that underlie student engagement. Under the framework of the Self Regulated Community of Learning (SRCL), Narrative as Student Engagement (vice-versa) is one more step forward in guiding real practice in 3D VLEs and an addition to postmodern narrative theory. Narrative as Student Engagement is an attempt to close the gap between spatio-temporal and emotional immersions in 3D VLEs. Narrative as Student Engagement builds the sense of community. In turn, the sense of community improves the depth of student engagement.

3D VLEs such as Second Life has significant advantages over web 2.0, gated virtual learning environment and single-user virtual learning environments in terms of group building and collaborative learning. However, Blended Online Learning is the combined effort of all of them. User engagement is much easier to be achieved in 3D VLEs because they provide “an advanced level of social networking through the employment of avatars” (Kirriemuir 2007), and allow people to “act within a world and experience it from the inside” (Ryan 2001). Thus, narrative is the mechanism that glues the community together; avatars are the mechanism by which the concept of the community is reintroduced and a narrative is implemented in-world.

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