



Enhancing learning in a virtual world using highly elaborative reminiscing as a reflective tool



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ABSTRACT

While virtual worlds are increasingly being used to provide technology-assisted experiential learning opportunities, no research has yet considered the use of reflective reminiscing within these worlds. Drawing on a strong body of developmental research, in which children's recall for past experiences is enhanced by parents' "high elaborative" reminiscing (open-ended questions, detail), we tested each element of this reminiscing style with adult learners. Ninety-eight undergraduate students were guided through a virtual event, a reflective reminiscing phase, and a memory test (free recall, multiple-choice). In free recall, a questioning main effect emerged. Students who had been asked open- versus close-ended questions during reminiscing deliberated for longer, and subsequently recalled more. When reminiscing time was controlled, those given high detail instead recalled more. In the multiple-choice test, an interaction emerged. Participants scored higher if given both open-ended questions and high detail during reminiscing. We suggest that reminiscing be employed as a reflective tool to enhance learning within virtual worlds, but only if a high-elaborative reminiscing style is used.

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1. Introduction

Educators are increasingly using technology-mediated learning environments to engage students in learning (Jarmon, Traphagan, Mayrath, & Trivedi, 2009; Lu, 2010). Virtual worlds – interactive three-dimensional environments where users adopt an avatar to interact with the world and others in real-time – are one such environment (Dickey, 2005; Johnson & Levine, 2008). Virtual worlds can be designed to look like any space, real or fictional, at any point in history. Virtual worlds are popular with educators because they offer experiential opportunities not always possible within "real world" learning activities limited by time and place. For example, in a virtual world, learners are able to "meet an Amazonian tribe" to learn about culture, or "visit the inside of a hospital theatre" to learn about physiology (Mathews, Andrews, & Luck, 2012; Wrzesien & Alcaniz Raya, 2010). Goals such as knowledge acquisition, higher-order thinking, and skill development can all be built in to the design of a virtual world, while at the same time maintaining a rich and engaging experiential environment for students to explore (de Freitas & Griffiths, 2008; White & Le Cornu, 2010).

Although virtual worlds are increasingly being used for a range of educational purposes, it is currently unclear what pedagogies are best suited for learning in these environments (Dickey, 2005; Kankaanranta, 2005; also see Hew & Cheung, 2013). While a plethora of educational research highlights the importance of students' reflection for learning (Moon, 1999; Russell, 2005), for example, no empirical research to date has tested or compared the ways in which student reflection is promoted within a virtual world environment.¹ Reflection is important because it allows students to consolidate, analyse, and draw conclusions from the material presented (Dunlosky &

¹ We searched the education database ERIC for all articles using the terms "virtual world" AND "reflect*". Because asterisks (*) operate as truncations, all other variants of "reflect" (such reflection and reflecting) were also included in the search. We limited to peer-reviewed results, but did not limit publication year, age group, or educational stage. There were twenty-six hits (1996–present). In 13 articles, the reflection referred to was that of the authors (e.g. reflection on virtual world pedagogy). Other articles reported students' reflections on the virtual world experience ($n = 2$), teachers' reflections on virtual world pedagogy ($n = 1$), case studies of worlds which may enable reflection ($n = 2$), theoretical discussions of virtual world design ($n = 2$), and articles describing other learning activities, such as video case studies ($n = 3$). Finally, three articles described students' reflection on virtual world content; yet with no manipulation of reflection or measurement of learning outcomes.

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Theide, 1998; Metcalfe, 2009; Rogers, 2001). Dewey, who highlighted the importance of reflection as far back as 1933 (p. 118), suggests that reflection enables “*careful consideration of any belief or supposed form of knowledge*”. In turn, Boud, Keogh, and Walker (1985, p. 43) argue that reflection “*is an important human activity in which people recapture their experience ... it is this working with experience that is important in learning*”.

Given the benefits of student reflection for learning, it is critical to consider how learning within a virtual world might also be enhanced through students' reflection. Across a multitude of studies, reflective activities such as reflective writing and blogging, topic summaries, group discussions, and role play focusing on previously learned material have been shown to enhance students' perceived learning, retention of information, and positive emotion of the task (Nestel & Tierney, 2007; Williams & Jacobs, 2004). Because the knowledge acquired in a virtual world is built in a simulated, event-based format, however, it is not clear the extent to which some reflective activities translate. Further research is required to determine which reflective approaches will be successful.

For example, while both instruction in the physical classroom and experiences in the virtual world each enable semantic knowledge acquisition, higher-order thinking, and skill development within a particular discipline or domain (Chin, 2007), the virtual world experience differs from many non-virtual learning activities in that it is inherently episodic (White & Le Cornu, 2010). Students experience a sense of personal involvement when engaging in virtual world tasks, and learning occurs within an experiential framework (Mathews et al., 2012; White & Le Cornu, 2010). There is therefore an opportunity to empirically test reflection activities that depend on both the episodicity of the experience and students' personal involvement, such as reminiscing.

Of course, plentiful non-virtual episodic learning opportunities also exist. When students go on an excursion or field trip, and when they perform hands-on tasks in the physical classroom, such as science practicals, learning is also experiential. Moreover, like virtual world experiences, such learning is very often also student-directed. While there may be some degree of difference between some non-virtual activities and virtual worlds – that excursions are bound by time and place (Wrzesien & Alcaniz Raya, 2010), or that hands-on activities often aim to develop procedural knowledge (see Anderson & Krathwohl, 2001) – we suggest that reflective activities which capitalise on the personal episodic nature of these non-virtual activities should support learning in virtual worlds too. Despite being inherently episodic, however, reminiscing has not been tested as a reflective tool to enhance learning in non-virtual experiential learning environments either.²

1.1. High-elaborative reminiscing as a reflective tool

Although no educational research to date has tested different kinds of reflection tailored to the virtual world, psychological research highlights the importance of reminiscing for episodic recall. In developmental research, for example, the ways in which mothers reminisce with their children has been shown to have differential outcomes for children's autobiographical memory (Fivush, 2011; Fivush, Haden, & Reese, 2006; Wareham & Salmon, 2006). Such work, grounded in the sociocultural theory, highlights the importance of providing scaffolding that supports and

extends children's contributions to the evolving memory narrative beyond what they would be capable of independently (Nelson & Fivush, 2004). Mothers who are characterised as having a “highly elaborative” reminiscing style – who typically ask a preponderance of open-ended questions and provide additional detail about past events when reminiscing with their children – have children who show greater accuracy and detail in their autobiographical recall of that event (Cleveland & Reese, 2005; Van Bergen, Salmon, Dadds, & Allen, 2009). Conversely, mothers with a “low elaborative” reminiscing style, who typically ask more closed-ended questions and provide scant event context or detail when reminiscing with their children, have children who recall the same experience less fully (Fivush, 2011; Van Bergen & Salmon, 2010).

In emerging psychological work with adults, similar outcomes are found. In a recent study with 12 long-married elderly couples, for example, Harris, Keil, Sutton, Barnier, and McIlwain (2011) showed that many couples remember meaningful past events far better with their spouse than alone: showing rich systems of mutual cuing to support one another's memories. The use of memory cues, cue responses, and reminders of important information each facilitated recall between spouses, whereas memory corrections inhibited recall. In similar work with pairs of non-pilots, novice pilots, and expert pilots asked to recall a series of novel aviation scenarios, Meade, Nokes, and Morrow (2009) similarly found that the way in which participants remembered together was important. Expert pairs were more likely to acknowledge and then elaborate on their partner's contributions: techniques which each predicted recall.

There are several reasons why highly elaborative reminiscing with open-ended cuing and questioning from a partner may strengthen recall. First, any opportunity for reminiscing provides a second encoding opportunity (Wareham & Salmon, 2006). By attending to and reliving the event mentally, information can therefore be consolidated and reworked. Second, by reminiscing about an event in high detail, compared to low detail, the conversational partner also provides scaffolding support, in the form of memory cues, to enable the event to be recalled more vividly. These additional memory cues would help strengthen the existing memory representation, as well as permit the formation of new memory linkages previously forgotten, or unattended to, during the initial event experience. Third, by being asked open-ended questions, the “rememberer” is given the opportunity to actively contribute to the new event construction. Much previous research shows that material that has been personally generated is more memorable than material that one has been told to remember (Kinjo & Snodgrass, 2000; Moshfeghi & Sharifian, 1998). In an educational context, therefore, the types of questions directed to students and the amount of reflective detail that is self- versus other-generated would each be expected to influence students' subsequent learning (Chin, 2007; Smith & Higgins, 2006).

Together, these findings suggest that reflective reminiscing may serve to enhance students' recall of an episodic virtual world experience in the same way that other reflective activities, such as reflective writing and blogging, group discussions, and role play aiming to refresh or re-enact the knowledge have been shown to enhance retention and perceived learning for other kinds of information (Nestel & Tierney, 2007; Williams & Jacobs, 2004). Moreover, they suggest that the style of reminiscing imposed – whether high or low in detail, and whether open or closed in questioning – will mediate this effect.

1.2. Questioning in the classroom

While no educational research to date has tested the impact of reminiscing as a reflective learning tool, open-ended questions

² We searched for the terms “reminisc*” AND (“experiential” OR “virtual world” OR “virtual learning”), using the same search settings and limits as above. There were 12 hits, yet no article described the use of reminiscing or reflection to enhance learning.

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