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Special Issue Introduction

Crossing boundaries: Learning and teaching in virtual worlds

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While the concept of multi-user virtual worlds is not new, the rising popularity of virtual world applications has been rapid over the last 5 years, with around 180 Virtual Worlds at present available or under development (de Freitas, 2008). The Virtual Worlds allow users to interact with one another with a greater sense of presence than ¹ in video or web conferencing. In addition, three-dimensional worlds allow for a range of activities beyond social meetings and online seminars, eg, interactive activities, quests, mentoring and research collaboration of distributed groups (Prasolova-Førland, 2008).

The emergence of virtual worlds as a teaching and learning tool and environment is a comparatively recent one, stemming largely from a set of socio-technical transitions such as wider access to broadband, the development of powerful technologies and platforms, the emphasis upon social and experiential interactions, and advances in the uses and applications of the internet. These forces have led to greater challenges and opportunities for the learning and teaching communities that may broadly be categorised in terms of social, pedagogic, institutional and technological. The expansive nature of these tools and applications introduces further complexities regarding the impact and implications of virtual worlds for teaching and learning. Specifically, virtual worlds can be used in unique disciplinary contexts and in very broad ways to support general teaching and learning, or research practices and communities. This area of research

1 and practice presents the community with real challenges. Furthermore, these envi-
2 ronments offer potentials, such as:

- 3 • re-organising and extending social interactions and collaboration;
- 4 • increasing engagement and motivation through greater learner empowerment and
5 participation;
- 6 • presenting new opportunities and scope for creativity in learning such as through
7 role plays and mentoring;
- 8 • embedding simulations and play to support deeper learning such as undertaking
9 experiments that are difficult to replicate in the real world;
- 10 • opening up new learning spaces for rehearsal and exploration, experimentation and
11 design, production, and user-generated content;
- 12 • providing broader capabilities for learner-led activity, problem-based and exploratory
13 learning.

14 Broadly, this potential has been identified in a previous special issue of BJET [40(3)], but
15 as succinctly pointed out by Salmon and Hawkrigde (2009, p. 408) in the introduction [2]
16 for the issue on the use of three-dimensional multi-user virtual environments in higher
17 education,
18

19 Noticeably, none of the UK or US papers [discussed] reported a major research project. Many were
20 promotional or even speculative, writing about what might happen in SL [Second Life] rather
21 than what has happened.
22

23
24 In this issue, we have attempted to bring together some of the early emerging studies
25 that are implementing virtual world environments into teaching and learning practices
26 to extend prior work and push forward the main research lines towards a more homo-
27 geneous set of discourses, thereby integrating some of the diverse disciplinary perspec-
28 tives, identifying and testing the varied methodologies and frameworks put forward,
29 and synthesising some of the main lessons from early research in the field.
30

31 While it is clear from this special issue (and previous ones) that there are still significant
32 gaps in the research in this field (see for example Hew & Cheung, in this issue), this work
33 collectively represents a substantial advancement over the last 5 years not only in the
34 use of Virtual Worlds for learning and teaching, but importantly in the methods and
35 approaches being used to experiment with, understand, evaluate and validate this
36 usage. The trend towards lists of examples of uses of Virtual Worlds (eg, Kirriemuir,
37 2008) has given way to real and substantial study of problem-based, exploratory learn- [3]
38 ing and pedagogically driven uses of Virtual Worlds. While there has been an emphasis
39 upon the use of Second Life as a popular example of a virtual world, other virtual
40 worlds are being explored (eg, Whyville, OLIVE) and greater subtlety of themes exam-
41 ined is notable in the papers gathered in this issue.
42

43 While one of the key issues in this field has been how to bring together work from such
44 diverse subject areas such as cognitive psychology, computer science, educational tech-
45 nology and the learning sciences, gradually a 'cross-discipline' is emerging that is

1 allowing different methodologies to be brought together through dialogic forms that
2 were previously difficult to support because of the more silo-based structures of the
3 academy. Although 'interdisciplinarity' and 'cross-disciplinarity' were identified as
4 desirable concepts, the capabilities and infrastructure to actively engage with different
5 disciplines was simply not developed. Over the last 30 years, academic disciplines have
6 been encouraged to engage in, and have re-arranged methods that better facilitate,
7 cross-engagement and cross-collaboration. Challenges faced by the authors with bring-
8 ing diverse subject groups together have often centred upon methodologies—how do we
9 allow for different methodologies of data collection, analysis and synthesis to be
10 brought together seamlessly? How can we best facilitate collaboration when conceptual
11 stepping-off points (eg, between scientific and social scientific paradigms) are so
12 different?

13
14 Towards this end of real cross-disciplinary engagement, this issue was twinned with the
15 First International IEEE Conference on Serious Games and Virtual Worlds, which was 4
16 held in March 2009 at the University of Coventry, UK. The conference explored how
17 boundaries of disciplines had been traversed and had brought together leading expo-
18 nents of the field to debate and discuss their work in the light of the considerable
19 challenges set out in this introduction. One of the papers published in the Conference
20 Proceedings (edited by Rebolledo-Mendez, Liarokapis & de Freitas, 2009) is included in
21 this volume (de Freitas *et al.* in this issue), and two papers from that conference are
22 included in a special issue on Visual Computing (edited by Liarokapis, 2009), exemplify
23 the cross-disciplinary nature of the emerging field of research.

24
25 Over the next 5 years, we anticipate that further inroads will be made into establishing
26 effective methods for building truly cross-disciplinary methodologies that would help us
27 cross the boundaries between science and humanities, systems and participatory
28 design, formal and informal learning. This issue then, is part of a bigger and ongoing
29 process of bridge-building and seed-planting. Interestingly, at least part of the solution
30 to these challenges may be provided by the subject matter under consideration (ie,
31 educational/learning technologies). Virtual environments offer learning and teaching
32 practitioners, researchers, policy-makers, and developer's real scope and a basic infra-
33 structure for collaboration, not just between disciplines, but also across physical spaces
34 and institutions. The work included in this volume attests to this substantially through
35 an emphasis upon the role of the social at the heart of the virtual interactions.

36 37 **Virtual worlds and the social**

38 A theme that permeates all papers in this special issue is that of sociability and the
39 capabilities of Virtual Worlds to support groups or communities of learners. The sense
40 of presence inherent in virtual worlds appears to aid engagement and collaboration,
41 and has been identified as having key benefits for education and training purposes.
42 However, the social capabilities of virtual worlds are just beginning to be exploited in
43 educational and training settings. Perhaps, one of the reasons why this is particularly
44 challenging for instructors is how learning is conceptualised. The work of Laurillard

1 (1993) has shown the importance of dialogue, and the social nature of virtual worlds
2 build upon and extend the dialogic model substantially. Social is not just defined as
3 interactions between individuals and groups, but also between individuals and the
4 spaces they co-construct around themselves. The act of building and producing hence
5 becomes a powerful training and teaching tool supporting socialisation and extending
6 opportunities for conceptual thinking and exploration. The study by de Freitas and
7 colleagues (in this issue), for example, focuses upon the social- and community-building
8 dimension of Virtual Worlds, and how different aspects of the education system may be
9 affected by the transition. In effect, the definition of learning as information regurgita-
10 tion is giving way to a notion of learning as centring upon 'immersive learning
11 experiences' that are inherently social and collaborative. The key challenge for educa-
12 tionalists here is to respond to a significantly more dynamic and complex learning
13 environment and its associated sets of teaching tools.

14 **Pedagogy and virtual worlds**

15 One of the main pedagogic issues at stake in this debate centres on the kinds of peda-
16 gogies implemented in virtual worlds and environments. As is traditionally the case,
17 when new and emerging technologies are adopted and integrated into educational
18 processes, they are implemented and used in traditional and recognisable ways, with
19 linear PowerPoint slides replacing projectors, and blogs replacing personal reflection
20 diaries (Veletsianos, in press). It is not uncommon to see intricate virtual world class- 5
21 rooms where students are asked to sit in rows to passively receive a video or slideshow
22 presentation. To fully understand the possibilities that the tools and environments offer
23 for pedagogy, we need to harness a culture of experimentation, trial-and-error, and
24 creativity, along with a deep understanding of what opportunities virtual worlds offer
25 for teaching and learning.

26
27
28 Towards this move for more creative approaches to learning, Dalgarno and Lee (in this
29 issue) review the unique characteristics of virtual worlds, identifying opportunities for
30 researchers and practitioners to use virtual worlds in education in relation to the
31 potential learning benefits they provide, for example, the facilitation of task-centred
32 learning, opportunities for experiential learning, increasing levels of motivation and
33 engagement, the provision of richer and more effective collaborative learning. Viewing
34 technology-enhanced education through an *affordances* lens (Kirschner, Strijbos,
35 Kreijns & Beers, 2004) has gained wide attention in the literature. Virtual worlds offer
36 suggestions for action and design of learning activities and tasks, but it is important to
37 highlight that while these suggestions influence how a technology is used in educa-
38 tional spheres, actual use is not *completely* determined by the technology, and is also
39 shaped by sociocultural forces (Veletsianos, 2009). The spirit of adopting more 'high-
40 risk' learning strategies and inquiry-based learning opportunities, in line with the
41 affordances inherent in virtual worlds, is also demonstrated by Ketelhut and colleagues
42 (in this issue) who outline the implementation of a virtual world where middle-school
43 students collaborated in solving authentic and situated problems related to the emer-
44 gence of bacteria and disease in a historic town. Empirical results from the investigation
45 are promising, but the notion of appropriating virtual worlds to harness a powerful

1 pedagogical approach highlights both the power and limits of thinking of technologies
2 in terms of the capabilities that they provide for education. Certainly, the links
3 between pedagogy and the social dimensions of learning need deeper scrutiny and
4 consideration.

6 **Virtual worlds and the institutions**

7 A separate but linked challenge of using virtual worlds has been outlined in the litera-
8 ture and rests upon various disconnections between the institution of the university/
9 school and the use of virtual worlds. This 'disconnect' is multiple and includes:

- 10 • infrastructural disconnect (eg, between formal curriculum and informal learning);
- 11 • practical disconnect (eg, hours of schooling and durations of play);
- 12 • empirical disconnect (eg, between purported benefits and realised outcomes);

13 One response to these disconnections has been to adopt more collaborative, student-
14 centred and activity-based teaching practices. There is no reason to expect that the gulf
15 between the disconnects cannot be bridged. For example, Hew and Cheung (this issue)
16 in their review paper attempt to bridge the empirical disconnect by reviewing prior
17 literature with respect to (1) how virtual worlds have been utilised, (2) what types of
18 research methods have been used to study virtual worlds, and (3) what research topics
19 have been investigated. While the affordances and opportunities for virtual worlds
20 provide hopes for the use of virtual worlds to empower education, Hew and Cheung
21 note that such opportunities need to be empirically questioned and investigated if insti-
22 tutions are to adopt virtual worlds. It is therefore clear that a concerted effort is required
23 to create the bridges and cross the boundaries between where we are and where we need
24 and want to be. In this respect, academics should ask what purpose universities are
25 fulfilling, how that purpose is changing, how each one of us, individually, can promote
26 the values inherent in education, and how virtual worlds can contribute towards
27 desired goals.

29 **Virtual worlds and the technological advances**

30 The fourth consideration framed in this issue is the technological, which is the sum of
31 the other categories. The technological advances that are occurring at the forefront of
32 the field are situated in the areas around (1) development of tools and frameworks for
33 extending virtual world capabilities, and (2) intelligent and conversational pedagogical
34 agents/avatars. Three papers are included in this issue to outline these contributions.

35
36 Bellotti and colleagues in this issue focus on describing the development of tools and
37 processes that allow for the development of re-usable learning tasks that can be embed-
38 ded across virtual worlds. Their work reduces barriers to enter the virtual world devel-
39 opment scene by introducing scalability, flexibility, ease-of-use and cost-effectiveness to
40 virtual world development. Importantly, this development follows on the footsteps of
41 the Web 2.0 world in the sense that technological maturation allows both experts and
42 novices to contribute, participate and create content. While early adopters may experi-
43 ment with and utilise virtual worlds in their teaching and research endeavours, wide-
44 spread use is bound to suffer until the development of flexible tools that enable seasoned

1 users to seamlessly develop in-world content and activities that solve their identified
2 problems. To this extent, Bellotti and colleagues forge a path towards further virtual
3 world adoption.

4
5 Veletsianos and colleagues (in this issue) focus on intelligent and conversational peda-
6 gogical agents/avatars. This paper outlines a drive that includes a notion of humanistic
7 intelligence, the idea that avatars and agents can integrate an element of intelligence
8 and sociability that can support differentiated learning, personalisation, authenticity
9 and situated cognition (Brown, Collins & Duguid, 1989). Veletsianos and colleagues
10 exemplify the value of multidisciplinary in this area by presenting perspectives from
11 four different disciplines on the design of geriatric avatar-patients in medical simula-
12 tions, highlighting points of convergence and future research/practice. Falloon and
13 colleagues outline their study and development of an avatar-based authoring program,
14 providing evidence for the power of using these tools for digital story-telling. This area
15 is not without its own controversies. Stemming from such approaches as intelligent
16 tutoring systems, it is clear that the drive is towards socially affable agents that are
17 supportive and guiding of co-constructed learning.

18
19 Ultimately, the volume and movement of work around how best to use virtual worlds to
20 support learning and teaching is an ongoing process that has commenced with this
21 work but that goes beyond it into different disciplines. While the work clearly signals
22 the need for the development of the 'cross-discipline' that is not to the exclusion of the
23 disciplinary depth, both are needed. The cross-discipline can provide synthesis for the
24 main findings and outcomes of the disciplinary, allowing lessons to be learnt and fed
25 back into the disciplinary context. In this way, the main argument of the authors is that
26 while this work is important for signalling fertile ground for cross-disciplinary work
27 that brings together new tools and frameworks, and methods and approaches, this is
28 not to the exclusion of a disciplinary emphasis. Virtual Worlds open up new potential
29 for learning and teaching, but present real challenges for researchers and learning
30 practitioners who are attempting to find appropriate and beneficial ways of usage.
31 However, the work included here demonstrates a change in this approach and the
32 beginning of greater criticality and analysis in how virtual worlds are deployed in
33 education.

34
35 To conclude, the issue scopes the directions of research and practice in the use and
36 application of virtual worlds for learning and training, however it also signals the
37 beginning of wider adoption of immersive learning strategies, indicating available
38 pedagogies being used, and opening up debate around some of the critical themes and
39 issues emerging. The work is a starting point for future research in the field, capturing
40 the possibilities of virtual world learning not only for supporting social interactions but
41 also for providing an infrastructure for international collaboration and cross-
42 disciplinary within this field and across the academy.

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