

Social Conferencing in a Virtual World: The Innovative Approach of The Virtual World Conference

Andreas Schmeil¹, Béatrice Hasler², Anna Peachey³, Sara de Freitas⁴, Claus Nehmzow⁵

¹Faculty of Communication Sciences
University of Lugano (USI)
Via Buffi 13, 6900 Lugano, Switzerland
andreas.schmeil@gmail.com

²Advanced Virtuality Laboratory
Interdisciplinary Center (IDC) Herzliya
Herzliya, Israel
hbeatrice@idc.ac.il

³Eygus Ltd.
England
anna@eygus.co.uk

⁴Serious Games Institute
Coventry, England
sfreitas@cad.coventry.ac.uk

⁵Alcus International Ltd.
Hong Kong
claus.nehmzow@alcus.biz

Keywords: Virtual worlds, conferences, online events, case study, evaluation, innovation, experience design, design science research

Abstract

In this paper the authors present the organization of a virtual world conference that brings together top international researchers and pioneers in the fields of research and application of virtual worlds from academia, education, and industry. The authors outline the successes and challenges of adopting the approach of structuring the global conference into three equidistant major time zones – East, Central, and West – resulting in a 24-hours worldwide event. The paper presents analyses of questionnaires that were completed by attendees, in an attempt to test the central hypothesis that virtual worlds can support engaging and effective conferencing. We present innovations that we apply for the second edition of the conference and close the paper with suggestions and novel ideas for future virtual world conferences.

Introduction

As a result of globalization, distributed work teams and groups of researchers travel more and more for international projects and to attend conferences on all continents. Financial cost, time spent, and the impact on the environment that international travel causes are all high, and many companies, organizations and institutions are looking for alternative methods for bringing people together.

Over the last few years, virtual world platforms have proliferated. A range of platforms, such as ActiveWorlds, Second Life, OpenSim, and Olive, that allow for large numbers of people to experience co-presence in virtual environments are being used widely in many diverse fields. Conferencing in virtual worlds is becoming an increasingly popular solution. It has the immersion to make participants feel engaged and part of the group (Schroeder, 2006), and has the ease of access and low costs that enable participants to take part from their offices or homes or even on the move without missing out on the socializing aspects of the conference. However, one of the major issues with using virtual worlds to support synchronous meetings lies in the imposed limits of physical world time zones; while users within a continent can relatively easily overcome the time zone barriers, when working between several continents, 6-8 hours differences can be difficult to reconcile.

The authors have collectively over twenty-five years experience of working in immersive virtual environments. The common focus of the team from different disciplinary backgrounds including computer science, psychology, educational research and collaborative work and organizational behavior has been on how social collaboration can be best designed and supported in virtual and hybrid spaces. Social collaboration in virtual spaces has been investigated in psychological studies (e.g. Hasler, in press), in education research fields (e.g. Peachey et al., 2011; Peachey et al., 2010; de Freitas et al., 2010; de Freitas, 2006) and from computer science, Human-Computer Interaction (HCI; e.g. Schmeil et al., in press), and Computer-Supported Cooperative Work standpoints (CSCW; e.g. Schmeil et al., 2009). Since the different areas traditionally focus upon different aspects, the research team that organizes The Virtual World Conference represents a rare collaboration of these perspectives, creating the opportunity for a rich reflection on our shared experience.

The initial purpose of the conference was to bring together aspects of two physical conferences (the Serious Virtual Worlds and ReLIVE conferences, both based in the UK) into one virtual world conference that complemented both and provided a platform for wider international dissemination, collaboration and networking. The virtual event felt increasingly appropriate in a period where budgets to attend physical conferences are rapidly diminishing, and global considerations increase the wider arguments against international travel. For example with speakers and delegates from around the globe, the benefits of holding our conference in a virtual environment are apparent in air miles alone. Rough calculations, allowing two-thirds of delegates to be one-third of the planet away from the conference home in Milton Keynes, suggest that 500,000 miles were travelled virtually to attend the conference. This reduces the environmental footprint of the conference, and saves on the time and cost of being out of the office for days either side of the main event, along with

the conference fees needed to fund physical facilities. Even better, for one small delegate fee, colleagues could share a single avatar, or project the conference on to a large screen for group viewing.

In order to be truly global the idea was born to organize an event spanning 24 hours, divided into three equidistant conference time zones of 8 hours each: East (Asia, Oceania), Central (Europe, Africa), and West (the Americas).

With this pioneering approach, we felt the need to implement a design science research (DSR; Hevner et al., 2004) approach: The Virtual World Conference (TVWC) is subject to perpetual redesign; each year the conference and its format and organization is evaluated, and is redesigned based on the analyses, comments of attendees, and further trackable data.

The paper first gives a background of virtual world conferences and other events, describes the case of TVWC, presents the evaluation of its first edition, discusses resulting implications for its second edition, and closes with suggestions and novel ideas for future conferences in virtual worlds.

Conferences in virtual worlds

Many inworld conferences took place before The Virtual World Conference, for example a Second Life event for surgeons was very successful (Kinross et al., 2009). However while there had been other attempts at conferences engaging audiences across time zones (most notably VWBPE: Virtual Worlds – Best Practices in Education), The Virtual World Conference was, as far as we are aware, the first to have adopted a twenty-four hour approach that worked with the natural day of speakers and audience.

In previous conferences held by the Serious Games Institute in the UK a hybrid model of combining physical conference space and lectures with remote participation (through inworld avatars) had been developed; the first conference of this kind, Serious Virtual Worlds, was held in September 2007 with the launch of the Serious Games Institute (SGI). The event was well attended, both inworld and in the physical world. The virtual event however merely projected the actual event back into the Second Life auditorium (via video stream), and the link back to the physical conference was not established. For the next year Serious Virtual Worlds established a two-way communication system, and now inworld participants could ask questions and even present from Second Life lending a more international flavor to the event, and testing the streaming technology. From 2007, the Second Wednesday monthly events were also piloted using the same technique, but held every month. These events brought 4-5 speakers a month into the virtual and physical hybrid event spaces, and remote participation with the events is still significant now.

The IEEE Virtual Worlds and Serious Games conference (VS-GAMES) in 2009 also adopted the hybrid model of virtual and physical presence. The main observation from the experience of hosting events in both settings is about the wider reach that has been established and the community that has been formed and supported through the three years, but also the connection of the community to industry gives the collaboration a focus upon physical world application of theory, and a strong

connection with practices in education, health and the environment. Collaboration is the watchword of this type of community building, and supporting communities over long periods can be difficult but also rewarding. Intellectually, it has led to many new synergies being created, in particular innovation is well supported through this approach due to the cross-disciplinary backgrounds of participants. Communities of interest as well as practice (Wenger, 1998) emerge over time and people between sectors seem to become much more cohesive after several meetings.

The Virtual World Conference approach

The organization team of TVWC 2010 was composed by four conference chairs (2 in the UK, 1 in Hong Kong and 1 in California), two technical helpers in the UK, and a student volunteer in Turkey.

Scope

We titled the conference unambiguously *The Virtual World Conference* for its aim to cover applications of virtual worlds in the most diverse application areas, research done in and on virtual worlds, and current and future developments, also including combinations with real and other digitally-augmented environments. The name says it all: it was chosen to stand for diversity, manifoldness, and collectivity, on all aspects of virtual worlds. With its innovative, dynamic approach and yearly redesign we further aim to showcase a new understanding of just what the medium can be good for.

Timing Structure

The event was organized as a 24-hour around the world event, moderated by one chair for 8 hours each (two co-chairs in the Central time zone). All presentations in all time zones were open to be attended for registered delegates, although it was expected that most delegates would spend core time in their own time zones. Table 1 shows the conference schedule to illustrate the timing structure of the conference and the timings of the talks in the East (E), Central (C), and West (W) for the other time zones. Conference presentation slots are in bold font in their respective time zones, night times are grayed out. With this timing structure, we aimed for each attendee to be able to attend all presentations in the time zone closest to their location, plus an additional 4-8 presentations of other time zones, by sacrificing some evening leisure time for it. Note that attendees were not only located in one of the three time zones, but rather dispersed in all time zones in between. We also informally decode TVWC as “The Virtually Worldwide Conference”.

Conference Environment

The 2010 event was hosted entirely inworld on a UK Open University island in the virtual world Second Life, which was chosen as the most popular immersive environment of the moment (Kirriemuir 2009). The spatial organization was conventional: rows of seats for the audience, directed towards a speaker podium that was flanked by two big screens – a bespoke slide presenter displaying the current presenters’ presentation slides, and a video screen that could play videos from elsewhere on the Internet. This convention was a deliberate action, reflecting that the key drivers for being in the virtual world were considerations of physical practicalities rather than innovation. Providing a familiar space, icons and artifacts meant that both speakers and delegates would be comfortable with their environment and free to concentrate on the content rather than the delivery of presentations.

Table 1 Schedule of The Virtual World Conference 2010

	West (UTC - 8)	Central (UTC +/-0)	East (UTC + 7)
E: Speaker 1	17:00	1:00	8:00
E: Speaker 2	18:00	2:00	9:00
E: Speaker 3	19:00	3:00	10:00
E: Speaker 4	20:00	4:00	11:00
E: Lunch	21:00	5:00	12:00
E: Speaker 5	22:00	6:00	13:00
E: Speaker 6	23:00	7:00	14:00
E: Speaker 7	0:00	8:00	15:00
C: Speaker 1	1:00	9:00	16:00
C: Speaker 2	2:00	10:00	17:00
C: Speaker 3	3:00	11:00	18:00
C: Speaker 4	4:00	12:00	19:00
C: Lunch	5:00	13:00	20:00
C: Speaker 5	6:00	14:00	21:00
C: Speaker 6	7:00	15:00	22:00
C: Speaker 7	8:00	16:00	23:00
W:Speaker 1	9:00	17:00	0:00
W:Speaker 2	10:00	18:00	1:00
W:Speaker 3	11:00	19:00	2:00
W:Speaker 4	12:00	20:00	3:00
W:Lunch	13:00	21:00	4:00
W:Speaker 5	14:00	22:00	5:00
W:Speaker 6	15:00	23:00	6:00
W:Speaker 7	16:00	0:00	7:00

The Second Life island environment has an externally imposed limit of 100 concurrent users, and conference registration was restricted to manage an expectation of no more than around 60 users at any time in order to reduce lag and manage an optimum experience for the participants.

Figure 1 shows the inworld setup for TVWC 2010. The speaker podium contained the controls for the video screen.



Fig. 1 The setup of The Virtual World Conference 2010

Selection of speakers

Following the conference goal of addressing global challenges, we invited 21 speakers whose reputations suggested that their experience would inform a discussion on the opportunities for virtual worlds to address some of the core issues in contemporary society. We asked speakers to consider how virtual worlds can change the way that we learn, work and socialize, and invited them to select a focus from:

- Social interaction, societies and communities in virtual worlds
- Business applications and strategies for using virtual worlds
- Formal and informal teaching and learning in virtual worlds

Most of the speakers were familiar with Second Life but a small minority needed additional support to get an avatar and become familiar with the interface. All speakers were asked to submit their slides and video in advance of the event, and were invited to meet their session chair and technical support inworld for logistical and technical checks in the week leading up to the conference.

Management and administration

Like any other international conference, The Virtual World Conference is supported by a website (<http://thevirtualworldconference.org>) to inform about dates, presenters, chairs, registration, and the conference program, showing abstracts of all presentations (the 2010 website is archived at www.thevirtualworldconference2010.org). A low registration fee for all attendees covered web hosting expenses and other organizational costs, as well as providing some measure of assurance that registered delegates would take up their places in the restricted space.

As an aside it is worth noting that the area of cost would make an interesting topic for further research, as the real costs of hosting the conference were considerably more than the income derived, but a discussion thread in a community mailing list at the time suggested that some people felt that all virtual world events, without exception, should be free to attend.

Evaluation of The Virtual World Conference 2010

A link to an online survey was sent to all attendees and speakers one week after the event to evaluate various aspects of TVWC and collect opinions and ideas for improvement.

Participants of the Survey

27 participants of TVWC (6 speakers, 19 attendants, and 2 who did not specify the type of their participation) replied to the survey. 18 participants were from the Central, 7 from the West, and 2 from the East time zone. Most of the participants (85%) reported to be frequent virtual world users. Only two participants rated themselves as occasional users or newbies. Two participants did not provide information about their virtual world experience. Second Life was the most frequently used virtual world (25 mentions). Participants stated that the main interests pursued in virtual worlds were educational purposes (36%), followed by research (28%), business (16%), collaborative work (16%), and design/arts (4%). 81% of the survey participants had attended events in virtual worlds before; TVWC was the first inworld conference for only 5 of them.

Quantitative Evaluation

Technical aspects. Participants were required to rate the quality of technical aspects of TVWC on a scale from 1=very poor to 4=very good. The results are summarized in table 2. Technical aspects were overall rated as very positive.

Table 2 Mean ratings and standard deviations of technical aspects of TVWC

Items	Rating		
	<i>N</i>	<i>M</i>	<i>SD</i>
Sound quality (could understand the speakers)	27	3.44	.70
Graphics (could see the environment/people)	27	3.48	.58
User experience (could communicate/navigate)	27	3.41	.69

Setting

The setting of TVWC was evaluated with several aspects that were rated on a scale ranging from 1=very inappropriate to 4=very appropriate. The results are summarized in table 3. The results indicate that attendees were in principle satisfied with the setting (this results though might have been influenced by the choice of the word “appropriate”, because free-form comments suggest major changes to the conventional design, see below).

Table 3 Mean ratings and standard deviations of the conference setting

Items	Rating		
	<i>N</i>	<i>M</i>	<i>SD</i>
Arrangement of seats	27	3.37	.63
Arrangement of slides/video screens	27	3.37	.63
Speaker space	26	3.27	.60
Location of conference program	27	3.22	.70
Location of posters	27	3.15	.60
Timing of sessions (to address the whole planet)	27	3.41	.74

Future attendance

Participants were asked to indicate the likelihood of their attendance of a future edition of TVWC. 81% of the participants were sure that they would attend a future TVWC event, and 19% indicated that they would maybe attend. None of the participants indicated that they would not attend.

Qualitative Evaluation

Participants were asked to compare their experience at TVWC with that of a physical-world conference, and to indicate the “pro’s and con’s” of virtual world conferences. In addition, they were asked to provide suggestions for improvement of TVWC for future editions. Participants’ free-text responses were categorized, and the number of statements in each category was counted. The results are summarized in tables 4-6.

Table 4 Subjective pro’s of virtual world conferences

Category	Count
No travel (time and cost savings; ease of access)	18
Real-time feedback/discussion during presentations	10
Additional/different features (e.g., recording, sharing links)	9
Global networking	8
Flexibility (e.g., to move around physically, tune in/out)	6
Different interaction styles (e.g., relaxed, informal, intimate)	5
Comfort and convenience (e.g., home environment)	5
Ease (e.g., sharing information, information cataloging)	3
Greater variety (e.g., topics, speakers)	3
24 hour schedule	1

Table 5 Subjective con’s of virtual world conferences

Category	Count
Lack of socializing/networking possibilities (e.g., no lunch)	10
Technical problems	7
Not enough dialogue/interaction between participants	4
24 hour schedule (e.g., missing talks, losing attention)	4
Face-to-face aspects missing (e.g., no real names/faces)	4
Too close schedule/information overload	4
Inadequate presentation styles (slides/video)	3
Overloaded chat (too much info, not enough time to respond)	3
No visual feedback from audience (e.g., speakers felt isolated)	2
Issues with sharing materials	2
“Value for money” (e.g., no “freebies”)	2

Table 6 Suggestions for improvement

Category	Count
Presentation style (e.g., slides could not be displayed, more interactivity, inworld presentation skills)	8
Foster mingling/networking (e.g., enable small group discussions)	5
Guidance for newbies (e.g., use of camera; etiquette)	5
24 hour schedule (more time/stretching the timetable)	5
More information on participants (e.g., bio of attendees)	4
Setting (e.g., rows and lecturer; satellites instead of 1 room)	3
Scope (e.g., open call/not limited to invited speakers; more frequent meetings and focused on themes)	3
Technical (e.g., SL alternatives, other presentation tools)	3
Archive materials	3
Thematic sessions/division	2
Conference announcement (earlier, more/better marketing)	2
Make use of embodiment (avatars/3D space) (e.g., visualize when avatars have ideas/questions; include virtual field trips)	2
Value for money/ no payment for virtual conferences	2

As anticipated, the biggest advantage of using virtual worlds was considered to be the fact that no travel is involved to attend a conference, allowing greater flexibility and convenience while attending the conference. Also the great variety of topics and speakers was valued. On the other hand, the lack of the no longer necessary travel was at the same time seen as the biggest disadvantage, as it prohibits most possibilities for networking, (face-to-face) dialogues, and socializing. Another cause for the lack of social interaction was considered to be the schedule, which was rated

to be very dense; it was suggested to stretch it out, in favor of more informal social interaction and breaks.

For the topic of supporting interaction it was further suggested to introduce ways to actively foster mingling and networking, using features that are unique to virtual worlds. The conventional setting of the conference – basically copied from physical world conference setups – was criticized. This aligns with comments on the presentation style, where the use of virtual world tools was missed, as well as the use of visual cues and a solution to the information overload in the Second Life chat window (caused by everyone chatting in the same window, often discussing multiple topics at the same time).

Last but not least, technical problems were mentioned (mostly due to the Second Life viewer and platform), and more help for newbies and technical support would be appreciated.

Implications for the next edition

The date for TVWC 2011 is September 14th, 2011. This second edition of The Virtual World Conference introduces some innovations and alterations to the ways the conference was organized in the first run, which we have derived from the evaluation analysis and comments from the attendees and presenters. This section provides an overview, along with explanations to each innovation.

Schedule

The second edition of TVWC introduces a less tight schedule. Instead of 21 speakers, each time zone has merely 5 presentations, resulting in a total of 15 conventional talks. The presentations are further limited to 30 minutes, leaving another 30 for discussions or activities, before the next slot.

Format

All talks are divided into two sessions for each time zone, while keeping the highly valued diversity of topics. Apart from the 15 invited talks, TVWC 2011 includes networking periods and designates time for informal mingling, engaging activities and planned discussions. Also a focus group is offered to capture the best of each zone's discussion and feedback.

Real identities

The possibility of displaying real names above the avatar name is provided, in a non-obtrusive way. During the talks, the presenters' pictures, short biographies, and links to personal and/or project websites are displayed on a dedicated screen, so that attendees are more aware of who is presenting and have immediate access to further information.

Tool use

Presenters are not limited to only slide show and video player as tools to support their verbal narration, but also a voting/polling tool at their disposal, in order to better include the audience in the presentations and discussions.

Participation

Throughout the conference, many boards offer the possibility for attendees to leave comments in form of objects that attach to the boards upon click. This is useful for adding questions to abstracts before presentations (so the presenters can tailor their talks to the interests of the audience), for adding comments to particular slides or posters, for leaving notes and contact information to others on whiteboards, and for writing on whiteboards in general. Other boards are equipped with a movable arrow, to point to a certain spot on it, for example on the current slide.

Networking

At the beginning of each time zone 'chapter', networking games and activities are offered, making use of the attendees' virtual embodiment (i.e., their avatars) and their ability to navigate in 3D space. Interactive tools and a responsive environment will be used to create memorable experiences and persistent impressions. For the hour-long lunch break, semi-formal discussion rounds are organized, centered around topics taken from the preceding talks. At the end of each time zone chapter there is more time to network and discuss.

Collaborative Innovation

The focus group aims at creating innovative virtual world collaboration patterns for future editions of TVWC. Moderated by one of the conference chairs, attendees and invited speakers work on ideating novel practices for conferences and other social events in virtual worlds. This way The Virtual World Conference is forced to remain in its iterative redesign cycle (cmp. design science research).

Setting

Harnessing the virtual world features of the availability of abundant 3D space and the possibility of scripting responsive environments and interactive tools, the conventional conference setting (lecturer-audience, static presentation slide and video screens) gave way to a dynamic platform accommodating the presenter and the audience; it moves back and forth between a persistent row of presentation slides in a spiral set up. Instead of switching slides on a static screen, the entire conference session moves along a path of presentations, traversing different topics, so to speak. Our basic policy is that every object has a function, in comparison to other virtual world events that focus on architectural extravagance and/or detailed decorations.

'Freebies'

All attendees receive an electronic version of the proceedings of The Virtual World Conference, including presenter biographies, abstracts of their talks, presentation slides, and possibly an edited version of the chat log of their session. These 'proceedings' will not otherwise be published.

A plausible future of online conferences

In future editions of this conference – or other virtual world events, for that matter – the following ideas could be considered.

Automated presentations

Talks could be pre-recorded (in better audio quality), possibly edited, cut into pieces and attached to single slides, or just paused and resumed with buttons. The real-

time interaction should focus more on the discussion; the speakers themselves could so join the discussion in text chat during their own talks.

Main caveat: The talk (the audio recording of the presentation) might run the risk of getting pushed in the background and losing its central role.

Interaction

Instructions for speakers on how to prepare their talks could be offered and live support could be given. This could allow for more engaging and effective methods of involving the audience using avatars, the 3D space, interactive objects, and external tools.

Main caveat: The content of the presentation might run the risk of getting pushed in the background, with too much attention on the use of novel tools.

Metaverse

Virtual field trips within Second Life and in other virtual worlds could be organized, and informal gatherings could be held between the main conference events (e.g. virtual lunches).

Main caveat: Field trips often end in losing most of the group while teleporting. With the abundance of virtual world group meetings, an innovative format has to be implemented.

Cross-media format

A combination of the real-time event in the virtual world and social networking tools might be a successful format fostering networking among participants.

Main caveat: Using cross-media approaches for social events is prone to end up in splinter groups, with attendees drifting off to different platforms.

Interest Communication

Attendees could be given hats or other props in different colors that display their main interest in virtual worlds

Main caveat: Too many props could clutter the conference.

No proprietary software, no/fewer costs

A switch from Second Life to the OSGrid as a location for The Virtual World Conference – or another virtual world based on open software – seems appropriate, already for technical glitches and limitations imposed by Linden Lab. In line with this, sponsors could be found (e.g., a virtual world news media channel), in order to cancel out the registration fee.

Main caveat: Second Life is – still – the most popular virtual world, and the platform people think about when they hear The Virtual World Conference.

Summary and conclusions

The paper has presented The Virtual World Conference, describing its organization, unique format, and the novel and innovative approach of redesigning it immensely each year. Its first year attendees greatly valued this new conference format, and expressed excitement about the event in general and participating in a live 24-hour event around the world in particular. We have presented the lessons learned from the first edition of TVWC and described how we implemented them in the redesign of the event for its second run.

In summary, while we have replicated a physical conference in the first edition of TVWC, the second edition will try out more innovative scenarios concerning the organization, format, setting, and use of tools, and will introduce more varied elements to the program. An evaluation after TVWC 2011 will hopefully provide more insights on whether we move into the right directions, and inform the redesign of the event for its third edition in 2012.

Acknowledgements

We thank the Open University UK for hosting The Virtual World Conference on its Second Life grounds in already two consequent years, and the Serious Games Institute for the help in administration and management affairs. Further we thank Greg Withnail for the excellent technical support and Kadriye Kobak for helping out as a volunteer.

References and citations

de Freitas, S., Rebolledo-Mendez, G., Liarokapis, F. Magoulas, G. & Poulouvassilis A. (2010). Learning as immersive experiences: using the four dimensional framework for designing and evaluating immersive learning experiences in a virtual world. *British Journal of Educational Technology*, 41(1): 69-85.

de Freitas, S. (2008) *Serious Virtual Worlds: a Scoping Study*. Bristol: Joint Information Systems Committee. See: <http://www.jisc.ac.uk/media/documents/publications/seriousvirtualworldsv1.pdf>.

de Freitas, S. (2006) *Learning in Immersive Worlds*. Bristol. Joint Information Systems Committee. See: http://www.jisc.ac.uk/media/documents/programmes/elearninginnovation/gamingreport_v3.pdf

Dunwell, I., Petridis, P., Protopsaltis, A., de Freitas, S., Panzoli, D. & Samuels, P. Automating Content Generation for Large-Scale Virtual Learning Environments using Semantic Web Services. In proceedings of the 5th International Workshop on Semantic Wikis (SemWiki2010), ESWC2010, Hersonissos, Crete, Greece, May 29th -June 3rd 2010.

Hasler, B.S. (in press). Intercultural collaborative learning in virtual worlds. In R. Hinrichs & C. Wankel (Eds.), *Transforming virtual world learning. Cutting-edge technologies in higher education* (Vol. 4, pp. 271-310). Bingley, UK: Emerald Publishing.

Hevner, A.R., March, S.T., Park, J., & Ram, S. (2004). Design Science in Information Systems Research. *MIS Quarterly*, 28(1), pp. 75-105.

Kirriemuir, J. (2009). *The Spring 2009 Snapshot of Virtual World use in UK Higher and Further Education*. Bath: Eduserv Foundation.

Panzoli, D., Peters, C. Dunwell, I., Sanchez, S., Petridis, P., Protopsaltis, A., Scesa, V. & de Freitas, S. (2010). Levels of Interaction: A User-Guided Experience in Large-Scale Virtual Environments, *IEEE 2nd International Conference in Games and*

Virtual Worlds for Serious Applications (VS GAMES10), Braga, Portugal, March 26-27, IEEE, pp. 87-90,

Peachey, A. & Childs, M. (eds). (2011). *Reinventing Ourselves: Contemporary Concepts of Identity in Virtual Worlds*, London: Springer

Peachey, A., Gillen, J., Livingstone, D. and Smith-Robbins, S. (eds) (2010). *Researching Learning in Virtual Worlds*, London: Springer.

Schmeil, A., Eppler, M. J., & Gubler, M. (2009). An Experimental Comparison of 3D Virtual Environments and Text Chat as Collaboration Tools. *Electronic Journal of Knowledge Management*, 7(5), 637-646.

Schmeil, A., Eppler, M.J., & de Freitas, S. (in press). A Framework for the Design of Avatar-Based Collaboration. To appear in R. Hinrichs & C. Wankel (Eds.), *Engaging the Avatar in Global Education*. Bingley, UK: Emerald.

Schroeder, R. (2006). Being there together and the future of connected presence. *Presence*, 15, 438-454.

Wenger, Etienne (1998). *Communities of Practice: Learning, Meaning, and Identity*. Cambridge: Cambridge University Press.