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Role play in 3D virtual environments: a pedagogic case study

Theodor G. Wyeld

Abstract
Researchers are beginning to explore the role of digital design collaboration within multi-user 3D virtual environments. In the latest installment of an ongoing remote digital design collaboration project with the Sydney University Key Centre of Design Computing and Cognition (KCDC), the University of Queensland Information Environments Program (IEP) co-coordinated an online production of T. S. Eliot's *The Cocktail Party* in a 3D virtual world environment. This paper describes the process and pedagogical outcomes of early learners collaborating remotely in digital 3D media.

Keywords
3D collaborative virtual environments, pedagogy, constructivism

Introduction
Designing is an iterative process. In a traditional design practice – such as architecture, engineering, industrial design, and so on – it relies on the formation of collaborations with colleagues from within and external to the firm (consultants, clients, and service providers; involving telephonics and the transfer of files such as email, text, video, audio, CAD, animation, VRML, among others). As design firms are globalising, potential design collaborators increasingly consist of local and geographically remote partners. Traditionally, design collaboration includes informal and formal meetings. Informal meetings may take the form of chatting about problems (via telephone, email, or IRC), while formal meetings occur when most partners gather in the same physical location including: colleagues, clients, and consultants, although often a phone or even video link-up to remote partners is used [4]. Of importance to this study is the way inclusion of a 3D visualisation component usually comes at the end of this process. It is largely seen as simply a tool and not part of a social process. Its tool-like use is also emphasised over the social in the approach taken by many researchers in the field of design collaboration [1, 2, 3, 5, 6, 8].

Collaboration is, on the other hand, a process of socializing [7, 11, 12, 20, 24] – an opportunity for collaborating partners to: get to know each other; learn how to work together; and, discover what sort of support one can garner from the other. This occurs with long term as well as short term goals in mind: will the firm continue to work with these people in the future? Good social relations often lead to future client referrals in both directions [4, 12]. Despite this, most of the literature about 3D Collaborative Virtual Environments (CVE’s) talk not in terms of its potential outcomes in the design practice,
rather they discuss: visualisation issues; real-time, multi-user, 3D interactive virtual environments (VE’s) providing a natural, more ‘intuitive’, user interface – more closely aligned with natural perception; perspectively corrected displays; visual acuity; hardware/software configurations; the difficulty in recognising and manipulating virtual ‘objects’; whether to use VR glasses (HMD), a cave, or a desktop PC, and so on [15].

What a CVE does offer, on the other hand, is the opportunity for participants to enter into a simulated workplace, interact, and collaborate directly on a design project. By contrast, 3D VE’s are still largely seen as rapid prototyping tools. VE immersion tools such as: head-mounted display helmets (HMD’s); Computer Assisted Virtual Environment (CAVE) typically incorporating a large, back-lit, screen, LCD shutter glasses with position tracker, and a data wand or glove allowing for interaction with the environment; ‘Round Table’ [17] object substitution using optical projection glasses providing a stereo view of virtual objects overlaid on physical objects; and the more specific CVE devices such as Jung et al’s [14] VR Sketchpad and Gross’ [13] pattern-recognition software, and so on. Few, if any, of these installations would be found in a typical design practice. However, desktop PC’s are common. Hence, rudimentary 3D VE’s are accessible.

While many claim that 3D VE’s are a key technology in enhancing the real world by providing the tools for its virtual exploration [17], few address the potential transformative outcomes of actively working in and with them. Worldwide, the number of key centres for collaborative research which are actively investigating this emerging field is expanding (see Chalmers’ MediaLab, Sweden [25]; MIT media lab, USA [26]; CASA, UCL, UK [27]; MiraLab, Switzerland [28]; HitLab, USA [29]; Martin Centre CADLAB, UK [30]; Key Centre for Design Computing and Cognition, Australia [31]; Information Environments Program, Australia [32], among others). To test the efficacy of the various systems developed, ongoing remote collaboration between and within design schools has proven to be an invaluable data source [5, 8, 9]. As part of ongoing research into the efficacy of 3D VE’s to provide for collaborative socialization this paper reports on its latest installment. The remote digital design collaboration project described here was conducted with the Sydney University Key Centre of Design Computing and Cognition (KCDC) and the University of Queensland Information Environments Program (IEP) (Brisbane). Together we collaborated on an online performance of T. S. Eliot’s [10] The Cocktail Party in a 3D virtual world environment (Active Worlds). Students of design from both Sydney and Brisbane were engaged in a self-directed learning exercise which focussed on using digital media to transform prior understandings about what a 3D virtual environment (VE) can be used for. This paper discusses the pedagogical outcomes of this process for the students from the Brisbane campus. It adopts Guba and Lincoln’s [11] constructivist methodology to support its participant-observation reflections. It extends earlier work done from the University of Adelaide which involved a similar remote design collaboration exercise where digital media students showcased digital animations in the 3D VE. In that project they embedded rich media in deep media in a process of both working in and with the media [see 9].
A constructivist methodology

As noted earlier, much of contemporary evaluation of the use of computing in design practice is pragmatically oriented [21]. It displays an open optimism about the technology which falls within a long tradition of positivist rationalism since the rise of the scientific method. As such, evaluating the use of computing technology in educational settings presents a problem. Learning outcomes are often guided more by their socio-cultural and historical contexts than the positivist's rigid pre-formulated and objective framework can capture. Hence, it is more appropriate to evaluate educational outcomes by investigating the social and environmental context of participants engaged in specific real-world activities. Therefore, this paper adopts a constructivist [11] methodology to analyse and evaluate the exercise described here.

The constructivist approach does not preclude a positivistic scientific methodology. Rather it sees the latter as merely one construction among many for perceiving and making sense of the world around us. It seeks instead to provide a pluralistic overview of the transformative outcomes of the participants’ engagement with the technology including a pragmatic analysis of the technology used.

When our perceptions about the world around us are altered by profound new ways of thinking – such as where: Lavoisier saw oxygen, Priestly had seen dephlogisticated air; the properties of light were once thought to be wave-like then particle-like, it was finally accepted that it could be “a self-consistent entity different from both waves and particles” [22, p114]; and, it was once believed that the reason why water rises in a pump was because nature abhors a vacuum [23], this was dispelled by the work of Galileo’s vacuum pump; and so on – we may experience what [22] describes as, a paradigm shift. A perceptual transformation where familiar things are seen in new and unfamiliar ways. This shift in perception is graphically demonstrated in the duck-rabbit Gestalt illusion.

Figure 1. Duck-rabbit Gestalt illusion demonstrating switching shift in perception.
New paradigms force experimenters to make transformations in their thinking. It is the sudden changes, like the Gestalt switch, in understanding that permits a new solution – a new paradigm to be born or intuited. In this sense, paradigms determine areas of experience too. While the exercise described here does not include a paradigm shift as such, it does demonstrate a transition to a deeper understanding of a technology and its potential application in a group setting. The outcomes were, nevertheless, profound enough for both participants and teacher to transform prior understandings of what the technology could be used for and to become a new, essential, component of the curriculum.

The project

The remote design collaboration project fits within the broader curriculum themes of an introduction to digital technology and a design studio as part of the first year of an undergraduate Multi-Media degree in the school of Information Technology and Electronic Engineering. The technological issues revolved around constructing, hosting, and acting in a 3D VE. The studio issues address the narratological themes of 1st, 2nd, and 3rd-person narratives and their applicability within an online 3D VE. T. S. Eliot’s The Cocktail Party was chosen because it presents complex yet accessible social interactions in a series of short acts and small spaces which were easy to reconstruct within the VE.

77 first-year Bachelor of Multi-Media students in 5 groups of 15-16 members participated at the Brisbane campus with 30 second-year Design Computing students in groups of 6 participating at the Sydney campus. The play was divided into 5 acts which coincided with Eliot’s original combination of acts and scenes. Each student brought their own skills and abilities to the group collaboration where the various tasks and roles were negotiated.

Participant background

Students came from diverse backgrounds – international students, interstate students, and a range of ages 17-43. For many, English was a second language. Their acculturation to digital media was equally diverse – from extensive self-taught students, some already working in the multi-media industry coming back to ‘upgrade’ their qualifications, to those with little exposure to digital technology. Teams in Sydney and Brisbane were able to communicate only via email, chat, and within the Active Worlds (AWs) environment. The reflections expressed in this paper were drawn from my teaching journal, conversations with students, email correspondence between collaborators, chat logs from the AWs environment, and the students’ final project reports.
The collaborative virtual environment described here included access to a studio space with a projector and 20 2GHz PC’s running Windows XP. Each PC had a version of the Active Worlds (AW’s) client application in Brisbane (the server was hosted by Sydney). The usual array of word, graphics, and CAD packages were installed including email. Participants also had access to their own telephony.

The main collaborative interface, AW’s, incorporated a navigable 3D window, http browser, and hypercard-like organisation of its various features. Within the 3D navigable space, participants were able to manipulate and insert new objects from a library. Prototype 'props' could be constructed in any 3D CAD program, converted to the native format for AW’s using Accutrans and added to the library database for later retrieval. Participants are represented in the AW’s 3D environment by an avatar selected from a pull-down menu list. The chat textfield provided another method for real-time interaction, while the http browser facilitated support such as faq’s and project guidelines which could be dynamically and remotely updated by students and teacher alike.

The process

First, each group analysed the play. From this they were able to identify all the props, stage settings, actors, roles, interactions, actions and so on for the whole play and for their particular act. Second, tasks and roles were negotiated within the local group and with their remote collaborators. This involved email at first, followed by the transfer of prototype props for insertion into the AWs environment.

Little collaboration takes place without the motive of a deadline, however. Hence, most activity occurred towards the end of the project rather than early negotiation. Consistent across all groups also was the complaint that communicating via email or chat was inferior to face-to-face or telephone exchange. The fragmented nature of the medium means little detail is included in communiqués, leading to further confusion. In response to the perceived 'unacceptable' variability and arbitrariness of email communication, remote partners tended instead to work alone – only updating information as a courtesy, if at all.

Despite this apparent lack of collaboration, 'formal rehearsals’ (when I was present) and the final performance demonstrated a concise level of collaborative understanding of the overall process. The ‘phantom’ audience in Sydney contributed beforehand by applying their knowledge and skills with the AW’s environment and during the performance by adopting an ancillary narrative role – they relayed their visual and textual interpretation of the various acts as they were performed. The pedagogical benefits of this process
for the actors and their entourage was immediate and tangible feedback in a rich learning environment, which was also of their own making.

The play

Groups used their interpretations of the play to re-construct it [11] in a collaborative VE. Their interpreted re-constructions tended to include elaborate imaginary spaces which borrowed heavily from pre-conceptions about computer game settings. Scripts were prepared in advance in Word, Excel, and Notepad text etc. These ‘texts’ were then simply cut and pasted into the chat text field of the AWs interface at the appropriate times.

To appeal to a modern audience, contemporisation of the script was used extensively. This included SMS-style text (txt) messaging, chat jargon, and emoticons. This ‘txting’ was further accentuated by movement about the virtual ‘stage’ generating a dynamism not ordinarily experienced in a less ‘structured’ VE encounter. At times their recently acquired facility with the technology saw them ‘working the audience’. In this way they were identifying the various ‘layers’ of reality between: each other in the lab; their agents in the VW; and, the phantom audience in Sydney, who’s only identification came via chat messages. Oversized props were used to exaggerate the spatial characteristics of the AWs forum – typical of computer game scaling.

Celia:   y do u think u n Lavvy will get back??
Eddy:   *shrugs*... i dunno
Celia:   ahhh.. you don't know?
Eddy:   i saw some guy at the party... he told me
Celia:   who?
Eddy:   I don’t no who he is. Just some random
Celia:   what!! what did he say?
Eddy:   dunno... stuff I guess. But after talking 2 him I rekon me n lavinia still gotta
Eddy:   chance
Julia.:   Hey u 2. This is all I can do. Anyway lets make a toast.
Celia:   well, what did he say?
Eddy:   ok... to who?
Julia.:   Your aunt of cause! Lol ;-) 
Celia:   hmmm......
Eddy:   uhhh.... sure..o_0
Julia.:   Well anyway, let’s all go out and eat.
Eddy:   *toasts to fake aunt*
Eddy:   thanx... but no thanx
Celia:   sure.. i'll meet up with you in a minute
Julia.:   Okies!! Buh bye
Eddy:   ta taa
Celia:   cya
Evaluation

According to Bruckman [16] when using digital collaborative software cultural differences in perception of the technology used and the social and institutional context within which the technology is situated should be foreground. The co-evolution of technology and pedagogy within a CVE should emphasise the social and cultural influences on and of technology. Hence, adopting Guba and Lincoln’s [11] constructivist methodology, in a forum-like manner, a series of short questions was asked of each group following the final performance:

1) Was this a worthwhile exercise?
2) What did you learn about remote collaboration?
3) What did you learn about each other? and,
4) What did you learn about the technology?

Typical responses included:

1) “We can see this is a very interesting technology and we can have fun in it but why do we need the 3D?” “...it only slowed things down.”
2) “Remote collaboration only works if everyone collaborates.”
3) “We learnt that we have different skills and some people surprised us with their ideas for instance.” “I didn’t think X could do that.” “When we did work with Sydney they were able to ‘fill the gaps’ we couldn’t and we could only describe what we needed in chat.”
4) “we’re all used to the realism in computer games” “…this render engine was very basic but we were still able to get our message across!”

Their responses were then negotiated as a class in an iterative process until consensus was achieved on agreed meanings. The outcomes of this process indicated that:

- despite the system’s fallibility, the opportunity to design virtual spaces, to communicate through text, and motion, to a captive audience, was empowering in ways traditional CAD, video, or animation does not allow.

The real-time collaborative interactivity provided for instantaneous (or almost instantaneous) feedback on design moves, in Schon’s sense [12] – in this case ‘moves’ were of a performative/gestural nature. According to Guye-Vuilleme et al [18], gesturing provides for what psychologists [19] call ‘non-verbal communication’ – tacit communication that occurs without the use of voice, text or signs, such as facial expressions, posture and so on;

- the notion of collaboration, remote or otherwise, was not something that had been broached seriously in their prior education experiences. This exercise was instrumental in transforming the students’ ideas about the need for, and potential rewards from, collaborating both within a team and across a time zone;

- through this process students were able to reflect on the transformative outcomes of deconstructing their prior concepts about what a VE could be used for. From this they constructed a new reality whereby the
accepted realisms of a computer game are not necessary to communicate performative design concepts.5

Conclusion

Through the vicarious experiences of the students engaged in this exercise we can construct a pedagogy that recognises the need for collaboration (both local and remote). To this end the 3D VE described here provided a vehicle for its exploration.

Two main lessons were learned from this exercise: the importance of face-to-face interaction in collaboration exercises. Participants found they could not rely on the technology to instigate the collaboration; and, that collaboration comes from joint goal setting. These goals may not always be those circumstantially framed by the pedagogical exercise, rather more pragmatic aims were needed, such as being prepared for the reviews which attracted marks. From this it is difficult to make any direct correlation between pedagogical collaboration and the necessities of commercial design collaboration. Nevertheless, it is only a small jump in imagination for the students involved in this exercise to see themselves engaged in such activities in a professional setting.

Hence, in broad terms, we can speculate that such a system could be used in a design practice to facilitate remote design collaboration. However, it is not clear that it would support, let alone enhance, the socialization which is a key component of any collaboration. Nevertheless, it could be used as an adjunct to other methods of communication to at least provide for an environment where direct, interactive, and shared, design actions can take place.

References


CVE Labs:
[26] MIT media lab, USA; http://www.media.mit.edu/
[27] CASA, UCL, UK; http://www.casa.ucl.ac.uk/
[28] MiraLab, Switzerland; http://miralabwww.unige.ch/
[29] HitLab, USA; http://www.hitl.washington.edu/
[31] KCDC, Australia; http://www.arch.usyd.edu.au/kcdc

1 Often detail is left out of communiqués in the vain hope that this would speed the process along. But, as communicating via email – the most extensively used media – is asynchronous, replies are invariably executed in between unrelated tasks which introduce delays of hours or even days.
2 Phantom in the sense that their ghostly presence gave few clues about their ‘real’ identity.
3 Brisbane participants were reliant on their Sydney partners to upload props into the AWs server.
4 A less structured VE is one where users interact without purpose, pedagogical or game-play motive.
5 Students felt that the AWs environment offered an impoverished, abstract realism when compared to the realisms of high-end computer games such as Quake, Doom, Final Fantasy and so on. But that this did not impede their ability to ‘tell their story’.