

	<p><b>Learning Technology</b></p> <p>publication of</p> <p>IEEE Computer Society's</p> <p><u><a href="#">Technical Committee on Learning Technology (TCLT)</a></u></p>	
---	--	---

---

Volume 13 Issue 4	ISSN 1438-0625	October 2011
-------------------	----------------	--------------

---

<b>From the Editors</b> .....	<b>1</b>
<b>Special Theme Section: Virtual Worlds for Academic, Organizational, and Life-Long Learning</b> .....	<b>3</b>
<i>Collaboration through virtual worlds in Australia and New Zealand higher education institutions</i> .....	4
<i>Robots and virtual worlds to support 'Japan Recovery': an emphasis on cognition</i> .....	7
<i>Presence for Professional Development: Students in the Virtual World</i> .....	11
<i>The SHU3DED Cyber Campus Prototype</i> .....	14
<i>An OpenSim-based Virtual Lab for biotechnology education</i> .....	18
<i>Minds of Chimera: Adapting MineCraft for a Creative Learning Platform</i> .....	21
<i>Deploying Virtual Worlds for Education in Real Schools</i> .....	24
<i>Virtual World Enriches the Learning Experience of a Self-development Tool</i> .....	27
<i>Users' Representation Supporting Collaborative Learning in 3D Virtual Environments</i> .....	31
<i>Engaging Students in HCI Design Activities in Virtual Worlds</i> .....	34
<i>On the necessity of time and resource issues to support collaboration in e-learning standards</i> .....	39
<i>Virtual Tornado Hits the Library</i> .....	42
<b>Regular Articles Section</b> .....	<b>46</b>
<i>Innovations in Public-Private Partnership for E-Skills Development in the European Union</i> .....	47
<i>VizResearch: Linking the Knowledge of People and the People with Knowledge</i> .....	50
<i>Three Case Studies on the Affect Effects of Teaching Foreign Language and Culture with Technology</i> .....	53
<i>A pervasive solution NFC based for access to bibliographic sources</i> .....	56
<i>A Natural User Interface Classroom based on Kinect</i> .....	59
<i>Socializing Autistic Children with Interactive Computer Games</i> .....	62
<i>Use of digital interfaces as an extension of school attendance</i> .....	66
<i>e-Learning : Re-emerging paradigm for enhanced learning</i> .....	69
<i>The Cost of Employee Learning</i> .....	72
<b>PhD Abstracts Section</b> .....	<b>74</b>
<i>Towards Semantic Educational Recommender Systems</i> .....	75

## From the Editors ...

Welcome to the October 2011 issue of the Learning Technology newsletter on Virtual Worlds for Academic, Organizational, and Life-Long Learning.

Virtual worlds get more and more popular and are used in different settings such as education. Virtual worlds have been demonstrated to be useful to support learning at formal educational institutions, for organizational learning and for life-long learning. In order to support learning in such virtual worlds, different forms of formal and informal learning spaces are built, using either traditional educational concepts or taking advantage of new concepts and technologies for learning available in virtual worlds.

This issue shows current research on academic, organizational and life-long learning in virtual worlds and introduces the use of new concepts and technologies as well as demonstrates the successful use of those concepts and technologies.

Gregory describes the activities of the Australian and New Zealand Virtual Worlds Working Group (VWWG) for supporting the collaboration through virtual worlds in Australia and New Zealand higher education institutions. Vallance describes the results of an international collaboration between researchers at Future University Hakodate, Japan and UK universities, where robots and virtual worlds have been employed for science education. Peachey & Herman describe virtual world activities for groups of students, where a virtual platform is used to augment the social aspect of belonging to a study cohort, exploiting the sense of presence and constructivist affordances of the 3-D environment. Nisiotis, Beer & Uruchurtu describe the SHU3DED Cyber Campus Prototype, which is based on SecondLife and serves as a testbed for investigating how social networking can be used to help students facing barriers to attending on-campus courses. Ramírez et al. describe the results of an educational project, where virtual world technologies have been used to build up a set of virtual laboratories oriented towards engineering studies. Wingrave discusses the Minds of Chimera project which is based on MineCraft for creating a virtual creative learning platform. Di Blas et al. present the results of four different educational programs that were deployed in school environments to investigate the educational effectiveness of Multi User Virtual Environments. Geer & Hardin describe Star Journey, a symbol-based method for self-reflection that has been re-created in a virtual world format for positive teaching and learning experiences. Terzidou et al. discuss the design, implementation and evaluation of virtual metaphors, appearance features, gestures for students' avatars. Vosinakis & Koutsabasis present a postgraduate Human-Computer Interaction design studio course that makes a combined use of the constructivist pedagogy of Problem-Based Learning with a Virtual World design studio. Garrido, Morales & Serina discuss the necessity of time+resource metadata in current e-learning standards to support collaborative activities. Finally, Hill describes a library exhibit to share information on tornadoes, including virtual books, posters, handouts, links, 3D objects, and photos.

The issue also includes a section with regular articles (i.e. articles that are not related to the special theme). Mishra discusses some of the key issues associated with public-private partnerships in education, in order to understand the role that multi-stakeholder partnerships can have in improving the skills and education system of the European Union. Masud et al. describe VizResearch, an online research community, a social network of researchers and academicians where they can interact with through following other's work, form a group of same interest, do group base activities like message post, comment, and file sharing.

Erbaggio et al. discuss three case studies to show that by creating materials online, course content can be more authentic, appropriate and cost-effective; furthermore, the use of instructional technology can help create more positive affect effects in today's students' learning. Borrego-Jaraba, Ruiz & Gómez-Nieto describe a prototype system that provides students access to bibliographic sources recommended by teachers, based on the IMS LD specification. Noel et al. describe a prototype which uses Microsoft XBOX 360 Kinect to help teachers interact with powerpoint presentations more naturally. Hassan et al. describe an educational game which aims to teach autistic children the concept of money and how to make use of it in the shopping mall. Camas & Mengalli describe a project which aimed to support teacher education in order to advance e-learning in Brazil. Tyagi et al. present a brief introduction of e-Learning, including its history, evolution and main considerations. Finally, Koumpis discusses the cost of employee learning.

Special theme of the next issue: Adaptive and Intelligent Systems for Collaborative Learning  
(guest-edited by Dr. Stavros Demetriadis)

Deadline for submission of articles: 15 December 2011

Articles that are not in the area of the special theme are most welcome as well and will be published in the regular article section.

#### **Editors**

##### **Sabine Graf**

Athabasca University, Canada  
[sabineg@athabascau.ca](mailto:sabineg@athabascau.ca)

##### **Charalampos Karagiannidis**

University of Thessaly, Greece  
[karagian@uth.gr](mailto:karagian@uth.gr)

**Special Theme Section: Virtual Worlds for Academic, Organizational, and  
Life-Long Learning**

## *Collaboration through virtual worlds in Australia and New Zealand higher education institutions*

### **Introduction, lessons learnt and protocols established**

The Australian and New Zealand Virtual Worlds Working Group (VWWG) was formed in November 2009. It began as a small group of 10 academics from the DEHub Consortium of the University of New England, Charles Sturt University, University of Southern Queensland and University of Central Queensland. The first meeting was via teleconference and set out to establish aims, objectives and goals of the group. At the very first meeting, it was decided that to keep the group to only members of the DEHub consortium was very restrictive as there was expertise elsewhere that should have been part of the group.

The first goals of the group were to seek members and collaborate on projects and academic papers. Before we could do this, we needed a cohesive definition of what a virtual world was as there appeared to be very diverse and conflicting views from the members of what this may entail, from online artwork presented through a website to Facebook to immersive 3D virtual worlds such as Second Life.

Even though, at this stage, the group consisted of only members of four Australian universities, there was one member living in the United States of America who worked for one of the member institutions. We quickly established that teleconferences were not appropriate so the second meeting was held via Skype. There were approximately 15 members of the VWWG at this time. The meeting did not work very well with people not being able to connect or dropping off. Finally, it was decided that we should “walk the talk” and meet in a virtual world. From there on, February 2010, the group has met in Second Life at Australis 4 Learning – an island jointly owned by the University of New England, the lead project member of the DEHub, and two other members of the VWWG (see: <http://slurl.com/secondlife/Australis%204%20Learning/134/136/22>). It was also at this time that members of the virtual world community from other higher education institutions were invited to join.

### **Collaborative Projects**

Membership of the VWWG increased and collaborative projects began. The first was collaboration between the University of New England and Charles Sturt University with a scoping study undertaking a systematic review and environmental analysis of the use of 3D immersive virtual worlds in Australian Universities (Dalgarno, Lee, Carlson, Gregory, & Tynan, 2010; 2011). This project expanded to include New Zealand in mid 2010 when Massey University joined the DEHub consortium. This project has conducted surveys and interviews and analysis of the project can be found in the above noted papers.

In July 2010 members of the VWWG wrote a joint paper where all members (bar one) contributed. The one could not contribute as they were in a hospital overseas. There were 23 contributors of this paper from 21 institutions (S. Gregory et al., 2010). The paper presented a snapshot of Australian Higher Education institutions in virtual worlds. This was the first wholly collaborative project.

In November, five institutions from the VWWG were awarded an ALTC (Australian Learning and Teaching Council) grant called VirtualPREX researching virtual worlds for professional experience by pre-service teachers through self, peer and academic assessment, both formative and summative. The University of New England, Charles Sturt University, Australian Catholic University, Curtin University and RMIT have undertaken this collaboration for the project, arising out of VWWG members and reported on the website (see <http://www.virtualprex.com> and several publications: S. Gregory & James, 2011; S. Gregory et al., 2011).

Late in 2010, New Zealand academics that were teaching and learning in virtual worlds were invited to join the VWWG. The VWWG now stands at over 180 members from more than 50 institutions. The growth and collaboration has been enormous which culminates, at this time, in a further joint publication written in July 2011 by 48 authors from 28 higher education institutions, focusing only on the Australian higher education institutions (B. Gregory et al., 2011). This paper explores how Australian higher education institutions are contributing to change through innovative teaching and learning through virtual worlds. A New Zealand paper has also been written. It was decided that there should be two papers reporting on activities as the requirements for the paper length was restricted which would limit reporting across the two countries.

Members of the VWWG currently report that they teach in almost every discipline that one can imagine, however, predominantly, the following are the disciplines that most institutions use virtual worlds as a teaching and learning tool: education, business, health, science, behaviour studies, social work, art and languages. The virtual worlds are being used for role-plays, simulations, scenario based training, design, construction, lectures, tours, discussion, debates, moot court and play.

Members of the VWWG also participate in presenting at other's institutions, joint presentations at symposiums and papers at conferences. They have also joined together to conduct conferences, workshops and sharing of space in the virtual world.

## **Conclusion**

The Australian and New Zealand Virtual Worlds Working Group has demonstrated how international collaboration can take place. The group currently meets inworld (in Second Life) once per month to discuss current and future collaboration and how to assist each other in achieving their individual, institutional and project goals. The final collaborative project that the group has undertaken to date is the production process of a VWWG book. Extended abstracts were sort from authors worldwide to contribute to the book titled "Virtual Worlds in Online and Distance Education" which will be published in late 2012. This call for papers received 94 contributions, demonstrating how the group is now held in high regard worldwide.

## **References**

Dalgarno, B., Lee, M. J. W., Carlson, L., Gregory, S., & Tynan, B. (2010). 3D immersive virtual worlds in higher education: An Australian and New Zealand scoping study. In C. Steel, M. J. Keppell, & P. Gerbic (Eds.), *Curriculum, technology & transformation for an unknown future* (pp. 269-280). Presented at the *ascilite2010*, Sydney. Retrieved from <http://ascilite.org.au/conferences/sydney10/procs/Dalgarno-full.pdf>

- Dalgarno, B., Lee, M. J. W., Carlson, L., Gregory, S., & Tynan, B. (2011). Institutional support for and barriers to the use of 3D immersive virtual worlds in higher education. In G. Williams, N. Brown, B. Pittard, B. Cleland, & (Eds.), *Changing Demands, Changing Directions*. Proceedings ascilite Hobart 2011. Presented at the ascilite2011, Hobart.
- Gregory, B., Gregory, S., Wood, D., Masters, Y., Hillier, M., Stokes-Thompson, F., Bogdanovych, A., Butler, D., Hay, L., Jegathesan., J.J., Flintoff, F., Schutt, S., Linegar, D., Alderton, R., Cram, A., Stupans, I., McKeown Orwin, L., Meredith, G., McCormick, D., Collins, F., Grenfell, J., Zagami, J., Ellis, A., Jacka, L., Campbell, J., Larson, I., Fluck, A., Thomas, A., Farley, F., Muldoon, N., Abbas, A., Sinnappan, S., Neville, K., Burnett, I., Aitken, A., Simoff, S., Scutter, S., Wang, X., Souter, K., Ellis, D., Salomon, M., Wadley, G., Jacobson, M., Newstead, A., Hayes, G., Grant, S., Yusupova, A. (2011). How are Australian higher education institutions contributing to change through innovative teaching and learning in virtual worlds? In G. Williams, N. Brown, & B. Cleland (Eds.), *Changing Demands, Changing Directions*. Proceedings ascilite Hobart 2011. Presented at the ascilite2011, Hobart.
- Gregory, S., & James, R. (2011). VirtualPREX: Open and Distance Learning for pre-service teachers. *Expanding Horizons - New Approaches to Open and Distance Learning*. Presented at the 24th ICDE World Conference on Open & Distance Learning, Bali.
- Gregory, S., Dalgarno, B., Campbell, M., Reiners, T., Knox, V., & Masters, Y. (2011). Changing directions through VirtualPREX: engaging pre-service teachers in virtual professional experience. In G. Williams, N. Brown, B. Pittard, & B. Cleland (Eds.), *Changing Demands, Changing Directions*. Proceedings ascilite Hobart 2011. Presented at the ascilite2011, Hobart. Retrieved from <http://www.ascilite.org.au/conferences/hobart11/procs/filename.pdf>
- Gregory, S., Lee, M.J.W., Ellis, A., Gregory, B., Wood, D., Hillier, M., Campbell, M., Grenfell, J., Pace, S., Farley, H., Thomas, A., Cram, A., Sinnappan, S., Smith, K., Hay, L., Kennedy-Clark, S., Warren, I., Grant, S., Craven, D., Dreher, H., Matthews, C., Murdoch, D., McKeown, L. (2010). Australian higher education institutions transforming the future of teaching and learning through virtual worlds. In C. Steel, M.J. Keppell & P. Gerbic (Eds), *Curriculum, technology & transformation for an unknown future*. Proceedings ascilite Sydney 2010 (pp. 399-415). <http://www.ascilite.org.au/conferences/sydney10/Ascilite%20conference%20proceedings%202010/Gregory-full.pdf>

**Sue Gregory**

ICT Education Lecturer/Research Fellow  
Chair, Australian & NZ Virtual World Working Group  
School of Education/DEHub  
University of New England, Australia  
[sue.gregory@une.edu.au](mailto:sue.gregory@une.edu.au)

## *Robots and virtual worlds to support 'Japan Recovery': an emphasis on cognition*

### **Introduction**

Science education is concerned with the meaningful pursuit of comprehension, knowledge and understanding of scientific concepts and processes. 'Knowledge construction' requires students to be actively involved in the experience of learning. Virtual worlds have been proven to support the experiential learning of science (deFreitas, 2008). However, the UK Joint Information Systems Committee (JISC) states that further research is required for developing better metrics (e.g. frameworks, approaches and models) for evaluating experiential learning in virtual worlds. Robots can provide a context for such metrics. For instance, programming a robot to undertake pre-defined, discrete physical movements provides a clear representation of success. For example, LEGO robots enable students to build a robot, input instructions via the Mindstorms NXT software, program the robot to follow the instructions, and subsequently view the physical movements of the programmed robot. Previous research by Vallance *et al.* (2010) and van Schaik *et al.* (In press) have captured quantitative data of collaborative robot programming in virtual and real worlds, and subsequently analysed for associated human cognitive processes (Anderson *et al.*, 2001) and flow (Csikszentmihalyi & Nakamura, 2010).

### **Implementation**

The robot selected for the programming tasks was LEGO robot 8527 supported by the Mindstorms NXT software version 2. The first important variable of task difficulty in this context was defined as the minimum number of discrete maneuvers required to successfully navigate a given maze. For example, a maze requiring five distinct maneuvers such as a forward move, a left turn, a forward move, a right turn and then a final forward move, was defined as a maze of complexity level five. Mazes with differing levels of intrinsic difficulty act as the problem specification dependant variable (Vallance *et al.*, 2010).

In the collaborative programming process, communication between students remotely located in Japan and UK has been undertaken in a dedicated, learner-designed OpenSim virtual space hosted by Reaction Grid. The communication has been digitally captured, transcribed and analyzed using the approach described in Vallance *et al.* (2010). In summary, given the steadily rising level of task difficulty and students' increasing mastery of the more challenging tasks as evidenced by their ability to complete them with fewer errors and in less time, Bloom's taxonomy (Anderson *et al.*, 2001) would suggest that some developmental pattern should be expected to emerge as the procedural knowledge required to complete the tasks came to be more effectively applied and as student accomplishment increased. However, the relative frequency with which particular kinds of cognition appeared in the data (e.g. 'applying procedural knowledge') was not patterned as tasks progressed and difficulty increased. Moreover, the relative frequency with which different elements of cognition appeared in the data (e.g. 'applying conceptual knowledge') did not present itself as a linear or rising percentage as tasks became progressively more difficult. In other words, cognitive development is, as expected, not linear. This is influencing our design of subsequent tasks.

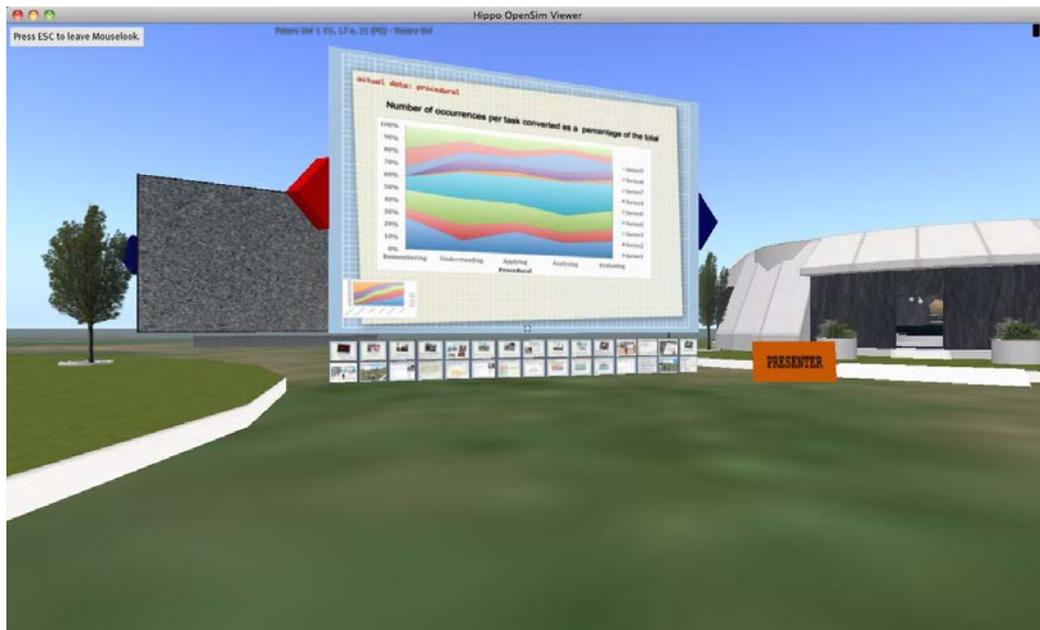


Figure 1. Data presentation

## Current research

The research is now being furthered by contextualizing the robot tasks inside a virtual nuclear power facility. First, students will be given a robot and circuit task to solve. In order to capture the data direct from the students while working towards a solution, a virtual iPad (named 'FlowPad') will appear in the virtual world at timed intervals. Students will respond to the iPad questions and the tagged data will be transferred to a database on the researcher's server. The iPad data items will use Csikszentmihalyi and Nakamura's (2010) psychometric evaluation of flow (concentration, perceived control, mergence of action and awareness, transformation of time, transcendence of self and autotelic experience), and Anderson *et al*'s (2001) cognitive descriptors (remember – understand – apply – analyse – evaluate - create).



Figure 2. FlowPads

In addition, a two dimensional movement of the virtual LEGO robot within the virtual world will be synchronized to a real world LEGO robot. As the virtual robot is moved, so will the real world robot. This action will be achieved by programming the robot using LabVIEW software with NXT module.



*Figure 3. Moving the virtual robot*

Moreover, the virtual nuclear facility will be designed and built in a new virtual space called JIBE; an open source project using the Unity 3D engine and supported by Reaction Grid (<http://jibemicro.reactiongrid.com/pathfinderlester/webplayer.html>). By using the virtual nuclear plant this research can be additionally used to familiarize students with safe and dangerous nuclear operations.

The research tasks will also challenge students to maneuver the virtual LEGO robot around a virtual nuclear plant in order to solve problems. The iteratively increasing complexity of these tasks, informed by our previous research, will be designed to engage but also challenge the students. Data will then be captured for researchers to map cognitive development and knowledge acquisition in order to correlate with the specific programming task. Data of flow will be simultaneously captured.

This is an international collaboration between researchers at Future University Hakodate, Japan and UK universities. The project will pragmatically support the ‘Japan Recovery’ initiative whilst developing a better understanding of task design in virtual worlds.

## References

- Anderson, L.W., Krathwohl, D.R., Airasian, P.W., Cruickshank, K.A., Mayer, R.E., Pintrich, P.R., Raths, J. & Wittrock, M.C. (2001) A taxonomy for learning, teaching and assessing: A revision of Bloom’s taxonomy of educational objectives. New York: Longman.
- Csikszentmihalyi, M. & Nakamura, J. (2010) Effortless attention in everyday life: A systematic phenomenology. In *Effortless attention: a new perspective in the cognitive science of attention and action* (Ed. Bruya, B.) pp. 179-189. Cambridge, MA US: MIT Press.

- de Freitas, S. (2008) Serious virtual worlds: a scoping study. JISC publications. Retrieved March 14, 2009, from <http://www.jisc.ac.uk/publications/publications/seriousvirtualworldsreport.aspx>
- Schaik van, P., Martin, S. & Vallance. M. (In press). Measuring flow experience in an immersive virtual environment for collaborative learning. Journal of Computer Assisted Learning.
- Vallance, M., Martin, S., Wiz, C. & Schaik, P. van (2010) Designing effective spaces, tasks and metrics for communication in Second Life within the context of programming LEGO NXT Mindstorms robots. International Journal of Virtual and Personal Learning Environments. Vol. 1 (1), pp. 20-37. January - March 2010.

**Dr. Michael Vallance**  
Dept. Media Architecture  
Future University Hakodate  
Hokkaido, Japan  
[mvallance@mac.com](mailto:mvallance@mac.com)

## *Presence for Professional Development: Students in the Virtual World*

### **Introduction**

This report describes virtual world activities for groups of students studying a course designed to support professional development especially following career breaks. The activity uses the virtual platform to augment the social aspect of belonging to a study cohort, exploiting the sense of presence and constructivist affordances of the 3-D environment.

### **Background**

T161: Return to Science, Engineering and Technology (SET) is a ten-week level one module at The Open University (OU) currently in its final presentation. The majority of the students are female, graduates and qualified professionals wishing to return to work after taking a career break. As well as concerns relating to presentation of skillsets, many have experienced a sense of isolation and lack the current contacts and networks needed to get back into employment. The module is embedded in the OU's Moodle VLE and students work online in a single cohort, using web-based activities with a strong emphasis on collaboration through asynchronous forums. Students place significant value in the forum discussions and follow up evaluations have shown that a shared sense of 'being in the same boat' is particularly important for participants (Herman, 2011)

The OU has been using Second Life™ (SL) since 2006 and has a consistent social community here (Peachey, 2010), where the standout affordance is the facility to meet with others, in real time, in a shared space that provides a strong sense of physical presence. Resonance with the socially constructivist nature of the T161 forum discussions was noted, leading to a hypothesis that a virtual world would provide a richer environment for mediating this aspect of T161. It was suggested that students meet synchronously in SL for informal course discussion with the support of the module forum moderator. During the module visiting experts join the forum to answer questions posted by students. It was proposed that this asynchronous activity could also be supplemented by hosting a live chat with the experts in Second Life.

### **Activity**

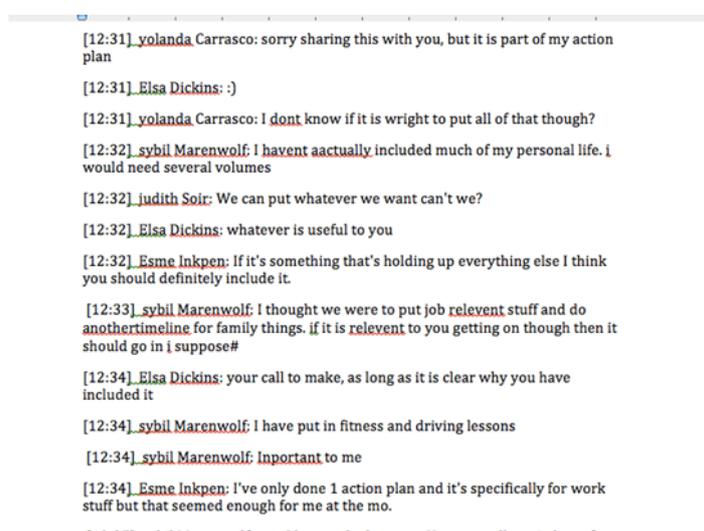
The first inworld activity was proposed for the April 2010 presentation of approximately 30 students. A message was posted to the discussion forum during the second week of the module offering an informal meeting in SL. The message stressed that this was not mandatory and that the course team recognized that not all students would either want or be able to access this environment. Brief registration instructions were provided and sources of technical support were signposted. Responses in the forum reflected intrigue and a sense of adventure with some caution about technical skills and ability.

The first meeting saw ten students inworld and, after some initial chat about their avatars and the environment, students stayed for over an hour discussing their experiences on the module and wider issues relating to their study and personal situations. Feedback in the forum was positive, again with some reference to the adventure and pioneering nature of the activity. Several further meetings took place over the ten-week presentation, during which time 2/3 of the students participated at least once. The visiting experts session was particularly successful, with half the cohort present to talk with three of the four experts.

## Research

All students who participated in the SL events reflected positively on their experiences in the module forum, and many used SL for a later reunion. This experience suggested that SL has a sense of presence that enhances the social connections between students on T161, and it was proposed to offer the same opportunity to students in the next cohort with the structure to explore this hypothesis and to formally evaluate what SL brings to their T161 experience. With research permission from the university the asynchronous discussions around SL from forum transcripts, as well as the synchronous chat discussions from live SL activity could be captured and analysed, triangulated with a final online questionnaire.

In October 2010 the next T161 cohort began and students were offered the opportunity to meet in SL. The cohort was smaller (25 students) and only 8 participated inworld, which may be attributed to the consent paperwork generated by research permission. However chatlogs of informal meetings plus the visiting expert session and forum discussions were captured and provided data for analysis, along with two responses to the post-module survey.



[12:31] \_yolanda Carrasco: sorry sharing this with you, but it is part of my action plan

[12:31] \_Elsa Dickens: :)

[12:31] \_yolanda Carrasco: I dont know if it is wright to put all of that though?

[12:32] \_sybil Marenwolf: I havent aactually included much of my personal life. i would need several volumes

[12:32] \_judith Soir: We can put whatever we want can't we?

[12:32] \_Elsa Dickens: whatever is useful to you

[12:32] \_Esme Inkpen: If it's something that's holding up everything else I think you should definitely include it.

[12:33] \_sybil Marenwolf: I thought we were to put job relevent stuff and do another timeline for family things. if it is relevent to you getting on though then it should go in i suppose#

[12:34] \_Elsa Dickens: your call to make, as long as it is clear why you have included it

[12:34] \_sybil Marenwolf: I have put in fitness and driving lessons

[12:34] \_sybil Marenwolf: Inportant to me

[12:34] \_Esme Inkpen: I've only done 1 action plan and it's specifically for work stuff but that seemed enough for me at the mo.

*Figure: Chatlog Excerpt*

## Discussion and Conclusions

Full analysis and triangulation of data is not yet complete, but some generalisations may be drawn from experience across both cohorts and supported by data generated in the second.

All students reported positively on their experience, despite some minor technical glitches that they were inclined to forgive, with one respondent commenting, "I enjoyed the synchronous interaction - it brings the course to life".

Students were generally more comfortable using text, suggesting a preference for more control over their conversation (particularly after one student was deeply embarrassed about leaving her microphone open whilst berating her son) and maintaining a level of separation. All students selected human avatars reflecting their physical gender, referencing the argument that presence is supported when the avatar resembles its user (Murray and Sixsmith 1999). Some students noted the potential to join the wider OU community in SL: "I particularly liked being asked by a newer arrival at the entrance how to change clothes and [we] made friends."

The results of this small study indicate that the sense of presence and constructivist affordances of a virtual world can be used to provide a richer environment than an asynchronous forum for augmenting the social aspect of belonging to a study cohort.

## References

- Herman, C. (2011). CASE STUDY After a Career Break: Supporting Women Returning to ICT. *International Journal Of Gender, Science And Technology*, 3(2). Retrieved October 10, 2011, from <http://genderandset.open.ac.uk/index.php/genderandset/article/view/136/327>
- Murray, D.C. and Sixsmith, J. (1999) *The Corporeal Body in Virtual Reality, Ethos*. *Body Self Technol.* 27(3), 315–343
- Peachey, A. *The Third Place in Second Life: Real Life Community in a Virtual World* in Peachey, A., Gillen, J., Livingstone, D. and Smith-Robbins, S. (eds) (2010) *Researching Learning in Virtual Worlds* London: Springer

**Anna Peachey**

Eygus Ltd/Open University, UK  
[anna@eygus.co.uk](mailto:anna@eygus.co.uk)

**Clem Herman**

Open University, UK  
[c.herman@open.ac.uk](mailto:c.herman@open.ac.uk)

## *The SHU3DED Cyber Campus Prototype*

### **Introduction**

Education is one of the most important components of life where good practical skills and knowledge required by professional bodies and industry are developed. The importance of education is identified and everyone has the right to receive education (1), but some people cannot physically attend educational institutions due to various reasons. E-Learning supports education using a number of techniques over the Internet, eliminating mobility barriers (2) to some extent. In this research we hypothesise that cyber campuses can support education and overcome barriers that restrict the ability of potential students to physically attend educational institutions, and have designed an initial prototype to test our hypothesis.

We shall introduce our cyber campus concept; describe the design influences and the SHU3DED development.

### **Cyber Campuses**

Cyber campuses are 3D representations of educational institutions on Multi-user Virtual Environments (MUVE) and have been identified as suitable solutions to deliver education (3). Considered as especially designed meeting points, cyber campuses simulate real life classroom, supporting synchronous delivery of learning materials and real time communication and collaboration in state of the art 3D environments (4). Cyber campuses have been described as “*an effective tool*” where “*explorations and experimentation can be carried out in a relatively risk-free environment*” by educators (5).

After critically evaluating the functionality and support of virtual environments currently available, we decided to adopt Second Life MUVE to build our cyber campus.



*Figure 1. SHU3DED Cyber Campus Building*

### **SHU3DED Development Methodology and Influences**

The initial SHU3DED prototype (Figure 1) has been developed following best practice applied in other cyber campuses, but the main driver was the "virtual school" concept as demonstrated by the Occupational Therapy Internet School (OTIS) project (6) (Figures 2 and 3). This was an innovative and sophisticated system for its time (1999), capable of managing educational resources, handle communications and support educational activities through a virtual environment over the Internet. The environment was based on a text-based

multiplayer “dungeons and dragons” type game environment of having a consistent virtual world that was mainly designed by the users (7). The system consisted of a series of rooms, each with a different function or set of course materials (6). This allowed students to connect and group to discuss items of common current interest. Records could be kept of these discussions and students could revisit them whenever necessary. Our current prototype aims to develop this functionality in a modern virtual environment, for which MOODLE Learning Management System (LMS) has been used and we will further explore some of the advances made in social networking.

Having almost completely replicating the OTIS project theory and practice, we can say that SHU3DED is what OTIS project should have look like if it was implemented using the technology of today.



Figure 2. OTIS Project Rooms Layout

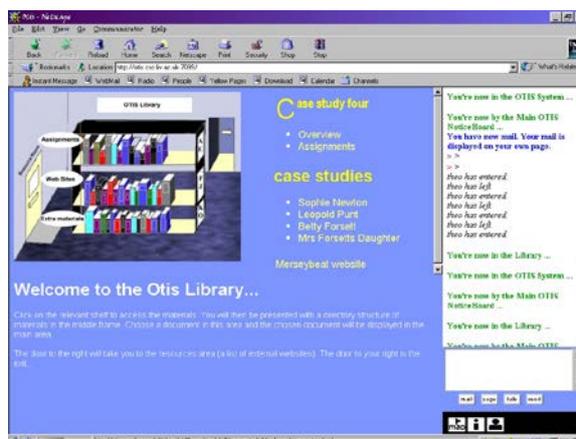


Figure 3. OTIS User Interface (7)

### SHU3DED Rooms Layout

When users visit SHU3DED, they are “teleported” (virtually transferred) to the main hall (Figures 4 and 5) where a reception area is situated that can provide useful information and guidance, and answer queries. There is also a “meeting point” where users can gather before setting off to the areas relevant to their study in the current session. The student café will allow students to exchange thoughts and relax during the breaks.



Figure 4. SHU3DED Main Hall Entrance



Figure 5. SHU3DED Main Hall (Faculty Office View)

The lecture room (Figure 6) and the examination room (Figure 7) have been designed to replicate the real life classroom by providing educational materials delivery functionalities such as presentation boards and video players, and also other functions such as quiz, surveys, record chat logs etc. Also the examination room provides components to test and record the student's performance on the LMS.



*Figure 6. SHU3DED Lecture Room*



*Figure 7. SHU3DED Examination Room*

A Library room (Figure 8) is available to support students learning by providing access to online databases; in addition a meeting room (Figure 9) is provided for users to gather and exchange thoughts and concerns privately.



*Figure 8. SHU3DED Library Room*



*Figure 9. SHU3DED Meeting Room*

## Summary and Future Work

This paper presents an initial prototype, which we can use to develop out ideas on how social networking can be used to help students facing barriers to attending on-campus courses and how they can gain the social and academic benefits of interacting with their peers. The OTIS project used the concept of adjacency to indicate similar interests and we wish to investigate whether this concept carries through well into cyber campuses. So far, the basic functionality of OTIS has been demonstrated with the added immediacy of navigating through a 3D virtual world. There seems to be less difficulty caused by students "getting lost in space" and the appearance of avatars certainly improves the impression of occupation, which was a problem with the original OTIS design, where students often did not recognise each other. Further work is required to demonstrate that this has significant educational advantages, and that the cyber campus can be used for real learning activities.

## References

1. HOC. House of Common Education and Skills Committee: Special Education Needs. 2006 [19/07/2010]; Available from: <http://www.educationengland.org.uk/documents/warnock/warnock00a.html>.
2. Chellappa.R, Barua.B, Whinston.A. An electronic infrastructure for a virtual university. Commun ACM. 1997;40(9):56-8.
3. Twining P. Exploring the educational potential of virtual worlds-Some reflections from the SPP. British Journal of Educational Technology. 2009 10/03/2011;Vol 40(No 3):496-514.
4. Delucia A, Francese R, Passero I, Tortora G. Development and evaluation of a virtual campus on Second Life: The case of SecondDMI. Computers & Education. 2009;52(1):220-33.
5. Graves.L. A Second Life for Higher Ed: A virtual world offers new opportunities for teaching. USNews & World Report. 2008.
6. Armitt.G, Green.S, .M B. Building a European Internet School: Developing the OTIS Learning Environment. 2001.
7. Isbell.C, Kearns.M, Singh.D, Stone.P. Cobot in LambdaMOO: A Social Statistics Agent. American Association for Artificial Intelli- gence [serial on the Internet]. 2000.

**Louis Nisiotis**

Sheffield Hallam University, UK

[Louis.Nisiotis@student.shu.ac.uk](mailto:Louis.Nisiotis@student.shu.ac.uk)**Martin Beer**

Sheffield Hallam University, UK

[M.Beer@shu.ac.uk](mailto:M.Beer@shu.ac.uk)**Elizabeth Uruchurtu**

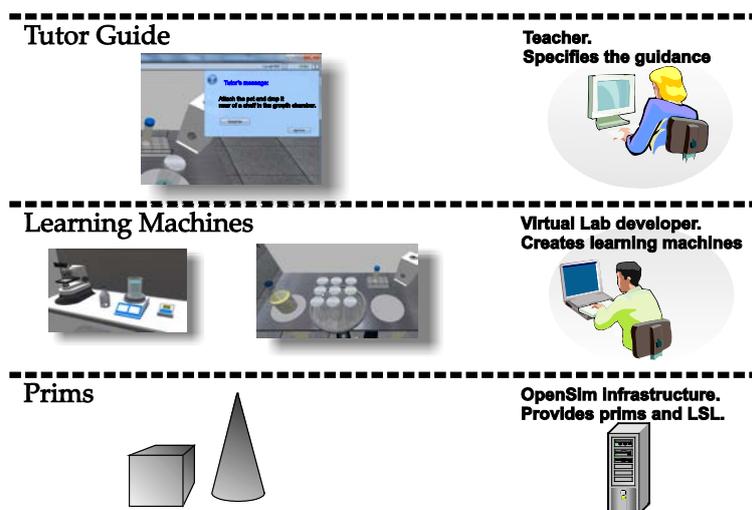
Sheffield Hallam University, UK

[E.Uruchurtu@shu.ac.uk](mailto:E.Uruchurtu@shu.ac.uk)

## *An OpenSim-based Virtual Lab for biotechnology education*

This paper describes the preliminary results of an educational innovation project at the Universidad Politécnica de Madrid (UPM), Spain, in which virtual world technologies have been used to build up a set of virtual laboratories oriented towards engineering studies. In particular, this paper focuses on showing the main features of a biotechnology laboratory. Instead of relying on a commercial solution, these labs have been created with an open source software infrastructure named OpenSim.

Non-immersive virtual worlds in education have shown to be very attractive to students [1] due to their detailed graphics and social facilities. Expensive, dangerous, or time-consuming are some of the properties of a real laboratory that justify tackling its virtualization. One of the most used platforms is SecondLife [2], but it has several limitations, such as its cost, and technical constraints such as a maximum number of objects in your parcel. Another low-cost option exists, and its name is OpenSim. Virtual worlds created with OpenSim rely on the creation of interactive objects by means of simple primitives named prims, which can be joined to create complex objects, and can have the intended behavior by means of scripts written in a programming language named LSL (see lower layer in Figure 1). This language allows the specification of interactive aspects such as object-to-object communications, as well as the communication between objects and virtual world inhabitants (students' avatars). However, a virtual lab should be much more than a set of interactive objects. It should support the execution of practical lessons in a way as faithful to the reality as possible.

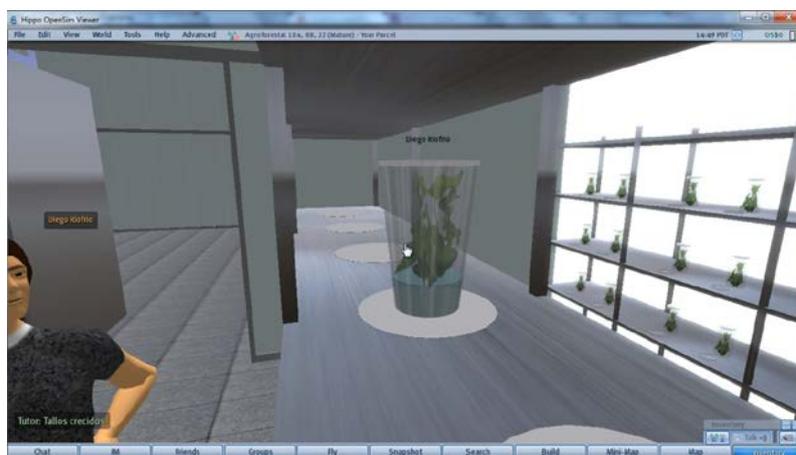


*Figure 1. Layered structure of our virtual labs and people involved in each layer. The tutor guide is built on top of the infrastructure provided by OpenSim (lower level), integrating the different learning machines involved in a given virtual lab.*

In the real world the practical lessons performed in a biotechnology lab use to be like a social game, therefore a virtual lab has been developed allowing a controlled number of students participate simultaneously in a practice, fostering interaction among them during the limited time-frame of the practice in order to cooperate in the resolution of difficulties. The practice is organized into several levels in which a set of targets must be achieved in a specific order, inspired by online multi-user games with which a high number of students are familiar. In the practice the students are expected to obtain a tree whose genome (genetic material that defines an organism) has been modified in only one gene (fragment of the genome

responsible for a concrete physiological function), increasing the levels at which this gene is expressed in the plant, by using genetic engineering techniques. In order to achieve the targets, the students can perform different kinds of actions such as mixing substances in a tube, applying some substances to small pieces of a plant, or allowing a plant to grow in places specifically prepared for that.

After the completion of the practice the student is expected to conclude that the function of this modified gene is to codify or produce an antibiotic that leads to increased resistance of the tree towards certain diseases. The overall goal of the virtual lab is to facilitate the student the acquisition of skills in several basic plant genetic engineering techniques for genome modification, manipulation and study, as well as basic knowledge about plant in vitro growing. Figure 2 shows an avatar working in the obtainment of little trees to be used afterwards for the genome modification.



**Figure 2.** Growing room in the biotechnology virtual lab. Screenshot of the virtual world browser as it is seen by the user (student), showing his/her avatar and a detailed view of the tree plants after gene manipulation.

The implemented practice takes students approximately 30 minutes to complete, whereas this same work would require almost two years in a real world laboratory due to the long waiting times associated to plant growing, a constraint that can be easily overcome in a virtual lab where the time scale can be manipulated as necessary.

Another very important goal in our approach is being able to provide guidance to the students during their learning process, even if the human professor is not directly supervising the practice. This approach supports an autonomous learning setting in which professors play a secondary role because they are not involved directly in the learning process, but they only get reports automatically generated by our system in order to evaluate the activity of their students in the virtual labs. When a student does not achieve a given target, there should be a mechanism to provide the student with hints and explanations about the reasons of his/her failures, or otherwise the student may get frustrated. For this purpose, we have created a “Guiding Tutor” software component (see top layer of Figure 1) that is capable of communicating with all the interactive objects involved in the learning process, and to provide a suitable guidance to the student. From the beginning this element was conceived as a general-purpose component that will be reused in different virtual labs. Basically, this component has two roles, firstly, it checks whether a student can perform a certain action or not at a certain moment of the practice, that is, it checks whether the preconditions of the actions are met; and secondly, it provides tutoring feedback to the student related to his/her last action.

Some of the lessons learnt during our experience developing virtual labs with OpenSim are the following:

- A high level of realism is possible even in this open code software system.
- It is possible to adopt a “guiding tutor” software infrastructure to simplify the creation of guided practical lessons.
- The professor gets a new evaluation tool with no effort. The evaluations coming from our virtual labs are integrated with other student’s grades by providing a communication between the virtual lab machines and Moodle.

### Acknowledgements

This work has been funded by the Department of Educational Innovation at Universidad Politécnica de Madrid (UPM) for the course 2010-2011. See videos of the labs at <http://www.youtube.com/user/PEIAUPMVirtualLabs>.

### References

- [1] M. Rico, G. Martínez-Muñoz, X. Alaman, D. Camacho, E. Pulido, “A Programming Experience of High School Students in a Virtual World Platform”, *International Journal of Engineering Education* 27, 2011, pp.52–60.
- [2] M. N. K. Boulos, L. Hetherington and S. Wheeler, “Second Life: An Overview of The Potential of 3-D Virtual Worlds In Medical and Health Education”, *Health Information and Libraries Journal*, 24(4), 2007, pp. 233–245.

#### **Jaime Ramírez**

Computer Science School  
Universidad Politécnica de Madrid, Spain  
[jramirez@fi.upm.es](mailto:jramirez@fi.upm.es)

#### **Mariano Rico**

Computer Science Department  
Universidad Autónoma de Madrid, Spain  
[mariano.rico@uam.es](mailto:mariano.rico@uam.es)

#### **Marta Berrocal**

Department of Biotechnology  
Universidad Politécnica de Madrid, Spain  
[m.berrocal@upm.es](mailto:m.berrocal@upm.es)

#### **Diego Riofrío**

Computer Science School  
Universidad Politécnica de Madrid, Spain  
[d.riofrio@alumnos.upm.es](mailto:d.riofrio@alumnos.upm.es)

#### **Angélica de Antonio**

Computer Science School  
Universidad Politécnica de Madrid, Spain  
[angelica@fi.upm.es](mailto:angelica@fi.upm.es)

## *Minds of Chimera: Adapting MineCraft for a Creative Learning Platform*

### **MineCraft and Minds of Chimera**

The potential for collaborative constructivist learning using Virtual Worlds is promising, but elusive. Gamers quickly recognize it for what much of it is: shallow gaming, poor stories, bad gameplay and artistically lacking environments. Enter MineCraft (<http://minecraft.net>), an Open World indie game paradoxically attracting the attention of typical gamers with: no plot, no story, no goal, simplistic combat and pixelated graphics. Selling more than 3.5 million copies before it has been released, this game's mechanic is unadulterated collaborative creativity with a touch of exploration and adventure.

MineCraft is a 3D multiplayer virtual world constructed of 1 meter blocks that can be destroyed and harvested by players, crafted to create new tools and blocks and placed to form houses, castles, farms, walkways, art, statues, traps and machinations. Gameplay is split into creative and survival modes, which allow players to focus on creating monuments unfettered by reality's limitations or fortifications designed to resist monsters or player vs player combat. Additionally, different player-run servers have different rules, goals and activities.

The NSF funded Minds of Chimera project at the University of Central Florida's Interactive Systems and User Experience Lab is creating a Serious Games platform on MineCraft. We are participating in the active modding community to extend the platform with multiple learning activities for collateral learning and an enhanced end-user development approach allowing for the development of creative complex content.

### **Typical Problems Encountered**

Michael Zyda's influential "From Visual Simulation to Virtual Reality Games" [4] article listed many of the problems facing Serious Game developers and in it, we see why MineCraft is promising. First, game development and licensing of the game engine is costly. Second, additional entries to a game genre are successful by extending the existing genre; so, a Serious Game has to be at least as complex as the best game in a genre. Third, collaborative gameplay is heavily network dependent which is difficult to optimize for additional gameplay. Lastly, tools for 2D and 3D graphics, sound, story, AI, etc., have to exist and be easy enough to allow educators to create content. In conclusion, educators do not have the resources to accomplish full-blown games; instead often focusing on short or mini-games.

In MineCraft, we see these problems alleviated. First, Mojang has announced that the modding license will be free. An active community currently is creating plugins for MineCraft and Mojang has been quite supportive of these activities. Second, MineCraft breaks the mold regarding complexity as it paradoxically has no purpose and relies on a simple mechanism of adding and removing blocks. Educators can develop relatively simple additions to the game to achieve interesting gameplay results. Third, MineCraft's networking is largely transparent and sufficient to support the number of gamers that an online community's social networks can support. MineCraft servers are generally small clusters of communities that rely on closeness to achieve server-specific goals and to protect against grief-play. Lastly, an active modding community has created plugins and tools that allow a wide range of tailoring of a server. As well, high-fidelity graphics, sound, story and AI, cornerstones of most Virtual Worlds, are not expected by MineCraft gamers (yet).

## Minds of Chimera Project

Originally developing on a more typical 3D virtual worlds platform, we were heavily stymied by the lack of tools and ability to deviate from a fairly strict set of gameplay options (a path of least resistance [2]). MineCraft and its modding community have been anything but limiting.

Minds of Chimera is a single world experiencing a golden age which splits and the player awakes to find time has passed and the golden age over. Three worlds remain, designed for three different play styles and heads of mythical Chimera: Ercilis the snake-headed survival world, Herfinita the goat-headed creative world and Leocitius the lion-headed questing world. Players excel in each world by surviving attacks from monsters and other players, creative and original creation or enduring tasks created by non-player characters.

Three initial educational experiences are being weaved into these worlds. The first is a Boolean logic quest line where players must power simple machines and circuits to solve quests. The second is a custom programming language created by placing blocks in the world to program simple robotic behaviors to solve quests. The third is a series of conceptual physics games based upon the pedagogy of the NSF Lunar Quest project.

## Creativity through End-User Programming

Minds of Chimera's fourth play style is a creative platform where gamers modify and create Serious quests and activities. These activities will exist in parallel with the other activities in the Minds of Chimera server and grow with those worlds. This constructivist approach to learning is achieved in much the same way as the Alice project [1], but through the use of Concept-Oriented Design (COD) [3]. COD was developed as a representation for developing 3D worlds and user interfaces by studying and mimicking the underlying representations in developer minds.

## Conclusions

MineCraft is a simple, fun, heavily moddable game platform that reaches the same demographic of gamer as main-stream games. Its Open World game style, open licensing and low expectations regarding sound and graphics, make it a platform educators can use to reach students. It has been very useful to the Minds of Chimera project and we encourage others to follow.

## References

- [1] Conway, M., Audia, S., Burnette, T., Cosgrove, D. & Christiansen, K. 2000. Alice: lessons learned from building a 3D system for novices. *CHI*, p. 486-493.
- [2] Myers, B., Hudson, S. & Pausch, R. 2000. Past, present, and future of user interface software tools. *ACM Trans. Comput.-Hum. Interact.* 7, 1, p. 3-28.
- [3] Wingrave, C., Laviola, J. & Bowman, D. 2009. A natural, tiered and executable UIDL for 3D user interfaces based on Concept-Oriented Design. *ACM Trans. Comput.-Hum. Interact.* 16, 4, Article 21, 36 pages.
- [4] Zyda, M. 2005 "From visual simulation to virtual reality to games," *Computer* , 38, 9, p. 25- 32, Sept.

**Chadwick A. Wingrave**

Interactive Systems and User Experience Lab (ISUE Lab)

Dept. of Electrical Engineering and Computer Science

University of Central Florida

[cwingrav@eecs.ucf.edu](mailto:cwingrav@eecs.ucf.edu)

## *Deploying Virtual Worlds for Education in Real Schools*

Between 2002 and 2008, we have developed and deployed four educational programs based on Multi-Users Virtual Environments (MUVes): more than 9,000 students from Europe, USA and Israel took part in MUVes based experiences in the context of formal education, i.e. at school, as part of a curricular activity and not as a “recreational experimentation” of technology (Figure 1). The different programs had a similar pattern, with a technology and an architecture that evolved over the years.

<i>Experience</i>	<i>SUBJECT</i>	<i>YEARS</i>	<i>Number of countries</i>	<i>Age of the students</i>	<i>Number of involved students</i>
<b>Shrine Educational Experience</b>	Bible studies and ancient history	3 (Nov. 2002 - Mar. 2004)	3	12-19 years old	1,480
<b>Learning@Europe</b>	European Identity and Modern History	4 (Mar. 2005 - Nov. 2008)	18	15-22 years old	6,130
<b>Storia@Lombardia</b>	Regional Medieval History	2 (Nov. 2004 - Jun. 2006)	1	12-19 years old	1,116
<b>Learning@SocialSports</b>	Educational value of Sport	3 (2007-2009)	1	12-19 years old	440
<b>TOTAL</b>					<b>9,166</b>

*Figure 1. Educational experiences based on virtual worlds.*

Our work was driven by a main question: “Can MUVes be educationally effective and generate, beside fun and engagement, substantial educational benefits?” A variety of means were used to test the educational impact: surveys to teachers (at each step of the experience) and students (at the beginning and at the end); reports by the online tutors, after each online meeting; interviews to a large number of teachers; focus groups with selected teachers; direct observations in a few classes, video recording what was going on; 3D Logs of the virtual “meetings”; and chat logs of the virtual environments and the forums. Teachers’ rating of the program’s impact was surprisingly good, even more since we explicitly asked them to rate it as compared to regular school activities. A large variety of benefits were acknowledged, from basic competences to improved functional use of English and group work. The overall educational impact was perceived by teachers as Excellent (19,7%), Very good (41,0%), Good (37,7%), and Poor (1,6%). Data from students show a similar “pattern” (just 5%-10% less favorable).<sup>1</sup>

**Technology.** The first virtual world (Virtual Leonardo) was an offspring of a student’s project. Once we decided to re-design the virtual world for educational experiences, we faced a number of developments leading to the first version (WebTalk-I), the second (WebTalk-II), and then the current version (WebTalkCube).<sup>2</sup> We had a few overall requirements:

- *Simplified deployment.* Being the target European public schools, the setting of the client had to be simple and without any specific technical installation. In fact, we were successful in involving schools with very basic equipment and connection.
- *Efficient re-purposing,* i.e. being able to quickly and inexpensively adapting the environment for different educational experiences. We have never achieved this as configuration in strict sense. Some level of programming was always needed, but the

amount of manpower involved was kept at a minimum (ranging from a few days to a couple of weeks).

- *Rapid configuration*, i.e. to quickly setup the environment for different “runs” of the same experience. We were successful in allowing non-technical people to reconfigure everything, without calling in programmers.
- *Collaboration fine control*. Collaboration features had to be controlled quite precisely even while a session was in progress. The collaborative features, each with its own rules, were motivated by educational purposes (like in a class where a lecture is followed by a quiz, for example).

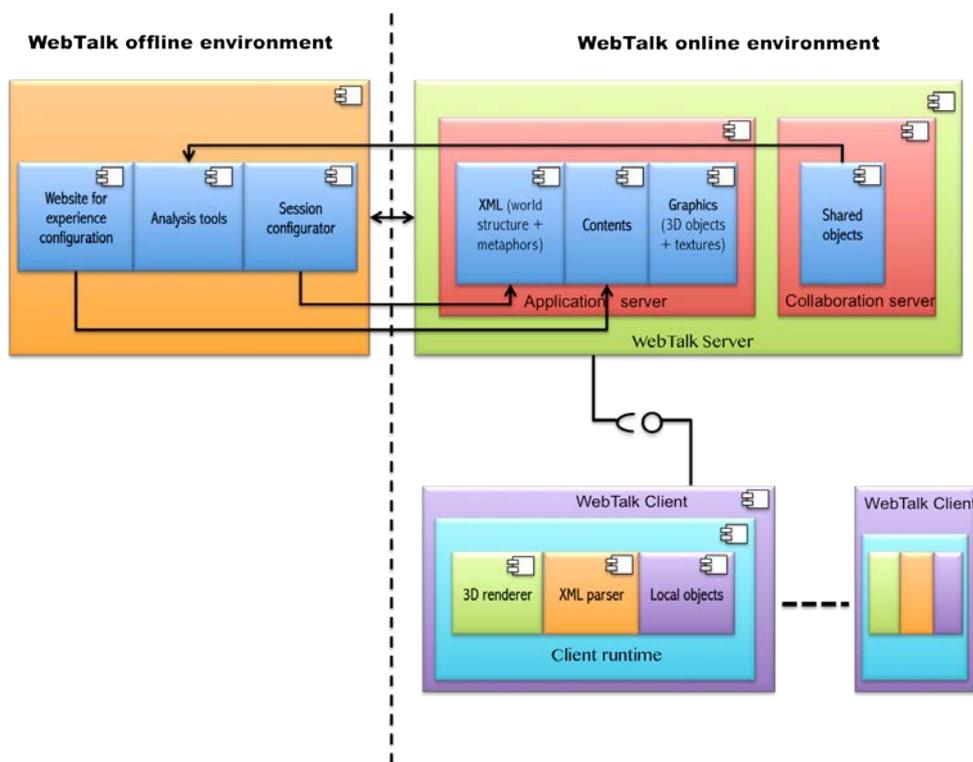
During the design (and re-design) of the WebTalk virtual environment, we carefully considered a number of technical concerns that shaped its software architecture (Figure 2):

- *Client-side*: the choice of deploying the client side in form of browser plug-in vs. a standalone application.
- *Server-side*: the need to keep a coherent shared state of the virtual world (e.g. objects and avatars position).
- *Middleware and network*: the responsiveness of the system. The sense of “being together” of the participants is influenced by the middleware architecture, thus a suitable Internet connection and a careful setting of the proxy/firewall are needed to avoid unwanted interruptions of the experience flow.
- *Collaboration*: the granularity of the control on interactions among users-objects-world (who can do what and in which way, how the objects react to actions, how the actions modify the virtual space and the shared state).
- *Tools*: the richness of a toolset that provides back-office and authoring functionalities to the virtual environment.

Two main points derived from our requirements: (i) great variability of micro-design needs, (ii) great quantity of settings variants. Traditional 3D environments mostly fail to support these needs, as their authoring systems (when provided) are unsuitable for non-technical users. To overcome this, our environment is based over a declarative (XML-encoding) description of the virtual world including static and dynamic properties.

**Lessons learned.** Our main lesson learned is that the experience’s requirements drive technological choices of the virtual world, and not the other way around. In our case, implications were numerous, and we can only recall a few:

- Graphics: simplified, with little concern for high quality and realism;
- Virtual world features for the avatars:
  - Often unusual, impossible to foresee without a precise vision of the experience;
  - “Asymmetrical” (different users have different “powers”);
  - Dynamic (they can change as the session goes on);
- Content: kept to a minimum (action is too quick);
- Collaboration: the crucial feature that makes the session engaging; users must be treated as groups, not as individuals;
- Activities in the virtual world: carefully scheduled, fast-paced;
- Environment design: very flexible and easy to “repurpose”;
- Environment setting: flexible, efficient, and doable by non-technical staff.



*Figure 2. WebTalk software architecture. Two sub-environments separate the main responsibilities: staff people use an offline environment for authoring experiences and to analyze interactions; students access an online environment during sessions.*

## References

1. N. Di Blas, P. Paolini, C. Poggi and A. Torrebruno, "3D Worlds to Learn and Play: 6 Years of Projects with an Engaging, Pedagogically Effective, and Versatile Educational Format," Proc. World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2008, Chesapeake, VA, AACE 2008, pp. 738-745.
2. U. Barchetti, A. Bucciero, and L. Mainetti, "Collaborative Learning through Flexible Web CVE: The Experience of WebTalk," In: G. Vincenti & J. Braman ed. Teaching through Multi-User Virtual Environments: Applying Dynamic Elements to the Modern Classroom, Hershey PA, USA: IGI Global publications, 2011, pp. 471-490.

### **Nicoletta Di Blas**

Politecnico di Milano, Italy  
[nicoletta.diblas@polimi.it](mailto:nicoletta.diblas@polimi.it)

### **Paolo Paolini**

Politecnico di Milano, Italy  
[paolo.paolini@polimi.it](mailto:paolo.paolini@polimi.it)

### **Alberto Bucciero**

University of Salento, Italy  
[alberto.bucciero@unisalento.it](mailto:alberto.bucciero@unisalento.it)

### **Luca Mainetti**

University of Salento, Italy  
[luca.mainetti@unisalento.it](mailto:luca.mainetti@unisalento.it)

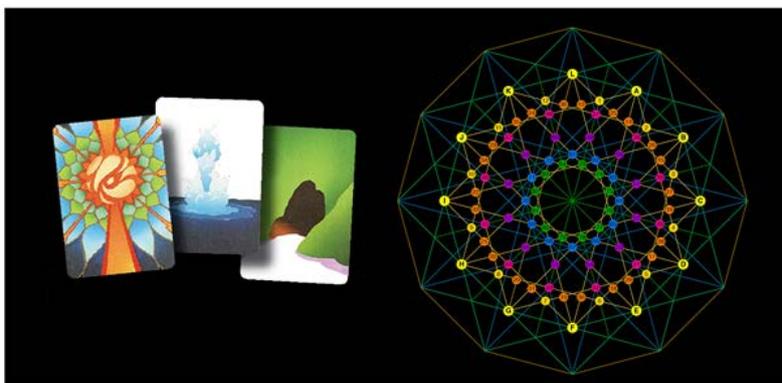
## *Virtual World Enriches the Learning Experience of a Self-development Tool*

### **Introduction**

Educational opportunities within Second Life (SL) offer students a rich context for interactivity, online accessibility, dynamic visual displays, and communication capabilities that facilitate self-exploration. A site that is useful to educators is an island called Star Journey.

### **Star Journey**

Star Journey is located at <http://slurl.com/secondlife/Star%20Journey/128/123/440> in SL. It is a symbol-based method for self-reflection that has been re-created in a virtual world format for positive teaching and learning experiences.



*Figure 1: Star Journey's two main components: ninety-six symbol cards and circle pattern chart how symbols interconnect into a new mapping of consciousness*

Star Journey is a cosmological model as well as a practical tool used for problem solving. In the real world, its two main components are separate and distinct although very inter-related. One of these is a set of 96 Symbol cards and the other, a Circle Pattern chart showing how the symbols connect into a whole. That whole is a new map of consciousness, a model of the personal universe.

On Star Journey's own specially designed island, the Circle Pattern was the blueprint for designing an arrangement of gardens and seas on ground level, and stars and gateways in the sky above. Moving through this landscape, one encounters individual symbols, each expressed in some unique and interactive way.



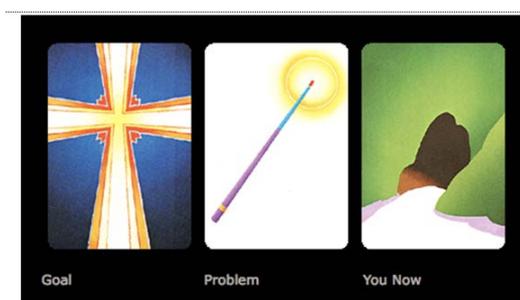
For example, the symbol *Rose* is experienced as a grotto filled with roses, the symbol *Snow* can be visited up on a mountain top, and a special room tells about the *Crown* symbol, though freebie crowns and a regal setting.

Using the Star Journey in any of its modes involves working with symbols and metaphors to tap one's inner awareness. A key part of the method is a guided process which leads a person through various mental techniques, with the object of gaining insights and clarity about personal situations. Below is an exemplar journey by a student.

## Case Study

### One Woman's Journey to Fulfillment

"I visited the Goal Journey workshop, seeking insight into my current life situation. I am a recent college graduate, who is used to working a full time job in retail while pursuing education. That recently changed as I became a full time mother. Now I felt lost, with little direction as to what to do for my life and future. I began looking inward, seeking spiritual paths and somehow found Star Journey island.



At this hands-on learning session, I decided to be the volunteer, posing the question about my current situation.

First, at the Star Deck, I was asked to choose one of twelve doorways, Gateways, basic themes in Star Journey. I instantly was attracted to "*The Pure Water*" Gateway because of a dream I had of running in water near a mountain. It felt 'right.' Then I chose three random symbol cards for my own Goal Journey.

First was *The Cross*, representing my Goal. We teleported to the Cross room; instantly, I felt a connection, and a resonance deeply within me. The symbol's keywords: New Direction, Revelation, Spiritual Awakening.

In my life, it seems there are many signs pointing me to pursuits of the spiritual. And with this being my Goal card, it made total sense for me. I saw that *The Cross* was about inner experience, about fulfillment. With all of the 'soul seeking' I've been doing, it made complete sense.

The second symbol was *The Wand*. This stood for the Problem, keeping me from the Goal. *The Wand* area had a beautiful hot air balloon and wind chimes. My first impression was something magical, such as magical thinking or wishing, and of feelings such as having faith or belief in self (or lack thereof). The keywords were: Imagining, Potentials, Will, Actualizing.

This resonated deeply with me once again. My problem is not actually taking the step of what can be, but to follow my dreams. I saw that the only problem is my failure to make the move from imagining to actualizing.

*The Wand* fit onto the Circle Pattern chart at the Key level symbol, representing challenge. The challenge is to just hop on board and make it happen. My third symbol was *The Cave*, as the You Now. This is where I am now in my life, and it was also at the level of fulfillment. *The Cave* was full of life, a waterfall, living creatures, and crystals. My first impression of the cave was seclusion, or hiding. The keywords are “Inner resources, Insight.

As a fulfillment symbol, I saw that I am already using my inner resources to gain insight into my life, which is completely true! I realize the current feelings of seclusion and solitude (my intuitive impression) are also allowing me opportunities of insight.

All three of these symbols resonated perfectly with me about my current life situation, and my interpretation was that the answer was to use the process (the Wand) of actually just taking the steps in my life toward spiritual fulfillment.

Then at the Envision Deck, I visualized the three symbols together in a picture as me walking on a path and coming out of a forest. The path leads into a cave, above which there is a large cross. I am carrying *The Wand*. It is summer time, and the sun is shining through the trees illuminating *The Cave*. It feels like I’ve found something, and *The Wand* has led me there.

In this vision, the cross was upon the cave. I was carrying the wand, using the ‘process’ to find my spiritual fulfillment; walking the path will bring me there, to discover the treasure within myself; fulfillment and happiness. I just need to have the faith to take action and diligently seek spiritual fulfillment, to make myself more whole. This journey was incredible! It helped me gain new insight into my life.”



Christine F.

9/27/2011

## Summary

Star Journey is a method that can be utilized by students to facilitate introspection. Further information on Star Journey can be found at [www.star-journey.com](http://www.star-journey.com).

**Richard H. Geer**

Star Journey Symbol Method, USA

[star\\_hold@geercomm.net](mailto:star_hold@geercomm.net)

**Sonya R. Hardin**

University of North Carolina–Charlotte, USA

[srhardin@uncc.edu](mailto:srhardin@uncc.edu)

## *Users' Representation Supporting Collaborative Learning in 3D Virtual Environments*

### **Introduction**

An avatar is a graphical representation of a real person in a collaborative virtual environment, including its behavior (Capin et al., 1999); through avatars students can meet and interact with others, agents, or with virtual objects. The customization of an avatar's appearance greatly influences the perceived sensation of presence and awareness (De Lucia et al., 2009). Avatars could mediate important information about participants through their appearance and behavior. The term "non-verbal communication" is commonly used to describe all human communication events which transcend the spoken or written word (Loomis,1992). Non-verbal communication in human real-life interaction involves gestures, body movement, facial expressions and speech; Collaborative learning is effective if the group members engage in rich interactions (Dillenbourg, 2000). To this direction, avatars' representation and gestures could support the application of collaborative learning scenarios.

This article deals with the design, implementation and evaluation of virtual metaphors, appearance features, gestures for students' avatars. The case study aims to support students' collaborative learning activities by enriching avatar's representational capability. Features that were implemented include: a) user's role representation, b) nonverbal communication and c) virtual metaphors.

### **Implementation of Avatar Features**

A three-phased, online collaborative learning scenario was conducted in Second Life for the duration of three weeks; two collaborative learning techniques were used: a) Jigsaw (Aronson & Patnoe, 1997) and b) Fishbowl (Barkley et al., 2004). Nineteen postgraduate students participated and they were assigned a certain study topic, working in predefined groups.

### **Enhancing User Role Representation**

Users in SL, can customize their avatars' appearance through a SL tool while they have also the ability to "act" non-verbally through gestures and animations. The implementations that concern the avatars' appearance are mainly related to the clothes that they wear during the online meetings. The objects regarding avatar attire that were implemented (Figure 1a) are presented below:

- *Jigsaw Shirts*: Different colored shirts, with jigsaw group indicators.
- *Expert Group Jackets*: Jackets with expert group indicator.
- *Moderator Hats*: Colored hats for group moderators.

### **Augmenting Nonverbal Communication**

Non-verbal communication seems to be highly beneficial to user interactions. Thus, we designed non-real world metaphors for the students' avatars. All features aimed to support collaboration among student groups. Collaborative scenario interaction analysis revealed basic gestures, animations or poses needed to support students in collaborative activities, which constituted a "nonverbal" equipment set for the students; newly implemented gestures, as well as some existing SL gestures have been augmented.



***Figure 1. Implemented avatar's features.***

## Virtual Metaphors

We assume that visual metaphors in e-learning can boost collaboration in CVEs and result in more effective learning. In order to evaluate this assumption we designed virtual tools implementing useful visual metaphors, described below:

- *Student Voice Tool* (Figure 1b): enables the differentiation of the speaking user through a ring with the denotation “Speaker” over his/her avatar’s head and a microphone.
- *Query Visualization Tool* (Figure 1c): visualizes users' questions, through question marks emerging from the avatar’s head.
- *Idea Visualization Tool* (Figure 1d): visualizes users having an idea through light bulbs with the word “idea” emerging from the avatar’s head.

## Results

The evaluation combined quantitative and qualitative data gathering techniques. Follow, we briefly present, the evaluation results concerning the added value of the implemented features and virtual metaphors on SL avatars, in order to support collaborative learning activities.

- Students felt represented by their avatars. The majority of the students declare that, the existence of avatars strengthened their sense of presence in the virtual learning space within SL.
- Virtual tools that can boost the feeling of “presence”. A realistic student behavior was detected, that included emotional expressions through avatar features. Students identified themselves with their avatars. Furthermore, students’ dialogues reveal their awareness about self and co-presence.
- When students work virtually, they need to extend their communication ways beyond the verbal channel. In general, avatar gestures were positively commended by the majority of the students for their usefulness.
- Avatar's appearance influence collaboration in student groups. Avatars' clothes helped users to easily distinguish their group members and their role, introducing the color of the clothes as the most important factor. Collaboration within groups was supported by the differentiation of group clothes for each scenario phase.
- The majority of participants used gestures.
- Avatars did not distract students from their main objective.

## Conclusions

Educational CVEs seem to have special requirements for avatar representation and gestures that could support the learning and collaboration process. Based on the user evaluation results, we can conclude that when gestures were used, they enriched the participants' ways of communication and interaction within collaboration groups as well as their perception of virtual presence. Another important issue that was revealed and requires further research is to provide students and teachers with the appropriate help in order to design and conduct successful and effective collaborative learning scripts using 3D environments. We assume that external help in the form of an anthropomorphic SL artificial intelligent agent could provide the necessary support. This will be also the subject of our future work.

## References

- Aronson, E., & Patnoe, S. (1997). *The Jigsaw Classroom: Building Cooperation in the Classroom*, Longman, 2nd Edition, ISBN: 978-0673993830.
- Barkley E., Cross P., and Howell C. (2004). *Collaborative Learning Techniques: A Handbook for College Faculty*, Jossey-Bass, ISBN-10: 0787955183.
- Capin T., Pandzic I., Magnenat-Thalmann N., and Thalmann D. (1999). *Avatars in Networked Virtual Environments*, John Wiley & Sons Ltd, West Sussex England, ISBN:0-471-98863-4
- De Lucia A., Francese R., Passero I., and Tortora G. (2009), Development and evaluation of a virtual campus on Second Life: The case of SecondDMI, *Journal of Computers & Education*, 52 (2009) 220–233.
- Dillenbourg P. (2000). Virtual Learning Environments: EUN CONFERENCE 2000: Learning in the New Millenium: Building New Education Strategies for Schools, *WORKSHOP ON VIRTUAL LEARNING ENVIRONMENTS*, 2-30, Geneva.
- Loomis J. (1992), Distal attribution and presence. *Presence: Teleoperators and Virtual Environments*, 1, 113-119.

### **Theodouli Terzidou**

Computer Science Department  
Aristotle University of Thessaloniki, Greece  
[literz@csd.auth.gr](mailto:literz@csd.auth.gr)

### **Thrasyvoulos Tsiatsos**

Computer Science Department  
Aristotle University of Thessaloniki, Greece  
[tsiatsos@csd.auth.gr](mailto:tsiatsos@csd.auth.gr)

### **Stavros Demetriadis,**

Computer Science Department  
Aristotle University of Thessaloniki, Greece  
[sdemetri@csd.auth.gr](mailto:sdemetri@csd.auth.gr)

## *Engaging Students in HCI Design Activities in Virtual Worlds*

### **Introduction**

We present our postgraduate HCI (Human-Computer Interaction) design studio course that makes a combined use of the constructivist pedagogy of PBL (Problem-Based Learning) with a VW (Virtual World) design studio. The goals of the course are to:

- Cultivate high-level skills to students: a) critical thinking and reflection on the use of HCI methods, b) group work, and c) self-directed learning attitude;
- Develop a design project from ideation to user evaluation that is authentic and related to practice requiring field and design work.
- Make constructive use of a number of technologies to improve students' digital design competence (Arvola & Hartman, 2008), with emphasis on VWs.

### **PBL in an HCI Design Studio Course**

We have adopted the PBL pedagogy for this course. In PBL, students are presented with an authentic problem and context and work in groups and autonomously to identify a route to a solution. PBL should not be confused with mere problem-solving; in PBL the problem is authentic and related to practice; the process of inquiry needs to be identified by the learner; the outcome is essentially a unique proposal to tackle the problem (Wood, 2003). Nelson (2003) argues that PBL can be employed to restructure computer science courses, programs of study, or entire institutions provided that professors conceptualize “*curriculum as problems, place students in the role of designers, and reconfigure classrooms as design studios*”.

The HCI course had the following schedule (3 hours/12 weeks):

1. Introduction (1 week).
2. Research & inquiry (3 weeks).
3. Design (conceptual & analytic) (5 weeks).
4. Evaluation (2 weeks).
5. Final presentation (1 week).

The main phases of the project development (2-5) were considered as problems of HCI and design methods use. The course process was iterative and incremental, blending HCI methods, design practice and technology. The main activities (Figure 1) were: (a) presentation; (b) critique; (c) reflection; and (d) design.

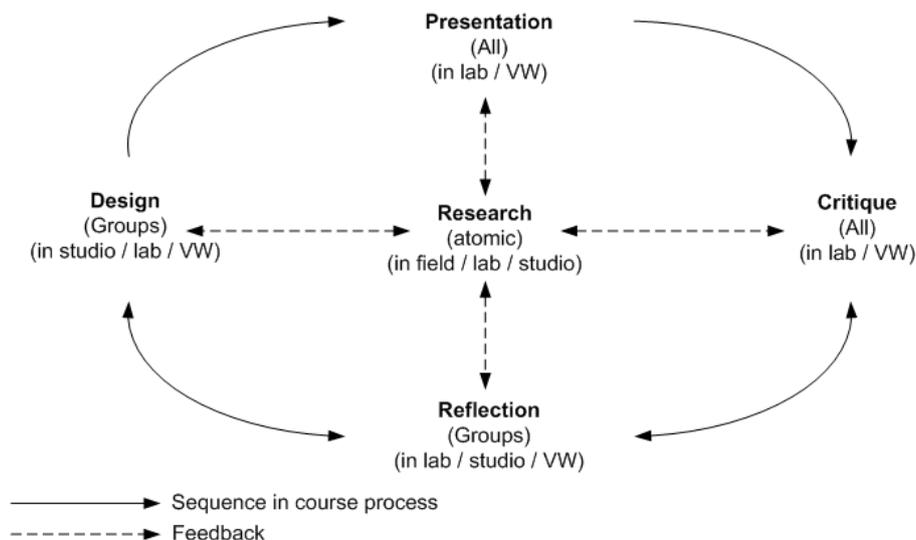


Figure 3: Outline of the iterative process and activities followed during each HCI studio course work.

### The Virtual Design Studio: Supporting Remote Collaborative Activities

To support the virtual studio activities we have installed a VW based on open source software<sup>1</sup>, instead of the most popular SL (Second Life) environment, to allow us with freedom (and no cost) of configuring the environment, controlling user access and storing user-generated content. However, a Virtual World is not a learning or design environment per se; it has to be designed as such. Therefore, we have designed and developed additional content in the form of workplaces and interactive objects (tools). The workplaces were:

- Classroom; the meeting space used for open presentations and critique.
- Private rooms; for each student to work on his own resources and develop ideas and concepts before public presentations.
- Group collaboration rooms, where the team met to discuss and co-design.
- (Virtual) Prototyping rooms.

We have also developed a number of interactive tools (Figure 2) using the Linden Scripting Language (LSL):

- The **Projector** and the **Projector Controller** for group presentations (Figure 3).
- The **Annotation** tool stores notes or comments and places them in the environment.
- The **Short Annotation** tool displays the message floating above it, so other users do not have to click on the object and open the note to read it.
- The **Message Board** is a collaborative text-only whiteboard.
- The **Sketch Board** allows students to directly draw sketches on a white surface.
- The **Drawing Board** displays Google Docs drawings in the VW and lets visitors immediately connect and edit the document.
- The **Post-it Board** allows students to add new text messages on it in the form of colored Post-it<sup>®</sup> notes.
- The **Chat Recorder** allows students to record chat sessions, play them back, or save them as annotations.

<sup>1</sup> OpenSimulator platform: [http://opensimulator.org/wiki/Main\\_Page](http://opensimulator.org/wiki/Main_Page), Freeswitch voice server: <http://www.freeswitch.org/>, Hippo (or other SL-compatible) browser: <http://mjm-labs.com/viewer/>

- The **Resource** tool displays a short description of a Web document and it opens the hyperlink in a new browser window when clicked.

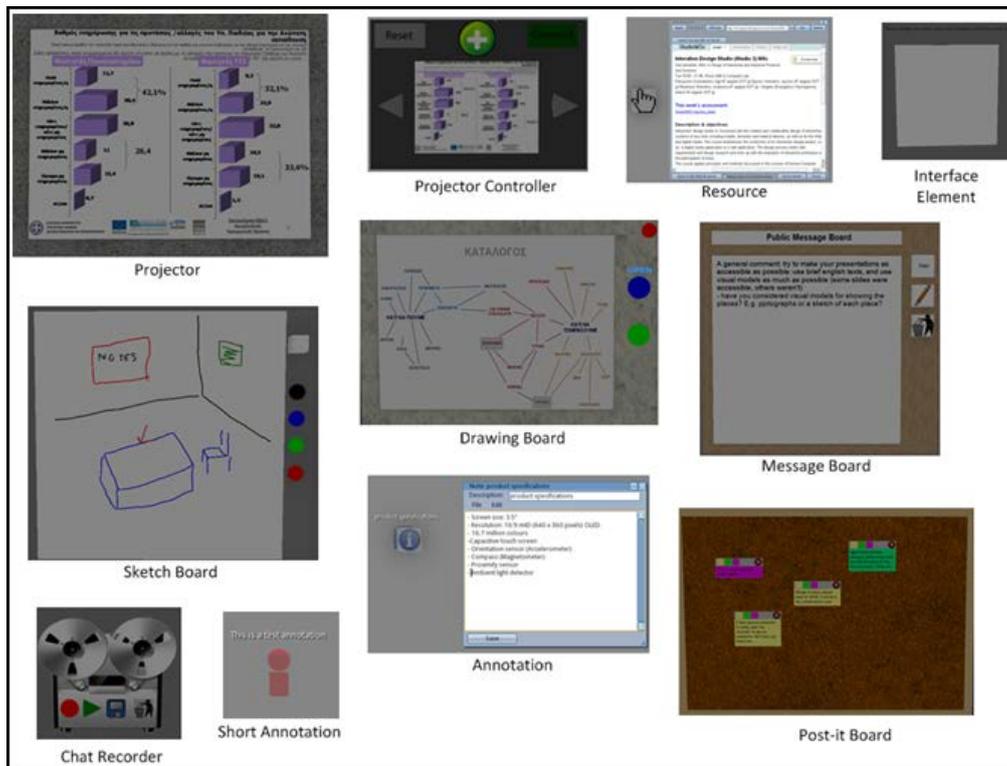


Figure 2. Virtual World tools.

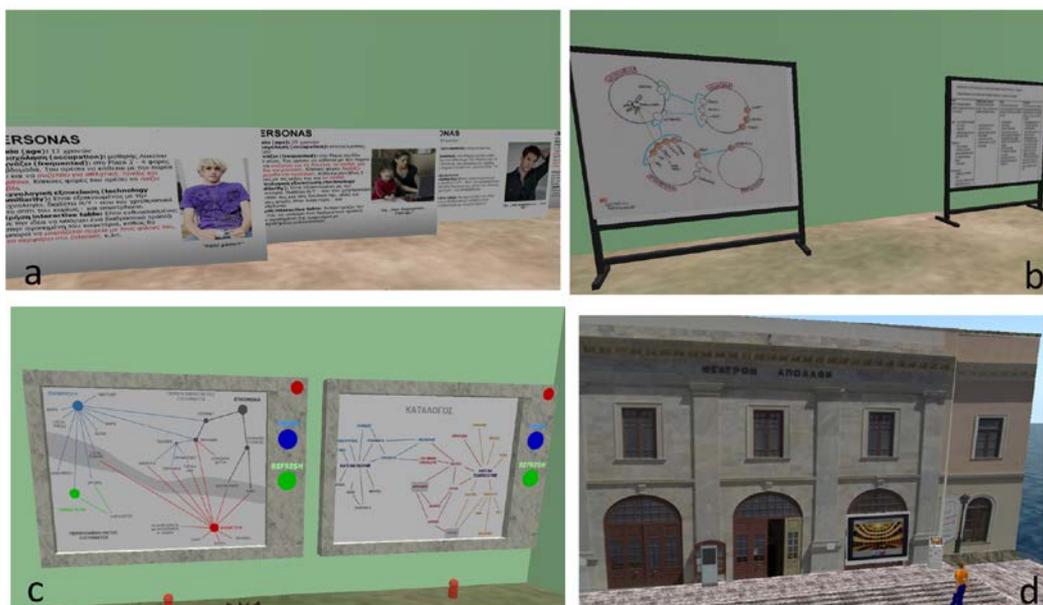


Figure 3. A Group presentation in the classroom.

Finally, we have developed the **Interface Element** to be used for the implementation of the functional user interface prototype inside the VW. Using multiple copies of this object, students can progressively construct windows containing elements such as buttons and images and define their behavior using simple commands. The interface element can have

one or more of the following functions: (a) a Button, (b) a Window, (c) an Image Container (contains a number of images and it may display the next, previous or any indexed image based on the event it receives).

During the design activities, the VW design studio tools were used in various ways (e.g. Figure 4).



*Figure 4. (a-c): Sketches and models of the design projects created in the virtual design studio with the use of the sketch board and drawing board tools; (d) the VW as a prototyping tool: a user approaching a multimedia kiosk at the entrance of a theatre.*

## Assessment

The assessment of the course indicates that the VW can contribute to students' engagement to the collaborative design project and to the development of digital design competence. The VW has been used in this course as a design studio allowing remote collaboration and as a prototyping tool. We are currently applying and refining our approach in a wider range of projects and paths in the multidisciplinary area of HCI, interaction and service design involving more students and groups on the basis of the experiences gained.

## References

- Arvola, M. & Hartman, H. (2008) Studio Life: The Construction of Digital Design Competence, *Nordic Journal of Digital Literacy*, Vol. 3, Issue 2, pp. 78-96, 2008.
- Nelson, W.A. (2003) Problem-Solving through Design, in D.S. Knowlton and D.C. Sharp, eds., *Problem-Based Learning in the Information Age, New Directions for Teaching and Learning*, San Francisco: Jossey Bass, Fall 2003, pp. 39-44.
- Wood, D. (2003) ABC of learning and teaching in medicine: PBL. *British Medical Journal*, 326 (2003), pp. 328-330.

**Spyros Vosinakis**

University of the Aegean  
Department of Product & Systems Design Engineering  
Syros, Greece  
[spyrosv@aegean.gr](mailto:spyrosv@aegean.gr)

**Panayiotis Koutsabasis**

University of the Aegean  
Department of Product & Systems Design Engineering  
Syros, Greece  
[kgp@aegean.gr](mailto:kgp@aegean.gr)

## *On the necessity of time and resource issues to support collaboration in e-learning standards*

In this paper we motivate the necessity of time+resource metadata in current e-learning standards to support collaborative activities. Learning Objects (LOs) are currently defined in a very independent way from each other, which makes it difficult to use them in a real scenario where students interact and have their own constraints. We present some challenging features that, at least, should be discussed when elaborating new e-learning standards.

### **Motivation**

In e-learning, metadata labelling offers an effective way to annotate LOs by means of title, description, keywords, relations and some technical data. Basically, e-learning standards focus on the educational perspective, dealing with LOs in an isolated way, which facilitates the dynamic sequencing of learning routes tailored to the students' profiles. However, a fully-tailored route should not only cover the individual user pedagogical aspects, but also the physical issues of the real setting in which the route will be used [1]:

1. LOs and their involved activities could require group interaction, collaboration and sharing of some particular resources which are not always available.
2. Students (and teachers) have their own temporal constraints (e.g. number of hours devoted to each course), which implies constraints on the learning route.
3. Not all the students have the same learning goals; some students are interested in being acquainted with some general contents, but others want proficiency in just a few topics. And students also have different preferences in terms of difficulty of the course, duration or even fees.

Therefore, it does not suffice to bring the right content to the right person, but also at the right time and with the right resources, which is usually missing in traditional e-learning standards. In addition to these static characteristics, students have to eventually execute the learning route, which means that some discrepancies (e.g. an activity takes more time than expected, a resource is no longer available, or one student cannot finish an activity on time) may appear and invalidate the original route. At this stage, students may opt for keeping as much of the original route as possible, or to find a similar cost/length new route. And again, nothing about these stability concerns is considered in current standards.

Most Learning Management Systems (LMSs) and tutoring tools now provide options to address collaboration, such as shared calendars, chat, forum tools and on-line surveys (i.e., evaluation checkpoints where teachers monitor the accomplishment of a learning activity). However, this information is poorly supported in current e-learning specifications. For instance, i) IMS-LD models collaborative activities but cannot represent temporal nor resource constraints; and ii) goals are usually represented as nested activity structures, and checkpoints are modelled as properties that represent predefined conditional routes. This information is currently too static, and prevents us from using an automated mechanism that adapts the learning route to the students' profile in a dynamic way -mainly because there is not a clear standard specification from where to obtain this information. Perhaps, IMS-LIP could be used to define goals at different levels, or IMS-MD to define temporal margins for collaborative LOs; but again, there is no metadata to express this.

## Use of modern techniques and applicability

AI planning techniques offer very appealing possibilities for the development of e-learning environments that effectively consider the previously described constraints and requirements. In fact, a lot of everyday activities imply some kind of intuitive planning to determine a series of tasks to reach some goals under definite constraints. The advantage of using intelligent planning (and scheduling) techniques is that they bridge the gap between the purely e-learning necessities and the accommodation of time+resource constraints of the real environment. Planning techniques go beyond the traditional e-learning insights and give support not only to adaptation and LO sequencing, but also to scheduling constraints and multi-criteria optimization metrics. This raises a challenge for a successful integration with LMSs that facilitate the dynamic navigation of contents/LOs, monitor the students' progress when following their proposed learning routes, check whether some discrepancies appear and react to them to adapt the routes to the new necessities.

The possibility of directly encoding in the e-learning standards all the information related to temporal and resources constraints, students' goals and preferences would highly increase the effective applicability of planning, independently from the LMS adopted. And not only for planning application, but also for other approaches that address these issues. In fact, many authors have tried in the last years to handle these constraints using different techniques, such as adjacency matrices, integer programming models, neural networks and graph-based sequencing procedures [1,2,3], but the main limitation is the lack of standard metadata on which to rely.

## Conclusions

We propose the integration of time+resource metadata in current e-learning standards to promote a more effective learning process. This is fundamental to support collaborative activities, sharing of resources, handle users' constraints and goals independently from the LMS adopted. We have used AI planning techniques which have shown to be very adequate to generate fully tailored routes [1], although other approaches could benefit from these additional information. All in all, we think that the use of automated techniques that deal with temporal and resource constraints would be very important for the development of effective e-learning collaborative methods and their integration with current LMSs.

## References

- [1] Garrido, A., and Onaindia, E. (2011). Assembling Learning Objects for Personalized Learning. An AI Planning Perspective. IEEE Intelligent Systems: *in press*.
- [2] Idris, N., Yusof, N., and Saad, P. (2009). Adaptive Course Sequencing for Personalization of Learning Path Using Neural Network. Int. J. Advance. Soft Comput. Appl., 1(1): 49-61.
- [3] Kontopoulos, E., Vrakas, D., Kokkoras, F., Bassiliades, N., and Vlahavas, I. (2008). An Ontology-based Planning System for E-course Generation. Expert Systems with Applications, 35(1-2): 398--406.

**Antonio Garrido**

Universitat Politècnica de València, Spain

[agarridot@dsic.upv.es](mailto:agarridot@dsic.upv.es)

**Llivia Morales**

Institute of Computing  
Technological University of la Mixteca, México  
[llviamorales@mixteco.utm.mx](mailto:llviamorales@mixteco.utm.mx)

**Ivan Serina**

Free University of Bozen-Bolzano, Italy  
[ivan.serina@unibz.it](mailto:ivan.serina@unibz.it)

## *Virtual Tornado Hits the Library*

Virtual worlds are computer platforms which allow synchronous interaction across distance in a persistent digital space. Through task-based learning, educational concepts can be embedded in new pedagogical designs within serious virtual worlds (Bellotti et al 2010). Over the past decade, the use of virtual worlds has rapidly risen, particularly for young people (Kzero 2011). For educational use, the Kzero report found Second Life to be the leader used for colleges and universities and Whyville for 9 - 15 year olds.

Librarians were among the earliest groups to embrace virtual worlds with the Alliance Virtual Library, now called the Community Virtual Library) organizing an island in Second Life in 2006. Librarians around the world are collaborating through the Community Virtual Library, the American Library Association, and numerous universities. Examples of the uses of virtual worlds in librarianship include: information delivery, conferences, workshops, exhibits, displays, simulations, research, book discussions, and interactive discovery learning (Hill & Lee 2009).

### **Virtual Tornado: An Exhibit and live Simulation**

A group of librarians in the Texas Library Association built a library exhibit at the Community Virtual Library to share information on tornadoes, after the disastrous tornado outbreak across the United States in the spring of 2011. Virtual books, posters, handouts, links, 3D objects, and photos were set up during the months of August-October 2011. Volunteers were recruited to serve as rescue workers for two live rescue simulations created by a Second Life resident, Freecilla Kuhn, at TRS360 (the Right Place All Around).

### **Purpose of the Project**

Because libraries have been revolutionized by the Internet, rapidly changing technology applications, and user-generated content, students entering schools and libraries today have information needs unlike those of only a decade ago. The TLA Second Life librarians happened to meet the builder of several virtual rescue simulations in Second Life. The topic of tornadoes seemed timely, both for understanding preparation for disaster and for experiencing a simulated rescue operation.

### **Training for the Simulation**

Three training sessions were held prior to the live tornado rescue simulation events. The TLA SL librarians donned rescue worker attire (firefighter uniforms, rescue uniforms or police uniforms) and were given the rescue equipment needed, such as hoses, stretchers, and medical equipment. The volunteers (some were librarians and some were friends, family, teachers, or students) were given the choice of roles: rescue operation workers or victims. Those who attended training also received vehicles to drive: an ambulance, a police car, or a fire truck. Most newcomers chose to be tornado victims.



*Virtual rescue workers*

The tornado rescue operation was a very short and simple scenario. Volunteer avatars met at the exhibit for a brief introduction about the background and purpose of the project. A librarian on duty at the Community Virtual Library reference desk was given the landmark to the virtual tornado rescue sim (virtual island in Second Life), in case anyone interested in participating came late.



*Tornado destruction*

After an introduction at the exhibit, the avatars teleported (instant transport to a different island or sim on the Second Life grid) to the rescue exercise. The storyline given to participants was as follows: Individuals are walking through town when a tornado suddenly hits. An emergency call alerts the police, fire department, and emergency medical team. The police officer asks for help as needed and the firefighters and emergency rescue workers

respond. The story ends with all hurt victims delivered to safety. An optional role was a television reporter discussing the damage at the scene. The builder in Second Life created the sim to randomly display the debris and damage from the tornado each time the script is run, which adds to the realism of the simulation. Feedback from participants noted that the "chaos experienced was what one might expect during a real tornado rescue!"

After each of the three training practice sessions and the two final live events, the participants, librarians, and volunteers met to debrief and discuss the learning process. One younger participant, experienced in video-gaming, had no difficulty at all learning to operate the vehicles, even though he had very little experience with Second Life. Another older educator felt "overwhelmed at times by the amount of multi-tasking involved."

The TLA Second Life librarians, as organizers of the project, found that learning was taking place on two levels: (1) the virtual world platform itself (learning how to maneuver the objects, animations, and avatars) and (2) the learning objectives for content (understanding how a rescue operation takes place). With any new technology device or application, the tool itself must be mastered before meaningful content can be embedded and used. For example, a student must become a fluent reader before tackling a variety of literary genres for meaningful purposes. The book, at one point in our human history, was a new technology.



*Traditional print resources*

## **Discussion and Implications for the Future**

Students in a traditional school library might study tornadoes through print materials, websites, or audio-visual resources (such as a video). Through an immersive simulation, many subjects can be taught in an active rather than passive context. Over the past decade, the use of video games has increased and stories are now embedded into video games which make them a literary genre (Mastel and Huston 2009). Cinematography and special effects add to the realism of videogames and experts agree that the brain uses critical thinking to master skills needed in the semiotic domain of gaming. (Gee 2003).

Undoubtedly serious gaming and virtual worlds are impacting the information seeking behavior of students and library users, just as the Internet did decades ago. As librarians and educators seek best practices for implementation of new technological applications into curriculum and libraries, it will be imperative to consider the purpose of synchronous immersive learning environments. The Virtual Tornado Exhibit and Simulation was an

example of utilizing a virtual world to deliver meaningful content across distance and across a variety of media.

## References

- Bellotti, Francesco, Riccardo Berta, Alessandro De Gloria, and Ludovica Primavera. 2010. Supporting authors in the development of task-based learning in serious virtual worlds. *British Journal of Educational Technology* 41, (1) (01): 86-107.
- Gee, James Paul. 2003. *What Video Games have to Teach Us About Learning and Literacy*. New York: Palgrave Macmillan.
- Hill, Valerie, and Hyuk-Jin Lee. 2009. Libraries and immersive learning environments unite in second life. *Library Hi Tech* 27, (3): 338-56.
- KZero Worldwide. 2011. <http://www.kzero.co.uk/>
- Mastel, Kristen, and Dave Huston. 2009. Using video games to teach game design: A gaming collection for libraries. *Computers in Libraries* 29, (3) (03/01): 41-4.

### **Valerie Hill**

School of Library and Information Studies  
Texas Woman's University, USA  
[vhilledu@gmail.com](mailto:vhilledu@gmail.com)

## **Regular Articles Section**

## *Innovations in Public-Private Partnership for E-Skills Development in the European Union*

### **Abstract**

This paper aims to discuss some of the key issues associated with PPPs in education in order to understand the role MSPs can have in improving the skills and education system of the European Union (EU). Also, it sketches out some possible policy recommendations to ensure that MSPs can successfully harness all available expertise and resources in support of a shared goal. The paper concludes that given the complexity of the operating environment for multi-stakeholder PPPs in education, it is important to state that there is no single ideal-type multi-stakeholder PPP for e-skills development. Further, substantial political support is needed to explain the changes implied by PPPs potential for the EU and EU Member States in the e-skills content.

### **To Begin With**

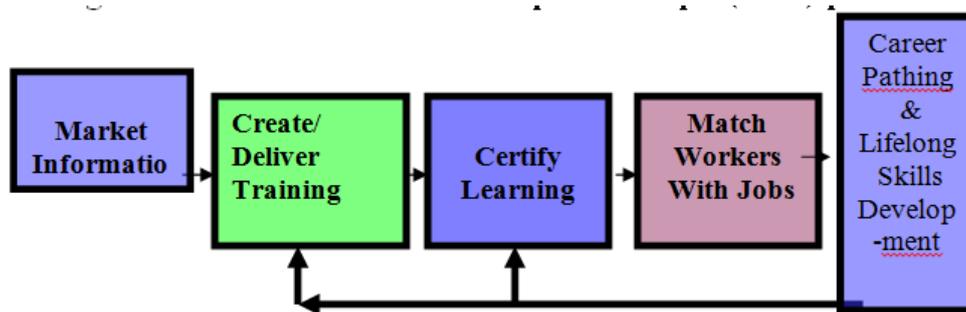
The term “e-skills” encompasses a wide range of capabilities (knowledge, skills and competences) and issues with an e-skills dimension and spans over a number of economic and social dimensions. The ways individuals interact with information and communication technology (ICT) vary considerably, depending on the work organisation and context of a particular employer, or home environment. Today, there is greater need for discussion and research about “public private partnerships” (PPPs) or “multi-stakeholder partnerships” (MSPs) for ICT skills development.

### **Multi-Stakeholder Partnerships to Bridge the “Parallel Universes”**

The ability of society to enhance the development and maintenance of education systems capable of meeting the changing needs of its users, the pupils, and of the ICT-embedded industry, and the society as a whole, is coming under ever closer scrutiny. The wide-ranging demands placed on traditional education systems, including improving quality, promoting equity, and ensuring accountability mean that governments alone may no longer be able to meet all these challenges.

### **Digital Opportunity Initiative**

Evidence strongly suggests that, in order to reap the benefits of ICT at a national, regional or sector level, it is necessary to create a new form of collaboration that involves the full range of actors in the public and private sectors in a process that is inclusive, open and participatory. The “multi-stakeholder partnerships” (MSP) strategies are not universal. Countries face different circumstances, priorities and financial means, and should, therefore, adopt different strategies accordingly. A comprehensive framework, however, can assist in determining a strategy regardless of what goals have been established, since coordinated action is always likely to yield more effective results. The MSPs can be built at every stage of the value chain for continuous learning (Figure-1).



*Figure-1: The Multi-stakeholder partnerships (MSP) process*

### **Benefits of Multi-Stakeholder Partnerships:**

- For the public sector:
  - More widespread provision of computer literacy, basic as well as professional e-skills, ensuring wider productive participation and co-operation of citizens in the knowledge-based society.
  - Enhancement of existing curricula to fit modern needs. Students will be able to leave formal education channels with workplace ready-skills.
- For the students:
  - Enhancement of just in time learning and lifelong learning opportunities.
  - Updated curricula mean acquisition of current, real-valued e-skills.
- For industry:
  - Workplace-ready employees.
  - Closer match of supply and demand reduces need for costly re-training on the job.
  - Supply of workforce no longer dependent on national boundaries.

### **Some Examples of Multi-Stakeholder PPPs for E-Skills Development**

- Recognition of vendor certifications in the United Kingdom: One of the most relevant examples for public recognition or endorsement of vendor qualifications by a national education system comes from the UK. Within today's UK education system, more than 100 publicly accredited "Awarding Bodies" offer qualifications to schools, colleges and training providers.
- Recognition of vendor certifications in the Netherlands: The ECABO (Dutch National Body for Vocational Education) is charged with developing and maintaining a qualifications framework in the Netherlands. In the area of e-skills, the ECABO has developed a set of occupational competences in association with industry and educational institutions.
- The Cisco Networking Academy Programme (CNAP): The CNAP is a PPP between governments, educational institutions, social partners and industry, in particular Cisco, created to teach students how to design, build and maintain computer networks.
- The European Computer Driving Licence (ECDL): The "European Computer Driving Licence" (ECDL) is an internationally-recognised, vendor-neutral, end-user computer skills certification. It has more than 3.5 million participants and is currently available in 135 countries. Belgium recently launched an initiative aimed at bringing ECDL certification to the unemployed.

- The eSkills Certification Consortium (eSCC): The eSCC is seeking to establish a multi-stakeholder partnership of government, industry, and education stakeholders to develop a European framework which will allow the recognition of industry and other non-formal certifications within formal national educational and vocational training systems across Europe.
- Australian IT Skills Hub: The Australian “IT Skills Hub” represents a single, united body that will take responsibility for e-skill development across the entire education and training spectrum, from secondary schools to higher education and industry-based certification.

### **Concluding Observations**

The paper concludes that (a) Substantial political support is needed to explain the changes implied by PPPs potential for the EU and EU Member States in the e-skills content; and (b) Comprehensive and integrative partnership projects, such as projects for a “European ICT Career Development System and ICT Career Portal”, could serve best to deliver the applied economics of multi-stakeholder partnerships for e-skills development in Europe and beyond.

### **References**

1. Asian Development Bank, proceedings of the ADB seminar Public-Private Partnerships in Education, Tokyo, 29 May – 7 June 2000.
2. <http://www.qualityresearchinternational.com/glossary/lifelonglearning.htm>, accessed on September 30, 2011.
3. <http://www.kmel-journal.org/ojs/index.php/online-publication>, accessed on September 30, 2011.
4. [http://www.e-skills-ilb.org/docs/initiatives\\_euLevel.pdf](http://www.e-skills-ilb.org/docs/initiatives_euLevel.pdf), accessed on September 30, 2011.
5. [http://ec.europa.eu/enterprise/sectors/ict/files/comm\\_pdf\\_com\\_2007\\_0496\\_f\\_en\\_acte\\_en.pdf](http://ec.europa.eu/enterprise/sectors/ict/files/comm_pdf_com_2007_0496_f_en_acte_en.pdf), accessed on September 30, 2011.

#### **Santosh Kumar Mishra**

Population Education Resource Centre (PERC)  
Department of Continuing and Adult Education and  
Extension Work  
S. N. D. T. Women's University,  
Mumbai - 400020, Maharashtra, India  
[drskmishrain@yahoo.com](mailto:drskmishrain@yahoo.com)

## *VizResearch: Linking the Knowledge of People and the People with Knowledge*

The importance and influence of social network has been ubiquitous nowadays. This decade has seen the rise of these platforms where billions of people are sharing their information, communicating their feelings and even performing activities to satisfy their business requirements. If we take only one of the several popular social networking services – facebook for example, we can see that their number of active users is more than 800 million. More than 50% of them log on in any given day, sharing 250 million photos every day<sup>2</sup>, and growing at a rate of around 83 percent per year on average over the last 5 years<sup>3</sup>. The concept of social networking has changed the way we have thought about communication – personal or professional, and in no way we can ignore it anymore. The purpose of this article is to emphasize the application of social networks among a specific group of people – the researchers and to present a platform that combines some unique features in this respect.

Researchers also share the same communication requirements as general people. They need to find information and share it with others. As a matter of fact, the requirement of effective communication is more important for them than the general people; as knowledge is power and dissemination of that knowledge only increases it. The type of information and communication also varies according to the level and expertise of the researchers. There are situations when a researcher searches for publications and references, when a freshman looks for research funding and a supervisor to work with or when an academician wants up-to-date information of any particular research topic or work by other researchers, only dealing with factual information makes the task difficult and time consuming. The field of research is becoming richer with the high increase in the amount of research works, research depth and the number of people involved. Given this inherently social and dynamic nature of research, an interactive network platform is utterly needed to bind information with people focusing on research activities.

There are several web resources like Citeseerx, Google Scholar, Pubzone to find out research related information, besides the professional bodies like IEEE and ACM. These include papers, citation data and author information. Sites like *Microsoft Research*, *Arnet Miner* (<http://aminer.org>) and *Microsoft Academic Search* provides information with better visualization tools like co-author path, citation graph, organization comparison, location based research, researcher info and effective search pruning options. But these sites lack collaboration facility among researchers. There is another service provided at [www.academia.edu](http://www.academia.edu) that targets this field. Though more than half a million<sup>4</sup> academician users update and share information about their work and interests here, making it probably the largest social network for academicians, the site lacks many important facilities to share and find information that would have made it more effective. Nevertheless, the success of this website proves the requirement of such a service.

To combine the requirements of a research regarding information access, sharing, and collaboration, we propose our solution VizResearch, a platform for online research community with visualization of information. It is a social network of researchers and academicians where they can interact with through following other's work, form a group of

---

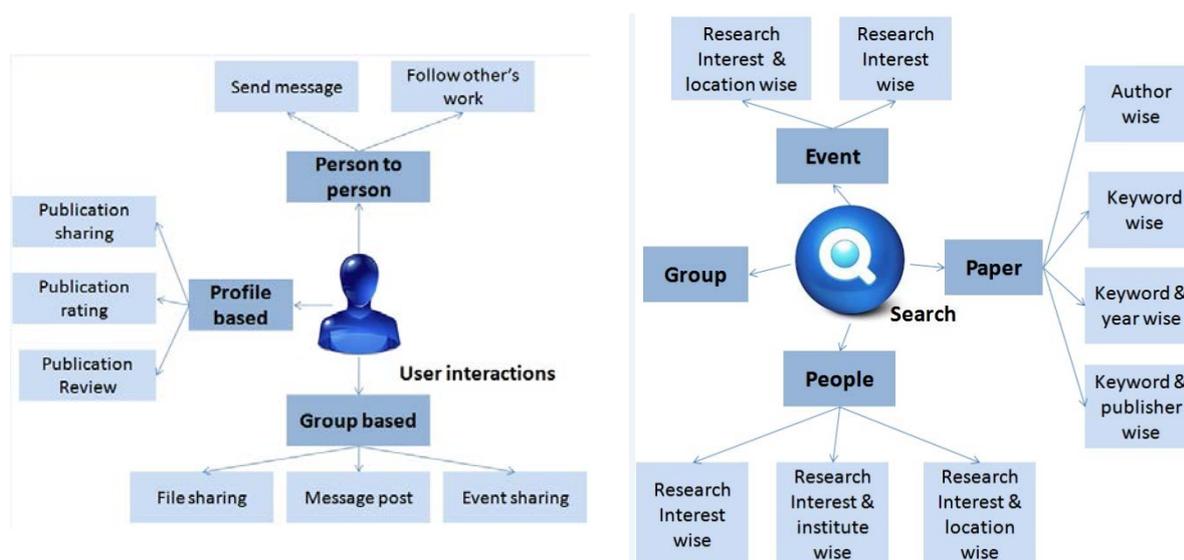
<sup>2</sup> <http://www.facebook.com/press/info.php?statistics>

<sup>3</sup> <http://www.facebook.com/press/info.php?timeline>

<sup>4</sup> <http://www.academia.edu/>

same interest, do group base activities like message post, comment, and file sharing. Another group-based activity is arranging related events like conferences, seminars, or information sharing along with the event's geographic location visualized in a map. Users can upload and/or share their publications' information too. Papers and publications can be rated and reviewed by other users.

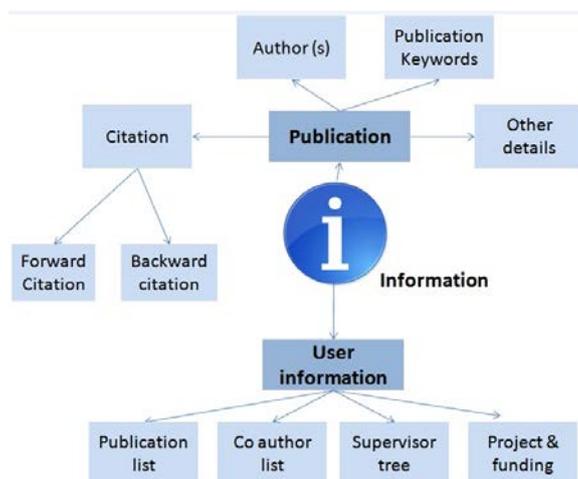
Users' provided profile information are presented with visual aids. A researcher's relationships can be visualized, like her co-authors list and supervisors' hierarchy tree. Papers and publications are presented with their bibliography as well as their citation information. Users can share their project or research work details and also the corresponding funding information.



*Fig. 1: User interaction and search options.*

Based on the users rating, publication search has been made efficient in VizResearch. Publication can be searched with title, author, and keywords with the filtering options of publication year and publisher. The search result can be presented in a sorted order based on citation number and user rating. Researcher's information can be found with many efficient filtering options like organization, research interest, and most importantly, by geographic location in a Google map. Also the trend of research fields can be visualized in a chart showing percentage of the total number of researchers working on various fields verses time.

The project VizResearch is developed on ASP.NET using Oracle as the backend to provide robustness and security. We are working on developing a version of VizResearch that will provide easy access and use from mobile phone devices. We expect to implement location based organization, researcher and event finding facility with GPS data. One of our biggest challenges will be recruiting large number of academicians around the globe in the site. We hope to do this by forging partnerships with universities and research institutions.



*Fig. 2: Information visualization.*

This work, VizResearch, in essence brings all vital research facilities namely, information sharing, information visualization, community interaction and dynamic evaluation of research and researchers under a single hood. It aims to become a platform to link the knowledge of people and people with the knowledge and thereby fueling research collaboration and information exchange globally.

**Sarah Masud**

Bangladesh University of Engineering and Technology  
Dhaka-1000, Bangladesh  
[sarah\\_26cse@yahoo.com](mailto:sarah_26cse@yahoo.com)

**Monjura Afrin**

Bangladesh University of Engineering and Technology  
Dhaka-1000, Bangladesh  
[hello.rumi004@yahoo.com](mailto:hello.rumi004@yahoo.com)

**Farhana Murtaza Choudhury**

Bangladesh University of Engineering and Technology  
Dhaka-1000, Bangladesh  
[farhanamc@gmail.com](mailto:farhanamc@gmail.com)

**Syed Ishtiaque Ahmad**

Cornell University, USA  
[sa738@cornell.edu](mailto:sa738@cornell.edu)

**Hasan Shahid Ferdous**

Bangladesh University of Engineering and Technology  
Dhaka-1000, Bangladesh  
[hasan.shahid@csebuuet.org](mailto:hasan.shahid@csebuuet.org)

### *Three Case Studies on the Affect Effects of Teaching Foreign Language and Culture with Technology*

Foreign language and culture instruction today, particularly the less commonly taught languages, faces a paucity of authentic, engaging, appropriate, and affordable teaching materials. We use three case studies to show that by creating materials online, course content can be more authentic, appropriate, and cost-effective; furthermore, the use of technology can help create more positive affect effects in today's students' learning.

There has been an increasing trend towards the incorporation of authentic materials into foreign language and culture classrooms for the past twenty years. Authentic material promotes overall communication competence through a task-based approach (Rogers & Medley, 1988) and positive attitude towards the target culture (Westphal, 1986). However, students can experience anxiety when faced with authentic materials that are not completely tailored to their proficiency level and needs, resulting in negative learning experiences.

We contend that the use of technology can alleviate student anxiety and foster an inviting learning environment by affording students more control over the input of authentic materials. For example, by presenting authentic materials online, students can have all the advantages provided by authentic documents and at the same time determine how and when they use them. Once the cycle of anxiety and frustration is broken, they will experience less stress when faced with authentic language in a live setting. Technology also brings about student engagement. Carmean and Haefner (2002) state that internalization occurs when learning is social, active, contextual, and student-owned. Current technologies can be used as powerful tools to encourage student cooperation and assist them to deploy active learning techniques and multiple learning styles. Course Management Systems (CMS), for example, enable instant information exchanges and simultaneity, and employ various cognitive stimuli both in material-presentation and in activity-design. As the first generation that has grown up in the digital age, today's students have the unique ability of weaving together images, text, and sound and extracting information from them, and prefer environments that offer immediate rewards and opportunities for social networking (Lippincott, 2005).

Our first case study is the design of an online virtual book for Contemporary Francophone Quebec Culture, which is taught in English. Prof. S first identified reliable English websites and other multimedia resources that matched the topics in her syllabus. She then created hyperlinks on Blackboard. Then she required students to prepare PowerPoint documents by synthesizing the information presented in the authentic documents; she also required students to participate in an online discussion board. Prof. S scaffolded students to retrieve and process authentic information in a hands-on manner; for example, when studying the conflict between the French and English in 1950s Montreal, instead of reading a dry account of an historical event, students are drawn into the emotions communicated by the authentic multimedia documents they are exposed to. Also this virtual textbook spares the expense of course materials, when most of our students are from low-income families in an urban-setting.

Prof. P created web-based activities for Beginning Italian, to make up for the lack of authenticity and task-based activities in the textbook and the lack of diversity in Italian pedagogy. Students worked in groups to surf Italian websites to compare travelling by train and by airplane. Then they justified their choice by completing charts with required information. Finally they checked train and airline websites to come up with a travel

itinerary. Then students completed charts regarding what clothing items the traveler needs with role-play and then they used online shopping links to buy the desired clothes with a budget.

These internet-based and student-centered activities that simulate real-life experiences boosted students' interest greatly. Students approach the authentic material with less frustration because their mastery of technology balances their language deficiencies; they show persistence and collaboration in trying to solve the linguistic, cultural, or pragmatic issues, all important factors for successful learning.

The majority of the handful of existing Chinese textbooks reflects an out-of-date grammar-translation approach. Prof. H. decided to create his own online homemade video vignettes to supplement such deficiency. These materials also resolved difficulties caused by a low budget and copyright laws that make it harder to purchase high-quality, suitable, and authentic teaching materials.

First, Prof. H videotaped some conversations by Chinese speakers. He guided these conversations to include the structures and vocabulary being taught in his Intermediate Chinese. Such semi-authentic and semi-pedagogical materials can engage learners better and enrich the input format. Also, such 'directed' authentic speech helped alleviate some of the anxiety that students might have otherwise experienced. Prof. H selected and edited the clips to be posted on Blackboard. Using the Chinese input, he created a variety of exercises including multiple choice, dictation, and filling in the blanks, with the test-designing tools.

Authentic materials are best suited for the development of skills in listening and reading comprehension. While audio can isolate listening exercises, video can do more by training students to interpret other essential communicational cues, like gestures and facial expressions that might be language- and culture-specific. The option of keeping the video captioning on made each video not only a listening but also a reading exercise.

We conclude that when authentic, interactive, engaging, appropriate and affordable materials are incorporated into foreign language and culture teaching by means of technology, they can make learning independent, social and student-oriented, providing nurturing affect effects that tap into students' own technology skills.

## References

- Carmean, C. & Haefner, J. (2002). Mind over Matter: transforming course management systems into effective learning environments. *EDUCAUSE Review*, 27-37.
- Lippincott, J. K. (2005). First Steps toward Understanding the Net Generation. In Diana Oblinger and James Oblinger (eds.) *Educating the Net Generation* Educause.
- Rogers, C. & Medley, F. (1988). Language with a Purpose: using authentic materials in the foreign language classroom. *Foreign Language Annals*, 21: 467-78.
- Westphal, G. F. (1986). On the Teaching of Culture in the Foreign Language Curriculum. *Canadian Modern Language Review*. 43: 87-93.

**Pierluigi Erbaggio**  
University of Michigan, USA  
[erbaggio@umich.edu](mailto:erbaggio@umich.edu)

**Sangeetha Gopalakrishnan**  
Wayne State University, USA  
[sangeetha@wayne.edu](mailto:sangeetha@wayne.edu)

**Sandra Hobbs**  
Wayne State University, USA  
[sandra.hobbs@wayne.edu](mailto:sandra.hobbs@wayne.edu)

**Haiyong Liu**  
Wayne State University, USA  
[an1884@wayne.edu](mailto:an1884@wayne.edu)

## *A pervasive solution NFC based for access to bibliographic sources*

### **Abstract**

This paper presents a proposal for a pervasive system that provides students access to bibliographic sources recommended by teachers in each of the subjects or courses in which students are registered. To define the educational content to a subject or course we used the IMS Learning Design (IMS LD) standard. Finally, we have studied the use of Near Field Communication (NFC) for the development of this pervasive system.

### **Introduction**

Currently, Europe has undergone a process of change to educational level: the construction of the European Higher Education Area (EHEA) [1][2]. Due to the new directives of the EHEA, a new model of education should be implemented at European universities. The implementation of this model requires the application of new methodologies and teaching techniques as well as the use of information technologies to provide customized and ubiquitous training, so students can develop their skills and abilities through a process of classroom and virtual training.

This work is focused on the use of existing ontological standards (IMS Learning Technology Standards Observatory (IMS-LTSO) [3]) for the proposal of an ontology for describing of custom teaching guides. The ontology contents are related to bibliographic information chunks which have been recommended by the teachers in order to improve the understanding of the subjects and the development of expected skills. Specifically we have made use of the IMS-LD standard [4] which offers a way to describe the learning activities and their organization. This language is both a means to elaborate and share pedagogical design and a support for the execution within Learning Management Systems.

The main goal of our work is to define a standard ontology based on IMS-LD oriented to the creation and maintenance of teaching guides. In addition we aim to monitoring teachers teaching students, to give support to students in their study, promoting access to personalized bibliographic sources, guiding what specific sources (articles, books, and any kind of recommended bibliography) must be accessed by students in order to acquire the required knowledge in each of the disciplines. In addition, this study focuses on the use of NFC [5] (Near Field Communication) technology to build a customized system. This system helps the university students to access, read and review the necessary bibliography sources for the development of their learning. The independent study and consultation of bibliographic sources for a college student is a gap in the current system. However, it is of vital importance in the new training model

Basically, the system has an architecture based on a back-end system responsible for the management of the information and a front-en system running on a NFC enabled device. The back-end system is responsible for the management of the information about teachers, students, teaching guides, etc., and link items to bibliographic elements of the subject programs. A bibliographic item can be anything from a full text, book chapter, one or a set of pages, a web address, etc. The front-end system is designed for the students can use this system at anytime and anywhere in a personalized way. Its application areas are university libraries, promoting the study of students and the access to recommended literature.

Under this goal will be proposed an ubiquitous system architecture based on Web-services and use of NFC technology. When a student "touches" one bibliographic source, he/she receives personalized information on his/her NFC device about the information elements that this source can contribute to their academic and professional training. In order to apply and test this approach, a tool called PINAKES (Pervasive and INtelligent system for the Awareness Elicitation for Students) has been created.

## PINAKES Overview

We have developed a prototype which uses the information that has been defined through IMS-LD ontology. This ontology describes the structure of the teaching guide and the recommended references. The prototype user interface is developed on top of the Android platform and tested on Nexus-S smart phone.



*Figure 1: Some PINAKES Mobile Application snapshots*

The tool allows getting information about a bibliographic source through a NFC Tag assigned to it. This Tag (a RFID label) stores the information about the source. Fig 1 shows some snapshots of the application's interface. The application could be instantiated on demand by the user or automatically when the user "touches" a Tag available in the source. When the application is instantiated on demand, the application shows to the user all the available options (Fig 1.a): a) Library access, b) Touch source, c) Touch teacher post-it, d) Search, and e) Recover information. The information received by the user in previous interactions could be stored for future accesses and requests.

- When a Tag is "touched" with the NFC device, the application is initiated (if it has not been previously by the user) guiding the user interaction about the services stored in the Tag. As shown in Fig 1.b, four options could be selected by the user: a) advices, shows the subjects and learning activities for which the source is recommended (Fig 1.c), b) information about the source (Fig 1.d), c) reviews, show comments and ratings from other users (Fig 1.e), and d) other uses.
- When a Tag in an intelligent teacher post-it is "touched" with the NFC device, the application is initiated and show the references which have been recommended by the teacher. The intelligent teacher post-it is located at the teacher office entrance.
- Finally, when a NFC reader in a library is "touched" with the NFC device, the application shows personal notes for the student.

## References

- [ 1 ] Clausen, T. H. (2005). Undergraduate Engineering Education Challenged by The Bologna Declaration. *IEEE TRANSACTIONS ON EDUCATION* , 48 (2), 213-215.
- [ 2 ] European Commission. (Mayo de 2006). *Cumplir la agenda de modernización para las universidades: educación, investigación e innovación*. Recuperado el 1 de 2011, de European Commission: Education & Training: [http://ec.europa.eu/education/higher-education/doc1324\\_en.htm](http://ec.europa.eu/education/higher-education/doc1324_en.htm)
- [ 3 ] LTSO, Learning Technology Standards Observatory, <http://www.cen-ltso.net>.
- [ 4 ] IMS Learning Design Standard, 2003, <http://www.imsglobal.org/learningdesign>.
- [ 5 ] NFC Forum. (2010). Recuperado el Octubre de 2010, de <http://www.nfc-forum.org/home>

**Francisco Manuel Borrego-Jaraba**  
University of Córdoba, Spain  
[fborrego@uco.es](mailto:fborrego@uco.es)

**Irene Luque Ruiz**  
University of Córdoba, Spain  
[iluque@uco.es](mailto:iluque@uco.es)

**Miguel Ángel Gómez-Nieto**  
University of Córdoba, Spain  
[mangel@uco.es](mailto:mangel@uco.es)

## *A Natural User Interface Classroom based on Kinect*

In a classroom environment it is necessary for the teacher to teach the students in a way that is convenient for both the students and the teacher. The overall teaching process should not only be educative and informative, but also there should be equal participation and interaction between the students and teacher. The teaching lessons become boring and ineffective when this interaction and communication is missing in the classroom.

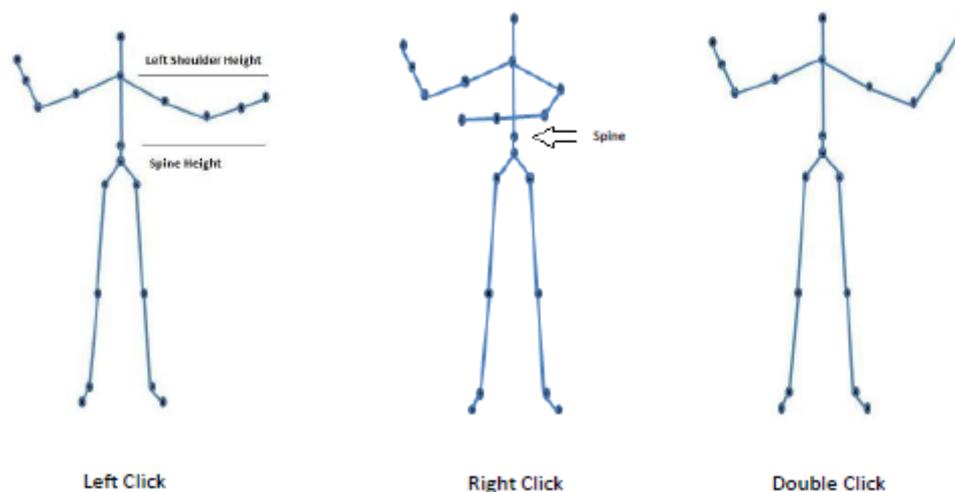
While delivering a presentation in PowerPoint or during any demonstration in the classroom, the teacher has to constantly move to the computer to change the slides and to perform other operations, which creates inconvenience and often interrupts the flow of the teaching and concentration of the students. Using the Microsoft XBOX 360 Kinect sensor, the power and ease of use of the new emerging techniques of *Natural User Interface (NUI)* can be applied to make the presentations and other computer operations easier and more effective. The students can directly take part in the teaching process and the interaction between the teacher and students can be more natural in this way.

Kinect is not just a sensor device for Microsoft XBOX 360; rather it is being deployed in different educational and recreational purposes. Kinect has been integrated in different schools in South Africa [1] for the educational and recreational activities of the children. The motto is: *“No more monologue by the teacher aimed at the students who don’t retain half of what they hear. No more boredom in the classroom... “Language is no longer the barrier; physical impairment is no longer a shortcoming. Interactive schooling is the way of the future.”*

Kinect has been used for teaching mathematics concepts relating to functions with Kinect [2] and also for Learning Analytics and RTI [3] (*Response to Intervention*). It has been used for different recreational purposes such as for hand painting [4] and also for other interactive games.

With this latest sensor device developed by Microsoft, we have used our programming skills to detect basic human gestures to control PowerPoint presentations and the mouse operation by our hand movements, and thus freeing the teacher from the keyboard/mouse and to interact more *naturally* with the students.

We have developed a gesture detection engine on top of the Kinect Software Development Kit (SDK) to detect hand movements so that we can control the operation of Microsoft PowerPoint and the mouse operations with our gestures. The NUI Skeleton API of Kinect provides information about the location of a person standing in front of the Kinect sensor array, with detailed position and orientation information. The data is provided to application code as a set of points, called *skeleton positions*, which compose a skeleton. This skeleton represents a user’s current position and pose. The movements of the hand are used to control the PowerPoint and the normal operation of a mouse for computing. We have used right hand movements for PowerPoint control and cursor movement of a mouse and different left hand movements for left click, right click and double click of a mouse. Both hands can be used for mouse dragging operation.



*Fig. 1: Gesture based computing, some examples*

To make a gesture based command, the teacher has to keep his right arm at about his/her shoulder level and move it left or right to make commands, “Next Page” or “Previous Page”. For mouse cursor control the right hand position is used. For left click the left hand has to be between the spine position and left shoulder position, for double click the left hand has to be over the left shoulder position and for right click the left hand has to be between the spine position and right shoulder position. For mouse drag operation left hand has to remain fixed and the right hand movement will perform the operation.

The hardware requirement is Intel Dual Core PC or equivalent and Kinect sensor as mentioned earlier. It also requires Microsoft Visual Studio 2010 Express, Microsoft .NET Framework 4 (installed with Visual Studio 2010), DirectX Software Development Kit and DirectX End-User Runtime Web Installer installed in the computer.

The scope of Kinect for learning (gesture-based learning) is not constrained to just inside a classroom, it can be applied to many other fields. It can be very helpful to the physically disabled and autistic (specially enabled) children for their learning and other purposes. Different useful and educative applications and operations are being performed effectively and conveniently by Kinect everyday and this new approach of human technology interaction will flourish more in the near future.

Kinect has opened a new era of Human Technology Interaction (HTI) and has created an easier and convenient way of teaching in the classroom. The class lessons will no longer be boring to the students, as it revitalizes classroom lessons and transforms ordinary classroom experiences into extraordinary immersive education. The teachers will also feel convenient and natural in teaching and interacting with the students. Kinect can detect any person in front of its sensors, so the students can also participate in the learning process effectively. This gesture-based interaction cannot only be used in learning but also be used for entertainment of the children, where many interesting and educative games can be played by it.

## References

1. <http://www.kinecteducation.com/blog/2011/09/19/kinect-in-education-good-bye-old-school/>
2. <http://www.kinecteducation.com/blog/2011/08/04/kinect-lesson-plans-teaching-math-linear-functions-with-kinect/>
3. <http://www.kinecteducation.com/blog/2011/09/21/kinect-for-learning-analytics-and-rti/>
4. <http://www.kinecteducation.com/blog/2011/07/14/kinect-in-elementary-classrooms-hand-painting-without-the-mess/>

**Ridwan Rashid Noel**

Bangladesh University of Engineering and Technology  
Dhaka, Bangladesh  
[noel\\_hbk\\_008@yahoo.com](mailto:noel_hbk_008@yahoo.com)

**Asif Salekin**

Bangladesh University of Engineering and Technology  
Dhaka, Bangladesh  
[asalekin@gmail.com](mailto:asalekin@gmail.com)

**Raihanul Islam**

Bangladesh University of Engineering and Technology  
Dhaka, Bangladesh  
[raihan\\_2108@yahoo.com](mailto:raihan_2108@yahoo.com)

**Sazzadur Rahaman**

Bangladesh University of Engineering and Technology  
Dhaka, Bangladesh  
[sazzad14@yahoo.com](mailto:sazzad14@yahoo.com)

**Rakibul Hasan**

Bangladesh University of Engineering and Technology  
Dhaka, Bangladesh  
[rakib\\_cse\\_062@yahoo.com](mailto:rakib_cse_062@yahoo.com)

**Hasan Shahid Ferdous**

Bangladesh University of Engineering and Technology  
Dhaka, Bangladesh  
[hasan.shahid@csebu.org](mailto:hasan.shahid@csebu.org)

## *Socializing Autistic Children with Interactive Computer Games*

As a part of our Human Technology Interaction (HTI) research group, we are studying the effect of multimedia in the learning process of autistic children. After working with the children of Autism Welfare Foundation (AWF), Bangladesh for the last six months, we have developed an educational game to teach them the concept of money and how to make use of it in the shopping mall. A paper on this research has been accepted in IEEE ISM (MTEL), 2011.

Autism is a life-long complex developmental brain disorder that prevents people from understanding what they see, hear, and sense. This developmental disability results in severe problems with social relationships, communications, and behavior. Now, understanding the concept of money and knowing its proper use is an important application of mathematics. The autistic child needs to recognize what notes and coins are along with their meaning, in order to start learning the use of money. We have observed that some of them have difficulty to carry out the calculation with money in the shopping mall due to their learning disability. Although they are familiar with numbers and are able to perform basic arithmetic operations with numbers, they are unable to relate the same task with money.

We felt learning-disability is one of the main obstacles that always comes in their way to lead a more convenient life. The term learning-disability is a classification including several disorders in which a person has difficulty learning in a typical manner, usually caused by an unknown factor or factors. The unknown factor is the disorder that affects the [brain](#)'s ability to receive and process information. This disorder can make it problematic for a person to learn as quickly or in the same way as someone who is not affected by a learning-disability. Children with learning-disability are as smart as or even smarter than their peers. But they may have difficulty in reading, writing, reasoning, recalling, and organizing information if they are left to figure things out by themselves or if taught in conventional ways.

The most strongly recommended approach for teaching children with autism is to use the visual aid. Pictographic and written cues can often help them to learn and communicate according to other empirical studies. We know that digital story-telling is a narrative approach with personal connection that is displayed in an engaging multimedia format. It is flexible and creative, individualistic and visually engaging. Thus digital story-telling fits the characteristic learning styles of autism spectrum disorder affected children.

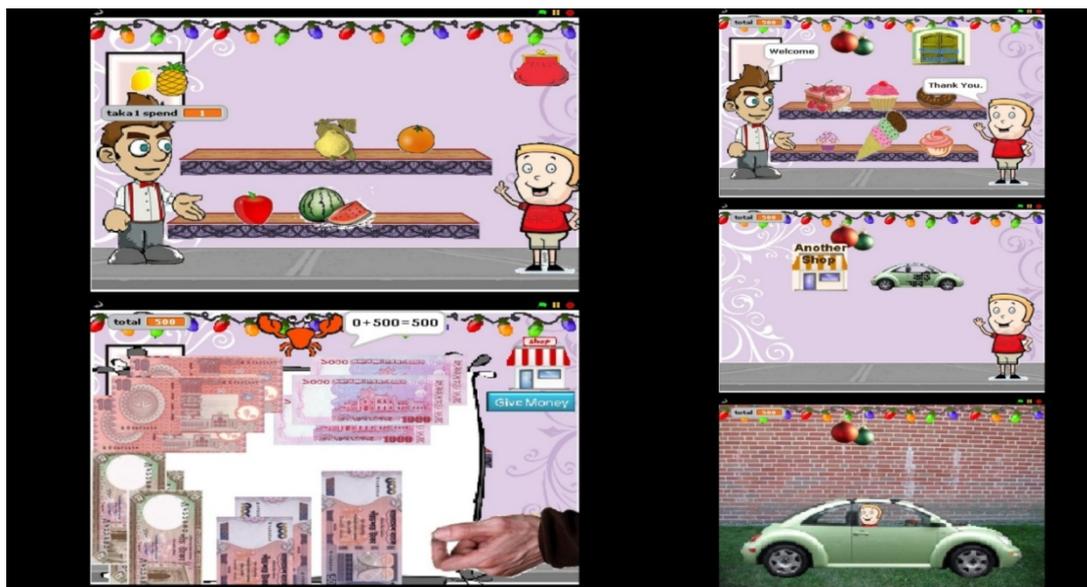
We have developed a personalized game based on digital story-telling concept that helps the children of age ranging from 9 to 14 years old with autism spectrum to understand the use of money. It also teaches the autistic children the social behavior appropriate in the shopping mall. The game is developed on BYOB (Build Your Own Block, an advanced offshoot of Scratch, developed by MIT). The game can be run on any Windows platform. Our game is organized in multiple levels. It enables the child to play the role of a customer. They can play it along with an instructor if necessary.

The objectives of our game are as follows:

- Money identification
- Buying single item
- Buying more than one item
- Learning money exchange

- Picking different combination of money
- Taking decision after shopping is finished
- Greetings, social behavior in the shopping mall

Our game is very simple and easy to play. We have tested the autistic children of AWF with our game and obtained a very positive response from them. In our game, the children are taught to identify money in the tutorial section. They are shown different notes from different angles a number of times. This tutorial is played as many times as possible until they pass the game part of matching the correct notes as asked. Then they are advanced to the next levels respectively according to their competence.



*Fig. 1: Some screenshot of the game*

We found the traditional approach of teaching the money concept was not proper for some of the autistic students who had communication problem. The children with communication problem reported difficulty to take any instruction. They do not response to the questions asked to them. Some of them have sensitivity towards touching certain objects. They simply do not seem to be interested to learn about money-notes. Autistic children often have trouble with generalization. This is also true in the concept of money. Most of them cannot understand that they can buy different types of items using money.

Computer games have been proved very powerful in this regard. Our game helps the children with autism to visualize the action to carry out in the shopping mall. The children with autism need to be kept visually engaged, which is like a challenge. They need to be amused in order to hold their concentration and thus to improve their learning skill. We have obtained a very positive response by using digital story telling technique in their learning process. More educational games can be built using digital story telling technique to help them overcome social, educational, verbal and behavioral problem.



*Fig. 2: Children in AWF playing the game.*

We are looking forward to develop more educational games to make learning enjoyable for the beautiful children with special needs.

We want to cordially thank Dr. Rownaq Hafiz for allowing us to work with the special children in the Autism Welfare Foundation. We wholeheartedly thank all the teachers for being co-operative.

**Arshia Zernab Hassan**

Bangladesh University of Engineering and Technology  
Dhaka, Bangladesh  
[arshia.zernab@gmail.com](mailto:arshia.zernab@gmail.com)

**Bushra Tasnim Zahed**

Bangladesh University of Engineering and Technology  
Dhaka, Bangladesh  
[zahedbushra@gmail.com](mailto:zahedbushra@gmail.com)

**Fatema Tuz Zohora**

Bangladesh University of Engineering and Technology  
Dhaka, Bangladesh  
[fatematz@gmail.com](mailto:fatematz@gmail.com)

**Johra Muhammad Moosa**

Bangladesh University of Engineering and Technology  
Dhaka, Bangladesh  
[johra.moosa@gmail.com](mailto:johra.moosa@gmail.com)

**Tasmiha Salam**

Bangladesh University of Engineering and Technology  
Dhaka, Bangladesh  
[tasmiha.salam@gmail.com](mailto:tasmiha.salam@gmail.com)

**Md. Mustafizur Rahman**

Bangladesh University of Engineering and Technology  
Dhaka, Bangladesh

[md.mustafizur.rahman@csebuet.org](mailto:md.mustafizur.rahman@csebuet.org)

**Hasan Shahid Ferdous**

Bangladesh University of Engineering and Technology  
Dhaka, Bangladesh

[hasan.shahid@csebuet.org](mailto:hasan.shahid@csebuet.org)

**Syed Ishtiaque Ahmed**

Cornell University, USA

[sa738@cornell.edu](mailto:sa738@cornell.edu)

## *Use of digital interfaces as an extension of school attendance*

### **Introduction**

Geographic differences in Brazil lead us not only to landscapes, ethnic dialects, flavors, different colors, but also to diversity and adversity in education. When we think of Education and Digital Technologies we must bear in mind the limited access to it due to the different deficiencies in our country, among them the technology related.

This research offers the vision of a graduate student in understanding the use of information access and sharing and the possibility of authorship. It was meant for the training of future teachers in the practice of citizenship through the digital culture, starting from the assumption that when we train young teachers who are not capable of understanding the responsibilities and skills required for the inclusion of digital technologies in the narrative curriculum, we will possibly perpetuate the historical mistake of non literate education involving the media of our time.

It is done in order to bring to the classroom different social media and environments such as Moodle, Twitter and Facebook as technological tools combined with classroom goals in the construction of the teacher's and student's knowledge.

### **Theoretical Bases**

The XXI century is marked by the social phenomenon of the use of the so-called Information and Communication Technologies that offer our youth instant access to the world. We live in the digital culture era. Having a cell phone or being connected to the Internet, having access to the network content makes us part of the world, citizens of our era.

However, the use of these technologies to support education is not fully inserted in our high education system in Brazil. During the period previous to the research, 76 teachers from the research institute were asked about which online tools they had already used or still used with his students, and it was found that 95% used e-mail, 1% e-mail and twitter and 5% e-mail and blog. The use of e-mails have become commonplace for teachers, but virtual learning environments such as Moodle had only been used by 3% of the surveyed teachers, but in other education institutions.

It is understood that the use of registration and communication interfaces, such as Moodle, must be something teachers intend to use as an extension of the classroom by the students as well.

Silva (2005), Lemos (2002) and Levy (1999) stated that cyber culture means the way of living and behaving taken in and transmitted in the "historical and daily experiences marked by computer technologies" (Silva 2005:63). Noting that communication and information mediation via Internet is something different from information and communication centralization as we can find in the so-called traditional media (radio, television, books, magazines printed). In what is known as cyberspace the logic of emission and reception coexist, because it assumes hypertext, interactivity, virtuality and others.

In what concerns education, it is understood that in order to include the student in the digital culture and make it able to reason in the cyber society the teacher must prepare him in a prior

learning, make him understand that the simple access to a site won't change a whole educational system, and because of that it can't qualify as an educational innovation.

Most schools and universities in Brazil are deeply unprepared for this. Confirming Silva (2005), it is known that those that invest in information technology may be doing, at most, digital inclusion, but are not in fact educating for inclusion in the cyber society and therefore are not promoting the possibilities found in cyberspace.

The investigated university, located in the Minas Triangle, precisely in Uberaba, Minas Gerais didn't have, before October 2010, any digital interface appropriate for education. As well as it had only one lab with 15 computers with Internet access.

In this sense, there was an attempt of developing a project using digital technology for teachers training. In order to make it work, the action taken was to implement and deploy the Moodle platform. Then, several workshops were held for the inclusion of the university's teachers in the applied use of classroom teaching, since the university didn't count on a distance learning program.

An elective course was created and formatted in order to leverage the use of Moodle's interface to the class attendance. Based in Valente (1999), who stated the need for dynamic communication, privileged by the mediation of the teacher joined by his student in the realization of what he called "description-execution-reflection-debugging-description," this work's difference is the way the live class is fed by digital media in the making of digital culture.

## **Experience**

Within a semester with two two-hour weekly classes, students were taken to the computer lab, where they could access the Internet, the historical thinking of technological developments was shown to them and the 22 students were introduced and logged on Moodle, Twitter and Facebook, then the class was divided into groups for the use of Googledocs.

## **Collected data**

Out of the 22 students surveyed, 5 had no computer at home, 22 had never used virtual learning environments for learning communication and sharing of educational information. Only 3 out of 22 students used Twitter and none of them had ever used Facebook. None of the 22 students had used Googledocs to share work with classmates or for group work. None of the 22 students believed in the possibility of learning by using a virtual environment.

## **Results**

The five students who had no access to the Internet learned that they can and should use digital technologies towards learning development in the lab, library or Internet cafes, the 22 students participated actively in the classroom work and brought to their own lives the research and reflection shared in the learning forums created to appease the dialogue about their work. 14 students reported that in addition to their own learning, they chose to teach colleagues and family how to use sharing tools such as Googledocs to perform other activities related to university. 17 students used Facebook and Twitter with their classmates to exchange information and study, and common leisure activities.

## Conclusion

The education involving the use of technological resources is able to promote learning actions that are reflective and continued, meaning to young users the possibility of reflective communication, sharing information and promotion of information that will generate knowledge.

## References

- Lévy, P. (1999). *Cibercultura*. Rio de Janeiro: Editora 34.
- Lemos, A. (org). *Cibercidade. As cidades na cibercultura*. Rio de Janeiro: Editora e-papers, 2004.
- Silva, M. A Internet na escola e inclusão. Almeida, M. E. B. de; Moran, J. M. (Orgs.) *Integração das Tecnologias na Educação*. Brasília: MEC, Seed, 2005.
- Valente, J. A. *O computador na sociedade do conhecimento*. Campinas:NIED, 1999.

**Nuria Pons Vilardell Camas**  
Universidade Federal do Paraná  
Brasil  
[nuriapons@gmail.com](mailto:nuriapons@gmail.com)

**Neli Maria Mengalli**  
Pontifícia Universidade Católica de São Paulo  
Brasil  
[mengalli@uol.com.br](mailto:mengalli@uol.com.br)

## *e-Learning : Re-emerging paradigm for enhanced learning*

### **Introduction**

One of the most confusing aspects of e-Learning is that many people misinterpret “e” as electronic. The “e” in e-Learning would be better defined as “Evolving” or “Everywhere” or “Enhanced” or “Extended” [3]. Today, there is a need of creating a virtual learning space. The reasons behind virtual learning space are as follows:

- To address the changing and demanding learning preferences such as demand-driven-education and education-at-ease.
- To keep pace with technological advancements such as IT and computer revolution, growing presence of Internet and cyberspace.
- Business success depends largely on high-quality employee performance, which in turn necessitates high-quality training.
- Through the increasing reach and simplicity of use, the internet has paved the way for a global learning community to exist where language and geographic barriers to education have been erased.

The pedagogical setup federates learning and “learner-centered” factors as derived from the American Psychology Association and is based on Merrill’s first five principles of instruction [4].

- Learning is promoted when learners observe a demonstration, the demonstration principle.
- Learning is promoted when learners apply the new knowledge, the application principle.
- Learning is promoted when learners engage in a task-centered instructional strategy, the task-centered principle.
- Learning is promoted when learners activate prior knowledge or experience, the activation principle.
- Learning is promoted when learners integrate their new knowledge into their everyday world, the integration principle.

The benefits realized through e-Learning are reduced cost, efficient, globally consistent, scalable, universal access to expert, flexible. In the next section we will present how the e-Learning has emerged and evolved in India.

### **History and Evolution of e-Learning in India**

In Oct 1999 e-Learning word was introduced in the seminar at Los Angeles [13]. In 1990 the learning management system was used for the management of courses where students and teachers could exchange learning materials, assignments, communicate and control and also track and trace progress. In 1996 the e-Learning was adopted by NIIT Netvarsity, India [2]. The constitution of the National Taskforce on Information Technology and Software Development in May 1998 by the prime minister of India was another milestone in e-Learning activities [2]. The Indira Gandhi National Open University (IGNOU) , in year 1999, has launched two prestigious programmes with Internet-centric approaches, that is, the BIT (Bachelor of Information technology) and ADIT (Advanced Diploma in Information Technology), in collaboration with the Edexcel Foundation of the United Kingdom. The

counseling and learning material was delivered through internet [2]. The universities like YCMOU, Tamil Virtual University, Punjab Technical University, Symbiosis International University, Indian Institute of Technology and Indian Institute of Science has followed e-Learning initiatives. In year 2003, another initiative, called “National Programme on Technology Enhanced Learning (NPTEL)” funded by the Ministry of Human Resource Development, Government of India and executed jointly by all the seven Indian Institutes of Technology and the Indian Institute of Science [1, 7]. In India, majority of faculty member in various engineering colleges are young and inexperienced. The focus areas for NPTEL initiative was higher education, professional education, distance education, continuous and open learning. Therefore, institutions like IITs, IISc, NITs and other leading Universities in India have taken the initiative to disseminate education of high quality through e-Learning [1, 2]. Since 1996 till 2010 there has been significance development in adoption of e-Learning initiative in India. However, year 2011 has opened many doors for e-learning in India. The e-Learning has extended its vertical for several corporate sections. In May 2011, Educomp announced to join hands with Great Lakes Institute of Management to provide e-learning education. In this project, two partners are poised to invest around 15 million USD in the next five years [5].

The Indian NGO sector has also begun using e-learning for furthering the cause of education for less privileged sections of the society. Smile foundation of Ahmedabad has launched a Twin e-learning Programme (STeP) that is designed to offer job-oriented skills to youth from urban slums and peripheral rural areas [6]. In May 2011, IGNOU, India’s largest Open University, has announced the details of the virtual university for Africa. The Pan-African E-learning Network will devise a robust e-learning network to alleviate the needs of African nations [11]. The Department of Information Technology, Ministry communication sand IT has also announced many e-Learning R & D initiative during X and XI plan[8,12].

## Conclusions

The article has presented a brief introduction of e-Learning and has explored the reason for the development of e-Learning in India. The e-learning has lots of potential in India. The adoption in the early stage has been slow but now marketing and awareness efforts are going to make it effective learning. We also felt that countries without university education can access universities in other countries via the Web, a solution much cheaper than building university infrastructure. In the recent years, many government and Non-Government organization has come forward for making success stories in e-Learning.

## References

- [1] Mishra, S., E-Learning in India. International Journal on E-Learning, Vol 8(4), 549-560. October 2009, Chesapeake, VA: AACE.
- [2] Sharma, Ramesh C. "E-Learning in India." Encyclopedia of Distance Learning.IGI Global, 2005. 772-778., DOI:10.4018/978-1-59140-555-9.ch111
- [3] <http://www.managersforum.com/elearning/>, Accessed on October 10, 2011
- [4] <http://www.webresourcesdepot.com/7-widely-used-and-open-source-e-learning-applications/> , Accessed on October 14, 2011
- [5] Educomp, Great Lakes to invest Rs 150 cr in e-learning, PTI, New Delhi May 06, 2011, 18:54 IST, <http://www.business-standard.com/india/news/educomp-great-lakes-to-invest-rs-150-cr-in-e-learning/134294/on>, Accessed on October 29, 2011
- [6] STeP, [http://smilefoundationindia.org/ViewEvents\\_Details.asp?Newsid=337](http://smilefoundationindia.org/ViewEvents_Details.asp?Newsid=337), Accessed on October 29, 2011

- [7] NEPTL, <http://nptel.iitm.ac.in/>, Accessed on October 29, 2011
- [8] MIT, <http://www.mit.gov.in/content/e-learning>, Accessed on October 29, 2011
- [9] <http://www.expresscomputeronline.com/20051114/market03.shtml>, Accessed on October 29, 2011
- [10] <http://elearning-india.com/>, Accessed on October 29, 2011
- [11] IGNOU , [http://articles.timesofindia.indiatimes.com/2011-05-06/education/29585464\\_1\\_ignou-national-open-university-vocational-education](http://articles.timesofindia.indiatimes.com/2011-05-06/education/29585464_1_ignou-national-open-university-vocational-education), Accessed on October 29, 2011
- [12] <http://www.mit.gov.in/content/e-learning-rd-projects-initiated-during-xth-and-xith-plan-period>, Accessed on October 29, 2011
- [13] History of e-Learning, [http://www.leerbeleving.nl/wbts/1/history\\_of\\_elearning.html](http://www.leerbeleving.nl/wbts/1/history_of_elearning.html), Accessed on October 29, 2011

**Sapna Tyagi**

Institute of Management Studies  
Ghaziabad, UP, INDIA  
[sapna.tyagi@imgzb.com](mailto:sapna.tyagi@imgzb.com)

**Preeti Sirohi**

Institute of Management Studies  
Ghaziabad, UP, INDIA  
[preeti.sirohi@imgzb.com](mailto:preeti.sirohi@imgzb.com)

**A Q Ansari**

Jamia Millia Islamia, New Delhi  
[aqansari@ieee.org](mailto:aqansari@ieee.org)

**Mohammad Yahiya Khan**

King Saud University  
Deanship of E-Learning & D-Learning  
Riyadh, Saudi Arabia  
[mykhan@ksu.edu.sa](mailto:mykhan@ksu.edu.sa)

**Mohammad Ayoub Khan**

Centre for Development of Advanced Computing,  
NOIDA, UP, INDIA  
[ayoub@ieee.org](mailto:ayoub@ieee.org)

## *The Cost of Employee Learning*

Companies are investing in their people by motivating them to participate in training or retraining programs, as part of their other core business activities. Incentives may vary, but most companies are aware that they have to invest in their human resources to extend or improve their business development cycles and increase their capacities. However, they are not able to exhibit the existence of a traceable process for managing their investments for learning. Furthermore, it is widely accepted<sup>5</sup> that competition is focused not in the prices or the location of production of a product or a service but in the intellectual capital that a company possesses and the means it has organised to deploy it appropriately.

My background is from the ICT industry: I work for a big ERP vendor in Greece that is operating an installed base of 50.000 companies – the majority is composed of small or micro-businesses though a certain amount is medium-sized and rather few are considered as large enterprises.

One problem that persists all these years that I am doing research in the area is the following: although employees are usually open to learn new things and acquire new skills from their working environment in their organizations, the motivation to learn normally largely depends on the rewards they expect to receive from their improved skills.

Talking about rewards comes to my mind one of the most unexpected things I learned all these years in business: *you either pay your people half much of what they are worth or twice much from what they deserve*. Virtual worlds may constitute the next big thing in the area of learning technologies, but it is important to see why we need to spend money on research in this direction.

Today these rewards are qualitatively assessed, based on human resource management principles, and not necessarily reflected in the balance sheets (value) of the organizations. But if the outcome of such learning processes could be more accurately quantified, and this quantification could result in direct increased benefits for the employee (salary or otherwise), then the employee would be more motivated to learn and be more proactive towards the acquisition of new skills that would ensure value to the company and his or her stay at the competitive edge – should I also add a minimization of the risk of getting dumped when cost cuts need to take place. No need to say that if such an approach is adopted, employee benefits would be based on more structured, quantified and reliable indicators.

A lot can be said about human nature and how it bears upon the success of initiatives to promote and support learning by individuals. A philosopher might emphasize self-interest and the individualistic nature of human beings. An economist would focus on utility and the need to compete for resources. A sociologist might look at the desire for status or the need to compete for a mate. Whatever way you look at it, the bottom line remains the same: people will learn when they want to, and only with reasonable anticipation of some sort of personal gain. In all other cases the entire initiative is destined to fail. So, what is it that makes people apt in learning when they set themselves an autonomous learning goal, usually related to personal areas of interest such as cooking, advanced sexual technique, gardening or whatever

---

<sup>5</sup> See for instance Value-based competition, K. Ellis, in American Salesman, October 2004 as well as the Special issue of the Journal of Intellectual Capital, 8 (4), 2007 on Strategic Enterprise Valuation and especially the following two papers: M. Bornemann, K. Alwert, The German guideline for intellectual capital reporting: method and experiences (pp. 563-576) and J. A. Nazari, I. M. Herremans, Extended VAIC model: measuring intellectual capital components (pp. 595-609).

else? And why do they exhibit suboptimal learning behavior when the learning context is provided by someone else, by government, school, or the employer for example?

Let's look, for a moment, to the other side: what is it about companies that make them worth many times the value of their recorded assets? What is the nature of additional value that is perceived by the market but not recorded by the company? Why do some companies have a higher market to book ratio than the others? In essence: why are some companies perceived to be more valuable than others?

Stock analysts state that a very significant factor for achieving high value is the quality of investment of companies in their people, accompanied with the necessary corporate organizational and business process infrastructure to exploit their people as a whole<sup>6</sup>.

The quality of the people of a company is thus an "intangible asset". Intangible assets do not have a direct market value (this is why they are called "intangibles"), but they certainly affect the overall value of the company. The better "quality" the employees of a company have, the larger the value of the company becomes.

But what affects the "quality" of the employees? It should come as no surprise that the "knowledge" of these employees, as this is embedded and utilized within the business processes of their companies, is a representative indicator of such quality. And of course learning increases this knowledge.

Within a company (like in all human settings), learning happens all the time. By definition, all business processes increase the knowledge of the people who are involved in them (at least, involvement increases "experience"). What any company would like to achieve is to understand (and exploit) how business processes create learning outcomes that become permanent and valuable knowledge assets both for the employees and for the company. To put it simply: *Employees learn all the time. But what is their learning worth?*

Individual workers are aware that the value they carry for their company is not fixed but continuously under negotiation. Therefore, in order to remain attractive they have to invest in themselves and increase their learning and knowledge capital, so that they are able to keep on selling their services to their employer or seek for a new one that can better reward them for their value.

If I were to choose the most appropriate statement to close this short note I would rather prefer to say that spendings in the area of learning is a one way for companies – therefore it needs to be done the right way which is to look at them as long term investments and not as ephemeral waste of scarce resources and money.

**Adamantios Koumpis**  
ALTEC S.A, Greece  
[akou@altec.gr](mailto:akou@altec.gr)

---

<sup>6</sup> The Private Sector in Development: Entrepreneurship, Regulation, and Competitive Disciplines, Michael U. Klein and Bitu Hadjimichael, World Bank Publication, 2003.

## **PhD Abstracts Section**

## *Towards Semantic Educational Recommender Systems*

The concept of Semantic Educational Recommender Systems (SERS) has been developed in the PhD dissertation entitled “Contributions to the Design, Implementation and Evaluation of Adaptive Learning Management Systems based on standards, which integrate Instructional Design with User Modelling based on Machine Learning” (Santos, 2010).

The main research goal behind is to support adaptive navigation tasks in current learning management systems (LMS) through an educational-oriented recommender system, and it is motivated by the success that recommender systems have in other domains where there is also the need to guide users in environments with information overload and inexperience in the alternatives to choose. The main advantage of this work with respect to the current state of the art lies on providing an alternative to deal with the recommendation needs in formal e-learning scenarios and identifying meaningful and useful educational oriented recommendations which can offer a personalised and inclusive support to learners in their individual and changing needs while they are interacting with a course delivered via an LMS.

SERS are characterised by guiding learners -based on some educational criteria- in their interactions with the LMS through personalised and inclusive recommendations that are semantically characterised. The recommendations to be delivered to each learner in her current context are obtained due to the information interchange among the different components involved in the process of generating and delivering recommendations, such as the user modelling component, the LMS tracker or the device model. SERS depend on the following elements: i) a recommendations model to semantically characterise the recommendations, ii) an open standard-based service oriented architecture to guide the integration of the SERS with existing LMS in an interoperable way by making use of standards and specifications to describe the information exchange, and iii) a graphical user interface integrated into the LMS presentation layer to show the recommendations delivered to the learners in a usable and accessible way.

In order to design recommendations for SERS, the TORMES methodology (which stands for ‘Tutor Oriented Recommendations Modelling for Educational Systems’) has been proposed. This methodology iteratively applies user centred design methods following the standard ISO 9241-210 to involve the educator in the elicitation of recommendations that consider educational issues to cover the appropriate instructional design. Educators’ involvement is desired as it can facilitate the understanding of the recommendations needs in current formal e-learning scenarios and the characterisation of the recommendations. In this way, educational oriented recommendations that include semantic-based descriptions can be obtained. Data mining analysis can be further applied to enrich the design of the recommendations produced by the educators with the user centred design process. In particular, the detailed descriptions of the recommendations done by the educators can be used as input data for the mining process in order to i) identify troublesome or promising situations, ii) tune the design of the recommendations proposed by educators and iii) adjust the recommendations design after the course experience.

To evaluate the recommender system and the recommendations designed for it, four dimensions have been proposed: i) integration of the SERS into the LMS; ii) impact of the recommendations on the users (both learners and educators); iii) value of recommender systems’ quality properties such as utility, serendipity, coverage, etc.; and iv) impact of the recommendations delivery on learners’ interactions.

Two prototypes of SERS have been integrated into two LMS (i.e. dotLRN and Willow) to show the flexibility of the TORMES methodology when it comes to eliciting recommendations in scenarios with different approaches and requirements. As a result, over 30 recommendations have been produced in the context of a course on how to use the dotLRN platform to support lifelong learning in an accessible way that go further than simply recommending learning objects. Moreover, a large scale experience was carried out with 377 learners in Willow where recommendations were designed to offer a full e-learning course through an LMS initially designed for blended learning. Participants benefited from the additional support provided by the recommendations, since an improvement was perceived on several types of indicators (i.e., engagement, learning efficiency, learning effectiveness and knowledge acquisition). The impact on the user experience was analysed in terms of the consistency usability principle, showing that the recommendations kept the high perception of the participants regarding Willow's usability and satisfaction.

The proposed approach relies on the availability of the third generation of LMS that are based on a service oriented approach and on the development of specifications and standards that describe the LMS services.

## Reference

Santos, O.C. (2010) *Contributions to the Design, Implementation and Evaluation of Adaptive Learning Management Systems based on standards, which integrate Instructional Design with User Modelling based on Machine Learning*. Doctoral Thesis. UNED. Madrid. ISBN 978-84-693-9145-7.

**Olga C. Santos**  
aDeNu Research Group  
Artificial Intelligence Department  
Computer Science School  
UNED (Spanish National University for Distance Education)  
[ocsantos@dia.uned.es](mailto:ocsantos@dia.uned.es)