

# Facilitating Virtual Learning Community with Inhabited Virtual Learning Worlds

Chi-Syan Lin

Department of Information and Learning Technology  
National University of Tainan, Taiwan  
linc@mail.nutn.edu.tw

Ming-Shiou Kuo

Department of Information and Learning Technology  
National University of Tainan, Taiwan  
mitchell@avatar.nutn.edu.tw

Yi-Mei Lin

Department of Communication &  
Graduate Institute of Telecommunications  
National Chung Cheng University, Taiwan  
telyml@ccu.edu.tw

C. Candace Chou

School of Education  
University of St. Thomas  
ccchou@stthomas.edu

Mark van 't Hooft

Research Center for Educational Technology  
Kent State University  
mvanthoo@kent.edu

**Abstract:** The paper first characterizes the differences between tangible learning community and virtual learning community and claims that virtual learning community is one of the most significant ingredients in networked learning environments. Subsequently, the architecture of an inhabited virtual learning world based on techniques and principles found in popular massively multi-player online games that host gaming communities successfully is proposed aiming at virtual learning community of practice.

**KEYWORDS:** Virtual Learning Worlds, Virtual Learning Community, Intelligent Agent, Networked Learning, Game-based Learning

## 1 Introduction

It is asserted that community design is the key in successfully crafting the next generation IT systems (Friedl, 2003). It is also claimed that learning community is one of the decided factors to the success of networked learning (Barab, 2003; Lin, 2005a). In the wake of shifting the focus on information delivery to the communication opportunities in the design of learning management systems, human content is getting more attention versus generic binary content in the field of networked learning. The trend denounces the significance of learning community. Nevertheless, there are two distinctive categories of learning communities in terms of networked learning. One is composed of members who have never met in their tangible living worlds. The other one consists of members who are bound to the identical local organizations or settings and already are acquainted with each other in their tangible living worlds. These learning communities, virtual and tangible respectively, exist in networked learning environments simultaneously. In current practices of distance learning or networked learning, however, tangible learning community is more common than is the virtual learning community in the works of research and instructional design. Reasons? Obviously, tangible learning community exists long before the emerging of networked learning and it demands less care than does the virtual learning community in the perspective of instructional design. In contrast, the concept of virtual learning community is too new and vague to be acknowledged or recognized by practitioners of networked learning.

Nonetheless, building up and sustaining vibrant virtual learning communities in a networked learning environment is imperative to engage learners in learning process in that it could provide an unbounded social space for learners, which are essential to the claims of constructive learning theory (Lin & Kuo, 2005c). As a matter of facts, virtual learning communities serve as virtual atmospheres or ambiances for interpersonal interactions and are

the cores of networked learning environments. The interpersonal interactions such as negotiation, communication, and collaboration that happen inside virtual learning communities could help a learner to exchange or reflect his or her newly acquired knowledge with members of the communities, and contribute it into a common shared knowledge pool (Lin, 2005b). The facts above imply that the nature of fantasy and versatility in virtual learning communities might inject the profound human content into and enrich networked learning environments (Friedl, 2003). These features are seldom found in other learning scenarios or strategies expect the virtual learning communities of practice.

Meanwhile, due to the significance of virtual learning community in networked learning, there already were quite a bit of related studies in the field. However, without solid and rigorous research design and tools, the results of studies on virtual learning community studies usually were either misleading or confounding. For instance, some researchers use grades or scores as incentives to motivate students to join online discussions in forums and claim that the group has formed a virtual learning community; even their students are sitting in front of computers side by side in the same computer lab. The scenario forth mentioned is somehow different from the native virtual learning community in that students are residing in the same location and they are acquainted to each other already.

It has been agreed upon that the formations and flows of virtual learning communities are associated with some unique and special entities that do not exist in tangible communities in any comparable or similar form, thus making it difficult to disclose all facets and inner functions of them (Barab, 2003; Friedl, 2003). However, although it has been agreed upon by most of the people in the field of networked learning of the significance of virtual learning communities, few could claim what a successful one is like. Furthermore, although some people have tried to use taxonomy approach to categorize virtual learning communities, they failed to discuss in detail about how to implement them in practice (Luppacini, 2003). Moreover, it has been conducted in mapping the characteristics of tangible communities into virtual ones yet leaving out the differences on their nature (Schwier, 2001). Therefore, it is asserted that the definitions and evaluation criteria of “a successful virtual learning community” have not been broadly and firmly identified yet. (Bonk & Dennen, 2005). For instance, Lin & Kuo have conducted couple experimental studies focusing on comparison of learning behaviors and performance between tangible and virtual learning communities. The results of studies revealed that virtual learning communities were not superior to the tangible learning communities in those two compared categories (2006).

Based on the results of provident networked learning studies (Lin, 2002; Concord Consortium, 2002; Dede, Clarke, Ketelhut, Nelson, & Bowman, 2005), it is suggested that current practice of web-based learning pedagogy that focuses on publishing learning materials on the Internet has to be abolished and move to the application of immersive learning environments, i.e., the inhabited virtual learning worlds. It is claimed that inhabited virtual learning worlds which combine the strengths of 3D spatial learning, immersion and telepresence of learners, intelligent agents, immediate visual feedback, and interactivity are imperative to the diffusion and success of networked or virtual learning (Concord Consortium, 2002).

Furthermore, as postulated by Damer, Gold, Marcelo, and Revi (1999), inhabited virtual learning worlds have distinctive themselves from a mere 3D graphical space by infusing simulation of tangible phenomenon and therefore can play an important role in community of practice in the cyberspace with the authentic nature of learning context. The other persuading features about the inhabited virtual learning worlds are that they are able to transform the networked learning environments into a 3D shared learning space and the learners in the shared space could be represented with avatars. In addition, the inhabited virtual learning worlds also provide the common playground for human learners, the avatars, and intelligent agents that are associated with learning. Ultimately, the significance of inhabited virtual learning worlds is that it can help to promote interpersonal interaction among learners via spatial dimensions with the sense of immersion and nature of authenticity to build up learning community with its analogy to the social bond that would engage learners in learning activities. In essence, the inhabited virtual learning worlds can provide a shared learning space for inhabiting avatars that is analog to the tangible worlds in terms of social patterns and environmental phenomenon. Therefore, it is for sure that the promise and potential of inhabited virtual learning worlds are much more profound than is the current practice of web-based learning with ad-hoc learning management system platforms (Costigan, 1997; Concord Consortium, 2002).

## **2 The Proposed Architecture of Inhabited Virtual Learning Worlds**

A prototype of virtual learning environment, Best Inhabited Virtual Learning Worlds (Best IVLW), is proposed based on the studies in Massively Multi-player Online Role Playing Games and networked learning for the purpose of experimental study on facilitating virtual learning communities.

## **2.1 3D World**

The 3D World provides a metaphor of the virtual shared learning space, which is composed of avatars, objects such as learning materials and teleports, and intelligent agents. It is the primary component of the Best IVLW system.

In recent years, the research and application of intelligent agents have advanced by leaps and bounds. Intelligent agents, in addition to avatars, are proposed to provide imperative learning supports in customized and individualized manners for learners in Best IVLW. In essence, intelligent agents could provide all kinds of learning support and make adaptive learning possible in the networked learning environments. In other words, the roles of intelligent agents are to monitor learners' learning behaviors, to record learning processes, to understand learners' progress, and to assist learners in an adaptive fashion at any time. Thus, intelligent agents could enhance the quality of learning activities in networked learning environments dramatically (Lin, 2001).

In order to achieve the above mentioned goals, Best IVLW will deploy these five intelligent agents: (1) learning companion, (2) moderator, (3) genie, (4) digital librarian and (5) evaluator (Lin, 2002) within the architecture.

## **2.2 Bird's Eye View**

This is an overview map of the world with radar function that could spot the locations of the online avatars respectively. Learners could approach any avatar on the map by clicking at it with their mouse. In addition, learners could also search for the current location of a target avatar by keying the name in the search box in the map.

## **2.3 Message Pane**

There are three kinds of message in the world. Two of them are related to communication purpose. One of which is the interpersonal interaction message generated by avatars and the other one is the broadcasting message initiated by the system. The message pane provides both functions of sending and receiving message in text format.

The third type of message is about information or feedback related to instructional design of activities in the world. The message pane will provide a channel for learners to input data for learning tasks and receive introductory or feedback information about the tasks.

## **2.4 Profile Pane**

A learner profile is like a student model in expert systems, which represents each individual learner's learning behaviors and status dynamically. It is the essential ingredient for embedding intelligent and adaptive features into the networked learning environments. It is the heart of the brand new pedagogical approach of virtual learning.

Learners who are online are displayed with their icons of avatars and names in the profile pane. Learners can access anyone's learner profile as long as he or she is online by clicking on the respective icon of the avatar in the profile pane. There are twelve variables in the proposed learner profile and they could be divided into three different categories.

### *2.4.1 Personal Identity*

The data in this category is static and associated with learner's personal identity information. It is composed of variables Full Name, Gender, Affiliate, and City pertaining to individual learners respectively.

### *2.4.2 Learning Behaviors*

The data in this category are dynamic and accumulated and are related to learner's learning behaviors online. The data are tracked and recorded by the system automatically. The data in this category are composed of Frequency of Login, Frequency of Upload (submitting artifacts), Frequency of Interpersonal Interaction, and Charisma, which represents the frequencies of both messages in forums are replied and artifacts are evaluated.

### *2.4.3 Personal Portrayal*

The data in this category is also static and associated with personal information. However, the values of variables in this category are editable to learners at any time. It is composed of Hobby and Interests, ICT Skills, Personal Photo, and Friend List.

## 2.5 Facility Pane

Provide facilities that are used by avatars in the worlds such as communication tools or data processing tools. Best IVLW will install PDA and five channels of earphone in the pane for avatars to access.

## 2.6 Avatar Pane

All avatars will be presented in the Best IVLW with first person and over-shoulder view. Meanwhile, in order to meet the need of providing sufficient and distinctive identities for avatars, the Best IVLW will install four categories of avatars which are kids, adolescence, adult and senior. In addition, all categories of avatars have different looks such as female, male, oriental, western, African, and Arabian. The avatars also will be equipped with limited self-configured functionalities.

Due to the limitation of current technology and bandwidth restrictions, avatars in the Best IVLW are only able to perform the following four types of gestures: (1) raise right hand; (2) wear an earphone; (3) hold a PDA with PDA screen in display; and (4) point (touch) with right hand to access objects.

With avatar pane, learners will be able to modify their appearances or illustrate gestures of avatars respectively.

## 2.7 Archive Pane

Best IVLW is a persistent and ongoing learning world. For creating the sense of a learning community, there is a need to record the significant events or histories of the worlds for newcomers of the community. Archive of the historical events that occurred in the worlds will do the job.

# 3 The Metaphor: The Best Digital Village

It is asserted that the metaphor of a virtual learning world could either hinder or enhance learners' perception about the learning environment, as the result of affecting the learning performance (Tashner, Riedl, & Bronack, 2005). As such, choose a profound metaphor of the virtual learning worlds is as important as design its architecture.

Best IVLW will be implemented with the primary metaphor of a digital village, the Best Digital Village (BDV), which provides a living space that is resemble with the tangible worlds for learners. Table 1 summarizes the sub-metaphors in the digital village.

**Table 1** Sub-metaphors in the Best Digital Village

Sub-metaphors	Descriptions
Town Hall and Plaza	Reception, Kiosk, Documents, and Archives
Community Center	Information Exchange, Who and Who
Exhibition Center	Artifacts and Arts, Museum
Library	Digital Library
School	Learning Space
Mall	Shopping Mall, E-Business, Cinema, and Bank
Park	Recreation Spot and Playground
Residential Area	Apartment for single, House for senior and married couple
Airport	Teleports for connecting to other worlds

Figure 1 displays the 3D worlds of the prototype with avatars.



**Figure 1** Avatars in Best Digital Village

## 4 Conclusions

With the experience in the field of networked learning during the past couple years, it is realized that the issues of telepresence, learning communities, and learning supports in networked learning have to be resolved before virtual learning could really take place and be relevant to education. The paper proposes a new paradigm of designing networked learning environments that abolishes the current practice of teacher-centered or information delivery paradigms. The suggested paradigm is to create a virtual learning world that could provide a 3D shared learning space as the residence of avatars which are the delegations of individual learners in the learning environments. In practice, each individual learner will be represented with an avatar in the virtual learning worlds and supported by a variety of intelligent agents who also reside in the networked learning environments.

Through the use of avatars with learner profiles, geographically separated learners are simultaneously presented in the virtual learning worlds and the utilization of the visual, gestural, and verbal interaction are becoming available. These are important to the fostering of a vibrant virtual learning community and development of unique collaborative learning experiences to learners. The new paradigm utilizes the strengths of virtual worlds: a combination of immersion, telepresence, immediate visual feedback, and interactivity.

With the proposed paradigm, it might be possible to create a networked learning environment that not only resembles the real life school learning environments, but also augments the value of traditional education by removing its shortcomings and implementing the virtual learning space and extending the new horizon of learning experience. It holds the high promise that the issues of virtual learning communities and learning supports in networked learning could be resolved with the new paradigm of implementing networked learning environments. However, the answers and realities remain to be seen, and which the Best Digital Village is going to explore. Explicitly, there are two folds in the goal of the future study with the Best Digital Village, which are (1) Examining whether the virtual learning community is able to outperform the tangible learning community or not? (2) Identifying the factors that affect the building of a vibrant virtual learning community in networked learning environments.

## References

- Barab, S.A. (2003). An Introduction to the Special Issue: Designing for Virtual Communities in the Service of Learning. *The Information Society*, 19, 197–201.
- Bonk, C. J., & Dennen, V. P. (2005). *Massive multiplayer online gaming: A research framework for military education and training*. (Technical Report # 2005-1). Washington, DC: U.S. Department of Defense (DUSD/R): Advanced Distributed Learning (ADL) Initiative. Retrieved January 27 2006 from

- <http://www.adlnet.org/downloads/189.cfm>
- The Concord Consortium, (2002). *PlaySpace Project*. Retrieved August 10 2005 from <http://playspace.concord.org/project.html>
- Costigan, J. T., (1997). *A Comparison of Video, Avatar & Face-To-Face in Collaborative Virtual Learning Environments*. Retrieved January 10 2005 from <http://www.evl.uic.edu/costigan/thesis.html>
- Damer, B., Gold, S., Marcelo, K., & Revi, F. (1999). Inhabited virtual worlds in cyberspace. In J. C. Heudin (Ed.), *Virtual worlds, synthetic universes, digital life* (pp. 127-152.). Reading, MA: Perseus Books. Retrieved January 10 2005 from <http://www.digitalspace.com/papers/vwpaper/vw98chap.html>
- Dede, C., Clarke, J., Ketelhut, D.J., Nelson, B., & Bowman, C. (2005). *Fostering Motivation, Learning, and Transfer in Multi-User Virtual Environments*. Presented at AERA 2005. Retrieved December 15 2005 from [http://muve.gse.harvard.edu/muvees2003/documents/Dede\\_Games\\_Symposium\\_AERA\\_2005.pdf](http://muve.gse.harvard.edu/muvees2003/documents/Dede_Games_Symposium_AERA_2005.pdf)
- Friedl, M. (2003). *Online Game Interactivity Theory*. Hingham, Massachusetts, USA: Charles River Media, Inc.
- Lin, C.-S. (2001). Implementation of the virtual school: Best cyber academy In H.-F. Shum, M. Liao & S.-F. Chang (Eds.), *Advances in multimedia information processing—PCM 2001 IEEE lecture notes in computer science* (pp. 316-323). Berlin, Germany: Springer-Verlag.
- Lin, C.-S. (2002). The New Paradigm for Networked Learning: Inhabited Virtual Learning Worlds and Intelligent Agents. *Proceedings of the 6<sup>th</sup> Global Chinese Conference on Computers in Education, 2002*, Beijing Normal University, China, 303-308.
- Lin, C.-S. (2005a). The Significance of Role Play Simulations and Games in Education. *Proceeding of SITE 2005 --Society for Information Technology & Teacher Education International Conference*, Phoenix, AZ, USA. March 1-5, 2005. 1991-1996.
- Lin, C.-S. (2005b). APEC Cyber Academy and Its International Collaborative Learning Program. *Proceeding of ED-MEDIA 2005*, Montreal, Canada. June 27 - July 2, 2005. 3968-3975.
- Lin, C.-S., Kuo, M. S. (2005c). Adaptive Networked Learning Environments Using Learning Objects, Learner Profiles and Inhabited Virtual Learning Worlds. *IEEE ICALT2005: The 5<sup>th</sup> International Conference on Advanced Learning Technology*, Koahsiung, Taiwan. July 5-8, 2005. 116-118.
- Lin, C.-S., Kuo, M.-S. (2006). Virtual Learning Community versus Physical Learning Community in Networked Learning Environments. In P. Kommers & G. Richards (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2006* (pp. 2351-2356). Chesapeake, VA: AACE.
- Luppincini, R. (2003). Categories of Virtual Learning Communities for Educational Design. *The Quarterly Review of Distance Education*. 4(4), 409-416.
- Roussos, M., Johnson, A., Moher, T., Leigh, J., Vasilakis, C., & Barnes, C. (1999). *Learning and Building Together in an Immersive Virtual World*. Retrieved October 9 2005 from <http://www.evl.uic.edu/aej/papers/presence/presence.html>
- Schwier, R. (2001). Catalyst, emphases, and elements of virtual communities: Implications for research and practice. *The Quarterly Review of Distance Education*. 2(1), 5-18.
- Tashner, J., Riedl, R., & Bronack, S. (2005). 3D Web-Based Worlds for Instruction. In C. Crawford, D. Willis, R. Carlsen, I. Gibson, K. McFerrin, J. Price & R. Weber (Eds.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2005* (pp. 2114-2118). Chesapeake, VA: AACE.

### **Acknowledgement**

The project is co-funded by both Ministry of Education and National Science Council of Taiwan.