

# CAMPUS 2007 TECHNOLOGY

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## **“Teaching and Learning in a 3D Immersive World: The AETZone Model”**

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## Teaching and Learning in a 3D Immersive World: The AETZone Model

### **Abstract:**

*The development of online opportunities for distance education is an important priority in higher education. At Appalachian State University, the principles of social constructivism inform our thinking as we construct teaching and learning environments. Our experience suggests 3D immersive virtual worlds support deep learning and can help learners make meaning in ways similar to those used outside of virtual environments. Virtual worlds such as AET Zone offer participants a sense of presence, immediacy, movement, artifacts, and communications unavailable within traditional Internet-based learning environments. This paper will report our experiences with an award-winning virtual, immersive learning environment. The results of these experiences highlight the efficacy for the formation of authentic communities within 3D web-based worlds as online distance education environments continue to evolve.*

## **Teaching and Learning in a 3D Immersive World: The AETZone Model**

### **A Day in the Zone**

It is early evening, and the avatars of students from the Master's degree program in Instructional Technology begin appearing in the Commons area. Soon they are joined by other Appalachian State students from programs in Library Science, Higher Education, and School Leadership. The conversation begins: one new student would like help in finding course materials; some veterans wander to the Chit Chat Coffee House to begin working on an assignment using an audio chat. Still another heads off to the on-line university library, metaphorically named the Information Gardens, for a tour conducted by a campus-based University librarian. One sees an available professor, and whispers a question.

After a while, a broadcast announcement goes out: a nationally known speaker will be giving a presentation in Classroom A. Students begin to move toward this location in AppEdTech, a world created for the Instructional Technology program, where they will be able to view the presentation while engaging in text and audio chats with the speaker and one another.

### **AETZone: A 3D Web-Based Learning Environment**

Descriptions of a 3D web-based learning environment (Appalachian Educational Technology Zone or AETZone) have been noted in other research (Bronack, Riedl, Tashner, 2006; Riedl, R., Bronack, S., & Tashner, J.; 2005 and Tashner, J., Bronack, S., & Riedl, R.; 2005). The 3D world (AETZone) is based upon a version 4.1 Active Worlds Universe Server (<http://www.activeworlds.com/>) that provides a means to build virtual worlds for students and instructors and other invited guests to meet and work together in ways not found in other learning environments that are currently available. This environment may be characterized by significant components of space, movement, physical presence and co-presence, conversational and presentation tools with small and large group shared workspaces, and metaphors and artifacts that assist collaboration and learning online in new and different ways. Students, faculty and guests, represented by avatars, move through the 3D world spaces interacting with each other and with artifacts within the worlds. These artifacts may be linked to different resources, web pages and tools necessary to provide content and support for various kinds of synchronous and asynchronous interactions. Small and large group shared workspace tools enable interactive conversations in text chats, threaded discussion

boards, audio chats and group sharing of documents, web pages, and other types of application type software as well as other resources.

Typical students are usually mid-career k-12 classroom teachers who want to learn more in-depth ways to integrate technology into their curriculum or who want to become instructional technology specialists in their schools or chief technology officers (CTO) at the district level. Many students teach within a 100-mile radius of our university. Using a cohort model, students enroll and move through the program together. Student classes are sequenced for each cohort. We currently meet face-to-face regularly at the beginning of the program with reduced numbers and frequency of meetings as the members of a cohort gain understandings of course structures and expectations. While we meet and use the virtual world for each class, the number of face-to-face meetings rapidly decreases after the first several courses to only an orientation class at the beginning and a final class session during which students present term projects and articulate their understandings. However, recent initiatives have expanded opportunities to enroll k-12 teachers in a totally online experience. Several Mexican teachers from the D'Amicis School in Puebla, Mexico, and faculty and students in Griffith University in Brisbane, Australia, are working with us completely online. No longer able to depend on any face-to-face contact, these pilot programs are challenging us to rethink the way we develop and enhance the sense of community in distance educational settings.

Our online learning environment is unique. It is designed to meet the needs of learners engaged in self-directed meaningful activity within a community of practice novices as well as experts.

According to Wenger (2006), "Communities of practice develop around things that matter to people. As a result, their practices reflect the members' own understanding of what is important." Tools are offered in support of the kind of problem solving that happens when information occurs in activity. Prompts and activities offer all learners the ability to participate in projects, discussions, and other activities at different levels of complexity as they develop and gain more experience (Figure 1). Finally, learners have multiple opportunities throughout AET Zone to turn interactions into artifacts and ways of knowing into expertise.



Figure 1. A community of learners in AETZone

## Basic Tenets

An underlying foundation or *Conceptual Framework* (Reich College of Education, 2005), based upon social constructivism, was developed by the College of Education and provides a clear guide to teaching and learning in the 3D web-based AETZone courses. These basic concepts are:

- Learning occurs through participation in a Community of Practice;
- Knowledge is socially constructed and learning is social in nature in a Community of Practice;
- Learners proceed through stages of development from Novice to Expert under the guidance of more experienced and knowledgeable mentors in the Community of Practice;
- An identifiable knowledge base that is both general in nature and also specific to specialties emerges from the Community of Practice;
- All professional educators develop a set of Dispositions reflecting attitudes, beliefs, and values common to the Community of Practice.

The 3D environment we have created supports the five assumptions of our college's conceptual framework about teaching and learning. It provides a space in which community can be formed and nurtured. Students know and can see when their colleagues are logged into the world. They can approach other students and talk to them about life, work, or the latest news. Through these interactions, both planned and serendipitous, students begin to create knowledge together. They talk about the work they are doing in class, they share ideas, processes, and resources with one another and contribute to the base of knowledge that exists in their field. Throughout this process, they move from novice to expert, both in terms of knowledge and skills, but also in terms of their abilities to work collaboratively and inside a virtual learning environment using tools previously unknown to them. Their beliefs about teaching and learning are challenged, refined, and shaped by the process of learning together in an authentic social world of dialogue and discovery (Sanders & McKeown, 2007).

## Presence and Co-Presence

Our experience based on feedback from students, observations of student activity and interaction and as illustrated in student products, suggests that 3D virtual worlds support deep learning and can help learners make meaning in ways similar to those used outside of virtual environments. Virtual worlds such as AET Zone offer participants a sense of presence, immediacy, movement, artifacts, and communications unavailable within traditional Internet-based learning environments. Schroeder (2001) notes, "Recently emerging research and the emergence of 3D web-based environments for teaching and learning is suggesting the importance of the sense of presence and co-presence in the development and evolution of online communities (as cited in Tashner, et al. 2007, p. 5). Our own experiences with teaching in an immersive learning environment support studies in social presence conducted by Rovai (2002) and Tu

(2002), which suggest that sense of presence and co-presence do seem to be critical factors in creating and maintaining online communities. Tashner, et al. (2007) elaborate on how this occurs in the Zone:

As an immersive 3D environment, AETZone allows participants to 'see' the other participants (represented by avatars) present. Each participant is able to move through the 3D world by keyboard action. As one moves, one's perspective changes, as does what is seen. This change in perspective as one moves, creates a sense of 'presence'. A participant has the perception of being somewhere else. In addition, as one observes others in the environment, one has a feeling of being somewhere else with someone else or 'co-presence'. These concepts lead one to experience a connected presence or mutual awareness of others. As the mutual awareness increases, so does the desire for and feeling of heightened engagement in the world and in the activities conducted within the world. Emerging from the analysis was a strong theme of the importance of both presence and co-presence in developing learning communities. Participants indicated that the feeling of isolation and working alone diminished as they become accustomed to working in the environment. As participants gain more of a sense of being somewhere and with somebody else, communication and collaboration is dramatically enhanced. Combining communication and collaboration tools with a sense of presence and co-presence provides opportunities for developing authentic learning environments.

As a result of these new opportunities for interaction and community building, we are thinking about our work very differently now. Our virtual world has helped us to interact more naturally and fluidly with our students. We can offer more opportunities for our students to take their own paths through resources and activities together, in groups and at times that make more sense to them. Structure and guidance are still provided, and a class within the virtual world may be as linear as any. However, we are more open to providing choices for the students within the 3D world, and the ability to help students construct individual paths through the virtual world is an essential element in that process.

### **Student Experiences in AETZone**

In the spring of 2007, current students along with program alumni were asked several questions concerning ways they would describe their experiences as learners in the immersive 3D world, AETZone. These questions revolved around themes of learning, community, and support. The results of this survey are presented and discussed below.

#### Sample

Participants in the survey were 121 current and former students of the Instructional Technology program in AETZone.

#### Participation in a Learning Community

Learning communities are characterized in many ways. The literature is divided on the actual meaning of learning communities. “Communities of learners”, according to some, are groups formed to increase their understandings or knowledge base in specific areas. Jonassen (1997) cites the following necessary components for a learning community: active, constructive, collaborative, intentional, complex, contextual, conversational and reflective. Others use the term “community of practice” which seems to indicate communities of similar practitioners who are currently exploring various aspects of their practice together. Wenger (1998) states that communities of practice include: “... a *joint enterprise* as understood and continually renegotiated by its members..., *mutual engagement* that bind members together into a social entity.... and the *shared repertoire* of communal resources (routines, sensibilities, artifacts, vocabulary, styles, etc.) that members have developed over time....” Others seem to use the terms learning communities and communities of practice interchangeably.

In either case, the literature suggests several main themes that emerge as useful guides for developing online virtual communities. An overview from a recent Academic Impressions conference on building learning communities states that such communities:

... Foster peer-to-peer collaboration, communication, interaction, resource sharing, negotiation and social construction of meaning, and expressions of support of encouragement among students. A blended or online learning community must have its own meeting or gathering space, as well as a defined set of members' roles and norms for resolving disputes (Academic Impressions, 2006).

Several common themes consistently emerge from these descriptions of learning communities. Communication, collaboration and support are central to their development and maintenance. Other factors include shared resources and authentic reasons to join together. Recently emerging research and the emergence of 3D web-based environments for teaching and learning is suggesting the importance of the sense of presence and co-presence in the development and evolution of online communities (Schroeder, 2001). Using such characteristics as these as both a vision and a guide, the instructional technology graduate program at Appalachian State University has been studying ways to develop an environment that continues to foster and support a wide variety of learning communities that may be identified with these characteristics.

Development and support of communities within a 3D immersive worlds used for learning requires consideration of how students will move through the course environments in collaborative ways, means to enhance the communication between students, guests and instructors and how participants will interact with the various resources in the environment that contribute to building meaningful communities of learners.

Survey responses indicate that students in this program gain this sense of community through participation in the AETZone.

Table 1

*As a student in the Instructional Technology program, I feel that I am part of an effective and supportive learning community.*

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	<i>Percentage</i>
Strongly Agree	71.9%
Agree	21.5%
Disagree	2.5%
Strongly Disagree	4.1%

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A key component of a learning community is the availability and efficacy of tools for communication. Through use of these tools for constant communication, students and faculty may promote learning in collaborative and active fashion. Students indicate that these types of learning are evident in the online, immersive environment.

Table 2

*The Instructional Technology program promotes continuous, collaborative and active learning.*

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	<i>Percentage</i>
Strongly Agree	81.8%
Agree	11.6%
Disagree	.8%
Strongly Disagree	5%

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### Guidance and Support



Support and guidance from mentors and peers are crucial elements of social constructivist learning experiences. In AETZone, whether it be online library resources, an individual course or even professional assistance needed, there was an instructor or peer ready to offer support. In a social constructivist learning community, such as those we create in the AETZone, we find that participants do move along a continuum from novice to expert. Indeed, each of our classes and the program has students representing various aspects of this continuum. As they become more aware of each other, of bumping into each other and become comfortable with others, the working relationships continue to develop and support each other.

Table 3

*The Instructional Technology program faculty have provided me with useful analysis and feedback regarding my performance, development, and/or achievement as a student.*

	<i>Percentage</i>
Strongly Agree	60.3%
Agree	31.4%
Disagree	3.3%
Strongly Disagree	5.0%

Table 4

*The Instructional Technology program faculty have been responsive to my needs as a learner.*

	<i>Percentage</i>
Strongly Agree	72.7%
Agree	19.8%
Disagree	1.7%
Strongly Disagree	4.1%

Learning in the Zone

Community and support are vital to supporting the learning goals of students in our programs. This development of an identifiable knowledge base, combined with growing competence and confidence on the part of students, is readily evident in students' self-reported experiences with learning in the Zone.

Table 5

*The Instructional Technology program has helped me increase my knowledge and abilities related to the ISTE NETS standards for teachers.*

	<i>Percentage</i>
Strongly Agree	62.0%
Agree	29.8%
Disagree	4.1%
Strongly Disagree	2.5%

With our K-12 teachers, it is important not only that they increase their own knowledge and skills, but that they be able to transfer their gains to their work with their own students. Students are provided with opportunities in each course to develop projects and activities for use with those they teach, and assignments are customized for these specific learning goals.

Table 6

*The Instructional Technology program has increased my ability to have a substantial impact on student learning.*

	<i>Percentage</i>
Strongly Agree	64.5%
Agree	28.9%
Disagree	2.5%
Strongly Disagree	4.1%

Perhaps one of the most important learning outcomes for students in AETZone is a fundamental change in views on teaching and learning. Much attention is given to creating learner-centered environments and facilitation of learning, and these core values are modeled in the online environment throughout the course of study.

Table 7

*The Instructional Technology program faculty challenged me to rethink my role as a teacher and as a learner.*

	<i>Percentage</i>
Strongly Agree	74.4%
Agree	19.8%
Disagree	1.7%
Strongly Disagree	4.1%

Clearly, participants studying and learning in this environment perceive a significant change in their views of instructional processes. The importance of Table 6 and Table 7 have been cited as major goals in recent reports on education for the 21<sup>st</sup> century (Horizon Report, 2006; Partnership for 21<sup>st</sup> Century Skills, 2002) .

## **Discussion**

The immersive web-based 3D environment of AETZone is one which provides students with a constructivist learning experience, as reported in survey results above. Not only do 91.8% agree or strongly agree that the environment is conducive to learning in the context of national standards, but 93.4% agree or strongly agree that they are able to translate their own learning into improved teaching for their own student populations. Perhaps most important is the self-report that 94.2% experience significant changes in their own views of teaching and learning. In a narrative response, one student comments, "This program has been a life-changing experience. I have not only learned the importance of being a leader...I have become a leader. My fellow classmates and I developed and carried out a program of technology in-service for all of our staff members. We have researched and written a grant to support further technology for our school and have influenced the decisions made about technology purchases in our schools. We have made a commitment to be a model grade level at our school so that we can be a resource to other teachers for technology integration in the classroom."

How are these results achieved? The concept of the development of a community of learners is of vital importance. 93.4% of respondents agree or strongly agree that they feel part of a community of learners, with the same percentage reporting that their experiences in AETZone have been those of active, collaborative learning. Certainly, the support of program faculty as noted above is critical as well. One student commented, "This world has made us in touch with one another. The real time contact allows us the ability to reach the instructor or panel of instructors for needs I have."

These results are directly in line with those of earlier informal qualitative analysis (Tashner, et al, 2007). In that instance, communication, collaboration, sense of presence and co-presence, development of leadership, and support were all cited by students as key factors to a learning experience in the program and AETZone.

## **Conclusion**

Participants in AETZone report a variety of positive experiences, advantages, and learning outcomes from their work in this environment. While participating in this social constructivist, immersive environment, students use a variety of tools for communication and collaboration, fostering various forms of learning communities. These include virtual communities develop within the AETZone for several reasons, including social networking, small group task completions, and authentic discussions for topics of mutual professional interest. An important theme that emerges is the strong sense of presence and co-presence while in AETZone, a factor critical in fostering the learning community.

The shared experience of AETZone has a number of other outcomes as well. Students share a variety of resources both during and after their period of formal participation. They also report that the environment provides support for learning, both from instructors and peers.

The AETZone is a unique environment for learning for our graduate students. The tools, support, and constructivist environment lend themselves readily to the creation of learning communities.

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