Chapter 5

This study attempted to examine selected student reactions to a new use of classroom technology, text based virtual reality. This highly experimental instructional environment combined text based virtual reality, list server and e-mail technologies in an effort to create a teaching/learning opportunity tailored to the delivery of a course (IGS 298) titled The Discovers. Since the content of the course dealt with critical events in human history, thought and social development, the instructors felt that the capacity of the MUSE (virtual reality) software to create highly interactive, real-time, multi-user environments in which students could participate in significant historical events and interact with key figures (Galileo, Aristotle, Mendel, etc.) might create a very effective learning experience. In this experimental course, instructors counted heavily on student's willingness to engage in various forms of dialogue and written discourse as the means for exploring and understanding the significance of historic events in shaping the world we live in today.

Central to the design of IGS 298 was the expectation by instructors that much of this important dialogue would be facilitated as real-time, multi-student interaction occurring in areas of the virtual reality classroom specifically designed to recreate the content of the student's most recent reading assignments. Additionally, faculty expected that students would access these virtual places independently in order to review facts and events, exchange ideas with other students and continue classroom dialogue via the list server. In keeping with the "electronic" delivery of the course, written assignments were expected to be submitted through e-mail. Perhaps this quote from Dr. Billie Hughes (Avalon) best sums up the hopes of instructors participating in the MariMUSE project:

> "I believe that MUSE will let me construct a simulated environment in which I can engage students in meaningful tasks, some of which require cooperation. Students can be assigned to groups that are required to create a school, and within that school model what they consider to be good student to student interactions, student to teacher interactions, seating arrangements, etc.

> How they structure the environment they create must be based on a philosophy, goals, and a stated curriculum (which they have experienced in the different "rooms" I create). Exactly what each group will learn will vary, but they will all complete the task. Their ability to construct an environment and defend it to others is the key learning activity." (Hughes, 1992)

IGS 298 was offered as a lower division course by the Phoenix community college in Arizona. As is often the case in such settings, there were no absolute prerequisites and enrollment was open to the student population at large. Successful completion of the course satisfied a three unit portion of the core curriculum. Although the course was designed to be delivered entirely over the Internet, students were not required to have access to a computer and modem at home. Internet capable computers were available to students in the college library during class meeting times for IGS 298 as well as during the day and evening.

Instructors offered optional class meetings where students were given a basic introduction to using the MUSE, list server and Pine e-mail systems. On-line, as well as printed documentation in the use of these systems was also available. Additionally, technical support staff in the library's computer center were available to help answer questions about the operation of these software tools.

What was Learned

In general, students appeared to enjoy the course. In particular, they enjoyed the social and conversational interactions innate to the virtual environment. Students in the IGS 298 virtual class, like players in other purely social virtual communities, also reported a greater sense of willingness to share and defend ideas and beliefs about which they might have been more reticent in a "real life" situation. This finding is entirely consistent with the writings of other researchers who have done extensive exploration of the sociology of virtual communities. It is also consistent with the value students on a "real-life" campus place on the importance of

clubs, student organizations, athletic events and other activities which promote social interaction and the opportunity to meet new people.

As previously noted in Chapter 4, students who reported enjoying all aspects of the course were typically older females (ages thirty-five (35) to forty-four (44) years) who had computers and modems at home. As with many other distance learning classes, student maturity and motivation appears to play a critical role in the ability of students to succeed in these new instructional environments. It may also be the case that these more mature students were able to better appreciate the significance of the course content. On a number of occasions, for example, younger students were baffled by the content of certain discussions because they lacked the prerequisite knowledge of basic science to understand the concepts under discussion. These under prepared students are in no way unique to the virtual environment but are rather a consequence of long-term underfunding of public education.

What is significant is the level of student preparation and its implications for content development and planning of future virtual courses. The level of intellectual sophistication and academic preparation of students involved in future virtual courses will need to be carefully considered. The level and quality of dialogue such students might be able to sustain without substantial input from instructors remains to be seen.

What was apparent from IGS 298, was that many students had little capacity for initiating dialogue and tended to rely on instructors to generate ideas for discussion. In many respects, both students and instructors simply recreated the student/instructor dynamic found in a conventional classroom. Perhaps this grew out of an inability on the instructor's part to live with the discomfort of bogged-down dialogue, long waits between student responses, lack of student preparation or the painful experience of watching students slowly flounder to a stop as they struggled with the very real consequences of sometimes lacking the intellectual resources to participate in a highly abstract discussion. In any event, it is important to know that highly sophisticated instructional environments do not necessarily attract highly sophisticated students.

In fact, within a virtual classroom, the minimal levels of competency (i.e. typing speed, facility with written language, ability to understand abstract concepts) required for effective participation may be well beyond the capacity of some students.

Successful participation in a computerized instructional environment appears to require a greater level of student responsibility and involvement than might be the case in a more traditional television based distance learning setting. When participating in televised distance learning courses, students can video tape the class for review, receive quizzes, tests and class handouts in the mail, submit papers to an instructor for review and perhaps meet with the instructor during office hours. The IGS 298 course occurred in real-time and required each student's undivided attention and participation for a two hour period. Rather than waiting passively for tests, quizzes, assignments and class handouts to arrive in the mail, IGS 298 students needed to navigate the halls and corridors of a complex virtual landscape in order to read the assignments posted in their instructors virtual offices, check e-mail regularly for class handouts and maintain frequent contact with the list server to receive notices, quizzes and tests.

Although a high degree of student involvement in the learning process was certainly consistent with the instructor's Constructionist educational philosophy, it would appear that the level of independence at which students were expected (whether by design or assumption) to operate was more than some could manage. For example, although information about assignment due dates was readily available from a variety of electronic sources at all times, students appeared to experience difficulty taking responsibility for finding this information independently. It is possible that much of the "frustration" experienced by some students might well be in reaction to learning in an environment in which students were expected (and again, it is unclear whether this expectation was by design or assumption) to operate as active learners rather than passive recipients of information.

Some component of this "frustration" might also have arisen from operating in an environment in which students were expected to find out what they needed to know rather than being told what they needed to know. Again, the question of how (or if) this expectation was communicated to the students is unclear. Given the "open door" policy of community colleges with regard to admissions and course enrollment, it would probably be very helpful to conduct the first few class meetings of future virtual classes in a networked computer lab where students could meet the instructors, gain a first hand experience of the look and feel of the virtual classroom, understand the level of independence and responsibility at which they will be expected to operate and decide whether having/not having a computer and modem at home will meet their needs for class participation.

A small amount of time spent in such a computer lab would also provide an opportunity for students to benefit from significantly higher levels of training and support in the use of the basic software tools which animate the virtual classroom. For students unfamiliar with electronic mail, text editors and the MariMUSE environment, the level of technical skill required by the IGS 298 course proved quite demanding. It may well be that struggling to understand the complexities of these technologies distracted some students from the instructional content of the course. Again, it is unclear whether instructors underestimated the technical demands of the course, expected students to learn on their own, assumed that sufficient technical support was available or thought that the basic instruction in using these technologies provided through preliminary optional class meetings would be adequate.

IGS 298 instructors may have underestimated the difficulty students would experience in easily accessing the MariMUSE environment. In fact, only fifty percent (50%) of respondents had a computer and modem at home. For many students, attending an IGS298 class meant coming to the college library and logging on through a local terminal. Without access to a computer and modem at home, many of the benefits of such a course (independence, ease of access, ability to work at home) cease to exist. The entire process of independent learning, exploration and communication in

a MUSE environment may need to be carefully reexamined with regard to assumptions about ease and frequency of student access to instructional resources.

Teaching with Technology

During delivery of the IGS 298 course, there were many instructional moments when teaching and technology merged so seamlessly that only learning remained. In these moments, awareness of using the technology seemed to disappear for both faculty and students. What remained was a formless teaching/learning environment perfectly suited to supporting the abstract ideas and discussions taking place.

Several possibilities come to mind in considering what might have caused the awareness of using technology to vanish. During such moments, which were always marked by high levels of participation by all students, the software tools being used were almost always limited to the simplest of "in-room" communications devices. Say, page and whisper are seen most often in these instances. It seems fair to say that many of the most effective instructional moments in IGS 298 were those in which a minimum of the technical potential of the MUSE software was being used. Perhaps for some students, the tools got in the way of the task.

Just as it will be important in the design of future virtual classroom curriculum to carefully consider the level of academic preparation of students, it will be equally important to carefully consider the capacity of these same students to manage the large number of operational commands available in the MUSE software environment. It might be of value to select a carefully determined subset of these commands, commands which best support the basic activities of teaching/learning in a virtual classroom, and develop instructional settings using only those commands. In order for learning to occur easily in the VR classroom, instructors and instructional designers alike will need to work diligently to remove the weight and burdensomeness of the underlying technology.

Another characteristic of these "teachable moments" was the linearity of the dialogue. Typical of virtual environments, including IGS 298, are multi-threaded conversations. This is a conversational dynamic in which several people are discussing several topics simultaneously. Depending upon typing speed, modem connection rates, computer slowdowns and other activities being carried out by participants in the conversation, several seconds or minutes might pass between responses to a specific topic. In the interim, however, many other conversations may have scrolled across the computer screen in response to other, unrelated topics. In order to participate in such multi-threaded dialogues, one must be able to remember and piece together multiple, non-linear conversational fragments into their related topic threads. Many students find this a challenging exercise and experience such conversational environments as chaotic and incomprehensible. During "teachable moments," though, these multi-threaded dialogues tended to focus and coalesce around a single topic so that the virtual conversation became highly linear, paced at closer to normal rates of conversation and much more dynamic. What seemed to create these special moments was a kind of harmony between the variables of tools, timing and topic.

Finally, we must consider what use was made of the unique qualities of the medium and how students experienced these efforts. Using creatively described locations, virtual interactive objects and the capacity of the medium to support simultaneous, multi-user conversation, the IGS 298 instructors attempted to create participatory electronic theater in which students, faculty, virtual actors and virtual locations merged to create a memorable learning experience. On at least one memorable occasion in which the class became participants during a Viking raid on a medieval Christian village, tools, timing and topic all came together to create a truly unique instructional experience.

On this particular occasion, the subject matter was narrowly defined, descriptions were explicit and well written, the number of objects and options was limited, the action moved swiftly and the instructional objective (understanding why Vikings were unafraid to attack Christian monasteries) quickly achieved. On other occasions in which location

descriptions were less evocative, more options and objects were provided and the action was slowed by lengthy "lectures" programmed into instructional objects, student participation flagged and that most critical of all occurrences in theater, the ability to suspend belief, did not occur.

If we adopt the metaphor of virtual classrooms as a kind of electronic theater, then set design, plot and action appear to play key roles in the creation of a truly engaging instructional experience. Too much clutter on the virtual stage and students become distracted and confused about what to look at and interact with. Too much dialogue from programmed objects or not enough action in the plot and students become bored and disinterested. As any experienced and talented instructor knows, teaching is theater. In a virtual classroom, however, the effective instructor must be playwright and set designer as well.

This raises some very real questions about the time, programming skills and "theatrical ability" required to prepare for and teach a virtual class. Given the highly experimental nature of the IGS 298 course, the involvement of two full time instructors in the development and delivery of the course to classes of four to eight students is probably not unreasonable. On a regular basis, such faculty to student ratios would obviously not be cost effective. In this new instructional paradigm, novel issues of student load, class preparation time, staging, production and dialogue development will need extended consideration. It is easy to foresee new partnerships between conventional academic disciplines, instructional design, theater arts and computer science emerging in support of creating highly effective virtual classrooms.

Using MUSE based VR Classes at De Anza College

There are several recommendations for the use of text based virtual reality classrooms which can be drawn from this study:

• Careful thought must be given to the advantages/disadvantages of presenting all or part of a class in a VR setting. Before such courses are

developed, strong and compelling factors must be identified which substantially enhance student learning, ease of access or levels of participation which meet or exceed what might otherwise be possible in a conventional classroom.

• Courses which will best "translate" into virtual environments are those which are "idea based" courses (philosophy, political science, sociology, etc.) and which naturally contain strong elements of group dialogue. Attempting to "shoehorn" courses which do not lend themselves to the strengths of the VR environment will probably not be successful;

• Such a project ought to begin with a core group of instructors who are already familiar with the give and take of communication in an electronic environment, have experience with the delivery of distance learning classes, are enthusiastic about the role of technology in instruction and are excited about exploring a new use of classroom technology.

• Instructors wishing to consider development of a VR classroom must be provided with sufficient time, technical support and computing resources to develop and test the entire curriculum before actually using it with students. It is strongly suggested that course development occur as a team effort which includes subject matter experts, instructional designers, theater arts specialists and MUSE software specialists.

• Careful thought must be given to the creation of instructional activities in the VR classroom which utilize the unique properties of the medium without imposing an undue burden of technical complexity on students or faculty.

• The technical infrastructure (telephone lines, dial-up modems, student accounts, network servers, public computing facilities, etc.) sufficient to meet the needs of all students enrolled in VR courses must be fully in place, operational and stable before any VR classroom course is offered. Campus data services staff must be trained and familiar with maintenance and support procedures for these hardware/software systems.

• Text based virtual classrooms seem to work best for highly verbal students who are visual learners, have good written communications skills, the ability to type at around thirty words per minute and access to a computer and modem at home. To the extent possible, the college is strongly advised to establish appropriate prerequisites (or counselor/instructor advisement) concerning these courses. The text based VR environment would likely prove much more challenging, and potentially highly frustrating, for students who are auditory or tactile/kinesthetic learners and whose writing and/or verbal communications skills are less well developed. Students with learning disabilities, particularly visual processing deficits, would probably experience severe difficulties with the entire text based VR setting and appropriate assistive technologies would need to be provided.

• Adequate levels of training and support in the use of all hardware and software tools used in the VR classroom must be provided to all students. It is strongly suggested that training in the use of these tools, along with a comprehensive introduction to vr classroom dynamics, instructor expectations, student duties and responsibilities, be a required portion of any VR course offered at De Anza college.

Future Studies

Exploration and study of virtual classrooms as effective teaching/learning environments has only just begun. Given the small N of this study, and its therefore limited statistical validity, one of the most potentially significant contributions of this work is in its identification of possible directions for future studies. Future researchers might wish to consider such topics as:

• The characteristics of students who succeed in virtual classrooms;
• The characteristics of students who fail in virtual classrooms;
• The characteristics of teachers who succeed in virtual classrooms;
• The characteristics of teachers who fail in virtual classrooms;
• The pedagogy of instruction in a virtual classroom;
• Identification of the minimal software tool set necessary for instructional delivery in a virtual classroom;

• The characteristics and properties "teachable moments" in a virtual classroom;
• The characteristics and content of curriculum which can be successfully transferred to a virtual classroom;
• An examination of "plot" and "set design" in the creation of successful interactive instructional presentation in a virtual classroom and
• An exploration of virtual classrooms which integrate World Wide Web and MUSE/MOO technology to create a highly interactive multimedia virtual learning environment.

Obviously, a substantial body of concept development, course development, implementation and research remains to be done if the fullest potential of virtual instruction is to be realized. Virtual instruction has enormous possibility and deserves the support of our educational institutions.