Chat rooms for students: One method of monitoring students’ technology usage after in-depth instruction

David S. Brown, Ph. D.


INTRODUCTION

One universally accepted principle is that all individuals need to be scientifically literate. The National Science Education Standards describe an educational system based on interlocking communities of students and teacher that is focused on learning science. In this system, all students should demonstrate high levels of performance, all teachers are empowered to make the decisions essential for effective learning, and supportive educational programs and systems are in place to nurture achievement (National Research Council, 1996). The Science Standards require teachers to design classrooms so their students become active learners. A project-based learning environment is one in which teacher will design their classroom so that students can work collaboratively, as well as individually, to create and solve real-life and imaginary problems. Project-based
learning is one method of instruction designed to meet the National Science Education Standards.

At the heart of project-based learning is social constructivism. This epistemology of how we learn can be practically described as allowing students to construct their own knowledge by building on what they already know through interaction with others (Vygotsky, 1978). The social constructivist strongly supports the project-based classroom as well as classrooms that complete with modern technology designed for student use and discovery learning. In today’s classrooms, technology many times means the internet. The internet is an open door to the world, a world full of data, pictures, facts and experiences. Allowing students the opportunity to use this valuable resource means allowing students to search for their own answers to problems.

In project-based learning, students brainstorm ideas on how to solve a problem or answer a question posed to them, plan a course of action, conduct research or an extensive review, then work together to develop then present their solutions (Land and Green, 2000). Schools and teachers using projects to empower the students do so with the belief the increase of science knowledge will result. Through the collaborative effort, these beliefs are verified. The group approach to working on real-life projects is founded in this social constructivist model.

The research surrounding the project-based learning academy described in this paper had a pre-test/treatment/post-test design. The Oklahoma Regents for Higher Education funded the summer academy, and short and long term goals for the academy were identified and met. Students and teachers were monitored for months after they participated in the academy to not only determine if their collaborative efforts in working
with real-life projects would carry over into the school year, but to see if the participants would share what they learned with others for a period of time after the academy was complete. To monitor participants’ technology use and collaboration, a web-based tool called WebCT was used to administer surveys and record chat room conversations. The effectiveness of this web-based tool is a significant part of this research.

Rationale

The purpose of this paper is to describe quantitative and qualitative outcomes from a project-based learning academy designed around collaboration and the use of cutting edge technology. Geographic Information Systems (GIS) mapping was taught to a group of 8th and 9th grade students, as well as the many uses of a Global Positioning System (GPS), and students created their own projects using these technologies. The students and teachers were then provided with the means of communicating with each other as well as with the academy staff on a monthly basis. Participants filled out surveys and participated in chat rooms to hopefully provide evidence that this project-based learning academy provided them with lasting positive impressions. The online tool was used to monitor technology usage by the subjects.

Hypotheses

This paper looks at two hypotheses from the research project. The first hypothesis was that students who used the technology the most at the academy and who used follow-up communication tools, would be the ones who also used the technology the most when they returned to their schools. Goals of this academy included increasing
students’ technology use by teaching new technologies, allowing students to become mentors to others on how to use the technologies, and to encourage year-long communication with instructors on their technology use once back at school. The on-line software that aided in this last goal was WebCT.

The second hypothesis was that a continual use of technology in groups would occur by students once they returned to their respective schools. Knowing that many 8th and 9th grade students use Instant Messenger at home and use the Internet to play interactive games, it is very probable that the technology use would continue to occur with others after the academy, and the more technology the students learned, the greater chance this would occur.

BACKGROUND

Web-based instruction

Using a web-based tool for delivering information has been a rapidly growing academic procedure. With the use of the Internet becoming a daily occurrence in our society, colleges and universities are finding more efficient ways to use web-based tools. Students are more and more likely to choose an online course or web-enhanced course than ever before, not necessarily out of need (Wang and Newlin, 2000). Students will many times use the rationale that an online course meets their need for time management and flexibility, yet today’s students are more comfortable with using computers and find the opportunity to complete courses and degrees at home to be more to their liking, not simply a necessity. Students who find success in taking web-based courses have done so because their strengths match those of the Internet. The Web has been described as a
self-motivated, self-directed, learner-activated, dynamic and multi-path environment which can cause the unprepared participant to become lost in “cyberspace” or allow the self-explorer to find unlimited information (Crossman, 1995; Wang and Bagaka, 2003; Shin, Schallert and Savenya, 1994). Research on web-based courses and uses is growing exponentially.

One aspect of web-based education is the assessment process. Instructors find web-assessment tools are unique in providing a means of communication and assessment for students. One of the benefits of using WebCT for the communication and assessment tool is the ability to create a “gathering place” for the community of participants in the academy. This gathering place works for communication purposes and as a data collection mechanism. Communication occurs in the chat room and on the discussion board, through use of the calendar, and through use of the monthly survey. Data collection occurs in every aspect of WebCT. All chats are recorded, surveys are tallied, and attendance and participation is automatically graphed by the online tool. The “gathering place” idea is of great help to the instructor, but is also beneficial to the participants.

Project-based learning

Students who learn as a result of inquiry-based teaching strategies generally show a greater understanding of concept acquisition than students learning through expository learning (Odom, 1996; Rutherford, 1998; and Brown, 1997). These researchers compared science scores from students involved in expository versus innovative teaching practices and all discovered that increase science comprehension and achievement as well
as a more positive attitudes towards science was the result of inquiry-based teaching practices.

Similar results have been found with project-based learning research. Diffily (2001) describes the benefits to the teacher and the students when involved in a project-based learning environment. She recognizes the fact that students in these types of classes can develop assigned themes in a more meaningful way than if the concepts were simply lectured by teachers. Teachers also benefit by allowing them the time to observe student learning through other means than simply tests or quizzes and providing ample opportunities to provide immediate feedback. Banks (1997) discusses similar opportunities for teachers in the realm of assessment. She discusses the development of higher level thinking among students and the ease at which this can be obtained when project-based classrooms are properly organized.

Gatrell and Oshiro (2001) show the relationship between project-based learning and geography education. They demonstrate ways in which Geographic Information Systems (GIS), a project-based learning application, can be utilized in classrooms instead of the traditional teaching approach. Their study stresses the significance of using project-based learning and the increased amount of achievement resulting from this method of instruction. Increased achievement and using teaching approaches other than a traditional lecture approach are components of the National Standards.

Global Positioning System

The term GPS stands for the Global Positioning System (FM 21-26, 1987). It is the only system today able to show an exact position on the Earth anytime, in any
weather, anywhere on our planet. The GPS is funded by and controlled by the U. S. Department of Defense, even though studies show there are many hundreds of thousands of civil users of GPS worldwide. There are 24 GPS satellites that orbit at approximately 11,000 nautical miles above the Earth’s surface. These satellites transmit signals that can be detected by anyone with a GPS receiver. Using the receiver, a person can determine a location with great precision. One of the expected outcomes of this academy was to instruct the students on the use of hand-held GPS receivers. However, due to the skyrocketing uses for GPS technology, especially in the areas of outdoor recreation and vehicle navigation, most of the students already were well acquainted with GPS, making time needed for this instruction very minimal. More time was available for GIS instruction, which was also found to be not as needed as thought, not because of prior use by participants, but by the ease at which the material could be taught and learned.

Figure 1. The Rino 110 handheld GPS used by summer academy participants.
Geographic Information System

A Geographic Information System (GIS) is defined as a digital database in which a common spatial coordinate system (latitude and longitude from the GPS) is the primary means of reference. Individuals can begin using a GIS by inputting data from maps, aerial photos, satellites, surveys, as well as any available data table. This data can be stored, retrieved and queried in an effort to analyze, model and describe spatial statistics regarding the data. Creating a GIS map or series of maps is an important outcome of using a GIS (see Figure 2).

Figure 2. Student-generated GIS map showing Midwestern cities and highlighted counties in Oklahoma.
An example of data that can be used in GIS mapping is that collected by the census bureau. The GIS map in this paper demonstrates one use for data collected from the 1990 U. S. Census Report. The data is downloaded into a GIS mapping program and used to create the map. One goal of this academy was to instruct all teachers and students on many of the uses of GIS mapping. As previously described, use of GIS was quite unlike the concept of GPS, none of the students or teachers had ever used GIS mapping, even though this technology has been available for almost 20 years. Surveys given at GIS presentations show that few individuals in education are aware of its existence or possibilities.

**METHODOLOGY**

The TEC Academy

The Technology, Education and Collaborative (TEC), held in the summer of 2002 and then again in 2003, was designed to introduce students and teachers to Geographic Information Systems (GIS) as well as its dependence on Global Positioning Systems (GPS). Although secondary science teachers are required to develop active learners, and project-based learning environments are ideal for this outcome, they do not always have the time to create these project-based activities for their classes. Bringing teachers into the academy and allowing them to work with students are developing projects deemed a worthwhile enough goal for the summer academy to be completely funded for three years.

The TEC summer academy was conducted at the University of Tulsa and hosted four high school teachers along with 20 eighth and ninth grade students. The Oklahoma
State Regents of Higher Education provided the funding to run the program in which the first year academy lasted a total of three weeks during the summer. All participants were required to apply for one of the limited spots, teachers and students alike, and a selection committee chose the most qualified and interested individuals. Once the group was selected, the four teachers attended the first week of the program, a week designed to instruct the teachers how to use the technology while allowing them to plan the two weeks in which the students would be in attendance. The following two-weeks of the academy included attendance of the teachers as well as the 20 students. During these weeks, the teachers acted as facilitators while the students learned the technology and participated in and created projects and activities based on GPS and GIS.

The web-based assessment software was introduced and monitored by the academic webmaster at TU. The webmaster was responsible for implementing all WebCT usage during and after the academy. A pre-academy survey was administered to determine the students’ attitude toward as well as their knowledge base of science and technology. At the end of the academy, a group of students were taught how to log onto the web-based part of the class, then students and instructors collaborated monthly using this online tool. This tool collected and recorded all activity by the participants for the past year.

One of the limitations of this academy was the small sample size of participants who were taught to use WebCT for year-long correspondence. In the first year of the program, only the five returning mentor students were taught the communication tool, with all 38 participants taught WebCT uses the second year.
Projects

There were two types of projects completed by all students: teacher-generated projects and student-generated projects. An example of a teacher-generated project is the Scavenger Hunt, described briefly below. The student-generated project described in detail in this paper will be the Emergency Phone project.

The Scavenger Hunt

The purpose of the scavenger hunt was threefold: 1) collaboration, 2) students learning to use technology, and 3) students understand that the technology they are using is real world and by presenting results to others, they are participating in active teaching and learning. The process to achieve all three goals was initiated in the design of the activity. Initially, students were placed in groups of three, one to collect GPS data, one to collect digital pictures, and one to manually record data (Figure 3). There were approximately 16 sites to locate and students were required to switch jobs after every five
sites were discovered. This design encouraged collaboration.

Figure 3. Students working together to complete the GPS scavenger hunt.

This also required each student to learn all aspects of the technology as well as teach others as they exchanged roles. After all sites were visited, students returned to the computer lab, downloaded pictures, created tables, and developed their own Power Point presentation to be given to the entire class. Each group completed similar but separate parts to the scavenger hunt and the presentations brought closure to the project.

Student-generated project

In small groups, students were required to design their own projects. The two general topics chosen for these projects were related to Emergency Preparedness and
Handicapped Accessibility. Groups were given two days to create their project, conduct any research needed, create a Power Point presentation and be prepared to share what they did and found. Some of the questions that different groups asked during their Emergency Preparedness project were:

- Are there adequate numbers of fire hydrants on campus and are their locations also adequate?
- Are there adequate numbers of emergency phones on campus for the student body in case of an emergency, and do they provide adequate service?
- Are their fire lanes in front of all buildings on campus and are they accessible to emergency vehicles at all times?

To answer these questions, students did the following:

- Used an aerial photograph to create a web page for locations
- Used a GPS to identify exact latitude and longitude coordinates
- Collected data such as location of fire hydrant to nearest buildings; the color, shape and size of hydrants,
- The availability of emergency vehicles to hydrants; width of streets where fire lanes were painted
- Tested all emergency phones, recording data such as response time, available lighting, and location to nearest building
- Used a digital camera to phones, hydrants, and fire lanes onto their digital map (Figure 4).

Figure 4. Digital maps showing every fire hydrant on TU’s campus

For the Handicapped Accessibility projects, students asked the following questions:

- Are their elevators in each multi-level building on campus and will they assist handicapped individuals?
- Are their adequate measures taken on TU’s campus to allow access to individuals with handicaps to fully use TU’s facilities?

To answer these questions, students did the following:

- Used an aerial photograph to create a web page for locations
- Used a GPS to identify exact latitude and longitude coordinates
- Take pictures with a digital camera of every elevator on the campus (Figure 5).
- Identify all handicapped parking spaces, ramps, and signs.

Figure 6. Student taking data on the McFarlin Library elevator.
Follow-up and Mentoring

After the three weeks of the academy are complete, some of the participants are still required to be involved. The teachers will choose the five top students to return the following year and serve as mentors for the next group of students. The criteria for mentors was ability to use the technology, especially the GIS mapping software, reliability, honesty, ability to work with others, ability to teach others, and attitude and personality. These students, along with the teachers, were given a WebCT address and shown how to log onto the system. Each month a survey was placed onto their WebCT accounts and these individuals were asked to complete the multiple choice questions as well as make detailed comments were required. A copy of the survey is shown in the Results section of this paper. The questions were designed to be quick to answer and students were given ten days at the end of each month to respond.

This group of participants was also invited to a monthly chat room. Not every individual remembered to chat each month, but all had the opportunity. Topics of discussion were based on technology usage, yet students were asked about school, about ideas for next summer’s academy, and about their views on current events. The chat room was very informal and the teachers and instructors tried to only chat to promote others. The chat room was generally scheduled on a Sunday night from 9-9:30 pm.

Data analysis

The data analysis is broken down into two parts for this paper. First, descriptive data will be compared for each month of cumulative use of technology by students and
teachers. This will show help determine if Hypothesis 1 of this paper was supported. This will be followed by descriptive data that shows the amount students use the technology at school, adding to the support for Hypothesis 1. Second, a qualitative look at students’ comments will be presented. This, along with descriptive data of how much technology was used, should help determine if Hypothesis 2 is supported.

RESULTS

Figure 7 shows the number of times the students and instructors used the chat room to converse after the academy was complete. As can be seen from the graph, one of the instructors and two students were able to participate in six of the seven chat rooms. One student only attended one chat room and the other participants were involved in three of the chat rooms. Figure 8 shows the number of comments sent by each student during the chats, with these numbers represented in percent of total student participation. Of the students who attended three or more of the chats, one student tended to “out talk” the others, yet the others made comments in almost equal proportions. One student attended only one chat room and spoke very little. This data comes from the monthly surveys students completed and is self-reported use.
Figure 7. The number of times each student attended a chat room (data collected using WebCT).

Figure 8. Percentage of the chat room discussion by each student.
The following are common answers on the monthly surveys from students. This data is presented from most common answer to least common for each question asked.

1. Which of the following forms of technology did you use this past month?
   1. GIS mapping
   2. GPS receiver
   3. Digital still camera
   4. Power Point
   5. Digital video camera
   6. Chat Rooms
   7. None

2. If you used GIS mapping, please tell me how many times you used it, for what classes, types of assignments used for, were you working alone or with others, and any other comments you want to make.
   Students’ responses:
   “2 times”
   “Not for school assignments”
   “Alone”

3. If you used a GPS hand-held receiver, please tell me how many times you used it, for what classes, types of assignments used for, were you working alone or with others, and any other comments you want to make.
   Students’ responses:
   “Once”
   “Alone”
“I was just having fun with my GPS”

“One time, by myself”

“I was playing”

4. If you used a digital still camera, please tell me how many times you used it, for what classes, types of assignments used for, were you working alone or with others, and any other comments you want to make.

Students’ comments:

“Once”

“Alone”

“Not for school, but to take Christmas pictures”

“Just to play around”

5. If you used a digital video camera, please tell me how many times you used it, for what classes, types of assignments used for, were you working alone or with others, and any other comments you want to make.

“Three times”

“With my sister”

“Taking pictures of my family on Christmas”

6. If you used Power Point, please tell me how many times you used it, for what classes, types of assignments used for, were you working alone or with others, and any other comments you want to make.

“Once”

“Alone”

“Just playing around with my computer”
“Five”

“Science, Tech Ed, Social Studies”

“Alone and in groups”

“Group and individual projects in each class”

7. If you participated in chat rooms this past month, did you talk to friends, classmates, or others and did you use them for schoolwork or for personal conversations?

“Only a few times, with my friends mostly”

“I like to chat, with the guys”

“I stay away from chat rooms”

“We do homework in chat rooms, but only with my friends, maybe once a week”

Table 3 shows the number of times students actually reported using the different forms of technology once they returned to their schools. Although every student did not participate in the chat room each month, all students responded to the monthly surveys.

Table 3. Number of times students reported using technology during the school year as compared to prior to academy and during the academy.

<table>
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<tr>
<th>Times per week GIS, GPS, digital camera, video camera, PowerPoint, and Chat Rooms are used</th>
<th>Prior to academy</th>
<th>During academy</th>
<th>Month 2</th>
<th>Month 4</th>
<th>Month 6</th>
<th>Month 8</th>
<th>Month 10</th>
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</thead>
<tbody>
<tr>
<td>Student 1</td>
<td>1</td>
<td>16</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Student 2</td>
<td>3</td>
<td>21</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Student 3</td>
<td>1</td>
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<td>9</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Student 4</td>
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<td>15</td>
<td>6</td>
<td>4</td>
<td>8</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Student 5</td>
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<td>18</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
DISCUSSION

Hypothesis 1 stated that students who used the technology the most during the academy would be most likely to use the technology throughout the year. Table 1 and Figures 7 and 8 show that the student who used the chat room the most and who reported using the technology the most during the academy was the one who reported using the technology the most during the school year. This hypothesis follows in line with research done by Rutherford (2000) and Brown (2003). Teaching students how to use new technology is only one avenue to ensuring it will be used past instruction. This academy allowed students to become mentors and teach others how to use the technology while providing real-life projects for them to use it with. The students who used the chat rooms each month, probably became more proficient with the technology, developing more confidence and resulting in more total technology use.

Hypothesis 2 tried to predict whether or not the technology would be collaboratively used by the students when they returned to their respective schools. Table 1 and the comments made by students taking the surveys showed that the technology was being used by the students, and was being used in groups for chat rooms, but most of the technology used was being done alone, and seldom for class projects or assignments.

Summary and Limitations

Teaching students new forms of technology will increase their technology use, no doubt, but that was not the research question this project had in mind. It was hypothesized that students who learned a new form of technology in small groups
through a two week academy, and who participated in monthly chat rooms for the following 10 months, would continue to use the technology in groups as the summer grew further away. The idea of choosing five students to return as mentors and keeping in touch with them for a year after the academy was deemed enough to instill the idea that collaborative technology use was a good idea. The results of this study were mixed in showing that even though an increase of technology was seen after the academy, there is still a lack of collaborative work done with technology, unless the technology is in the form of a chat room or is required by the instructor.

This study was limited by the fact that only five students were chosen to return as mentors, and only these five were monitored for the year following the summer academy. This limitation was corrected in the second summer academy in which all students were given access to WebCT and all had access to monthly chat rooms. Results from the 2003-2004 school year will show a greater sample size and hopefully somewhat similar results.

Bibliography


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Statement of Purpose

The objective of this research was to investigate the impact of an online communication tool (WebCT chat rooms) on technology use among middle school students and teachers. In a recent summer academy, teachers and students were taught how to use Geographic Information System (GIS) software and related technologies in order to collect, analyze and depict local and world-wide data. Goals of the academy were not only to teach project-based GIS techniques to teacher and student participants, but also to monitor the potential increase use of various technologies subsequent to their academy participation. WebCT was the web-based system used during and after the academy for participants to communicate with each other in chat rooms. Use of this web-based system was designed to provide a “gathering place” for continued communication among participants as well as a convenient method to track their usage of various technologies throughout the school year.
Summary of Methods

Data from the technology academy was collected in several ways. Pre- and post-surveys were administered to the participants to observe changes in attitudes towards technology as well as content knowledge in earth science. Subsequent to the academy, each month students and teachers completed an online survey on their usage of GIS technologies in their schools. In addition to the surveys, synchronous online chats were conducted on a regular basis to gather data but also to converse about technology usage in general. Chat room conversations were recorded and all data was analyzed (content analysis) to determine if the amount of usage of technology increased after attending the academy.

Results

Quantitative and qualitative results showed the chat rooms to be the best predictor of technology usage after the completion of the academy. Students surveyed who participated in the chat rooms were more likely to use all forms of technology than students surveyed who did not participate in the chat rooms. The students who took part in the surveys were also the ones who discussed the use of technology more often in the chat rooms than the students who did not participate in the surveys.

Implications of the Study

All students participated in the chat rooms set up within WebCT. All students also discussed many topics, other than technology, within these rooms. Students, however, who took part in the most surveys, participated in online chat rooms, and used
the technology at the academy, were the ones who discussed the technology to the
greatest extent once in the chat rooms. These students were more likely to use the
technology and mentored others to use the new technology once returning to their
schools. Providing an opportunity for students and teachers to chat online during and
after intense technology instruction may provide the confidence they need to continue
using newly acquired technology skills.