Lemon, C. (2005). Using technology to teach content in a student teaching experience (and as a first year teacher). *Contemporary Issues in Technology and Teacher Education*, *5*(1), 73-76.

Using Technology to Teach Content in a Student Teaching Experience (and as a First Year Teacher)

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Editor's Note: Cheryl Lemon received her bachelor's degree in biology from the University of South Carolina, and in fall 2002 she entered the secondary science teacher intern program in the College of Education at Lehigh University. In the secondary teacher intern program, graduates earn a master's degree in secondary education and Instructional I certification to teach in Pennsylvania public schools. The 14-week student teaching experience for which Cheryl's exemplary technology use was noted took place in fall 2003.

During my Lehigh University field experiences as a preservice teacher, I had the opportunity to use technology extensively in my instruction. During my internship, I taught for 7 weeks each at two different high schools.

At Emmaus High School, where I spent my first 7 weeks and used the most technology, the classroom had an interactive whiteboard. An LCD projector, a TV/VCR combination, a laserdisc player, and Texas Instrument data collection probes were available. We later acquired an IntelPlay digital microscope. My mentor teacher and I were also able to borrow a Classroom Performance System, a handheld interactive response system. I was able to borrow curriculum from Lehigh, including *Biology: Exploring Life* (www.biology.com), which integrates textbook, Web, and labs.

I was responsible for teaching biology to two very different ability level classes of ninth-grade students. Two classes consisted of Honors Biology students, and three classes consisted of Applied Biology students. In this school district, Applied Biology is a general education course designed for students who have difficulty learning in academic settings. Frequently, poorly motivated or unmotivated students populate these classes. Two of the Applied Biology classes were inclusion classes that had six students with identified learning difficulties.

I constantly thought of ways to enhance my biology lessons by integrating technology into appropriate curricular contexts. For example, I realized that the Honors students would have difficulty understanding abstract concepts of the sequential steps in the light reactions of photosynthesis, a typically difficult concept for learners to understand. I located a Flash-based interactivity of photosynthesis from the *Biology: Exploring Life* curriculum and used an interactive white board to illustrate and explain the sequential steps of the light reaction. During the instructional presentation, I used questioning practices to prompt learners with making predictions of the end products of each sequential step. As a consequence, my students were actively engaged in the lesson instead of being passive recipients.

I also used appropriate Web-based simulations to engage learners in exploring complex phenomena when materials or activities could not be duplicated in the laboratory. For example, I had the students complete a simulated experiment that involved exposing a plant to specific wavelengths of light and measuring the amount of oxygen produced. Through the use of this simulation activity, the students understood how different wavelengths of light affect biochemical reactions in a chloroplast.

With the Applied Biology students, I used a variety of technologies with appropriate pedagogical strategies to assist learners in understanding biological concepts and processes. Often, I would set up the classroom with a computer displaying visualizations and activities from *Biology: Exploring Life* on a projection screen or an interactive whiteboard. This enabled me to focus students' attention on the Web-based visualizations that were designed to illustrate key processes. Direct (highly organized, teacher-led) instruction was used to facilitate content learning and to assist learners in developing inquiry process skills. Coaching (structured questioning techniques) was used to assist students in reasoning through science concepts during content presentations. Online activities on the interactive whiteboard provided learners with many tactile learning experiences, such as building a structure, graphing data, and testing variables in a simulated experiment.

Students with mild disabilities may lack a specific basic skill necessary to perform a laboratory activity successfully. Such skills may include a computational skill or something more complex, such as a problem-solving skill. I realized that my Applied Biology learners would have much difficulty performing basic laboratory techniques, so I used an online prelaboratory activity to assist learners in understanding the biological processes that would be occurring in a photosynthetic rate laboratory. This allowed me to

model effectively the use of appropriate laboratory tools and to organize data so students could more easily see patterns in order to analyze them. Thus, my students were able to perform an inquiry-based experiment successfully without the repeated trial and error typical for this kind of investigation.

Although I was exposed to a variety of technologies during my preservice education program, I was eager to learn a new technology during my internship with which neither my mentor teacher nor I had any prior experience: The Classroom Performance System. In this system, I used a program to generate biology content questions that could be answered with multiple choice responses, A, B, C, D. I used the interactive whiteboard to present these questions to the class. The students used remote devices to register their answers. The responses were recorded and displayed on the computer, allowing me to assess student progress immediately. I learned how to use the system and not only facilitated its use in my classes but helped other teachers in the science department use this system, as well. I used this system with the Applied Biology students and discovered that this approach helped them to review and understand content they had difficulty with.

The students in my classes, especially the Applied Biology students, appreciated the Web sites and the interactive whiteboard. I rarely had discipline problems, even when the technology was not working. They understood that I was trying to do new and different things for them and cooperated. (I had a great group of students to work with.) The students were often engaged, and I had no problems finding volunteers, especially if it involved approaching the whiteboard. The students often asked before class if we were going to use the whiteboard and requested using other forms of technology. They enjoyed learning through the interactive Web sites.

At the end of my internship, I asked the students to fill out evaluation forms. One took the form of a Likert scale, with questions about my teaching methods, specific activities and technology, and the other was an open ended response questionnaire. Over 90% of the students who responded said they enjoyed the Web sites, the white board, and the Classroom Performance System. Several of the students said in their free responses that they had fun.

One may wonder what influenced my success. I think having the ability to use so much technology as a student teacher helped enormously. Also, Pat Waller, my mentor teacher, was willing to do a lot of work "behind the scenes." This certainly encouraged me to learn how to use the technology and find ways to integrate it into the classroom. I think many mentor teachers believe that having a student teacher allows them to take it easy. However, my mentor used this as an opportunity to use technology and other methods that she normally would not use. As a result, she had an invested interest in encouraging me to use the technology while showing me that it is possible and sometimes easier to teach using the technology.

Dr. Alec Bodzin, my science methods course instructor at Lehigh University, observed several of my lessons and offered advice about more efficient technology utilization in my classroom. He was also very helpful in terms of classroom management and teaching methodology advice.

Beyond adapting technology-based materials for classroom instruction, I also developed a Web-based inquiry activity called Shark Report (see Figure 1). This activity has been reviewed and included in the Gateway to Educational Materials (www.thegateway.org).

Figure 1. Screen capture from the Web-based inquiry activity developed by Cheryl Lemon (http://www.Lehigh.EDU/~amb4/wbi/clemon/home_1.htm)

As a first year teacher at Gateway Regional High School, I continue to think of ways to utilize technology as an instructional tool. To assist my Advanced Placement Biology students in visualizing abstract processes, such as movement of materials through cells, I use an LCD projector to show interactive animations found on the Internet and included with the curriculum. I developed a laboratory utilizing PASCO probeware for my biology students investigating the effects of acids and bases on buffers. Furthermore, I created a Webquest for my integrated science students to investigate the causes and effects of the Dead Zone in the Gulf of Mexico on the mobile wireless laptop computers.

I realize that students at all levels benefit from the use of technology-based instruction. I constantly think about how technology can be used to enhance learning and intend to seek new technologies that can be adapted for classroom applications.

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