

# **TELECOMMUNICATIONS TECHNOLOGIES AND CURRICULUM DEVELOPMENT: THE CASE OF A VIRTUAL HIGH SCHOOL PROJECT**

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## **ABSTRACT**

In this paper we present the lessons we learned from developing online classes for a virtual high school (LUDA-VHS) project and discuss the implications for teaching science using telecommunication technologies. Emphasis will be placed on presenting an online Health Education class, the model and process followed for developing the class, and briefly discuss implications for policy and curriculum development.

## **KEYWORDS**

Online learning, curriculum development, distance education, virtual high school, teacher professional development, in-service teacher training.

## **INTRODUCTION**

The development of virtual high schools is one of the trends in the field of distance education. Virtual schools offer alternative solutions and ways for educating K-12 students. The Virtual High School is a consortium of high schools, which offers online courses taught by consortium teachers for students in participating schools. During the academic year 2000-2001, it offered more than 200 high school courses to nearly 4,000 students in 350 schools in 30 states in the US (Kozma et al., 2000). Virtual high schools are developed and are in operation in several states including Kentucky, Florida, New Mexico, Illinois, and Michigan.

Clark (2002) conducted a study to examine the status of virtual high schools in the United States. The study was commissioned by the Center for the Application of Information Technologies (CAIT) at Western Illinois University (WIU) and it looked at other leading projects and provided information on forces driving state interest in virtual schooling. Such forces include state and federal initiatives, as well as curriculum equity concerns such as advanced placement. In addition, the study identified key characteristics of some leading virtual high school projects. These characteristics include technologies used, funding resources, curriculum issues, student services, professional development for teachers, access and equity issues, assessment, policy and administration, marketing, and public relations.

More recently Clark (2001) conducted another study on virtual high school projects in which he reports the following:

- A variety of virtual high school projects were identified among which state sanctioned projects, university-based virtual schools, virtual school consortia, virtual schools operated by schools and districts, virtual charter schools, and private virtual schools.
- The trend to continue developing virtual high school projects continues
- Between 40,000 and 50,000 K-12 students enrolled in an online course during 2001-2002
- Advanced placement courses and Calculus AB were the courses offered by most schools

- The most often reported tuition was \$300 per semester, but there was also a great variation among reported prices.

Virtual high school projects and distance education programs need to be constantly evaluated. Research and evaluation studies of educational technologies can help improve the development of theory and practice at all levels of education (Vrasidas & Glass, 2002). Evaluation studies are of critical importance for establishing a model for the development, delivery, support, and evaluation of distance education and online programs (Vrasidas & McIsaac, 2000). A coordinated, systematic study and evaluation of online projects will allow designers, developers, researchers, and policymakers to make informed decisions for project development, implementation, as well as for funds allocation. This paper will present and discuss issues in the development of a Health Education course.

## **LUDA-VHS**

Developments in telecommunication technology are blurring the boundaries between traditional face-to-face and distance education programs. Educators need to revisit their fundamental assumptions about teaching and learning (Vrasidas & Glass, 2002). LUDA-VHS, like other virtual high schools and online projects, is based on the assumption that learning occurs when the student is given opportunities for interaction with the content, the teacher, and other students. The face-to-face presence and interaction are not required for learning to occur.

LUDA-VHS is an effort by LUDA (Large Unit District Association) Education Foundation in partnership with CAIT at WIU to provide opportunities for virtual learning to high school students in the state of Illinois. The LUDA Education Foundation is a non-profit corporation formed to operate “exclusively for charitable, educational, religious, or scientific purposes.” Members of the foundation are school districts in the state of Illinois and members of LUDA. One of the goals of the organization, as stated in its bylaws, was to develop educational programs, which will permit students to learn in a virtual classroom setting.

The major goal of LUDA-VHS is to use technology for developing alternative ways for serving the needs of school districts and providing quality education to high school students in the state of Illinois. The project entered its planning phase in Fall 2000 with meetings attended by LUDA representatives and CAIT personnel. From the first planning meetings, one of the group’s goals was to create a sense of teamwork and interdependence among all stakeholders for achieving the goals of the project. All stakeholders were encouraged to be actively involved in supporting and promoting the program goals. Although the scope and specific goals of the project were not clearly defined, one of the goals of this evaluation was to help the Foundation identify clear objectives and goals for LUDA-VHS.

All LUDA-VHS classes are developed by certified Illinois teachers in conjunction with an instructional design and production team working at CAIT. All class content is tied to the Illinois Learning Standards and all LUDA-VHS classes are taught by trained Illinois-certified teachers. Teachers are trained in the use of the online learning technology that is used by these classes and on the nature of teaching in an online environment.

Local school districts may choose to deliver the class using the environment that best fits the needs of the students taking the course. This may include a traditional classroom setting, an independent study with an assigned class period, a virtual setting (off-site), or a combination of online/on-site. These options may be exercised by individual districts that have teachers trained in the use of the online class system. Students are required to interact with their teacher and other students within specific lessons and timelines. An orientation session for parents and students, a student-writing sample, and proctored mid-term and final exams are expected.

## **COURSE DEVELOPMENT PROCESS**

The LUDA-VHS planning committee believed that developing courses required for graduation would ensure a greater interest by schools to participate in the project and a larger audience would attend the courses. Therefore, the first class developed as a pilot was Consumer Education, a required class for graduation in the state of Illinois. The second class developed was on Health Education. After a series of meetings among interested districts, it was agreed that 6 teachers who were experts in Health Education would work to prepare the content. One of the teachers was assigned to be the content coordinator. These teachers worked closely with instructional designers and experts in distance education from CAIT to develop the class material.

The first meeting between the teachers and CAIT designers took place at CAIT offices. During that meeting, CAIT designers gave an overview of the process for developing online classes and discussed several ideas for providing interaction in the online environment. Examples were presented and issues involved in the online environment were discussed in detail. In order to facilitate content preparation by the teachers, a template was given to teachers. The CAIT design team used the template when they worked with faculty to develop online classes at Western Illinois University. This template provides a basic structure of how to organize the content for an online class, structure its goals, objectives, activities, communication strategies, and interaction. During the meeting, teachers were assigned units they felt more comfortable developing.

Following the first day meeting, teachers worked on their own to develop a sample lesson from the content they were assigned. They sent that lesson via email to CAIT designers and the content coordinator who provided feedback on how to improve the lesson. Following that, there were periodical meetings among teachers and CAIT designers during which the status of the project was discussed, feedback was provided on content development, and on the class website. After the content for the class was developed, teachers received training on teaching online and on how to use the class website.

## **HEALTH EDUCATION**

Health Education is offered as an alternative to the face-to-face health course that is required in the state of Illinois. The course will fulfill the requirements of this credit. Health Education provides multiple instructional approaches to student learning. Students are required to use the web as a resource for some activities. Other activities require that students turn off their computer and look for information in their community. Students are required to keep a journal, participate in class discussion activities, interact with computer graded practice activities, and submit work to be graded by the teacher. Additionally, students are broken into small groups for work in a project which threads throughout the entire course. In this activity, students are required to participate in small group discussion and work on a culminating project.

Health Education consists of 34 lessons divided into 10 units. The content of the course is listed below:

- Unit 1 Introduction to Health
  - Lesson 1 Becoming Health Literate
  - Lesson 2 Impact of Healthy Behaviors
  - Lesson 3 Healthful Decision Making
- Unit 2 Mental/Emotional Health
  - Lesson 1 Your Mental and Emotional Health
  - Lesson 2 Managing Stress
  - Lesson 3 Mental and Emotional Problems
- Unit 3 Body Systems/ Reproduction and Human Sexuality
  - Lesson 1 Nervous and Endocrine Systems
  - Lesson 2 Integumentary, Skeletal, and Muscular Systems
  - Lesson 3 Respiratory, Circulatory, and Lymphatic Systems

- Lesson 4 Digestive and Urinary Systems
- Lesson 5 Reproductive System
- Unit 4 Growth and Development
  - Lesson 1 Growth and Development
  - Lesson 2 Adolescence Through Early Adulthood
  - Lesson 3 Middle Adulthood to End of Life
- Unit 5 Diseases and Ailments
  - Lesson 1 Noninfectious Diseases
  - Lesson 2 Infectious Diseases
  - Lesson 3 STD's
  - Lesson 4 HIV and AIDS
- Unit 6 Fitness and Nutrition
  - Lesson 1 Importance of Physical Fitness for Health and Life
  - Lesson 2 How Nutrition Affects Your Health
  - Lesson 3 Maintaining Nutritional Health
  - Lesson 4 Hygiene
- Unit 7 Substance Use-Abuse
  - Lesson 1 Tobacco and Alcohol
  - Lesson 2 Prescription and Over-the Counter Drugs
  - Lesson 3 Illegal Drugs
  - Lesson 4 Treatment for Drug Abuse
- Unit 8 Safety/First Aid
  - Lesson 1 Safety at Home/Personal Life
  - Lesson 2 Safety in the Community
  - Lesson 3 Responding to Emergencies
- Unit 9 Environment/Consumer Health
  - Lesson 1 Effects of the Environment on Your Health
  - Lesson 2 Being a Health Consumer
- Unit 10 Relationships
  - Lesson 1 Family
  - Lesson 2 Peer
  - Lesson 3 Conflict Resolution and Violence

## **COURSE OFFERING OPTIONS**

There are two options for offering LUDA-VHS course and services:

### **Host License**

This option is for districts that employ a trained teacher to teach the class. The district pays only a class fee based on the number of students enrolled in the class. This option requires that the district have a LUDA Education Foundation trained teacher to teach the class. This training familiarizes the teacher with both the class content and the nuances of using the online learning system. This training is offered by CAIT. Once a district has a trained teacher, the teacher may teach up to three sections of the class per semester. The district then pays a per student fee for each student enrolled in the classes.

### **Seat License**

This option is for districts that do not have a trained teacher. Students are taught by a trained teacher from another district. The district pays tuition and a class fee based on the number of students enrolled in the class. This is an option for those districts that do not have or do not want a LUDA Education Foundation trained teacher to teach the class, and/or may only have a few students interested in taking the online classes. In this option, districts pay both a tuition fee and a seat fee for each student enrolled in the classes. Typically what happens in this scenario is that a district may have 1-5 students interested in the classes, but not enough to justify the expense of training a teacher and assigning her/him to teach

a section of the class. In this case, the LUDA Education Foundation will seek to place these students with another district that may have an opening in a class they are offering.

### **Recommendations for Districts**

The following are guidelines for districts using the LUDA Education Foundation classes:

- Districts seeking to host LUDA Education Foundation courses must have their teachers trained by a member of CAIT's K-12 Professional Development Division. This training will familiarize the teacher with site navigation, teacher tools, and teaching online courses.
- Teachers must hold Illinois certification in the subject area for the LUDA Education Foundation course they teach.
- The home district of the student will grant credit for each online course.
- The student will follow the guidelines set forth in her/his school's handbook in regard to behavior, conduct, and discipline.
- Each school must provide a "point-of-contact" person for the student to seek help from, if needed. This person would be responsible for proctoring the mid-term and final exams.
- Use LUDA Education Foundation courses to supplement student schedules and to reduce class size.

### **TEACHING SCIENCE ONLINE**

Like any other innovative ideas, developers of online courses must understand not only how students learn, but how the use of computers fit into current understandings of science teaching and learning. Online learning in science education provides the unique capability of allowing students access to data and information on topics that are not normally addressed in regular science courses. Online learning provides one of the ways for a student to learn about contemporary physics, chemistry, biology and health by following the process used by scientists in their own research in these areas.

Coincident with the use and development of online education, science education reform at all levels, especially in grades K-12, is gaining momentum nation-wide. Based upon research on how students learn, the reform emphasizes learning science by active involvement. Online learning can provide a unique experience that encourages this type of active involvement of students. We should not forget, however, that science educators in the past have traditionally not been fast to embrace educational technologies (Vazquez-Abad, 1999; Lehman, 1994). The relatively recent case of computer based learning applications in science education creates responsibilities for science educators to integrate online learning and consider the vast benefits that are offered.

Through online applications in science education, teachers and students alike can download exemplary curriculum units, scientific data, archives of photographs, and be connected through a variety of websites and hyperlinks to vast science resources (Berger et al., 1994; Greenberg et al., 1998; Yerrick & Hoving, 1999). While online education can provide virtually unlimited resources, educators should consider the complexities involved—for example, what support teachers need in negotiating challenges (Vrasidas & McIsaac, 2000), and how can teachers and students develop critical literacy required to sift through available resources (Zembylas et al., 2002).

### **LESSONS LEARNED AND IMPLICATIONS FOR PRACTICE**

After the first year evaluation of the LUDA-VHS project (Vrasidas, in press), some of the major lessons and findings regarding the development of online classes are:

- *Time for development, testing, and revisions.* The biggest issue that caused complications in the development and deployment of LUDA-VHS classes was the production timeframe. Several of the technology issues and problems were caused by the lack of time to conduct systematic usability testing. For future development efforts, class production (including content, manuals, and website) should be allowed a timeframe between 8-12 months. Production should be completed at least two

months before launching date. This will allow enough time for usability testing, tryouts, technology and content revisions.

- *Content, pedagogy, and structure.* Based on the evaluation findings, two major revisions were incorporated in classes for Fall 2001. First, the architecture of the class websites was opened up. This allowed students to complete any lesson in any sequence they preferred. This gave the teacher the freedom to choose lessons and activities they wanted to teach and which matched their personal teaching philosophy and school's needs and priorities better. In addition, if students needed help on how to complete an activity, they could continue working on other activities and lessons until they received feedback from the teacher. The second major revision is the implementation of a collaborative project that is expected to increase the amount of interaction among learners. In addition to promoting learner-learner and learner-teacher interactions, LUDA-VHS should consider the possibility for allowing outsiders with experience in the content of the class to participate in discussions with students. As LUDA-VHS expands, the Internet should be used to bring together students from different school districts in a shared web space where they can chat, discuss ideas for projects, and organize debates and competitions.
- *Teacher incentives and compensation.* In order for online projects to be successful, policy issues need to be clear and teachers need to know what the expectations are and be compensated according to their contribution.
- *Teacher training.* Teachers need to receive training on developing and teaching online classes. Training needs to be extended to provide teachers opportunities for practicing the principles of online teaching and learning. However, for teachers to be able to participate in longer training sessions, the support of their school districts is essential.
- *Equity and the digital divide.* Online projects should equally serve the needs of students regardless of socioeconomic status, ethnicity, and gender. LUDA Education Foundation, in collaboration with respective school districts, should establish policies to ensure equal access to classes offered by LUDA-VHS. One such policy can be the establishment of scholarships and awards for low-income students. In addition, a laptop program can be established in partnership with large corporations. Schools can lend students laptops for a semester, so they can complete an online class.
- *Student recruitment.* To equally serve students, online programs have to enroll students who are not solely judged on how well they do in traditional face-to-face classes. Students should be given the opportunity to participate and be provided with the support and guidance they need to succeed. Schools should work closely with LUDA-VHS personnel, site-coordinators, counselors, parents and students in order to educate all parties of what it takes to be an effective online student. Demonstrations of courses and workshops on online learning should be addressed to both students and their parents to help them make informed decisions on whether online classes are suitable for their learning style and skills. Open access to online classes should be made available to all students including students of Limited English proficiency, students with disabilities, home schoolers, and at risk students. By increasing the diversity of students enrolled in LUDA-VHS, it is likely to increase and broaden the project's impact.
- *Accepting online programs as a valid form of education.* LUDA Education Foundation should organize a campaign to educate personnel from other districts and the general public about LUDA-VHS and the benefits from participating in the project. Schools need to know information such as what is the nature of the project, what it will take for districts to participate in terms of resources and personnel, and what the benefits will be for their students, teachers, and schools.
- *Quality assurance.* As more classes are developed and the project grows and expands to include large numbers of students, one of the major concerns emerging is quality assurance. In order to maintain high quality of courses developed and instruction delivered to LUDA high school students, LUDA-VHS should establish a mechanism to review its courses yearly, to maintain alignment with Illinois Learning Standards, and to create professional development opportunities for teachers.

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