A PROPOSAL for a PROJECT in MATHEMATICS

by

Gordon Dean Haley

APPROVED: ___________________________ Date: ________________
Dr. George Tintera, Chair

Dr. Joe Champion, Member

Dr. Sarah Ives, Member

Style: APA
Abstract

In Texas high schools, students are being required to fulfill a new 4X4 mathematical curriculum because of recent legislation (Texas Virtual School Network, 2009). This requirement will lead more high school students into a pre-calculus course to fulfill their fourth year of mathematics. However, some students may possibly take a pre-calculus course and then take more advanced courses such as Calculus I the following year. At least, the new requirement for high school students imposed by the Texas Education Agency will necessitate a higher demand for pre-calculus teachers across Texas. Potentially this new State requirement will generate a higher need for online mathematics courses, such as pre-calculus, than any previous time. The author has been trained to teach in the traditional classroom environment and has also completed TxVSN training which is geared towards the online teaching environment. The author has also obtained training and certification to be a reviewer for TxVSN mathematic courses and has had 3 years experience with teaching online courses which include College Algebra, Pre-Calculus, and Calculus I. The goal of this graduate project is to complete an online course creation guide as well as an online mathematics course which satisfies multiple criteria: Texas Virtual School Network, Texas A&M University – Corpus Christi Learning Outcomes, as well as Dual Credit Standards of Learning.
Introduction

From 2003 and 2007, there has been a dramatic increase in the utilization of online course delivery to our Nations schools. Students in K-12 as well as higher education have seen a dramatic increase in online course delivery (Stoltenkamp, Kies, & Njenga, 2007). There were 317,070 students enrolled in distance / online courses during the 2003/2004 school year. The following year, that number nearly doubled to 506,950 students (U.S. Department of Education, National Center for Education Statistics, 2008). The Texas Legislature has written into law under Senate Bill 1788 that Texas high school students will have the ability to take courses offered online to enhance their education in ways that would not otherwise be available (Texas Virtual School Network, 2009).

The Texas Education Agency has named the official online learning community the Texas Virtual School Network or TxVSN. Through the TxVSN, any public, private, charter school district or College/University may opt to become a provider district. The receiver districts may only be public, private, or charter school districts which serve grades K-12 (Texas Virtual School Network, 2009). The State of Texas is currently making efforts to build its inventory of online delivered courses as well as instructors who have been certified to teach through this network. Currently, there are many courses available for students to enroll in, including mathematic courses from Algebra I to Calculus I. Presently, there is no Pre-Calculus courses offered through the TxVSN online course catalog as regular credit.
The goal of this project is primarily to articulate a concise, but complete, manual for creating online courses that meet the TxVSN acceptable guidelines as well as all collegiate learning outcomes. In essence, this project will not only describe but in fact model the steps of developing a quality online course through the creation of an online mathematics course.
Related works and Justification

The growing trend for institutions to expand their online course offerings is due to several factors. Approximately 93% of the colleges surveyed cited access as the primary reason for offering courses online (Allen & Seaman, 2007). Online learning provides access to those students who may have a scheduling conflict due to another class, work, or childcare issues. By allowing all students the option to participate in an online learning community, some students may take more courses because of the scheduling flexibility. The patterns of increased enrollments of online courses have been substantially higher than increases in face-to-face enrollments. The pattern is expected to continue for the foreseeable future (Allen & Seaman, 2007).

Most leaders of institutions believe the demand for online courses is still increasing while virtually every institution questioned who offers online courses expect enrollments for those courses to increase (Allen & Seaman, 2007). In addition to institutions, many states have already begun building virtual school networks for grade levels K-12. The primary reason for creating virtual school networks is to provide equal access to the rigorous, well designed online courses. For example, some smaller high schools may be limited in the course offerings when it comes to electives, foreign languages, or even higher level courses which can be offered. However, larger high schools have more resources and therefore can provide a larger selection of courses to their students. By making a vast variety of courses available online to every high
school student through the TxVSN, students from all areas can now study a
course which may not be available within their own district.

In addition to equal access, the research cites the strengthening of
students' 21st Century skills as being another very important goal for the online
learning environments. The 21st Century skills are concerned with technology
understanding and proficiency or the kind of technology skills students will be
expected to know when entering the workforce upon high school or college
graduation.

North American Council for Online Learning (2006) states the following:

Online learning through virtual schools is one of the most important
advancements transforming education in the U.S. It is imperative that 21st
Century skills be incorporated into the design, delivery and implementation
of virtual schools. By expanding access to high quality, rigorous academic
courses teaching 21st Century skills, we can expand the opportunities for
all students. (p. 9)

Texas has set up a virtual online learning environment and it is named
Texas Virtual School Network (TxVSN). TxVSN is still building its catalog of high
quality online courses. Currently, the TxVSN only has courses available for
secondary students (Texas Virtual School Network, 2009). The Texas Education
Agency provides stipends for those educational facilities who participate as a
provider or receiver district. Both provider and receiver districts have a financial
incentive to participate in the TxVSN online learning community. Each type of
participant has required avenues and procedures to participate in their desired
capacity. Additionally, each type of participant has a vested interest in the
success of the student who takes the approved TxVSN online course.
Once a district has determined that they wish to be a provider/receiver district, they will follow the enrollment procedures as outlined by the TxVSN clearing house under the supervision of the Texas Education Agency. The provider district will then submit any online course(s) to be approved to the TxVSN headquarters with the appropriate forms and review fees. Once an online course is approved, the course is entered into a list of available online courses on the TxVSN catalog and may begin enrolling eligible students from within Texas public, private, or charter school districts (receiver districts) (Texas Virtual School Network, 2009).

Provider districts are paid by a receiver district with State funds and may receive up to $400 per enrolled student for each course the student is enrolled in and receiver districts are paid $80.00 for each online course that a student successfully completes. Essentially, a provider district may have a number of virtual classes which are supported through external funding and may benefit many receiver districts/students simultaneously. The virtual classroom teacher may be compensated through a portion (or all) of the State funding (Texas Virtual School Network, 2009).

The virtual online community is a growing trend both in institutions and at the K-12 learning levels. The increase in online courses being delivered at the secondary levels may increase the demand for online courses as these students enter into colleges. Institutions which want to capitalize on this growing trend in education will need to begin to develop an immediate plan to add or modify their course structure. It is also imperative to assure the quality of the online learning
environment is consistent with national and state online learning standards while keeping the rigor of the institution.

Research has shown that certain design strategies for online courses will engage students in different manners. For an online mathematics course to maintain their integrity, the level of rigor, assessment, coverage of appropriate standards/objectives, communication, and instructional design components must be readily adhered to the corresponding traditional classroom face-to-face course. For this reason, the online mathematics course being developed as part of this project should be designed and created by a mathematician who has either online or face-to-face experience in the mathematics course being developed. When developing the online mathematics course it is necessary to provide adequate scaffolding, resources, and explanation that could not be provided by a person without the mathematical background or relevant mathematical teaching experience.

In addition, the design of online courses must incorporate intuitive design principles for delivery of the online course. The design and intuitiveness of an online course is essential. "Poor quality in Web design can frustrate learners and hinder their progress" (Chao, Saj, & Tessier, 2006). To create ample opportunity for all students, the course design should be easy to navigate throughout the entire course. Overall appearance and correct grammar, spelling, and presentation (color, layout, and font sizes) are vital components that can either pronounce or diminish all other aspects of an online course (Chao, Saj, & Tessier, 2006). In summary, the virtual design must be simple, consistent, and
accommodating for different learning styles. The distribution of the course should be in a flexible format and must contain a variety of instructional materials in order to reach all learner styles.

Online courses should also allow the instructor and students to utilize, develop, and master 21st Century technology skills. The integration of 21st Century skills should be threaded within online courses (Silva, 2008). This will help the students be ready for the work environment when they graduate. The frequent use of 21st Century skills a with the requirement to perform 21st Century skills by utilizing creativity, innovation, resource management, global awareness in addition to different types of technologies as they progress through the online course to better prepare them for entrance into the workforce.

Lastly, online courses inherently need communication features incorporated as part of the course. Primarily, the students and instructor need to have avenues to communicate and share ideas, questions and comments. Some types of communication must remain private 1-to-1 while others may be implemented in a forum or discussion board. There are two main types of online communications. These are asynchronous and synchronous communication. Research has shown that it is critically necessary for an online course to exhibit both types of communication within the online course. Each type of communication has its own purpose and developmental impact for the online student. “Asynchronous e-learning, commonly facilitated by media such as e-mail and discussion boards, supports work relations among learners and with teachers, even when participants cannot be online at the same time” (Hrastinski,
The asynchronous communication provides the opportunity for the online students to provide input according to their own schedule and after they have had sufficient time to reflect and analyze the topic. This type of interaction appeals to many users because they do not feel "rushed" or "surprised" as if they were picked to asked a question in a face-to-face classroom (Hrastinski, 2008, pp. 51-54).

On the other hand, synchronous communication helps students interact in a 'live' setting. These types of communication are usually implemented through video chat programs or similar presentation software such as Elluminate. This kind of communication has been related to the social development and sense of community of the online student. The feeling of being part of a greater group helps build that social connection to help the students connect to each other as well as the instructor (Hrastinski, 2008, p. 51). It is also a means to get direct answers to questions in a direct and quick manner. In synchronous communication, the instructor may poll the users and receive immediate feedback which will allow for modification of the lesson or additional support if the topic appears to be overbearing. Synchronous communication helps alleviate some of the anxiety for students when learning new topics (Hrastinski, 2008, p. 52).

The combination of asynchronous and synchronous communication activities built into an online course helps online students feel like they are part of a class instead of isolated. In addition, the online course begins to feel more similar to a face-to-face class setting by being able to interact with other
classmates or the instructor in a live setting. Thus, the students have all of the convenience of being at home and have frequent online interactions which build their sense of community. An online instructor may also get to know the students better by providing a variety of asynchronous and synchronous activities with the online course.

By adhering to all of the guidelines discussed in this proposal, the integrity of the proposed project will remain consistent with standards of other organizations as well as those of Texas A&M University – Corpus Christi. An online course creation guide based on this proposal guiding principles will provide online course instructors meaningful information to help facilitate the development of highly engaging online courses. In particular, the online mathematics course designed bases on these principles will serve as a model that satisfies the criteria for a quality online course as described with the guiding principles of this project.
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<th>Timeline</th>
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<tr>
<td><strong>September 2010</strong></td>
<td>Literature review and proposal outline</td>
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<td><strong>November 2010</strong></td>
<td>Write, edit and revise proposal</td>
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<td><strong>December 2010</strong></td>
<td>Defend proposal</td>
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<td><strong>January 2011</strong></td>
<td>Write Online Course Creation Guide &amp; Create Online Mathematics Course which integrates TxVSN Learning Strategies with TAMU-CC Learning Outcomes</td>
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<td><strong>April 2011</strong></td>
<td>Complete customized Online Course Creation Guide</td>
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<td><strong>April 2011</strong></td>
<td>Complete Online Mathematics Course</td>
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<td><strong>May 2011</strong></td>
<td>Final revisions of the project and submission of the final draft manuscript to committee</td>
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<tr>
<td><strong>May 2011</strong></td>
<td>Defend project</td>
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End Results Intended

The outcome of this research project will be two products. I will develop an online course reference guide as well as a single well developed web course (mathematics) which will fulfill multiple sets of criteria, namely the TxVSN and the Texas A&M University – Corpus Christi learning outcomes and requirements. The online course reference guide will provide detailed set of instructions necessary to create a well developed online course that meets the requirements for TxVSN requirements, but would be helpful for any creator of an online delivered course. The online course creation guide will include examples and screenshots of various stages of an online course design and implementation and as needed. The online course reference guide will utilize summary reports of existing online standards and best practices in addition to helpful hints and detailed explanations whenever needed.

The second outcome of this proposal will be an online mathematics course which is created may also actually become a course offered by Texas A&M University – Corpus Christi as an online course for current/future college students or high school students. The actual mathematics course which is created may directly benefit Texas students who are enrolled in a Texas public, private, or charter high school as well as students at Texas A&M - University Corpus Christi. The development of this online course will be used to illustrate best practices in addition to the essential components of an online course.
The guiding principles for this project are as follows:

1) An online mathematics course should contain the following components equal to its equivalent face to face course.
   a. a level of math rigor,
   b. assessment,
   c. coverage of the appropriate standards or learning objectives,
   d. communication of information and policies,
   e. instructional design.

2) An online mathematics course should contain the following online aspects implemented in the online structure and delivery of online material.
   a. Incorporate an intuitive navigation model which is uniform throughout the online mathematics course,
   b. Distribution of course content in flexible format along with a variety of presentations of instructional material,
   c. Use of the 21st Century Skills as needed and used in the present work environment.

3) An online mathematics course should have at least two interactive components as well as activities which help the student develop a strong sense of community. The interactive components may be any combination of the following types (at least one of each type):
   a. Asynchronous,
   b. Synchronous.
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Southern Regional Education Board. (2008). Do online courses work for middle grades and high school students? Atlanta, GA. http://publications.sreb.org/2008/08T05_Onl_Student_Survey.pdf
