



DISTANCE LEARNING IN LOW POPULATION DENSITY REGIONS. A REPORT FROM THE HIGH SCHOOL TECHING PRACTICE

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Abstract: The most of the long distance courses are mainly based on two or three face to face meetings and printed courses or courses available on the online course web site. In this case the individual students study has attached an important amount of time. Usually the students do not receive a feed-back of their progress and do not receive answers to their questions in real time. That's why this kind of distance learning courses is not appropriate for high school students. In this note we will present the design of a long distance course in mathematics at the high school level. The main particularity of this long distance course is the permanent contact in real time between teacher and students. At the final of this article we present a SWOT analysis of this project trying to establish the strengths, weaknesses, opportunities, and threats involved in this project

Key words: High school, Distance learning, Mathematics, AP Calculus

1. Introduction

Many organizations put great efforts into researching the possibilities of new technologies in process of education. Almost all universities offer long distance courses mainly based on two or three face to face meetings and printed courses or courses available on the online course web site. In this case the individual students study has attached an important amount of time. Usually the students do not receive a feed-back of their progress and do not receive answers to their questions in real time. That's why this kind of distance learning courses is not appropriate for high school students. Next we will present the design of a long distance course in mathematics at the high school level. The main particularity of this long distance course is that the students interact with teacher and get a feedback of these activities in real time. By presenting the next example we want to point out:

- A particular situation where it is necessary to design a distance learning course for high school level;
- An approach of a distance learning course at the high school level;
- A SWOT analysis of how successful could be a distance learning course.

2. Theoretical background of the distance learning

Distance education, or distance learning, is a field of education that aims to deliver education to students who are separated by time and distance, or both. Rather than attending courses in person, teachers and students may communicate at times of their own choosing by exchanging printed or electronic media, or through technology that allows them to communicate in real time and through other online ways. Fast development of technologies has caused many changes in process of education itself and distance learning is becoming more recognized for its potential in providing individualized attention and communication with students internationally.

The types of available technologies used in distance education are divided into two groups: synchronous and asynchronous. Synchronous technology is a mode of online delivery where all participants are "present" at the same time requiring a timetable to be organized. Web Conferencing is an example of synchronous technology. Asynchronous technology is a mode of online delivery where participants access course materials on their own schedule. Students are not required to be together at the same time. Message board forums, e-mail and recorded video are examples of asynchronous technology. There are also which can be used for both Synchronous and Asynchronous learning.

We can identify next types of distance education courses:

- Correspondence conducted through regular mail (in present used only sporadically)
- On line courses by using Internet or which content is delivered via radio or television
- CD-ROM/DVD, in which the student interacts with computer content stored on a CD-ROM/DVD
- PocketPC/Mobile Learning where the student accesses course content stored on a mobile device or through a wireless server
- e-learning
- Integrated distance learning, the integration of live, in-group instruction or interaction with a distance learning curriculum

Distance education provides major benefits such as:

- **Expanding access:** Distance education can reach underserved populations of students who cannot attend a school that offers the educational services they desire, perhaps because they live too far away.
- **Emerging market opportunities:** Distance education fuels the public's need for lifelong learning in education by providing access to learners not in the traditional k-12 age group.
- **Adapting to new technology and environments:** Educational institutions may adopt distance education as a means to adapt to the rapid changes in technology being used in education today.
- **Learning flexibility:** any student can learn when he has time, where he can and in his own ritm.

Distance education has few inconvenients such as:

- **Feed-back:** Sometimes the students don't receive a feed-back of their activities in real time.
- **Assesment:** The delivery of testing materials is fairly straightforward, which makes sure it is available to the student and he or she can read it at their leisure. The problem arises when the student is required to complete assignments and testing. Online courses have had difficulty controlling cheating in quizzes, tests, or examinations because of the lack of teacher control. In a classroom situation a teacher can monitor students and visually uphold a level of integrity consistent with an institution's reputation. However, with distance education the student can be removed from supervision completely.

- **Teacher contact:** sometimes because the students cannot communicate face to face with teacher some aspects remain unclear for students and it is possible that teacher do not detect them in a reasonable amount of time

3. Our project and its beneficiaries

In some regions of the USA because of the spread of population the schools are small and the number of students enrolled in advanced courses is usually low. For these students not always there are available good prepared teachers. Teaching a distance course is challenging but the one of the best ways to get strong courses (e.g. Advance Placement® Calculus, college courses) to students in small high schools (under 500 students) that cannot afford to reserve for a whole year (180 days) for 90 minutes/day a teacher to teach only 1-8 students. First let define distance learning or video conference as a form of teaching where a teacher is in direct live contact with students from remote sites. Another method very much used in South Carolina are virtual courses that are courses whose curricula and assessment is available on-line, and student-teacher interaction is mainly by e-mail.

The main site is Edisto High School (EHS), from where via dedicated T1 lines at speeds of 384kps (higher speeds are possible, but not needed) connection with the other sites is established. The remote sites receive full audio-video transmission. This system is very useful because it can go across school district lines: Edisto, Branchville, Hunter-Kinard-Tyler and Cope Area Career Center are part of School District Orangeburg 4, Bamberg-Ehrhardt part of School District Bamberg 1, and Blackville-Hilda part of School District Barnwell 19 (see links [6]). With the exception of Edisto High School that has approximately 900 students, all other 4 high schools have at most 300 students, thus their senior class (XI-XII grades) is around 40 students. The senior class is the main beneficiary of the distance learning because their schedule is permitting to take these not mandatory courses to graduate from high school. The college courses – Western Civilization and English 101 – are taught by teachers from the Orangeburg-Calhoun Technical College (OCTech). These courses are offered for Edisto High School (EHS), Branchville High School (BHS), Bamberg-Ehrhardt High School (BEHS) and Hunter-Kinard-Tyler High School (HKTHS) students. The other course, which I'm teaching, is AP® Calculus AB. This year, because of lack of enrolment only EHS, BHS and HKTHS were part of the distance learning for this course. Actually in the second semester the 3 students from Branchville have dropped all together the course, thus only EHS and HKTHS are part of the Calculus class. The benefit of taking an AP® course is that by passing the AP® exam that takes place in May, students can earn college credit at state and private colleges (see links [1], [4], [5]).

4. Teaching through Distance Learning

The benefit of this project is mostly from perspective of students because this design of a distance learning course is one of the best ways to give all students access to strong courses. The budgetary savings for the small schools is also a benefit of this project. The Calculus course is a 90 minute/day year long course, split into Honors Calculus (1 credit) in the first semester and AP Calculus (1 credit) in the second semester (the different labels do give different GPA points for the same grade). The course is open to any student (it is attempted mostly from the ones that has the prerequisite courses of Algebra 1, Algebra 2, Geometry and Pre-Calculus). There is a condition: if a student didn't make at least an 85 (out of 100) in the first semester he/she cannot advance to the AP class without the teacher's recommendation.

The personal contact should enable a better communication across the system, which is actually one of the set backs of distance learning. Students from remote sites interact very little with the teacher, although the system is designed for instant dialogue. That's why one of the requirements for the teacher is to travel as often as possible to the remote sites to teach the class from other sites than the home site, in our case Edisto High School, which is happening almost every Friday. Attempts of including a "class participation" grade in the previous years have been proven utile. We are in for more solutions to get students to interact better with the teacher. We identify the following reasons that cause the lack of interaction with the teacher: the students don't show the other schools students that they do not understand the concept (an image problem for gifted students); the teacher "is not from my school thus I do not know him very well". The latter is true because the students from EHS have no problem to ask teacher questions over the system when he is teaching from HKTHS or BHS.

The image problem is a very real one, because most of the schools are 20 – 30 miles (30 – 50 km) away from each other and these schools compete against each other in various sports, thus a rivalry is very much part of the high school life and it transcends with unhealthy consequences into academia. Because of the lack of questions from the students from the remote sites the instructor asks another teacher from the students' home schools for extra help and extra explanations. Also students can contact the teacher via phone or e-mail.

The preferred methods of teaching are:

- Direct lecturing. The system permits to “write” on the screen using Smartboard ® software. Next we will use the first person I to present the experience of the first author in implementing of this project. “Usually on a white background Microsoft PowerPoint ® presentation I write my notes, examples. All the lessons are saved and sent to an e-mail account calculuslesson@yahoo.com and posted on-line (mostly) at my schools website. Until last year it was difficult to collect the assignments (homework, classwork, quizzes, tests and exams) although every video room had a direct telephone line with a fax machine at each end which enabled me quick sending/receiving of assignments. This year at the recommendation of a colleague I started to use heavily on-line assessment through which I assign homework, classwork, quiz/tests, and exams (see link). All of my students have access at home and/or school to computers. Due to this method of assessment I have advanced faster through the course material, which will leave me with enough time do to a thorough review of the previous AP® exams to get my students ready for May 5, 2009”(see links [2], [3]).

- Another way of using the system is to project the screen of the TI-89 Titanium graphing calculator and explain the usage of it. This calculator it is given the students only during second semester because it can handle symbolic operations like solving equations, differentiation, integration, using variables.

Although the system has its setbacks (difficulties in reconciling bell schedules and academic calendars between districts) it seems to be the most viable option to deliver a college level course to a handful of students who otherwise wouldn't have a chance to be exposed to these courses.

It takes also time to build a successful program. And also it is important to change the culture regarding the course. At begin of this project the students did not pass the AP® exam. For the past two years success is becoming more and more a reality and students start to comprehend that the Calculus course requires a lot of amount of work. Success breeds success.

5. The SWOT analysis

Based on the previous remarks we can elaborate a SWOT analysis. SWOT is an acronym for Strengths, Weaknesses, Opportunities, Threats. Strengths and weaknesses are internal factors. Opportunities and threats are external factors. The technique is credited to Albert Humphrey, who led a research project at Stanford University in the 1960s and 1970s using data from Fortune 500 companies.

The SWOT analysis for our project it is shown in the table below:

	HELPFUL	HARMFUL
INTERNAL FACTORS	Strengths: <ul style="list-style-type: none"> - A new, innovative course of long distance learning - The access of any student to the advanced courses - The students benefits of the high qualified teachers - The contacts between teacher and students are realized in real time 	Weaknesses: <ul style="list-style-type: none"> - Students from remote sites interact very little with the teacher (this situation could be partially changed if teacher travel as often as possible to the remote sites to teach the class from other sites than the home site) - The variety of teaching-learning strategies is limited, the mostly used is the direct lecturing (this situation

	<p>students are realized in real time</p> <ul style="list-style-type: none"> - The students good results at the AP® exam - Budgetary savings for the small schools 	<p>could be improve because in this stage of the project the teacher follow up to diversify the educational methods and will start to experiment new teaching-learning strategies)</p>
EXTERNAL FACTORS	<p>Opportunities:</p> <ul style="list-style-type: none"> - A good perception of the community about this long distance course could conduce to introducing a higher number of these long distance learning courses - The development of the technology could make the long distance courses more competitive 	<p>Threats:</p> <ul style="list-style-type: none"> - The existing culture about a course design offer resistance in introducing other different types of courses, long distance courses in our case - The rivalry, which is very much part of the high school life, it transcends with unhealthy consequences into educational process

6. Conclusions

In section 2 of this article the main inconvenients of the long distance courses are shown. Because we knew these aspects we tried to improve them in our project. We already made some important steps in direction of teaching methods and assessment but next years we want to improve them. Also we want to make the community more receptive at these kinds of courses. Based on the SWOT analysis we can conclude this particular long distance course has more strengths than weaknesses and it has some good perspectives for the future.

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Links

- [1] AP exam scores and college credit
<http://edisto.sc.osh.schoolinsites.com/?PageName=%27SchoolPublications%27&CategoryID=%27951%27&SubCategoryID=%272072%27>
- [2] Calculus lessons
<http://edisto.sc.osh.schoolinsites.com/?PageName=%27TeacherPage%27&Page=%27Presentations%27&iSection=%27Teachers%27&CorrespondingID=%2753472%27&StaffID=%2753472%27>
- [3] Quia.com Calculus class page with a test open for anybody
<http://www.quia.com/pages/hdaichendt/apcal3>

[4] AP® exam dates

<http://professionals.collegeboard.com/testing/ap/about/dates>

[5] AP® international

<http://professionals.collegeboard.com/testing/international/ap>

[6] Map of region

<http://maps.live.com/default.aspx?wip=2&v=2&rtp=~&FORM=MSNH#JnE9eXAUQ29yZG92YSUyYytTQyU3ZXNzdC4wJTdlcGcuMSZiYj0zOC4xMDQzMDUyODM3MDk4JTdlLTQuMTg0NDE3NzI0NjA5Mzkln2UzNy42NDg2NTM0NDk1OTkxJTdlLTUuMzg3NDIwNjU0Mjk2ODg>

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