A Review and Assessment of Distance Learning Opportunities for Maine High School Students

A Report from the Maine Department of Education
in response to a request by the Joint Standing Committee
on Education and Cultural Affairs for the
First Regular Session of the 123rd Legislature

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Introduction

In 2007, as part of the first regular session of the 123rd Maine Legislature, the Joint Standing Committee on Education and Cultural Affairs passed into law the following Resolve:

Resolve, Directing the Department of Education To Review and Assess Distance Learning Opportunities for High School Students

Sec. 1. Review and assessment. Resolved: That the Department of Education shall review and assess distance learning opportunities for public high school students in the State. The department shall gather data on current state and local spending on and student enrollment in distance learning initiatives, including, but not limited to, the Maine Distance Learning Program, and shall consider options for optimizing the range of distance learning opportunities available to students in the State, including, but not limited to, increased support for online learning; and be it further

Sec. 2. Report. Resolved: That the department shall report to the Joint Standing Committee on Education and Cultural Affairs by January 15, 2008 with the department's findings under section 1 and any necessary implementing legislation. The Joint Standing Committee on Education and Cultural Affairs may submit legislation based on the report to the Second Regular Session of the 123rd Legislature implementing the recommendation of the department.

This report describes the results of the review and assessment that took place in December 2007 of distance learning opportunities for high school students in Maine. Two key types of distance learning opportunities are reviewed, and recommendations are made for enhancement of future opportunities.

Background

Distance education may be broadly defined as formal education where the majority of instruction and where the majority of student-teacher interactions take place when the instructor and students are separated by space and/or time. Distance education allows school districts the opportunity to extend a variety of high quality teaching and learning opportunities that may not normally be available locally due to constraints such as low enrollments, a lack of qualified teachers, insufficient funding, and conflicts in schedules.

Distance education in Maine high schools has traditionally been associated most with interactive video, and in particular the ninety-one (91) classrooms that make up the statewide ATM network (See Appendix B). ATM stands for *asynchronous transfer mode* – a technical term that refers to the method by which the voice, video and data are transferred electronically. More recently though distance education for many students has also taken the additional form of instruction online using technology offered by the Internet.

Regardless of the methodology used to provide distance education courses and Internet access, there will always be a need for a statewide infrastructure to deliver the voice, video and data needed within schools. Currently ATM technology is the backbone of the network for a significant number of Maine high schools, and as advancements are made, this need for bandwidth will always exist.

In a typical ATM session, participants are able to see and hear each other, even though they may be located at multiple sites across the state. The teacher may control cameras and equipment at all sites in the session, and each ATM room provides the ability to display a wide variety of educational materials, all in a potentially highly interactive environment. The teacher and

students in an interactive video class are typically in different locations, but participating at the same time. This type of distance education can be described as being *synchronous* – with teacher/student and student/student interaction occurring at the same time. Distance education that involves teachers and students interacting at different times is termed *asynchronous* – online learning is a prime example of this type of distance education.

ATM distance learning opportunities have been available for Maine high schools since 1997. The Maine School and Library Network (MSLN) is a broadband fiber-optic communications system that connects public schools, approved private schools, and public access libraries across the state. Many of the MSLN sites are equipped with advanced video-conferencing technology. The ATM infrastructure and classroom equipment was provided by proceeds from a 1995 $15 million state bond issue. Funding for ongoing network support and service maintenance is provided through a combination of general fund appropriations, the Maine Telecommunication Education Access Fund, local school unit expenditures, and Federal E-Rate (a fund that provides affordable telecommunication services to communities).

Currently there are 91 ATM sites – they are located in 83 of Maine's 131 public (or approved private) high schools, five of the 27 Technical Regions/Centers, and the two Youth Development Centers. There are four other distance learning sites: the Maine State Library, Bangor Public Library, University of Maine in Orono, and the Maine Department of Education.

Videoconferencing via the ATM network allows students in Maine high schools, other states, and around the world to share and access coursework and resources that might not be available in their local school.

Teachers and other education professionals also use the ATM system for training and professional development necessary to meet the challenges of serving Maine students. Several higher education institutions provide graduate level course work to students who might not be able to participate in training required for various degree programs, and for practicing teachers and other educators needing re-certification. Civil service agencies such as firefighters

and emergency medical personnel have conducted vital training statewide using the state's ATM network. In addition, state and local government representatives and agencies use the network for public hearings, for continued training and development, and other professional meetings.

More recently, a newer form of distance learning has been available to Maine high schools and students. In addition to courses provided via the ATM network, students in Maine are also able to take advantage of online learning opportunities. Online learning can be described as a learning experience or environment relying on the Internet as the primary delivery mode of communication and presentation. Using the Internet and other communication tools to bridge the gap in distance, online classes are typically taught using a course management system such as Blackboard, Moodle, First Class, Web CT etc., and involve the students and teacher using computers and web-based technologies to communicate and interact with each other. Online learning typically occurs with the teacher and students in different places at different times. This type of distance education can be described as *asynchronous* – with teacher/student and student/student interaction occurring at different times.

Online learning has become an increasingly popular method of providing high school students with educational opportunities that they might not otherwise have access to. In June 2007, Tucker of Education Sector reported in Laboratories of Reform that during the 2005-06 school year, 700,000 high school students participated in online courses. Similarly, Watson and Ryan of Evergreen Consulting Associates reported in their November 2007 report, Keeping Pace with K – 12 Online Learning that,

> "online learning at the K-12 level has grown so much in recent years that the main issue in most states is no longer whether or not online learning is occurring, but rather how it is being implemented. As of September 2007, 42 states have significant supplemental online learning programs (in which students enrolled in physical schools take one or two courses online), or significant full-time programs (in which students take most or all of their courses online), or both. Only eight states do not have either of these options, and several of these states have begun planning for online learning development."

An online course environment typically uses the Internet and other web-based communication tools to bridge the gap in distance. At a time that is convenient to both, the teacher and students may log in to their web-based course management system to access the tools they use for their online course. Class material is accessible 24 hours a day 7 days a week, extending the opportunity for learning beyond the traditional school day. The teacher may post instructions, and depending on the intended educational objectives, communicate with students in a variety of ways. There may be ongoing discussion topics that the teacher or student can reply to at a time that suits each of their schedules. Discussion forums are usually central to online courses, allowing for a reflective and often deeper level of communication to occur.

In addition, students can complete and upload homework assignments to the site and the teacher can then read them and provide feedback. The student can check the course schedule to determine what other course-related activities are coming up; there may be a scheduled chat session or phone conference, or they may need to view a class lecture or podcast for the next assignment. In many cases, the teacher is able to create quizzes and assessments online, each capable of utilizing a built-in grading system with appropriate feedback allowing the teacher to spend more time on teaching rather than administration.

Just as every classroom differs slightly, so does the online classroom experience for every student. All students have a unique way of learning that suits their needs best, and students may receive a more personalized experience that will increase the likelihood of academic success. Email, discussion forums, instant messaging, weblogs, and wikis are examples of tools that may be employed by the teacher, depending on the educational objectives of the course. As students engage in using these technologies, they are learning how to communicate using 21st Century skills in a very relevant and advanced global way.

As part of online courses, students are also able to read and re-read lectures, discussions, explanations and comments from their teacher and classmates. Students often miss material in a regular classroom due to distractions, missed classes, tiredness, or boredom. In an online learning environment, the teacher notes, lectures and reviews, along with entire class discussion transcripts, are all accessible to the student at their own pace for review or to make up missed work.

The following pages of this report provide reviews and assessments of these two principal types of distance learning in Maine; ATM and online. Data presented in this report include data on the ATM system regularly collected by the Maine Department of Education. In addition, a survey was distributed to all Maine high schools in order to obtain information regarding online learning activities, and additional information on ATM activities.

The survey was created using input from staff from the Maine Department of Education as well as from the Center for Education Policy, Applied Research, and Evaluation (CEPARE) at the University of Southern Maine (USM). It was designed to gather information on ATM network and online course participation rates, but more specifically on course enrollments using these distance education resources as well as cost. Surveys were distributed via email to principals and superintendents in all 131 high schools across Maine. Sixty-one completed surveys were received, constituting approximately 47% of those schools surveyed.

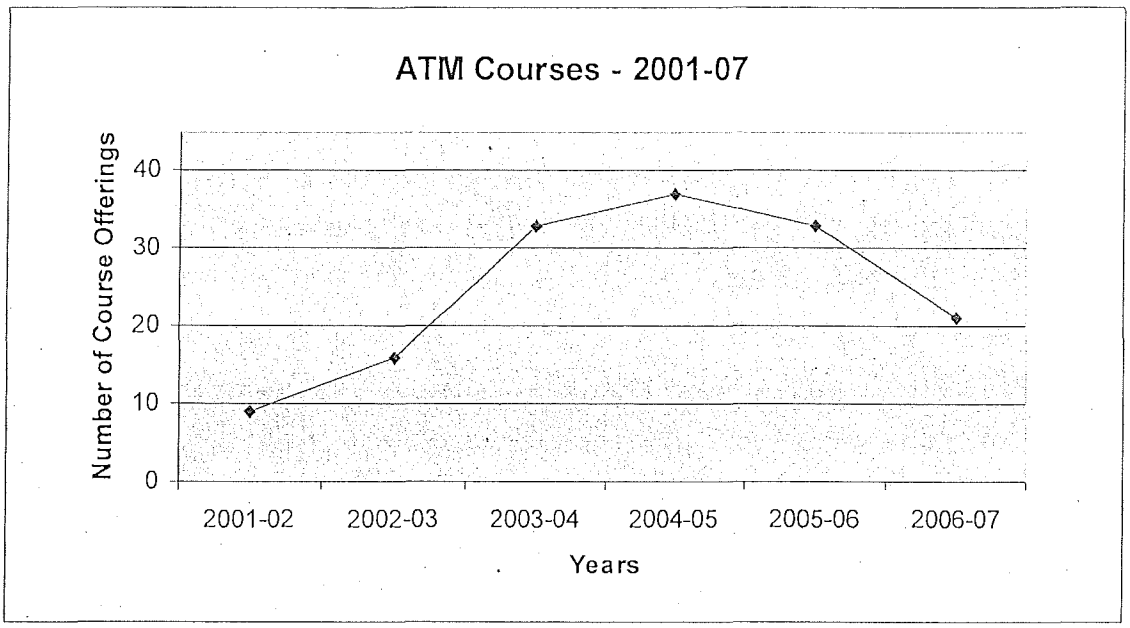
Review of ATM Distance Learning Opportunities

Course Enrollments

Since 2001-2002 use of the ATM system for offering high school courses has varied by year. As may be seen in Figure 1, the number of course offerings increased in the earlier years and has declined in the last two years.

According to Figure 1, the number of students enrolled in ATM courses in Maine peaked during the 2004-2005 school year, when 281 students were enrolled in 37 courses.

Figure 1



This number declined in each of the subsequent two school years, with 271 students enrolled in 33 courses during the 2005-06 school year, and 187 students enrolled in 21 courses during the 2006-07 school year.

Table 1 reports the number of student enrolled in different content areas for the 2005-06 and 2006-07 school years. As demonstrated in the table,

Table 1. Number of Maine high school students enrolled in ATM courses during the 2005-06 and 2006-07 school years.

Number of students enrolled in ATM courses				
Subject area	**2005-06**	**%**	**2006-07**	**%**
Language Arts	0	0%	15	8%
Social Studies/Social Sciences	3	1%	0	0%
Computer Science	0	0%	0	0%
Natural/Physical Science	4	1%	0	0%
Mathematics	5	2%	0	0%
Foreign Languages	183	68%	139	74%
Advanced Placement	51	19%	26	14%
Other	25	9%	7	4%
	271		**187**	
Total courses 2005-07	**458**			
	31% decline			

Foreign languages (American Sign Language, Japanese, Spanish, German and Latin) were most popular during 2005-06, constituting 67% (183) of the students enrolled. Advanced Placement courses made up 18% (51) of the students enrolled. Other offerings such as Accounting, Calculus, Environmental Science, History of Maine, History of Journalism, and Philosophy made up the remaining 15% (37) of the students enrolled.

During the 2006-07 school year, the number of students enrolled declined overall; however, student interest in foreign languages and Advanced Placement courses remained high. Foreign languages (American Sign Language, Japanese, German, French and Latin) were most popular, constituting 74% (139) of the students enrolled. Advanced Placement courses made up 13% (26) of the students enrolled. Other offerings such as Anatomy and Physiology, English, and Street Law made up the remaining 13% (22) of the students enrolled.

The significantly high number of students enrolled in foreign language courses using ATM can be attributed to two established programs. Both the Governor Baxter School for the Deaf and Hall-Dale High School were early adopters of ATM technology. The Governor Baxter School for the Deaf has offered American Sign Language using ATM for 12 years, with an estimated 800 students having participated from a distance in their classes. Naoto Kobayashi of Hall-Dale High School has taught Japanese since 2000, with 191 students from schools other than Hall-Dale having participated from a distance in his classes.

A combined total of 54 high school courses were offered via ATM in the two-year period between 2005-06 and 2006-07, with 458 students enrolled as distance education students. The change in student enrollment from 271 in 2005-06 to 187 in 2006-07 represents a 31% decline in ATM course participation over the two year period.

Reasons for ATM Participation and Non-Participation

In order to understand usage levels of the ATM system, high school principals were asked on the Distance Learning Survey to indicate reasons why they chose to participate or not to participate in the ATM system. Tables 2 & 3 report the principal's responses.

Table 2. Reasons why schools chose to participate in ATM courses during the 2005-06 and 2006-07 school years.

Reasons why a school chose to participate in ATM courses:	ATM %
Students were able to take courses which they might not otherwise have access to	26
Students were able to access courses that might otherwise conflict with their schedule	9
Students were able to take Advanced Placement (AP) courses that might not be offered at their school	7
Students were able to communicate with students/teachers from other schools	14
Teachers were able to learn new technologies and teaching skills.	14
Teachers were able to interact with a larger number of students	13
Teachers were able to teach courses not otherwise offered	13
Other	4

Table 3. Reasons why schools chose NOT to participate in ATM courses during the 2005-06 and 2006-07 school years.

Reasons why a school chose NOT to participate in ATM courses:	ATM %
Students' schedules do not allow them to take classes in other districts with different class schedules	25
Course offerings were not in line with the course needs of students	11
Costs associated with enrolling students in distance education courses	5
Local school policies inhibit students taking distance education policies	1
Lack of awareness of distance education opportunities	9
Teachers' schedules do not allow them to teach students in other districts with different class schedules	15
Teachers are not compensated for teaching extra students	12
Lack of teacher preparation in delivering distance education courses	12
Other	12

Principals and superintendents across the state identified their students' ability to take courses to which they might not otherwise have access as the

primary reason for participating in ATM courses (26%). It is a relatively well-known fact that higher level courses, especially in specialized subjects are not always available to students in more remote areas in a traditional classroom setting. The ATM system in Maine has, according to principals, allowed them to offer a more diverse menu of courses to students who may be prepared for learning at a level which the school is not able to offer.

At 14%, principals identified both the ability of teachers to learn new technologies and teaching skills as well as students' ability to communicate with teachers and students outside their school as a reason why they chose to participate in distance learning via the ATM system. Principals' concern for teachers' professional development, especially around technology is evident in this response. Instructing students in a different space while negotiating technology requires specific skills that principals appear to appreciate in their teachers.

Conflicting schedules was identified as the most important reason schools chose not to participate in ATM courses (25%). Because students and teachers are required to be together at the same time, though communicating via the ATM network over distance, problems often arise when schools have differing bell schedules. This has been a consistent concern of schools that use or are interested in using the ATM network.

Similarly, providing a teacher to instruct an ATM course may be difficult when bell schedules differ amongst schools. Fifteen percent (15%) of principals responded that teacher schedules do not allow those teachers to teach in other districts with different class schedules. Presumably, the only time that a teacher may have time to instruct an ATM course would be during a 'free' or 'prep' period, however, that time is usually built around the classes he or she teaches within the building. Often times, the free period of the instructing teacher does not fit the schedule of students on other campuses who wish to take the course via the ATM network and thus the course likely would not proceed.

ATM Costs

Exact costs of the ATM system are difficult to determine. There are State and local costs, but some of the costs are attributable to non-high school course offerings. Establishing what proportion of a site's ATM service fee can be associated with distance education is not simple. It should be noted that schools with an ATM connection use the bandwidth it provides for more than just distance education activities. An ATM site might serve as the means by which any/all other school buildings on a particular campus also receive their Internet data. In some instances the high school, middle school, and elementary school might all receive their Internet data via one ATM connection. Given this reality, estimated costs figures were calculated.

Proceeds from a $15 million state bond issue provided the infrastructure and classroom equipment for this initiative. Funding for ongoing network support and service maintenance is provided through a combination of general fund appropriations, the Maine Telecommunication Education Access Fund, local school unit expenditures, and Federal E-Rate (a fund that provides affordable telecommunication services to communities).

State Costs

At the state level, there are two major costs associated with supporting the ATM network. The ATM network carries the voice, video, and data for the 91 interactive classrooms, but it also carries the bandwidth associated with the Internet connectivity for all of these schools, and the additional 40 schools who also rely on this network but are not part of the interactive classroom videoconferencing project. The Department of Education contracts on a yearly basis with two entities:

Verizon contract

$499,371.60

On-site hardware based service and support. Verizon is contracted to service and maintain all site-based hardware. This includes support for

locally based networking equipment (LS 1010 and 3700), which is used for data connectivity.

UNET/ITS contract
$410,736.00
Help desk trouble-shooting and software based remote service and support. Individual schools with technical difficulties call the help desk to receive support. Maintenance of the Renovo scheduling software that is the mechanism by which ATM videoconferencing sessions are created.

Each ATM connection consists of 45 megabytes of bandwidth, 35 megabytes (78%) of which are dedicated to carrying the voice and video in a videoconference, with the remaining 10 megabytes (22%) dedicated to the transfer of data – i.e. it serves as their connection to the Internet. For the purpose of determining the local monthly cost for ATM service associated with distance education, the percentage of cost directly attributable to the distance education portion of the service provided (78% of total monthly cost) was included in the calculation of costs.

Locally each site is charged a monthly fee by Verizon for their ATM service. Over the two-year period reported here, this fee was approximately $2,100/month. However, this figure was offset by the federal e-rate discount that each site is eligible for in each year, and the MSLN reimbursement for the T1 line that was replaced by the ATM connection.

The actual monthly fee paid by each ATM site was therefore the $2,100 minus the federal e-rate discount that the site was eligible for in that particular year, and also minus the Maine School Library Network (MSLN) reimbursement ($358 per T1 line replaced) which each site was eligible for when the existing T1 line was replaced by the ATM connection.

The Schools and Libraries Program of the Universal Service Fund, commonly known as "E-Rate," is administered by the Universal Service Administrative Company (USAC) under the direction of the Federal

Communications Commission (FCC), and provides discounts to assist most schools and libraries in the United States to obtain affordable telecommunications and Internet access. The Schools and Libraries Program supports connectivity - the conduit or pipeline for communications using telecommunications services and/or the Internet. Funding is requested under four categories of service: telecommunications services, Internet access, internal connections, and basic maintenance of internal connections. Discounts for support depend on the level of poverty and the urban/rural status of the population served and range from 20% to 90% of the costs of eligible services. (http://www.usac.org)

Table 4. Costs associated with ATM course enrollments.

	Costs Associated with ATM Distance Education Courses	
	2005-06	2006-07
State Costs		
Contracts related to providing ATM and Internet connectivity	$910,107.60 (Verizon Service and Support contract and UNET/ITS Help Desk Support contract)	$910,107.60
Local Costs		
ATM Service Fee (78% of total ATM service fee paid adjusted to also reflect statewide e-rate discount in each year)	$279,637 ($343.40 per month x 12 months x 87 sites)	$269,377 ($330.80 per month x 12 months x 87 sites)
Additional costs (Course fees, books/materials/lab fees, subscriptions, teacher training fees, site coordinator fees, and other)	$32,340	$42,740
Total costs	$311,977	$312,117
Number of students enrolled	271	187
Local cost per student enrollment	**$1,151**	**$1,669**

Table 4 provides an estimate of costs per student enrolled during the two-year period under review. As may be seen from the table, in 2005-06, the estimated cost per student was approximately $1,151. This cost per student increased in 2006-07 because of fixed costs with declining student enrollments.

Over the past 7 years, use of the ATM network to provide coursework to students across Maine has been ongoing; however, its usage has not been consistent (see Figure 1). Similarly, the course subjects being taught have changed, and in 2006-2007 fewer courses were being taught to fewer students. However, there are schools that are continuing to offer courses through the ATM system and while the number of students enrolled in ATM courses has fallen off, the number of students taking online courses has increased over the past two years (to be discussed in the next section). The data collected on both online and ATM courses indicates that there is a need for continued distance education in Maine, though delivering it via the ATM network may not be the most convenient method for schools to participate.

Review of Online Learning Opportunities

Course Enrollments

Table 5 reports the number of Maine high school students participating in online courses during the two years under review.

Table 5. Number of Maine high school students enrolled in online courses during the 2005-06 and 2006-07 school years.

	Number of students enrolled in online courses			
Subject area	**2005-06**	**%**	**2006-07**	**%**
Language Arts	33	18%	71	18%
Social Studies/Social Sciences	34	19%	72	18%
Computer Science	10	5%	10	3%
Natural/Physical Science	25	14%	54	14%
Mathematics	23	13%	58	15%
Foreign Languages	15	8%	22	6%
Advanced Placement	4	2%	28	7%
Other	39	21%	85	21%
	183		400	
Total courses 2005-07	583			
	119% increase			

During the 2005-06 and 2006-07 school years, a total of 583 Maine high school students participated in online courses. In fact, 74% of the schools responding to this survey reported that they had students participate in online courses during this time period. There were 183 Maine high school students who participated in online courses in the 2005-06 school year, and in 2006-07 this number rose to 400 students, an increase of 119%.

This growth in online course participation by Maine students reflects the national trend where 40% of the online programs responding to a recent survey conducted on behalf of NACOL (North American Council for Online Learning), reported annual growth of over 25% in the 2006-2007 school year, and half of these programs reported growth of 50% or higher.

Florida Virtual School, the largest online program in the country in terms of number of unique students, had more than 100,000 course registrations, more than 90,000 course completions, and more than 50,000 students in 2006-2007.

Schools in Maine who have students enrolled in online courses do so by contracting with a particular entity that can provide the educational offering that their student(s) are in need of. Examples of online learning content providers servicing Maine high schools during the two-year period between 2005-2007 include:

Table 6. Online course providers used by Maine high schools in the 2005-06 and 2006-07 school years.

Online course providers for Maine high schools students in 2005-06 and 2006-07		
Maine	Higher Ed outside Maine	Fee-based
Colby College Kennebec Valley CC Thomas College Unity College UMaine Machias UMaine Orono University of Southern Maine Eco 2000 Cyberschool	Berklee College of Music, MA Brigham Young University, UT Penn-Foster Career College, PA Stanford University, CA University of Missouri MI	APEX Learning, WA Cyberschool, CA North Dakota Ctr. for Distance Ed., ND Plato (http://www.plato.com/) The Virtual High School, MA

Reasons for Online Participation and Non-Participation

School principals were also asked on the Distance Learning Survey the reasons they chose to participate or not to participate in online course offerings. Their responses appear in Tables 7 & 8.

Table 7. Reasons why schools chose to participate in online courses during the 2005-06 and 2006-07 school years.

Reasons why a school chose to participate in online courses:	Online %
Students were able to take courses which they might not otherwise have access to	37
Students were able to access courses that might otherwise conflict with their schedule	30
Students were able to take Advanced Placement (AP) courses that might not be offered at their school	9
Students were able to communicate with students/teachers from other schools	5
Teachers were able to learn new technologies and teaching skills	3
Teachers were able to interact with a larger number of students	2
Teachers were able to teach courses not otherwise offered	4
Other	9

Table 8. Reasons why schools chose NOT to participate in online courses during the 2005-06 and 2006-07 school years.

Reasons why a school chose NOT to participate in online courses:	Online %
Students' schedules do not allow them to take classes in other districts with different class schedules	4
Course offerings were not in line with the course needs of students	1
Costs associated with enrolling students in distance education courses	22
Local school policies inhibit students taking distance education policies	6
Lack of awareness of distance education opportunities	18
Teachers' schedules do not allow them to teach students in other districts with different class schedules	8
Teachers are not compensated for teaching extra students	14
Lack of teacher preparation in delivering distance education courses	8
Other	8

As with the ATM network, the most frequently chosen answer for online course participation was that it allows students to take courses to which they might not otherwise have access (37%). A significant portion of the students enrolled in online courses in 2006-07 came from schools where the total

enrollment was below 250 students. In fact, 181 students or 45% of the total students enrolled came from smaller schools. That highlights the fact that smaller schools are taking advantage of online courses more so than schools that have higher total enrollments. That type of exposure to a variety of courses could make the difference in helping students in rural areas keep pace with students in more densely populated communities.

Principals also identified the ability of students to take courses that might otherwise conflict with their schedules as reason why they chose to participate in online courses (30%). The courses students can take are often limited, especially in smaller schools, because of inflexible schedules and a small teaching staff. Online courses allow students to take advantage of courses that either conflict with their schedule or might not otherwise be offered because they can complete the class at their own pace.

Two significant barriers to participation in online courses revealed themselves in the Distance Learning Survey. Twenty-two percent (22%) of respondents indicated that the cost of online courses was prohibitive to their budgets. The majority of online courses currently being offered to public school students are for profit and thus cost either the school district or the individual student money. Some states that have their own online course program, like Florida, are able to provide students *in that state* courses free of charge, but students from out of state who wish to take a course must pay a fee.

In addition to the cost, respondents also indicated that their lack of knowledge of what online courses were available was a barrier to their participation (18%). This opinion was reflected later in the survey where principals were asked to make individual comments. Principals suggested that they may participate more but that they simply had too much else to do to investigate opportunities and determine if the standards of the courses would meet state requirements for course completion.

Online Costs

Table 9 reports the estimated costs of online opportunities for the years 2005-06 and 2006-07.

Table 9. Costs associated with online course enrollments.

	Costs Associated with Online Courses	
	2005-06	2006-07
State Costs		
Contracts related to providing ATM and Internet connectivity	$910,107.60 (Verizon Service and Support contract and UNET/ITS Help Desk Support contract)	$910,107.60
Local Costs		
ATM Service Fee (78% of total ATM service fee paid adjusted to also reflect statewide e-rate discount in each year)	-	-
Additional costs (Course fees, books/materials/lab fees, subscriptions, teacher training fees, site coordinator fees, and other)	$45,985	$92,624
Total costs	$45,985	$92,624
Number of students enrolled	183	400
Local cost per student enrollment	**$251**	**$231**

State Costs

It is difficult to quantify direct costs to the state associated with online learning. It should be noted that the state is responsible for providing the connectivity infrastructure, and is therefore responsible for the service and maintenance contractual obligations ($910,107.60 in each of the years 2005-06, and 2006-07). These costs are directly associated with providing Internet connectivity to each ATM school, but it is unrealistic to attempt to quantify the specific cost to the state of having 183 students enrolled in online courses in 2005-06, and 400 students enrolled in 2006-07. In the traditional educational setting, students participating in online courses may have used school provided Internet connectivity, but due to the nature of the flexibility of time and place that this method of education provides, students might just as easily

have completed their coursework outside of the school day using bandwidth from their local library, or from their own privately funded connection at home.

With regard to local costs, a total of 24 schools reported that they had 183 students enrolled in online courses in the school year 2005-06. In 2006-07 a total of 40 schools reported that they had 400 students enrolled in online courses.

Costs associated with these online courses included course fees, books/materials/lab fees, subscription fees, teacher training fees, and site coordinator fees. In 2005-06 the 24 schools with 183 students enrolled in online courses reported having costs of $45,985.00. On average each online course enrollment cost $251.00. In 2006-07 the 40 schools with 400 students enrolled in online courses reported having costs of $92,624.00. On average each online course enrollment cost $231.00. One third of those schools responding to the survey stated that they incurred costs for online courses during the two-year period examined. One third did not answer the question, and one third reported that they did not incur any costs for the online courses their students were enrolled in.

One possible explanation for schools reporting that they did not incur costs for enrolling students in online courses during the 2006-07 year is that students were enrolled in the University of Maine, Orono's Academ-e program. Grant funds, scholarships, and University of Maine policies allowed this program to be offered to Maine high school students either a reduced rate, or at no cost. The first year of the Academ-e program was 2006-07, when there were a total of 17 courses offered and an enrollment of 259 students.

Summary

The Department of Education assists schools in providing equitable access to a range of opportunities for their students, so that every graduating student is prepared for postsecondary education, a career, and citizenship. When comprehensive educational programs are not feasible due to geography and/or economic realities, distance education is a potential solution.

It should be noted that significant technological advancements have been made that currently render ATM technology as a relatively expensive method of transporting the voice, video and data that is needed for interactive classroom videoconferencing. The current contract with Verizon Business for ATM ends June 30, 2009 and after that date UNET/ITS (who support the ATM network), will be phasing out support of that technology in favor of more efficient and more affordable IP based technologies. In addition, much of the hardware equipment involved in the ATM network (TVs, cameras, ATM switches and video codec) is nearing the "end of life" stage, and will need to be replaced. Replacement of the ATM switches and video codec will be problematic since it is no longer being made. These concerns become magnified when we realize that the ATM sites (and 40 other local schools) currently depend on this transport mechanism for connectivity to the Internet.

Findings

- National and Maine trends show an increase in the use of Distance Education to provide educational opportunities to students regardless of their geographic and/or economic status
- National and Maine statistics show that significantly more students are using online learning than videoconferencing in distance education
- In Maine, statistics show that the costs associated with online learning are less than those associated with our current videoconferencing model (ATM) on a per student basis
- Maine and 7 other States do not have significant online learning programs in which students can enroll in courses.

- 57% of schools responding to the survey reported that students took online courses because the course was not offered at the local level.

The 2008 Conditions of K-12 Public Education in Maine book highlights the need for more advanced coursework for students across the state. In a survey, principals responded that upon graduation, significantly fewer students were completing advanced math, science, and Advanced Placement courses than were completing required courses. Eighty-six percent (86%) of graduating seniors completed Algebra I, 75% completed Algebra II, and 81% completed Geometry. Many of these students presumably have the skills to take more advanced courses in math. However, only 31% of graduating students completed the higher level Trigonometry/Pre-Calculus, only 6% completed Calculus, and only 4% completed Statistics. The statistics look very similar for science courses and for Advanced Placement courses; many students complete the required courses but do not participate in advanced courses. Though these advanced courses are not currently required for graduation, at least three-fourths of students taking math completed the prerequisite courses to take a higher level course if it were offered. Distance learning, specifically online learning, could be an option for those students who wish to take more advanced math courses.

In addition to the need to offer more advanced courses, principals responded overwhelmingly in the Distance Learning survey that they would be interested in receiving more distance learning opportunities if they were available. Ninety-two percent (92%) of schools expressed an interest in more distance learning opportunities while only 4% responded that they were not interested. Of the school that responded, 18% said that they were not participating in online courses because of a lack of awareness of what was available. Helping schools become aware of what opportunities exist may help move students into courses that they might not otherwise complete.

Recommendations and next steps

The Department of Education will investigate the most appropriate method of employing distance education technologies and pedagogies to assist with stated educational objectives. This will include examining the viability of alternate interactive videoconferencing models that are more cost effective, more flexible in their use, and more scalable than the current ATM network.

The Department of Education will also seek to determine how best to provide online learning opportunities that will allow students to participate in courses they might not otherwise have access to including, for example, Advanced Placement courses, world languages, core courses, electives, or general credit recovery. This includes examining the viability of creating a Maine-based virtual school, and/or contracting with existing online providers for services.

Distance education can assist with providing equity of access to coursework, and can also enrich the curriculum through extending communication and collaboration with others throughout Maine and around the world. It can compliment and assist with ongoing technological initiatives, high school reform efforts, and the implementation of 21st Century Skills.

In addition to providing a means to transport the voice and video in interactive classroom videoconferencing, the ATM network also provided each of the 83 "ATM schools" with their Internet connectivity. As part of this examination of the potential of distance education, the Department of Education will coordinate with the Maine Schools and Library Network (MSLN) to replace the ATM circuits with equivalent or better Internet connections to be implemented July 1, 2009.

A Department of Education plan for addressing how to take advantage of opportunities offered by distance education will provide a wide variety of benefits, not just for high school students, but all Maine students, teachers and administrators.