

Review of Literature

Cost Items for Implementing and Maintaining a K-12 Online School

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The purpose of this review of literature is to examine the cost items for online learning in K-12 education in the United States, to inform K-12 school districts of the cost items, and ways that online schools are being funded in the United States. Many reports have been issued highlighting the costs and cost items for online learning and establishing and maintaining virtual schools. However, there are limited reports or articles written comparing the costs of brick-and-mortar with online schools. This review of literature focuses on the cost items for virtual schools and a comparison of cost items for brick-and-mortar schools, online schools, and which costs are the same for both. After a brief history and growth of K-12 online learning and a discussion of the effectiveness of online learning, the bulk of this review of literature will focus on the cost items for implementing and maintaining an online school. Appendix 1 identifies all of the cost components for an online school and how they may be applied in establishing an online school in one school district.

Brief History and Growth of K-12 Online Learning

Otto Peters was one of the first to make important contributions to distance education theory and described “an industrialized theory for distance-teaching organizations” in 1967. (Beaudoin, 2003). The print version of distance education, known as “correspondence courses” was first developed at the University of Chicago in 1891 (Greenway and Vanourek, 2006).

One of the first reports that documented K-12 online learning described the statewide developing virtual school programs in Florida, Kentucky, Michigan, New Mexico and Utah (Clark, 2000). In this report, Clark set the framework from which all other K-12 online learning research would emanate. For, without any K-12 virtual schools, there would be no students or teachers to study

or research. Thus, K-12 online schools are just 11 years old, and the research regarding online schools began after 1997.

Historically, the first statewide virtual school programs were established in the states listed above. Utah Electronic School, considered to be the first, opened to students in Utah, was established in 1994. According to Watson and Ryan (2007) who have authored the *Keeping Pace Reports*, there were 6,365 students who received credits from the Utah Electronic School between July 2006 and June 2007. The Florida Virtual School, considered to be one of the models for K-12 virtual schools, was established in 1997. There were 77 half-credit enrollments in 1997 and that number rose to more than 113,000 half-credit enrollments in 2007 (Florida Tax Watch, 2007). The other well established virtual school program is Virtual High School, Inc. which was initially funded by a 5-year, \$7.5 million federal Technology Innovation Challenge grant that began in 1996. VHS, a cooperatively designed virtual school, provides online courses for 457 traditional high schools in 28 states and 23 countries. There were over 7,500 enrollments in the VHS online courses during the 2005-2006 school year (Tucker, 2007).

The number of students who enroll in virtual high school courses continues to grow. The National Center for Education Statistics estimated that during the 2002–03 school year, 328,000 public school students were enrolled in some type of distance education course—including Internet-based and other types of distance education programs (Setzer and Lewis, 2005). 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 (Watson and Ryan, 2007).

The number of K-12 students enrolled in online learning program was estimated to be 600,000 in 2005. (Smith, Clark and Blomeyer, 2005). Nearly two thirds of all districts (63.1%) currently have students taking either online or blended courses. Approximately 700,000 public school students were enrolled in online and blended learning courses (Allen and Seaman, 2007).

“Online learning is growing at 30% per year. There are an estimated 1 million enrollments in online learning currently,” according to Susan Patrick, Chief Executive Officer, North American Council for Online Learning (Hargadon, 2007). In higher education, the number of online course offerings and students taking online courses continues to increase by approximately 10% each year (Allen and Seaman, 2007).

Definitions

The term “virtual high school,” or VHS, is synonymous with the terms cyber school and online school. Generally, online school courses are any courses delivered through “Internet or web-based methods” (Clark, 2001). Because web-based learning varies in how much time a student interacts with an instructor in person, online courses are those delivered via the Internet and World Wide Web where 75% of the instruction is not delivered in a face-to-face classroom (Freedman, Darrow and Watson, 2002).

Allen & Seaman (2006) distinguished and defined three types of online courses:

- Online — Course where most or all of the content is delivered online. Defined as at least 80% of seat time being replaced by online activity.
- Blended/Hybrid — Course that blends online and face-to-face delivery. Substantial proportion (30 to 79%) of the content is delivered online.
- Web-Facilitated or Web-Enhanced — Course that uses web-based technology (1 to 29% of the content is delivered online) to facilitate what is essentially a face-to-face course.

The types of online schools vary throughout the nation and include state-led, charter and district online schools. These school also vary by the type of instruction which include fully online, partially online or hybrid (a combination of online and face-to-face) instruction. (Watson and Ryan, 2007).

Effectiveness of Online Learning

Various meta-analysis studies regarding student achievement and online learning have been conducted. Russell (1999) concluded that distance education is as effective as conventional education in terms of academic outcomes. Meta-analysis of 19 distance education studies showed small effects on achievement (Cavanaugh et al, 2004). Bernard, Brauer, Abrami, and Surkes (2004) did meta-analysis of 232 studies of distance vs. conventional education used online or video-based methods in K-12 or higher ed settings. Effectiveness was studied through achievement, attitude, and retention outcomes. No significance difference across all effects was found. Shachar and Neumann (2003) included 86 studies comparing distance versus conventional study. Using academic performance as the outcome variable, they found a moderately positive effect size for distance education. The above studies were a mix of K-12

and higher education. In both higher education and K-12, studies indicate that students achieve and perform as well in online courses as they do in face-to-face, traditional courses.

Costs of Online Schools

The cost of establishing and maintaining an online school is an important consideration. When discussing online schools, researchers note that the greatest barrier to developing an online school is the cost (Bearden, 2008; Marsh, McFadden, and Price, 1999). The best way to determine the overall cost of an online course or online school is to determine the average cost per student (Morgan, 2000). An analysis of costs for cyber schools completed for the Colorado legislature suggests that the cost for an online student is the same as a face-to-face student. However, as program enrollments grow, some economies of scale may result in the cost per student to decrease (Kalmon and Watson, 2004). The operating costs of online programs are about the same as the operating costs of a regular brick-and-mortar school (Anderson et al, 2006). The costs for a part time online school as compared to a full time online school may be less overall, but proportionately, the cost per student to educate a student in an online course is generally the same. One other development that may influence the cost of online schools is the open educational resource or OER movement. Educators around the world are putting their work and content online which allows free access for all. As more networks of open source educators develop, the cost of online content for online schools could decrease (Downes, 2007).

Although published studies and reports provide very little information about actual costs of K-12 online schools, it does provide strong evidence that online education at the collegiate level is more expensive than traditional education. A study of the Colorado Department of Education reported that the cost per student of a high-quality online learning program at the K-12 level is

the same as or greater than the per-student cost of physical school (i.e., traditional) education (Annetta, 2004).

The Southern Regional Education Board is a consortium of 15 southern states and have been on the forefront of reports about the costs associated with online learning. Included in the SREB report is a planning worksheet which includes all cost items for establishing a virtual school: administration, teachers, academic coordination/teacher training, course content, public information, technology, student services, finances, evaluation, facilities, and unanticipated costs. (SREB, 2006). Many of the costs, such as administration, teaching, and student services are similar costs as a traditional, brick-and-mortar school. However, there are other start up costs that a virtual school must finance, that may be one time or may be ongoing, including course content and the online platform/course management system. Depending on the design, these costs may be one time or ongoing. Based on the various studies and reports, the chart below suggests which costs apply to online schools as compared to brick-and-mortar schools.

Chart 1. *Brick and Mortar School vs. Online School Cost Comparison Chart*

Chart developed based on information from Florida Tax Watch (2007), Anderson et al (2006), Adsit (2004), and SREB (2006), and input from members of the NACOL discussion forum (April, 2008).

<u>Brick and Mortar School Only</u>	<u>Online School Only</u>	<u>Both</u>
Buildings and Grounds Maintenance	Space for offices and computer lab for students.	Administration
Security	Course Management System	Teachers
Transportation	Course Content	Professional Development
Energy	Computer and Internet Access for every teacher and student	Students
Computer and internet access for every teacher	Mobile communication device for teachers (e.g. cell phone) and network	Student Information System
Teacher sub costs (for teacher sick days or professional development)	Technology Support (e.g. help desk, course updating, server maintenance)	State Testing System
Athletics	Marketing and advertising	Textbooks
Music program (e.g. band)		Courses and Course Outlines approved by Governing Board
Nursing services		Access to Computers
		Special Education Services
		Student Support (Counseling, library)
		Network infrastructure
		Telephones and network

Appendix I shows the various cost items for an online school and applies these items to the Kings Canyon School District in Reedley, Ca.

Course content is one of the cost items that is different from brick and mortar schools. In most school districts, a course description sets the outline for each course. Additionally, many districts have curriculum calendars that suggest to teachers what concepts should be taught when in the high school classroom. Quality courses need to be transformed to the online environment.

Key elements of an online program include (1) courseware, platform, and delivery system, (2) instruction, and (3) management and administrative functions (Cavalluzo, 2004). Cavalluzo reports that state or district virtual school can purchase online content from a commercial provider or may create course content internally. Content purchased from a commercial provider tends to include a yearly subscription fee, while internal development of online courses is a one time expense. The amount that different providers spend on the development of courseware varies widely. One online school in Fayetteville, North Carolina reports that it uses standard templates and teachers who are experienced in course development, and it spends \$1,500 per course. Within Virginia, Prince William County spends \$4,500 per course to compensate two- or three-teacher teams for course development. At the high end, Florida Virtual School, reports expenditures ranging from \$50,000 to \$100,000 per course. APEX Learning, a commercial developer of foreign language and AP courses, makes similarly large investments in courseware development (Cavalluzo, 2004). In Colorado, Kalmon and Watson (2004) set the price for content at \$1080 per year per student per course. Whether course content is purchased from a commercial developer or developed in-house, the content will need to be updated on a yearly basis to provide the latest online content to teach the various concepts in each course.

The cost of a course management system or online course system also varies in price. A course management system may be hosted internally within a district or an online school may choose to have the system hosted by a company. A typical license for the platform is \$5,000 per year for unlimited users. Costs associated with maintaining the server and providing support range from \$15,000-\$20,000 per year (Adsit, 2003). The estimated cost for a course management system for 5,000 students is estimated at \$200,000 or \$40.00 per student per year (SREB, 2006). Open

source solutions such as Moodle are free to download and use. However, there are support costs for hosting the course management system within a school district or state, which are estimated at \$15,000-\$20,000 per year (Adsit, 2003).

The largest cost for online schools, as well as brick-and-mortar schools, is the cost of personnel, and, in particular, teachers. Although teachers in online schools may be hired part time, the largest cost for an online school is still the cost for teachers. Other cost items that are the same for online schools as they are for brick-and-mortar schools include ongoing professional development, textbooks, support services such as special education, counseling and libraries, and technology infrastructure. And, overall, the more students that are enrolled, the more the overall school cost decreases (Anderson et al, 2006).

Overall, the costs to adequately fund the start up of a full time online school program requires about \$1.6 million depending on program type, size, and quality, and level of investment into research, development, and innovation. The first year is used by the program to develop its educational program and infrastructure, and nearly 80% of start-up costs are in management and course development. (Anderson et al, 2006). Anderson et al, in their interviews with experts in the field suggest the per student cost is between \$3650 and \$8300, while Adsit (2004), in his analysis of Colorado cyberschools, estimates the cost of one full time online student to be \$7,485 per year. Florida Virtual School (FLVS) is considered one of the most developed online high school programs in the nation but is not a diploma granting institution. The school began in 1997 and has increased enrollments each year. Of the students who attend FLVS courses, 73% are part time who take regular courses at their brick-and-mortar schools as well. During the

2006-2007 school year, the per student cost at FLVS was \$5,243, while the Florida brick-and-mortar per student cost was \$6,291 (Florida Tax Watch, 2007). Further research is needed to determine the items to use in determining a per student cost in online courses.

Costs for online courses are listed on the chart below developed by the U.S. Department of Education (USDE, 2007).

Table 1. Selected Variables of Highlighted Online Course Providers^a

Online Course Provider	Year Initiated	Initiator	Locales Served	Types of Courses Offered	Number of Courses Currently Offered	Total Student Enrollments Since Inception	Approximate Per-Student Cost Per Course
Colorado Online Learning	1998	Consortium of 14 districts	Statewide	AP, ^b Honors, Dual-Credit, Core, Electives	80	6,832	\$200
Florida Virtual School	1997	District partnership with state grant funding	Statewide, National, International	AP, Honors, Core, Electives	80	200,000	\$440 per half-credit enrollment
Iowa Online Advanced Placement Academy	2001	Belin-Blank Center	Statewide	AP	11	5,616	\$380 (does not include cost of the AP exam)
Johns Hopkins University—Center for Talented Youth	1994	John Hopkins University Center for Talented Youth	National, International	AP, Accelerated, ^c Honors	60	53,000	Varies by course; ranges from \$440 to \$1,740
Michigan Virtual High School	2000	Michigan Virtual University	Statewide	AP, Core, Electives	110	26,700	Varies by course; ranges from \$275–\$350 per semester
Virtual High School	1996	Concord Consortium, Hudson Public Schools	National, International	AP, IB, ^d Honors, Core, Electives	216	40,028	\$130 per semester course with standard school membership

^a Data reported by online providers both here and in the profiles are for 2006–07.

^b Advanced Placement

^c An accelerated course compresses the content that normally would be covered in a longer course into a shorter time frame.

^d International Baccalaureate

How are online courses financed?

In one of the first reports about the cost items for K-12 virtual schools, Cavaluzzo (2001) identified how virtual schools are financed. In Florida, there is no charge for virtual school courses, in Kentucky, the schools pay the price for students to attend at a price of \$500 per year long course or individual districts may pass the cost on to parents; in West Virginia, the state pays 75% of the cost of an online course while the local district or parents pay the difference. The ways that online course costs can be paid include: state appropriation, percentage formula of regular student full-time-equivalency (FTE) or average-daily-attendance (ADA), grants from individuals or foundations, schools, parents, or any combination of the above (Anderson et al, 2006). Generally, throughout the United States, the FTE model for student apportionment or something similar exists in every state and was developed for brick-and-mortar schools. A student must be present in order to collect each day of apportionment. The student apportionment is all or none – either the student is present or he is not - only full time students are financed through these state funded models. In California, 60% of local public school funding comes from the state allocated through the ADA process, which is based on the number of days each student attends school (Freedman, Darrow and Watson, 2002). There have been two laws passed in California that attempt to allow ADA to be used for funding online schools – AB 885 (2001) and AB 294 (2003). However, the bill known as the “online classroom pilot program” ended in 2007 and no subsequent bills have been passed by the state legislature. Any state or school district will want to identify how online courses will be financed so the school can be sustained in the long term.

In higher education institutions, the funding model follows a different model than in K-12 education. Most 2-year and 4-year colleges receive funds based on the number of students who enroll in a single course (Taylor et al, 2001). However, the start up cost item items for developing and maintaining online courses and the course management system is the same in higher education as it is in K-12 education. Higher education has the similar dilemma of how to finance course development by faculty members and how to meet the ongoing costs of teaching online courses while following state mandated funding guidelines and demonstrating how online courses are cost effective (Taylor et al, 2001).

Other ideas for financing online courses have developed over the last ten years. One is VHS, Inc., an online high school program that originally was financed through a federal technology innovation challenge grant. This cooperative model requires schools to pay a \$6,000 per year membership fee, provide a teacher to teach an online course and, in exchange, up to 20 students from that school may take any of the 200 online courses offered by VHS, Inc. In a cooperative, costs are lower because instead of paying tuition, per student, the number of course offerings is balanced with the number of students participating. (Sack, 2003). Secondly, the open educational resource movement is making the tools and content for online learning less costly. (Downes, 2007) . The open source movement is perceived as a culture, an ideology, and potentially, a way for humans to better work together on shared pursuits such as online content or course management platforms (Couros, 2006).

For any online school ventures – whether K-12 or higher education, there are initial start up costs. These include administration, teachers, academic coordination/teacher training, course

content, public information, technology, student services, finances, evaluation, facilities, and unanticipated costs (SREB, 2006). Depending on the overall design, some of these costs can be ongoing or one time. All of these cost factors need to be considered in the overall system for the implementation, maintenance and sustainability of an online school.

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Appendix 1. Online / Technology School Component Chart - Dunlap Leadership Academy, Kings Canyon Unified School District, Reedley, Ca

Updated: April 5, 2008

<u>COMPONENT</u>	<u>DECISIONS/COST ITEMS</u>
Type of online/technology school	Hybrid – both face-to-face and online. Students attend 4 hours per day. (As per Ed. Code 46141)
Operational Control	District
Location	Dunlap High School, Dunlap. Computers and network in tech lab.
Course Management System	Advanced Academics. Future option: Moodle or Blackboard
Courses	Advanced Academics
Course Content	Advanced Academics
Course Type	Synchronous (all in same place at same time) and Asynchronous
Equipment	Computers at Dunlap High School. All students receive their own laptop computer.
Administration	Director, Paul Colagiovanni
Students	Students in KCUSD
Teachers	Advanced Academics and KCUSD.
Funding	ADA, grants (Career Tech), district
Costs	Personnel, content, equipment, classroom.
Implementation Committee	Assistant Superintendent Marcy Guthrie, School Director Paul Colagiovanni.
Advisory Committee	Parents, teachers, counselors, students, business and community members.