The California Virtual School Report:

A National Survey of Virtual Education Practice and Policy with Recommendations for the State of California

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About This Report

This report was prepared as a result of a Request for Proposal issued by the University of California College Preparatory Initiative (UCCP) (www.UCCP.org). UCCP is a project of the University of California, providing Advanced Placement and Honors courses to under-served populations in California, directed by Francisco J. Hernandez, Ph.D., Vice Chancellor – Student Affairs, University of California, Santa Cruz.

Two consultants were awarded the contract from the UCCP Request for Proposal. One was Knowledge Base, LLC (www.eKnowing.com), a consulting firm based in Monterey, California. The other was the Clovis Unified School District (www.clovisusd.k12.ca.us), a school district located in Clovis, California that has pioneered the use of virtual education. Gordon Freedman, founder of Knowledge Base; John Watson, independent consultant under contract to Knowledge Base; and George Lorenzo, editor and publisher of Educational Pathways (www.edpath.com); researched the national virtual education landscape and California's higher education organizational landscape. Rob Darrow, Online Learning Specialist for the Clovis Unified School District, researched the California educational landscape. Together, Freedman, Darrow, Watson and Lorenzo served as the report's primary authors.

The focus group process initiated by Darrow was implemented with the assistance of student researchers from the Center for Advanced Research and Technology (www.cart.org). High school students Jacqlyn Church, Raul Cobarruvias, Brock Bogenschutz and Jeri Roberts conducted focus groups and organized focus group data for this report.

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The report is divided into four sections:

I. Executive Summary

II. Report Body

III. Conclusions & Recommendations

IV. Appendices

Section I

Executive Summary

This study examines virtual high schools across the country, the state of virtual learning in California, and the state of the technologies supporting virtual education in order to explore the range of possibilities for a Statewide online learning program. California, with its technology corporations, entertainment industry, private and public university systems, and research institutions, has unique resources that can be harnessed to revitalize education in the State and to set a standard for the nation and the world.

California includes just over 6 million K-12 public school students, within 1,048 school districts. There are over 1.7 million students in 935 public high schools throughout the State. Since 1996, the number of students in public schools has increased by approximately 100,000 students per year. Statewide educational programs are administered at a variety of levels, including through the California Department of Education, the Office of the Secretary of Education, the State Board of Education, County Offices of Education, and Local Governing Boards. Numerous federal and State laws and programs, some of which have made California a leader in Internet connectivity among schools, influence virtual education in California. These include Federal Technology Literacy grants, the Digital California Project, the California Learning Resource Network, the Digital High School Program, and the California Technology Assistance Program, among others. Despite these programs, there are no Statewide virtual high school operations. A small number of local online programs, including those at Poway Unified, Clovis Unified, and Orange Unified, have developed hybrid or fully online courses. There are courses made available to high school students by individual programs in the University of California system, the California State University system, and the Community College system. The only activity that approaches a Statewide virtual high school is UCCP, which provides Advanced Placement and Honors courses to under-served schools and districts. There is new legislative budget language that would require UCCP to expand its course offerings to include additional college preparatory courses. If the current

California State budget for 2002-03 is accepted, the role of UCCP will be altered to increase the level and number of course offerings.

Because of the State's size, complexity, and diversity, its education needs are broad and challenging. In California, a Statewide online program could serve a number of unmet educational needs, including the needs of students who do not have full access to a college preparatory curriculum.

Extensive focus groups throughout California reveal that educators, parents, and students in California share an optimistic view of the promise of online education, as well as a realistic understanding of the challenges of virtual school programs. All three groups made suggestions about online policies, operations, and academics similar to those suggested by staff and directors of online programs in other States. The focus groups brought forth issues such as: the need for high-quality, interactive course content and a specialized, collaborative course repository; some level of local control of an online program; and strong mechanisms for student support and teacher training.

The California survey underscores the need for online education services. The surveys of fully developed programs in other States such as Illinois, Florida, Kentucky, Michigan, and West Virginia reveal programs maturing into an integrated part of education in each of these States. Virtual education in a number of States is now an operational reality. This analysis reveals that virtual education will continue to grow, despite funding issues.

A Statewide online program raises several critical operational issues. Areas of concern include target audiences; curriculum development; quality assurance processes; course pacing; technical support; funding; assessment; accessibility; teacher recruitment and development; plus interaction between various State education agencies, post-secondary institutions, vendors, existing schools, and parents.

The report makes a recommendation for the creation of a California eLearning Educational Trust (eTrust) to collaboratively administer virtual education in the State. The eTrust would consist of the key participants in California education, including the State Department of Education, county offices, districts, schools, university systems, and research and corporate facilities. The eTrust would be responsible for designing the specifications and maintaining the agreed-upon standards for the development of eLearning in California.

The model recommended in this report is uniquely suited to California's size and complexity. The eTrust design and intention is to promote collaboration at all levels, to require adherence to common standards and specifications, and to allow various programs to exist simultaneously and cooperatively.

Specific recommendations captured in Section III, include:

- California's investment in virtual education should be seen as part of its overall educational infrastructure, stretching from K to 20 and not as an isolated program.
- The entity in which the structure and responsibility is placed should be managed as a public trust with a governing board that is a collaborative effort between academic, governmental and commercial entities.
- Institutions and individuals should be placed into a structure where incentives can be granted to the participants, and success is achieved, because all are contributing to the common goals.
- Solutions must be developed that are scalable, are durable and standards-based, and result from the best thinking informed by research, corporate experience and public education.
- Significant start-up funding is needed to implement this plan. This funding is needed to guarantee access for all students to the educational benefits of this effort.
- Common content, technology standards, and course specifications should be adopted.
- A central operator of technology resources should set standards and operate central technologies that save money, provide efficiencies, and insure quality.

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Section II

1.0 Preface

Education is a central function in society. It is part of the national landscape, accepted by citizens as a birthright, and so much a part of everyday life that it is rarely examined as a whole by its various constituencies. Education is so multifaceted that debate is generally about issues such as changes in pay, teaching standards, annual testing, and funding, while thoughts of completely reforming education are rarely entertained. To think of change on such a massive scale would raise questions of tinkering with the very fabric of society and putting pressure on already strained governmental budgets.

Large social changes rarely occur without significant crises motivating that change. The world wars and the Cold War of the 20th century, the economic demands of the Industrial Revolution, and the economic constriction of the Great Depression are examples of the sea of changes that affected education. The last burst of complete reform at a national level came with the launching of the Sputnik satellite by the Soviet Union in the late 1950's. That period is also significant as the birth of the technological era whose innovations are now part of the consumer electronics and Internet culture that characterize much of modern life today.

In the last 45 years, K-12 compulsory education has alternated between emphasizing basic communication and computational skills on one hand and the importance of life skills on the other. During this period, the country itself has had to compete globally, while absorbing and embracing the social dimensions of racial and ethnic pluralism at home. Yet, education delivery has not significantly altered during this period of time. For nearly 100 years, education has maintained a recognizable form, a landscape of classrooms, chalkboards, textbooks, teachers, and administrators. Few aspects of society can claim so little change over such a long period of dynamic change and restructuring of social mores and economic realities. Both the private and public sectors have been largely overhauled in the last 20 years through the introduction of new technologies that affect communication, record keeping, financial transactions, information flow, and knowledge management. While schools have been "wired" and technology purchased, the use of technology to assist in support of central curriculum or centralized instructional resources remains spotty and non-systematic.

In many cases technology is seen as an add-on. However, in some areas, technology has changed the way that teachers deliver instruction to students. For the successful educational technology planners there is the sense that technology can provide a future infrastructure for education that can support significant change.

In this report, an examination is made of virtual high schools, especially those established by State governments, as well as the condition of virtual learning in California. This study is done in order to examine the possible form that virtual education or a virtual education system might take in California. The focus is not on conceptualizing educational technologies or infrastructure as an "add-on" to the State's activities, but as something that can become an integral part of the infrastructure of education in California.

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In California, a number of technology initiatives have been implemented, but they are not connected nor centrally coordinated. In the future, coordinating change in the use of educational technology should become the norm. This change must be part of an efficient, accountable system of education that facilitates an increase in student achievement, best practices, master teaching, student collaboration, parent conferences, and administrative oversight.

Funding constraints have often impeded the use of new technologies in education. While technology has front-end expenses, integrating technology into the education system may be less expensive and more efficient. Technology can also bring in a missing quality factor that is not otherwise obtainable.

California has already invested tens of millions of dollars on high-speed Internet connectivity, but California needs to augment this basic capacity with systems that bring coherent educational content to local districts via such connectivity. We need a thorough evaluation of education costs and education benefits that could flow from a centralized system of storage, delivery and of elearning materials.

The virtual education operations in States and schools in California and across the country continue to grow and will only increase in the future. Therefore, it is important to discover how to harness that energy for better results, better cost savings, and better understanding of the principles of good education. While the funding and survival of virtual education at a State level is still in question, the point of view of this report is that multiple methods of delivery have a real place in the educational infrastructure and should become part of a mainstream educational system.

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Making California A Leader in Virtual Education

California has truly unique resources that can be harnessed to revitalize education in the State and set a standard for the country and the world. California is home to resources without parallel in technology, private and public university systems, private and public research institutions, entertainment, and a technologically and media-literate population.

We need a thorough evaluation of education costs and education benefits that could flow from a centralized system of storage, delivery and of elearning materials.

Names such as Apple, Cisco, Hewlett-Packard, Oracle, and Sun have ushered in the digital age. Others such as Sony, 20th Century Fox, Paramount, and Warner Brothers built and command the film and media empires for the world. Institutions, including the University of California system, the California State University system, and private universities are without peer in scope and quality in one State. California-based research facilities such as the Scripps Institute, Lawrence-Livermore Laboratories, NASA-Ames, NASA Jet-Propulsion Laboratory, SRI International, the Rand Corporation, West Ed, the California Academy of Sciences, and the Monterey Bay Aquarium Research Institute are among the nation's first-in-class research facilities.

As the most populous and one of the most demographically diverse States, the challenge of educating every child to his or her potential, of training enough teachers, of building enough buildings, and of ensuring appropriate curriculum and resources is daunting. Simply building more of the same is not the answer. The time for greatly expanding virtual education in California is now.

2.0 Introduction

This report is prepared in response to the Request for Proposal (RFP) issued by the University of California College Preparatory Initiative (UCCP). UCCP provides access to Advanced Placement and Honors Courses to California high school student populations where such courses are not available. The UCCP program was launched by the University of California as a result of actions initiated by Governor Gray Davis, UC President Richard Atkinson, and the UC Board of Regents. The program development and operation was assigned to the University of California, Santa Cruz, where it is directed by Vice Chancellor Francisco J. Hernandez. The program has been expanding steadily through courses acquired from third party vendors, other institutions, and through courses commissioned by UCCP.

It has been the intention of UCCP, its founder, and the UC Office of the President to examine a broader vehicle than an AP and Honors program to serve the general and special needs of many different populations of learners and teachers, using technology. This report is the first phase of the broader examination of the form that virtual education could take in California towards a comprehensive virtual school system.

The term "virtual high school," or VHS, has numerous meanings. Generally, virtual 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, we define online courses as courses delivered via the Internet and World Wide Web where 75% of the instruction is not delivered in a face-to-face classroom.

A Statewide virtual school program should be structured to include an Internet-based course management system, a dynamic course repository, a teacher resource center, and a student resource center designed to fill numerous educational needs.

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The course management system provides the structure for the virtual education. The online course repository allows school districts to access common core courses, rather than causing every district in the State to create their own online courses or subscribe to the same course management systems. The teacher resource center allows for the training of teachers and for teachers to use the content of the course repository as a resource for face-to-face instruction. Students use the resource center to gain new or remedial content knowledge from the courses in the course repository. This system is also designed to provide an on-going data stream for analysis by researchers looking at pedagogical structures for online education, developmental and individual learning styles, applicability to special needs and, most importantly, performance accountability. Thus, VHS is a new educational form that would be available to California students and existing high schools to augment their current educational program.

To date, VHS operations are active at the State level in a number of States. They have come into existence primarily from legislative or gubernatorial action, largely in the recent budget surplus years. These State VHS systems are designed to provide educational resources in non-traditional ways and do so in or around the existing physical educational systems. VHS systems have started in response to the possibilities inherent in distributed technologies in responding to grassroots concern for extending student learning, supplying missing curricular elements, providing master teaching, and growing communities of teachers and learners. The early results are promising and more far-reaching than commonly understood. Most notable is the rapid evolution of these VHS efforts from small, focused projects to full school operations. Any VHS effort in California will experience a similar evolutionary process.

2.1 Initial Findings

This report highlights several critical trends that are important to note as California examines a virtual high school structure for use across the State. Additionally, the report has reviewed what other States have proposed and executed and has examined the structure, financing, and the results within each State. Much of virtual education in the United States is aimed at augmenting existing physical curriculums, replacing one or two physical courses, or meeting special needs. Virtual education also applies to students who do not, or cannot, regularly attend physical classes, may be independent learners, or are enrolled in virtual (not physical) schools.

The initial trends gathered in the report suggest that:

- Virtual education is more pervasive and is used with greater effectiveness than commonly realized.
- Virtual education is no longer novel and experimental and is quickly becoming an accepted educational delivery mechanism.
- Virtual education can accommodate both general and special needs, often from the same resource base.
- Virtual education is either State-sponsored curricula provided by a central office (top-down), created and supported by schools or districts (bottom-up), or created and developed by a national or regional consortia for shared use (horizontal).
- Virtual education at the State level came about primarily on a wave of budget surpluses in the late 1990s and will be challenged to find appropriate funding mechanisms going forward unless it is financially "mainstreamed" in the States where it is operational.
- Virtual education includes a variety of activities, some of which are centered on technology delivery, such as the building of high-bandwidth networks, and not on curricular development and distribution.
- Virtual education is supported by a handful of corporations that have developed technical solutions or course development systems that originated either in higher education or as the outgrowths of grants and are now being applied to schools.

This report, plus several recent national studies, suggests that virtual education is no longer experimental but is on its way to being part of our educational infrastructure, playing a critical role in fulfilling special needs or in developing master curriculum, the cost of which can be amortized over a variety of uses.

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2.2 A Need for Common Goals and a Common Agenda

Many of the schools, universities, research institutions, corporations, media companies, and governmental facilities in the State have contributed to educational excellence using new methods and technology. These voices are all speaking roughly the same language, but the voices cannot be heard in unison, since there are no common mechanisms to carry out common goals. The refrain that adding technology to education will change the education system is hollow without working examples, infrastructure, and organization to carry it out.

Today, the problems of achieving Statewide, first-class virtual education are not for lack of expertise, models, or resources. The missing agreement is getting people and organizations to work on common solutions to common problems without sacrificing organizational standing among peers and funding sources. Participation in cooperative efforts is hard to organize and maintain in light of particularized agendas, and different funding mechanisms.

The engineering and innovation challenge for creating a virtual education system in California is largely human, not technological. This common goal requires uncommon efforts.

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NOTES FROM THE TRENCHES: TWO EXAMPLES OF VHS GROWTH PATTERNS

Growth Can be Substantial and Quick

Florida Virtual School (FVS) is the obvious premier model that reveals how a well-supported Statewide virtual high school program can grow substantially over a short period of time. The 1999-2000 academic year garnered 2,700 enrollments - a figure that has increased to 8,200 enrollments in 2001-2002. During a span of 36 hours on April 17 and 18, 2002, 10,000 students sent in applications for the FVS summer program, which is capable of accepting only 2,500 students at this time, says Sharon Johnston, FVS director of curriculum. During a 48-hour period of time beginning on May 1, 2002, FVS received another 12,000 applications for its fall 2002 program.

A Notable SIS

Previous to this, FVS spent about eight months building a home-grown student information management system (SIMS) to handle the anticipated influx of registrants. "We had our whole tech team completely devoted to it," says Johnston. "It's a really robust management system" where student registration information is maintained, and where teachers can navigate to their courses and administrative duties via an electronic "teacher dashboard." The dashboard is the portal-like screen where such data as student progress and contact reports, as well as grades, are recorded. For example, the dashboard is where teachers log in information gathered from a mandatory welcome telephone call they make to every student enrolled in their class(es). The SIMS is also where student-related databases, such as segmented class completion logs by county, are constantly maintained.

FVS is the largest Statewide virtual high school program in the nation in terms of enrollments. FVS is referred to frequently in this report. However, other districts and schools are of equal importance and offer some valuable lessons as well. Throughout this report we weave in and out of districts and schools in an effort to provide a multifaceted picture. This picture is only a small slice of the national pie of virtual high schools.

Durham on the Move

For instance, the Durham Virtual High School (DVHS) based in a suburb of Toronto, Canada, is another case in point related to how some virtual high schools can experience rapid growth, albeit on a smaller scale than FVS.

DVHS is currently offering online classes to a district comprised of 67,000 students. For the fall 2001 semester, which was the beginning of Durham's first year of officially operating, approximately 200 students - about 60 percent of all applications - were accepted into the DVHS program.

The following spring semester saw a 300 percent increase in applications. "We will serve about 700 students next year," says Todd Hitchcock, DVHS eLearning project manager. In addition, DVHS has opened up an agreement where they will either share course development or delivery costs with eight other school districts in Ontario. Forty faculty members from these districts are currently being trained by DVHS to be "course developers, course deliverers and teachers for the fall," says Hitchcock.

Each of the eight school districts have populations in the 50,000- student range, so there is a distinct possibility that the Ontario school system could be serving upwards of 2,000 virtual high school students by fall 2002 through what Hitchcock calls the "hub and spoke" model. "We (Durham) become the hub; we train other groups (spokes) in Ontario, and then they become mini hubs and train more groups."

Meanwhile, requests for teacher training are growing fast. "My problem right now is limiting it (the number of Ontario teachers Durham can accommodate)," says Hitchcock. "All these eight districts would like us to go locally and train 20 to 30 teachers per district. If that were the case, then I would get out of my business of delivering courses and go into the training business. Right now, we started out slow, and we are saying this is what we can provide, and they (the districts) are begging for more."

3.0 Online Pedagogy

Online learning is a relatively new phenomenon and, as such, there is not yet a complete body of research to guide policy makers, instructional designers, teachers, or students. In higher education and corporate and military training, areas where online learning started and is most highly developed, there are debates about what constitutes sound pedagogy. At the high school and K-8 levels there has been an acceptance of electronic education as valuable, efficient, and appropriate for certain situations or certain students, but research into the efficacy of electronic education is not yet comprehensive.

As virtual high schools have come into existence, online learning is seen as an answer to a variety of issues. The technologies that capture pedagogy, for the most part, have been taken at face value. This report suggests that those who form virtual high schools or teach virtually should begin to critically evaluate what is effective pedagogy and what is not. Whether this is done formally or informally, the practice of reporting and recording what is effective and for whom it is effective is needed to guide others. Ironically, the scrutiny that online learning is subjected to is, ultimately, much more intense than normal classroom delivery and, by definition, it can be more easily tracked. Developing more evidence on a daily basis should be a part of the use of online education.

Pedagogical models are almost always implicit in the choices that instructional designers make when they construct courses. Except in rare cases where the user experience or the user interface can be adjusted for different learners, the pedagogical approach is locked. This "one size fits all" philosophy may be an issue worth noting in further research and in teaching practice.

The research that is available is spotty and sometimes is more informal than formal. However, many evaluations from the National Science Foundation tend to confirm the efficacy of the online environment as one that can be designed with specific outcomes in mind and can be monitored for efficacy. In particular cases, it has been shown that the online course stimulated learning, in general, and affected student performance positively in other subject areas.

However, most research is much more focused on the interaction of students and content. These studies are mixed between results from higher education and from K-12. This section of the report provides an overview of the research as it exists, and the report will strongly suggest on-going areas of research as a necessary part of any virtual education program. This recommendation is made not to question the efficacy of online learning, but to take advantage of its unique ability to deliver research results that can lead to stronger and more focused pedagogical information on learning in general.

Online learning research takes many forms. Three continually have received a great deal of research attention. These attributes are considered trackable components of the education process that are more transparent in online education because of the ability for technology to aggregate use data.

- **Communication immediacy**
- **Proportion of time spent online**
- **Level of learner autonomy**

Communication immediacy

- **Asynchronous (student works at any time):** The learner posts comments using asynchronous communication tools in which the learners will not need to be online at the same time as others. The teacher answers e-mails, checks the community forum, and consistently moderates the online discussions while the course is in operation by making an online post. At a minimum of once a week, the online instructor posts a summary comment in the discussion board to build community and push dialogue forward. Two variations of asynchronous exist:
  - **Fixed cohort** - A group (20-25) of learners begin and end at the same time.
  - **Rolling enrollment** - The course is open and learners join the class as soon as they register.
- **Near Asynchronous (scheduled participation, unscheduled communication):** Participants are logged into a system for a fixed, scheduled period, but the interaction is via an asynchronous bulletin board.

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- **Synchronous Session (fixed schedule):** Learners participate in real time with others (e.g. chats, virtual meetings through an online whiteboard, or other online meeting software, group telephone calls, etc.). The instructor should be present to moderate, solicit course feedback from learners, summarize the course topics-to-date, and invite opportunities to answer questions. Depending on the learners' level of fluency with technology, technical support staff might need to be present via telephone or e-mail to help learners sign on to synchronous sessions.

Proportion of time spent online

These are ranked from the most amount of time spent online as a portion of the course to the least amount of time.

- **Fully online (the entire course experience is online):** The sole means of interaction between learners and their peers and instructors is online. The forms of this interaction depend on the communication immediacy. Common forms include discussion boards, synchronous chats, and e-mail. The fully online model supports all three of the communication immediacy models described above.
- **Blended (online interaction plus offline interactions such as physical meetings or teleconferences)**: In this model, learners typically meet with their cohort at the start of the course, and may meet again at regular intervals throughout an extended course. The physical meetings may be used to introduce the cohort to one another and facilitate the formation of the community, or as capstone experiences for extended course activities. However, in blended learning, the majority of time in the course is spent engaged in purely online learning activities.
- **Supplementary (the classroom is main delivery mechanism):** Here the main learning activities occur in a classroom setting. Learners will spend time online as a small part of the class, perhaps researching a report, or collaborating with a virtual group, taking the same or a similar class at a different location. While the time spent online might be large in absolute terms, it is a small percentage of the time spent on the course.
- **Classroom-based (traditional classroom course):** There is no online component to the formal course.

Learner autonomy

- **Self-administered/Independent Study (self-paced courses without interactions with a cohort):** In this model the learner studies the course materials alone, setting his or her schedule and pace (although there might be an end-date set if the course is taken for credit). The materials might be purely online, CD-ROM based, or a mixture of online, CD-ROM, and text-based materials. Assessments typically occur online via a web-based form. Success in these courses requires great discipline. Learners have the most autonomy in terms of schedule and topics studied.
- **Coached (Guided, Tutored, Mentored):** Here there is an instructor with whom the learner will interact. There is more of a formal schedule and syllabus, although a strength of this format is that it allows for changes in the course objectives based on the interests and needs (as determined by the instructor) of the learner. The learner and the instructor interact at fairly frequent intervals, typically once a week. The course materials may be online, print-based, a CD-ROM, or a mix. Learners typically do not have any formal interactions with other learners taking the course.
- **Instructor-directed (an instructor leads a cohort of learners)**: These learning experiences have a set syllabus and schedule to which all learners must adhere. Typically there are explicit due dates for assignments, and little, if any, room for variation of the assignments by individual learners. Note that this does not mean the discourse is limited; while the assignment may be strictly to "discuss the reading," the learners are free to enter into a wide-ranging discussion that represents all viewpoints. Learners have the least amount of autonomy in terms of schedules and topics.

3.1. Challenges to Online Learning and Teaching

Virtual education has faced numerous challenges. Based on a review of research and evaluation compiled from several sources *(see Appendix A)*, the main challenges that can impede the success of online programs are listed below.

(For recommendations concerning the development of online learning and teaching best practices, see section 11.2.)

1. **Weak content and curricula**
   - Online materials are largely page-turning lectures and not activity, project, laboratory, or inquiry-based.
   - Content does not meet curricular standards, or State/national content standards.
2. **Weak online pedagogy**
   - Little interaction and collaboration to promote peer-to-peer, small group, or collaborative learning.
   - Limited variety of interesting, engaging activities.
   - Courses designed with limited contact with instructors and other students.
   - Few group and individual learning activities that lead to deep student understanding of knowledge, concepts, and principles.
3. **Limited forms of online assessment**
   - Course activities are designed without accompanying rubrics.
   - Weak accountability and assessment criteria (e.g. course participation and completion, not quality).
   - No consistent "learning standards."
4. **Lack of technology standards and best use of technology**
   - Materials do not capitalize on the multiple representations possible with technology.
   - Multimedia, virtual reality, simulations, and animations are used in superficial ways rather than in ways integral to learning.
   - Courses don't have consistent user interface or format (font, color palette, screen size, branding placement, site architecture, navigation, etc.). Students and instructors have to relearn the interface with each new course.
5. **Instructor is not prepared to be a virtual instructor**
   - Instructor does not know the logistics of homework, discussions, grading or similar functions within the course management system.
   - Instructor does not utilize online communication effectively to moderate discussions.
   - Instructor uses limited repertoire of assessment approaches.
   - Instructor does not know how to teach in a way that aligns curricula, standards, and assessment.
6. **Not all learners are prepared for online learning**
   - Not all students are sufficiently motivated.
   - Not all students have the learning strategies needed to be successful online learners.
   - Learners don't know how to use the online system (e.g. grades, communication, homework submission, etc.).

3.2 Technology Needs

There are four technology-related areas that are directly applicable to an online program:

1. **Course content**: The actual course material, which may be developed locally or purchased from a commercial vendor, especially for courses with extensive graphics, animations, audio/video, and other engaging features that most teachers and instructional designers are not able to easily create.
2. **Course management system (CMS)**: The technology platform through which online courses are offered, including creation and editing of course content, communication tools, assessment tools, and other features.
3. **"Portal" website:** The website surrounding the online courses, which serves as a brochure site for the online program, provides course listings and/or schedules, and may allow for registration and other student services.
4. **Student information/administrative systems:** The information technology systems that track student information (e.g. course registrations, test results) and report that information back to administrators of the virtual school and local schools.

Many commercial providers of the above technologies are linked, and many CMS companies offer a portal service. Course content is generally separate from both the CMS and the portal, but the two are in some cases linked because course content may be offered in either a proprietary course management system or within a subset of the commercial provider's systems.

3.3 Technology Needs: Course Content

Commercial course content providers typically create courses that are a mix of audio and video files, with animations and other graphics, and in some cases interactive exercises. These courses generally use multimedia elements, such as interactive animations, that most schools and districts do not have the resources to create. This does not necessarily mean, however, that the courses are demonstrably better at achieving desired student outcomes.

While there are numerous providers of course content, according to the survey done by Clark (2001), the most commonly cited commercial content providers were APEX Learning and class.com. The most common non-commercial source was the Florida Virtual School (FVS). Other sources of course content that were cited by more than one school in Clark's study were Academic Systems, Intelligent Education, NovaNet, eHarcourt, Child U, and Boxer Math.

FVS is also licensing its courses to other providers, with a goal of creating substantial revenues. FVS is using the Jones CMS, so the content is in the Jones e-education platform.

Textbooks, other published course materials, and course-related books continue to be an essential part of the learning equation. Yet, the textbook adoption processes and the lack of intellectual property security and business models have made it challenging for publishers to make digital textbooks accessible inside CMS products. However, textbook supplements have been converted to digital formats to be used as "course cartridges" within the Blackboard and WebCT CMS products.

3.4 Technology Needs: Course Management System

Common course management systems (CMS) have been developed primarily for post-secondary education, and now are being offered to, and in some cases adapted for, K-12. These systems tend to have fairly similar features and tool-sets, which include, at a very basic level, the following:

- A "portal" website that will serve as a brochure site for the online program, providing listings and descriptions of courses, support registration and online student guidance, and offering other similar marketing and logistical features.
- A method to allow for a single point of entry for courses, with a single user ID and password.
- A content authoring and editing system.
- Ability to post, store, and retrieve various types of electronic files (e.g., audio, video, PowerPoint slides, .pdf documents, etc.).
- Both synchronous and asynchronous communication tools (e.g., chat, whiteboards, threaded discussions).
- An assessment/exam tool.
- An online grade book, among other features.

There are two basic models for a commercially-provided CMS. One is a solution in which the client purchases software, owns and controls the server, and administers the CMS with technical assistance from the vendor. In the second model the vendor serves as an Application Service Provider (ASP) and hosts the software, and may provide extensive technical support as well. In the first model, the client must maintain a technology staff as well as the hosting hardware. Distinctions between these two models are becoming blurred, as companies move to offer a range of options, and other companies have been created to provide hosting services to the off-the-shelf software products.

For more information about CMS providers, see Appendix B.

Basic Models for Commercially-Provided Course Management Systems (CMS)

Client Purchased Software	Vendor ASP
Client purchases software	Client purchases server space
Client mounts on own server	Client mounts course content on vendor server
Client maintains server	Vendor maintains server
Client answers questions from the users	Vendor and client answer questions from users
Vendor purchases technical training and ongoing assistance as necessary	Vendor provides technical training and ongoing assistance as necessary

In addition to the CMS software and/or hosting, some companies provide a number of services that may include:

- Technical support for teachers (by phone and/or e-mail)
- Technical support for students (by phone and/or e-mail)
- Course content development
- Instructional design
- Creation of online registration, course catalog listings, and other student service functions

Blackboard and WebCT provide both ASP hosting and licensed software. While Blackboard initially focused on post-secondary education, the company's product is now in use in many K-12 schools. Blackboard reports that 17% of its total 2001 sales were to K-12 and projects that the figure will rise to 22% in 2002. Blackboard was originally created as an off-the-shelf stand-alone CMS, but has now expanded to include hosting, student services, portal, and other features. Specifically, Blackboard is used by the Orange Unified School District and Poway Unified School District in California.

WebCT has an installed base in post-secondary education that is similar in size to Blackboard. WebCT is not currently as prominent in K-12 as it is in post-secondary education. WebCT is also now expanding to include a portal product and similar services. WebCT reports that it intends for its higher education clients to work regionally with its K-12 counterparts.

Jones Knowledge and eCollege are exclusively ASPs with a suite of internal services. Both offer full-service hosting; portal; and extensive services, such as registration, technical support, instructional design, and other services. Specifically, Jones Knowledge is used by the Florida Virtual School and by the Clovis Unified School District in California.

Several companies have formed to service multiple CMS technologies. There are two leading examples. One is Collegis/Eduprise, a North Carolina-based company that has agreements with CMS companies to offer hosting, training, and other services built around the CMS platforms. The other is Embanet, an Ontario, Canada-based company that provides similar services. In particular, Embanet specializes in student support, course development, and telemarketing.

The creation of a Statewide virtual school is possible for a State the size and complexity of California, but new support structures are necessary for the school to be successful.

The four K-12 CMS providers listed here by no means constitute the whole universe of solutions available to K-12 for course development and distribution. These products and services have their roots in higher education and are designing their systems specifically for K-12.

It should also be noted that CMS products link in their systems the creation of course content and the delivery of that content. This creates a situation in which content created in one system is not immediately "portable" to another system.

The point of view of this report is that the current CMS products offer the best solutions today for quick and scalable entry into the VHS market. Over time, more systems designed specifically for K-12 are likely to be developed. Such systems will operate portable content solutions, and course content repositories. Likewise, changes to the user interfaces and student experiences are likely to change as the number of users dictates the way in which education will best occur using distributed technologies.

3.5 The State of Technology: Building a Systems Approach

There are gaps in the technology and gaps in the research and assessment of online learning programs. We have enough experience with course development to determine what structures support a Statewide approach and what structures need to be developed. The creation of a Statewide virtual school is possible for a State of the size and complexity of California, but new support structures are necessary for the school to be successful.

Available technologies

The following elements have been adequately addressed for the complete delivery of courses:

- General course development and course management tools
- General student registration systems
- General educational portal development

These components allow programs or courses and resources to be assembled and for virtual teaching or classroom support activities to occur. However, these elements generally do not inter-operate well. This means that these systems can scale to a certain number of users but will need other components or more development to go further.

Not Yet Available Technologies

The following elements have not yet been adequately addressed for enterprise delivery:

- Course repositories separate from the course creation/management software
- Independent course authoring systems that also classify learning content
- Ability to redesign user interfaces of courseware products for different users
- Ability to integrate textbook content or assessments into courseware products
- System to catalogue, search, and name courses/ resources that is generally accepted
- Ability to license certain courseware products on a Statewide basis

These elements need to be present to have a fully online system that can fulfill the entire needs of an educational infrastructure. In many cases, aspects of the items above are under development. However, development of these components is not coordinated by the companies or entities addressing the unmet needs. Large State operations could quicken the pace of development of each element and create an environment for a general ability to integrate all of these elements.

Layers of Technology

Operating a virtual education organization with 5,000 students is fundamentally different than operating one with 50,000 students. Most of the virtual education technology has come to K-12 after being developed for colleges and universities. Only a few colleges and universities have more than 50,000 students. However, there are numerous school districts, county offices, and States that have many times this number of students and much smaller budgets per student. The question, looking into the future, has to do with handling numbers of this size, which would require much more sophistication than simply buying one course management system.

Course management systems that allow for the rapid development of web-based courses, the easy distribution to student and teacher populations, and the management of the virtual class have become very popular. These systems have allowed courses to migrate to the web and enable synchronous (live) and asynchronous communication on the web in threaded discussions. They have done so at the expense of rich instructional design and rich media that resemble earlier CD-ROM learning and course materials. These systems have also evolved in such a way that it is difficult to remove course materials built in one system and migrate them to another. One day, however, course content will be fully portable. Today it is not.

The question of scale and the question of complexity have to be considered in any virtual education operation in California. An examination of the enrollment numbers and growth nationally would suggest the demand for virtual education is going to be high.

The technology layers become important to this report because of the numbers of students, teachers and administrators that any system would serve over time in a State as populous as California. Together, these network, hardware, and software solutions constitute a full "system."

Layer	Example
Network Technologies	Cisco
Hosting Technologies	Sun
Database Technologies	Oracle
Administrative Systems (ERP)	People Soft
Student Information System (SIS)	SCT Banner
Course Management Systems (CMS)	Blackboard
Learning Management Systems (LMS)	Saba
Learning Content Management Systems (LCMS)	Theorix
Digital Libraries	CA Digital Library
School Portals	Campus Pipeline

The layers are not going to be discussed in detail here. However, the only layer that has had systematic attention in California is network technologies. A majority of California schools (80%) have relatively large bandwidth (T-1) connectivity to the school. This does not mean that the level of connectivity is present in the classrooms, but it could be. Likewise, the Digital California Project (DCP) has brought a high-speed private network to nearly all of the county offices. The only other layer that has substantial activity is hosting, whereby servers have been sold to various educational institutions. Numerous student information (SIS) and administrative systems (often referred to as Enterprise Resource Planning or ERP) are in use, but many are not designed for use on networks.

While a small to medium-sized school district could manage without the full layers of the infrastructure, or with far less capacity, a large district could not. Likewise, small county offices, which are generally equipped to handle the distribution of bandwidth, can handle the technical layers but are not configured to handle the teaching and learning course activities associated with virtual education. The question of scale and the question of complexity have to be considered in any virtual education operation for California. An examination of the enrollment numbers and growth nationally would suggest the demand for virtual education is going to be high.

Missing Components

There are several issues that have not been given much attention but do need close scrutiny in order to operate a large-scale system. Today, full systems do not exist that can handle the complete management of programs, courses, resources, and services. Additionally, while digital library structures can house content, housing multiple elements that can form more courses is a different demand.

Course, Content and Resource Repository

Today, most courses are built as a single course at a time and they are housed in the course management software that created it. In the future, course components can be built separately, outside of the delivery platform, and then managed separately. Such an arrangement allows for one curricular effort to yield numerous course offerings, including college preparatory courses, remedial courses, and teacher education programs. The prevailing technology for authoring and storing does not handle this problem effectively. To help solve this problem, both corporate and higher education eLearning specialists are developing "learning objects" with defined rules and standards to determine where they are stored, how they are called up, and how they are assembled. Such systems are called learning content management systems (LCMS) or learning object repositories (LOR).

For more information about learning objects, see Appendix C.

Business Rules Engine

If courses, content, resources, and services are stored as learning objects, questions arise concerning what circumstances are required for someone to get access to the material, and who controls those who can alter the rules or the content? Business rules engines do exist that are able to inform a system who can do what with specific content. However, such systems need be further developed in order to be effective within education.

Transaction Management

A "system" must have the ability to transact a variety of different types of business transactions through an e-commerce model. The software that provides this secure system would have to be integrated with the business rules that assign transactions to the system that can be tracked, audited, and dispersed to the appropriate providers. Such systems are in place in the larger State virtual high school programs.

Common Course Specifications/Standards Adherence

As virtual education scales up, standards become increasingly important. Standards come in a variety of forms.

For more information about standards, please see Appendix D.

Curriculum Standards

State curriculum standards must be integrated into online courses in a similar mannner to that of face-to-face courses. If this can be done inside the instructional design of online courses, and made available in searches for approved curriculum and resources, it will greatly enhance the virtual education movement. The instructional design of online courses should be aligned to State standards so they can be searchable for both online courses and for use as a teacher resource. For example, a biology teacher looking for a new way to present cell knowledge would be able to search the virtual courses to find units and lessons that are already part of the virtual school system. Many software and web-based programs can assist in aligning with standards.

Technology Standards

Standards bodies are working on standards for how online course components can be meta-tagged for classification and retrieval automatically, according to search and assembly commands. These standards will lead the way in moving content from one proprietary environment to another, or between a textbook publisher and an online course management product.

Content Standards

Content standards are being developed that meet the Instructional Management Systems (IMS) Global Learning Consortium and the Sharable Content Object Reference Model (SCORM) standards. Additionally, content standards will evolve by subject and discipline.

Interoperability Standards

The Schools Interoperability Framework (SIF) is in place to assist disparate technologies inter-operate with each other.

Access Standards

Accessibility is a key component of online courses, and discussed more fully in Section 7.9 and in Appendix M.

New Developments

A number of developments are underway to address system deficiencies. Among them are:

- **Course Repositories:** Possibly in the next year, it is likely that course and resource repositories that are separate from the course management systems will appear on the market and be utilized by one or more large State operations. This development will allow courses created using different authoring tools, or developed in different course management systems, to be held in a common data structure that will include naming protocols for easy searching.
- **Interoperability of Course Management Systems:** Possibly within the next year to year and a half, the primary course management system vendors will adopt "web services" models that allow their software to interoperate with other solutions, content and technology solutions. This reduces the need to rewrite the computer codes of these systems to make an integration of technologies possible. This development is in an early implementation in Blackboard's "Building Blocks" program and is under development at both eCollege and WebCT.
- **Publishers Textbook Content**: Possibly in the next two years, publishers will begin to make more of their core content digital and available inside the course management systems to be linked when online courses are developed. To date, these systems are only in their infancy. This development will start to show up more prominently when a State insists on both digital and physical book delivery.
- **Better User Experiences**: At present, most course development is in static text-based HTML pages with static images and occasional streaming video and audio. This form of eLearning is convenient, but not very stimulating. As the web services model and Extensible Markup Language (XML) take hold, more flexibility will be available inside user interfaces and user experiences. Additionally new software products and services will increase the opportunities for online courses to be more interactive and include more multimedia elements.
- **Certain models may work better for creating large numbers of courses and serving large numbers of students**. Hybrid models, such as combining the programmatic model with the technology-driven model, may work best for a large agency that needs to both develop and deliver courses but is required to catalogue and take in courses from different sources. A combined model may present the most opportunities for insuring that the right central curriculum is developed and that the right diversity of offerings is present.

For a list of commercial vendors in eLearning, see Appendix E.

For information related to server solutions, see Appendix F.

NOTES FROM THE TRENCHES: LEASING ONLINE COURSES

The Florida Virtual School (FVS) has become confident enough in the soundness of their courses that they are leasing them to other school districts across the country. Of course, they are not alone in this arena.

Courses May Not Align with State Standards

At the Fairfax County Public School Online Campus (FCOC), for instance, Director Sandy Todd explains that "none of the courses (from outside vendors) match our Virginia Standards of Learning (VSOL)."

Todd says FCOC is in the process of creating biology, chemistry and geo systems, adding that "nobody outside Virginia teaches geo systems. You have to have these VSOL tests; you can't have courses not doing that. This is why we are creating our own courses, and these are all basic courses that our students have to pass on VSOL tests in order to graduate starting in 2004."

Clark County, Nevada School District's Cyber Schoolhouse had a similar experience when it purchased a class from an outside vendor. "We bought an AP econ class, but we were not real happy with it," says Kralene Lee, acting director of technology innovation.

Corrective Actions

FVS's Director of Curriculum Sharon Johnston mentioned that in the past FVS had leased "a few" classes "that were not quite ready," adding that one school was willing to take a FVS pre-calculus class while it was still in beta. "We have this rule now that we don't lease classes in beta," says Johnston. "This is a very good rule. We also don't license every one of our courses. We have gotten a better picture of how to look at what we license. We have a standard sheet and checklist. We have a process in place now that we did not have in the fall of 2000 for licensing a course."

MOLLI Launching in the Fall

In the State of Mississippi, Coordinator for Professional Development for the Statewide Mississippi Online Learning Institute (MOLLI) Betty Lou Pigg was in charge of leasing courses that will debut for the first time this fall when MOLLI officially kicks off.

"We had an RFP for courses," says Pigg. "We brought in teams of teachers and some people who have taught online previously and we reviewed courses." What was the outcome? "Basically, we are doing a couple of things. We are leasing some from FVS. We are developing some of our own courses. We are working with Kentucky, Illinois and Alaska because they are all on the eCollege platform, and we are sharing courses with them. We are also looking at courses from Intelligent Education, Inc. (based in Atlanta)."

Pigg adds that the Mississippi course review team utilized the Southern Regional Education Board quality indicators for Web-based courses as guidelines during the review process.

A Word About class.com

Lincoln, Nebraska-based class.com is one of the leading privately owned companies providing customized online course content and teacher training to schools across the country. (Apex Learning is another. For more information about Apex, see an article about online Advanced Placement at http://www.edpath.com/ap.htm.) According to class.com President and CEO Katherine Endacott, class.com has programs in 22 States that, combined, are being offered at 4,462 high schools through either the States themselves, intermediate providers or through school districts. The company (which started its licensing program only one year ago) offers licensing agreements on 42, "soon to be 45," courses that schools can pick and chose from.

"We have school districts in California that are talking to us," says Endacott. "We have a sales person there that is active. . . We are working with local districts to do their needs assessments and to help them find ways to move things along as quickly as possible. We are not, frankly, waiting for State initiatives."

Endacott adds that districts can't wait while "political winds blow in different directions. . . the teachers have to figure out how to help kids right now."

One example of a school district that relies heavily on class.com is Plano ISD eSchool, which offers 15 class.com courses out of its current total offering of 21 classes.

"The class.com courses we are using have worked well for us," says Jean Parner, eSchool administrator. "When Plano eSchool began, all of the courses offered were purchased from class.com. The curriculum department reviewed each course to determine whether or not they were aligned with both the TEKSD/TAKS and the Plano ISD learning course learning objectives. Some of the courses were then offered for credit and some for enrichment. We are in the process of developing courses in house."

Thus far, Plano ISD eSchool has internally developed and currently uses English 4, semester 1 and 2; Economics; Health; and World History, semester 1 and 2; with more to come.

4.0 Introduction: Existing Online Education Programs

A large K-12 online education movement is accelerating across the country through the concerted efforts of school districts, individual public and private schools, large State-funded entities, for-profit providers of classes and training, educational software and support services companies, university-operated educational programs and research initiatives, federal grants and programs, and State legislation.

4.1 Models of Online Education Programs

Clark (2001) has identified several different models used by online learning programs. These include:

- **State level:** There are an estimated 14 online programs sanctioned as Statewide programs by their respective State governments. Florida Virtual School and Kentucky Virtual High School are two examples. In this model, initial funding typically comes from the State, and the virtual school plans to recoup some or all operating costs through charging schools or students for taking online courses.
- **University-based:** A number of post-secondary institutions have made their introductory level courses available online to high school students. Additionally, university-operated high school independent study programs, typically provided in correspondence/paper & pencil modes, are rapidly being converted to web-based teaching and learning environments. The University of Nebraska (UNL) Independent High School is a prominent example. UNL currently provides both online and paper and pencil courses. Several years ago UNL spun off the now independent for-profit online course provider company class.com. Other examples of university-based operations moving to web-based teaching and learning environments include Brigham Young University's Independent Study Program, as well as independent high school programs offered by the University of Texas at Austin, Indiana University, University of Missouri-Columbia and the University of Oklahoma. Funding may come from a variety of sources, including foundation grants, State funding, and charging students or schools.
- **Consortium and regionally-based:** Concord Virtual High School, now VHS, Inc., is a leading example of a consortium model. At VHS, Inc., for example, schools pay an up-front fee to enroll in the consortium, which covers training a teacher and a local support staff member. Individual teachers then teach one or more courses of up to 20 students each. For each course taught, their school is able to enroll 20 students in other VHS courses at a low fee.
- **Local education agency-based:** Public school districts often create virtual programs to meet needs that individual schools are unable to accommodate, such as offering Advanced Placement courses. Examples include both rural districts and urban areas, such as the Houston Independent School District's Virtual School.
- **Virtual charter schools and private schools, including corporate-owned schools:** Numerous online schools have been created as charter schools, in order to take advantage of the exemptions to some regulations allowed to charter schools. A smaller number of private online schools have been established as well.

Specific examples of models most applicable to California are detailed in the following sections.

4.2 State Level Programs in Other States

These efforts are recent, brought on by a combination of budget surpluses, maturing technologies, growing needs in school systems, and successful implementations in higher education. Several State governors took the initiative over the last four years to establish virtual schools to augment or replace traditional physical education in their States. These programs have generally provided courses for credit, but not diplomas, to students and education facilities in the State. In some cases, these programs marketed those services outside of the State to create a revenue stream. In some ways, these efforts have combined the dot-com spirit with sound educational

principles. Some Statewide initiatives have been establishing State high-speed networks, where robust delivery technology is put in place prior to, or concurrent with, the development of Statewide curricular programs.

Florida Virtual School (FVS - www.flvs.net)

During 2001-02, FVS, the first Statewide virtual school funded by a State, according to Clark (2000), served 8,200 enrollments in 62 courses. FVS was started in the 1997-98 school year and has grown steadily, with total funding over the past five years of approximately $23 million, and funding for the current fiscal year at roughly $5.7 million. Because of the high level of State funding to date, courses are offered free of tuition to in-State students, and demand at FVS far exceeds the supply of course seats. To address equity issues while demand exceeds supply, FVS gives registration priority to students from low-performing schools and rural schools that do not offer honors and/or AP courses. FVS also allows students from out of State to take its courses, charging $650 per course (non AP) per semester. Additionally FVS is currently licensing courses to other online programs. FVS has an administrative staff based in Orlando and employs full-time teachers to teach the courses. By next year, FVS hopes to add middle school and adult education courses. FVS uses the Jones e-education course management system and has developed its own courses.

FVS originated with bipartisan support at a time when the governor and the Florida speaker of the house were from opposite parties. The State Department of Education was brought into discussion early in the development of FVS. The idea that FVS would be a service agency for the State's education needs developed early, and the program has grown into this role quite firmly. It would be improper to characterize FVS as part of the State education hierarchy because the mission of the FVS is to supply students with courses and programs that cannot be delivered efficiently or effectively by the Florida counties, districts, or schools.

FVS can be requested by students as a replacement for physical, school-based education; to serve home schooling needs; or to augment, supplement, or support school-based education. A nearly full curriculum is coming into existence. The courses are developed and coordinated by FVS, and the components may be built in different parts of the State. FVS is a distributed organization both in course creation and service delivery. The regional officers, for example, meet by phone and e-mail conferences on regular schedules and have, in a short period of time, established a recognizable sense of mission and spirit of operation. To listen to the regional officers is to hear of a new role in educational support and services.

The regional officers are the ambassadors and the public relations force of FVS. These individuals, most of whom were teachers, introduce themselves to school districts and explain their programs. Statewide PR and other efforts have made FVS known to parents and students throughout the State.

Schools recognize that FVS may have a course that is not offered in their school. This could be a course provided to fill in a scheduling conflict, or an Honors or Advanced Placement course that the school does not currently provide. Contact would be made with the regional representative who would explain the course offerings and requirements. Likewise, a student (or parent) may identify a course that they want to fulfill a requirement or a particular interest. In both cases, the school's principal and the school's counselor must give sign-off approval for attendance at FVS. Additionally, FVS has a full staff of counselors.

FVS courses and services remain free to Florida students. The initial grant of funds by the legislature contemplated a sunset of State funding in favor of self-sustaining revenues from sales of FVS courses to other States, school districts, or schools. While it seems unlikely that this funding source will support the increasingly popular FVS in Florida, the program is an accepted part of Florida's educational landscape.

Illinois Virtual High School (IVHS - www.ivhs.k12.il.us)

IVHS grew out of a concern from within post-secondary institutions about the readiness of students to achieve success in higher education. A group that included small and rural school associations, the State Board of Education, the governor's office, community colleges, State teacher associations, technology representatives, and others began to meet in November 1999. The governor's office soon supported this project, and the governor called for the creation of IVHS in early 2000. It was decided that oversight of project should be under the Joint Education Committee composed of the governor's office along with the chairs of the governing boards of three education agencies. The State education agency became the governing body, and a strategic plan was developed and presented at a July 2000 meeting of the Joint Education Committees. There has been no legislative authorization for IVHS, which operates within the State Board of Education.

IVHS became operational in January 2001, with a pilot of 16 courses, 33 schools, and 97 students. In Fall 2001, the program expanded to 69 courses. Total enrollments to date have been 401 course enrollments, plus 2,750 AP review enrollments.

Funding has included an initial planning grant of about $20,000 from the State board of higher education, then a State appropriation of $250,000 in FY 2000, and roughly $550,000 in FY 2001. For federal FY 2002, IVHS was able to receive $1.5 million in federal funding through an appropriation supported by House Speaker Dennis Hastert. Between ongoing State funding, grants, and federal funding, IVHS hopes to have between $2.5 - $3.5 million for 2002-2003.

IVHS originally set goals to serve a client population to include any Illinois resident, with priority to secondary-age students, including private school and home school students. Equity of access was considered a major objective of the program. Its three guiding goals were to create course equity access for students, professional development for teachers, and the integration of technology with content.

IVHS charges $300 tuition per semester, to be paid by the school, which, in some cases, passes along the cost to students. IVHS allows schools to pass on the $300 fee but does not allow them to add any surcharges. Schools sometimes charge students the fee when the course is not related to graduation requirements or admission to public universities, or when the school offers the same course.

IVHS operates with a full-time staff of about five people (some are with other organizations while working primarily for IVHS, so the exact number is difficult to define). About 50 teachers are under contract to develop and teach courses (mostly teaching). IVHS also uses services provided by eCollege fairly extensively. They have identified a need for an additional three staff people as they scale up. The program is contracting with universities to develop professional development courses. In the near term, professional development courses will specialize in online learning and technology, but over time, courses related to classroom teaching will be added.

IVHS works closely with local schools, who must provide an administrative contact who approves the course enrollment, acts as the liaison to the school, and deals with any credit issues that may arise. The local school must also provide a support coordinator for online students within the school and a technology contact who can troubleshoot any technology problems.

Courses are developed using teams that include design, standards, content, and assessment experts. Courses have a set start and end date, although IVHS is thinking of going with two unique schedules because schools in the north start and end later than schools in the southern part of the State. At this point, the program does not want to get into open entry and exit or self-paced courses.

To deal with disability accessibility issues, IVHS meets the standards promulgated by the State-assisted technology project, following ADA standards for accessibility. Regarding accessibility of computers and Internet access, IVHS has decided that it is not a "boxes and wires" program that can attempt to extend the reach of technology, so it relies on schools, homes, or libraries to provide the necessary computers.

Kentucky Virtual High School (KVHS - www.kvhs.org)

KVHS, which offers approximately 40 courses and enrolls roughly 750 students annually, has a budget of about $400,000 per year and charges tuition of $275 per semester for a fully online course. KVHS works closely with Kentucky's Commonwealth Virtual University, sharing some services in order to keep costs down. KVHS uses the eCollege platform and originally used some courses developed by class.com. Currently, KVHS is developing most of its courses.

KVHS was developed in 1999 as a program within the State's Department of Education largely as a result of interest from Governor Paul Patton. At the start, KVHS was given a $500,000 budget and three staff positions; this appropriation has dropped recently by about 14 percent due to State budget constraints. Additional funds included grants specifically for AP courses.

Students who desire AP courses and are unable to get the courses in their physical schools have been a key audience for KVHS. Other target populations include students not achieving well in traditional schools. KVHS is meant to supplement existing schools and not compete with them. In a recent addition to KVHS courses, the online program is now offering its content to teachers who are using it in their physical, face-to-face classrooms.

KVHS courses are taught by Kentucky-certified teachers, which helped to win support from the teachers union. KVHS uses part-time teachers to teach the courses, although eventually the program staff would like to add some full-time teachers and have a mix of full-time and part-time teachers. Current teachers include some who teach full time in districts throughout the State, and some who were retired from classroom teaching jobs.

KVHS requires that the local school provide a contact person to facilitate the KVHS process for the student and to be a contact for KVHS. Schools are also expected to supply the student with a computer, Internet access, and an appropriate setting to work online. Schools must also agree to grant credit to their students who take a KVHS course.

KVHS has also used course content from Intelligent Education and APEX Learning. The combination of APEX courses created in the Blackboard course management

system, with eCollege as the main KVHS platform, has presented some challenges. KVHS is increasingly developing its own courses, using teams of teachers and, in some cases, university consultants as content experts. These courses are constantly evaluated and improved. Courses are scheduled with some flexibility in order to accommodate students with different schedules, and students may work at their own pace if approved by the local school.

Michigan Virtual High School (MVHS - www.mivhs.org)

MVHS is another example of a State-funded, Statewide online program. MVHS was funded at $15 million over three years FY 2001 and $1.5 million ongoing in FY 2002-2003. MVHS has a current annual course enrollment of approximately 1,000. Michigan charges students $335 per course, per semester, and also has a district membership model where districts purchase 60 seats in any class at a reduced rate, which is based on the size of the district. Similar to Kentucky, MVHS is closely tied to a virtual post-secondary institution - in this case the Michigan Virtual University (MVU).

MVU, the parent organization, is organized as a 501c3 non-profit corporation with a very influential board in the State. MVU is free to make many of its own operational decisions without board approval. MVU now has five business units that form a comprehensive online State initiative in support of life-long learning: corporate learning centers, career tools, training courses, higher education and virtual high school.

The origins of MVU are with the Michigan Virtual Automotive College (MVAC), an initiative of James Duderstadt, then president of the University of Michigan, to bring college degrees to automotive workers and their families. MVU came about when Governor John Engler secured $30 million dollars in State gaming money for virtual education and training. The State was early to recognize the need and the benefit of having top educational and training resources in the State, at all levels. For example, training on technology was a large push, not only for teachers, but for re-training many State residents. Training courses were secured en masse from companies such as NetG.

MVAC appeared to compete with the State-funded universities structures in Michigan and, therefore, the universities were not in favor or supportive of the effort. Fortunately, MVAC recognized these problems and altered the direction of the program. Instead of having a competitive stance with the colleges and universities in the State, MVU was established. The purpose of MVU is to make partners out of the higher education institutions by providing products and services to get all of the colleges, community colleges, and universities "in the game."

Statewide licenses for the Blackboard software were procured and provided, along with training, to all interested Michigan institutions. Accompanying this, an online catalogue is maintained by MVU, all of this free of cost to the higher education facilities. There are now over 500 participating faculty members with 100% penetration on the State's campuses. There is also a collaboration of community colleges where courseware and courses are shared, again supported by MVU. Common tuition rates and infrastructure have been agreed upon between the community colleges.

The core funding for MVHS came from an $18 million allocation from the State budget advocated by Governor Engler. MVHS has a number of components with different funding mechanisms. One of the most ambitious programs is a provision for every teacher in the State (86,000 teachers) to have a laptop computer. The State, as a result of a good year for State revenue, was able to put a line item in the budget to cover the computer expense. Five vendors qualified as the laptop suppliers, and MVU oversaw the distribution and training.

MVHS started by building courses centrally to supplement regular education delivery. The organization created 40 courses with special course-building teams and MVU's dedicated course-building team. All courses were created to a design standard based on the research and pedagogy of a group of experts in curricular formation. MVHS creates its own courses in Blackboard, imports courses from class.com and from APEX Learning. The focus for MVU was to build a system with products, services, sales and marketing.

MVHS positioned itself as not competing with existing schools, and not seeking to eliminate teaching jobs. Thus, it was able to win the support of the Michigan teacher's union (MEA). MVU worked carefully with the union to have a united front. One of the benefits, a carry over from MVAC and the MVU corporate training, was a program to provide computer skills training free of charge to Michigan's teachers.

For high school students, MVHS provides a battery of testing products. For example, MVHS provides a college suite of test products from SAT that cover Michigan's high school exit exam. High school students with high scores on the exit exam win up to $2,500 toward college education in the State. Ten thousand 11th graders take the State exit exam.

Additionally, the Michigan legislature is considering making it mandatory for all high school students to take at least one online course. The reasoning behind this legislative initiative is that students, as they become working adults, will have to take online courses as part of

their routine of continuous education for frequent job changes.

West Virginia Virtual School (WVVS - http://virtualschool.k12.wv.us)

West Virginia has embraced the lessons of virtual education in other States and codified them in a Statewide, legislative-driven program that primarily uses 3rd party, vendor-supplied courses from Course.com, APEX, FVS, and other course providers. The State also works in public-corporate partnerships to achieve results more quickly and cost-effectively.

WVVS was created on July 1, 2000 within the West Virginia Department of Education to offer high quality educational courses through Internet technology to students in West Virginia public schools. WVVS offers required courses in English, mathematics, science, and social studies. Advanced Placement courses are also offered and are among the most requested services of the school. Additionally, elective, enrichment, and remediation classes are available, including several information technology (IT) courses. A variety of upper-level mathematics and foreign language courses are also available. Distance learning courses are used when curriculum content cannot be delivered because there is a shortage of certified personnel, a need to provide low-incidence courses, a need to offer a course while the teacher/facilitator renews course-related skills, or any other validated student need to access technology-delivered courses.

At the WVVS website, students may access the course catalog for a description of approved courses, pre-register to request courses, and register online for courses when approved by their local school. Each school has a contact who facilitates enrollment. The county superintendent designates a distance-learning contact at the school level to ensure virtual class information is provided to students and parents; any necessary affiliation agreements with the course provider are secured; that the course facilitator has been identified; and that any other duties are completed, as necessary, to provide student access. The local education agency is responsible for establishing specific uniform procedures for evaluating pupil progress and administering a final grade based upon provider guidelines and county policy. With the Statewide technology installations in public schools, students should have access to virtual courses at school. When available, student access may be authorized at other equipped locations, such as public libraries, community learning centers and homes. The school distance-learning coordinator is responsible for assisting students in finding solutions for access.

Hawaii (http://atr.k12.hi.us/eschool/index.shtml)

Hawaii's Department of Education operates an Advanced Technology Research Office that has received a US Department of Education Challenge Grant. In its third year of funding, Hawaii's eSchool provides virtual education to augment and enhance existing school-based education and to provide alternate delivery of courses and resources. The department is also developing and operating a virtual magnet school for the sciences and technology. A secondary school has spun off from the eSchool. This is the Hawai'i e-Charter School. In response to the need for a fully virtual school, some of the staff established the charter school to serve students that are having difficulty in the normal school environment because of under-performance or lack of a challenging environment. Students can receive their entire high school education and diploma from Hawaii's e-Charter School.

4.3 Consortium-Based

While there are virtual school consortia in several states, VHS, Inc., (www.govhs.org) is the leading nationwide high school online education consortium. VHS member schools typically provide a teacher and a course to the VHS course catalog. In exchange, member schools may enroll a set number of their students in VHS courses. The school also pays an annual fee to VHS. The advantage to this model is that the school is able to offer a much larger range of courses than most programs can develop on their own.

VHS was originally part of the Concord Consortium, a nonprofit educational research and development organization based in Concord, MA. Recently, VHS was spun out as a separate nonprofit organization focused on the operations of the virtual high school. Original funding came from a 5-year, $7.5 million federal Technology Innovation Challenge Grant. In Spring 2002, VHS was offering 132 courses to 2,000 students.

VHS charges two types of fees to member schools: annual membership fees and teacher/site coordinator training fees. These fees cover central administration, registration, server management, and all the other operational aspects of VHS. The membership fee is $6,000 per year for schools offering one course, with additional courses charged $4,000 per year. Each course offered by a school entitles that school to 20 student seats in both the fall and spring semesters. Training fees are $3,500 for the teacher, and $1,500 for the site coordinator. Consequently, the direct per-student cost of a VHS course is $150 per semester, but this cost does not include the training fees for the teacher

and site coordinator. In addition to membership and training fees, the school must provide release time to the teacher to teach the course and to the site coordinator to act as the local support person for the school's students. Schools that wish to participate in VHS as student-only schools can enroll 10 students per semester on a trial basis for one year at a cost of $8,000.

4.4 Regional or Local Education Agency Based Outside of California

Individual county offices of education, school districts, and other regional educational bodies have created online education offerings as extensions of having technology available to the schools and to meet specialized needs of learners and teachers that are not being met by traditional education. Counties or school systems across the country have launched and justified their systems based either in experimental test beds, that have gone on to provide durable services, or they have started with the intention in mind of being a full service entity. For example, the Fairfax County Office of Education in Virginia runs a program to meet a range of unmet needs, from homebound students to teacher education. Gwinnett County Office of Education in Georgia has a made a commitment that virtual education is a component of county education and runs a system devoted to high school education and teacher training online.

4.5 Virtual Charter Schools

In districts and counties where virtual education is not being offered or is not being offered at the levels of quality or curriculum desired, virtual charter schools have come into existence. Two examples are the Choice2000 School (www.choice2000.org) of the Perris Unified School District (CA) and the Hawaii eCharter school (http://echarter.k12.hi.us/). Both schools accommodate learners who do not fit into the traditional school setting. Students in these programs tend to be high achievers, low achievers, home-based or hospital-bound. Choice2000 is a unique virtual school that is a charter closely aligned with its home district. It teaches synchronously and holds regular school hours.

4.6 For-Profit and Non-Profit Corporations

A number of companies, with a variety of origins, are in business to supply virtual education either on a course-by-course basis or as a school. Schools such as the for-profit K12 (www.k12.com) are organized to replace the classroom education with a virtual education. William Bennett, former Secretary of the Department of Education, heads K12 with the intent of providing reliable education to concerned parents. Apex, Inc. (www.apexlearning.com), another for-profit corporation, provides Advanced Placement and Honors courses to school systems that don't have the courses.

A number of the virtual high school operations are formed as non-profit corporations. The VHS in Michigan, for example, is run as a 501c3 non-profit corporation. Where the mission is clearly defined, the non-profit structure allows these schools to operate with a single purpose.

4.7 K-12 Programs in California

In California, several different school districts have begun to offer online courses. Poway Unified School District in San Diego County has a virtual program that includes 14 online courses for juniors and seniors. Students meet with their teacher once a week during the first or last period of the day. The program allows students to also have a job. Clovis Unified School District in Fresno County utilizes five courses created and purchased from FVS. The program allows students more flexibility in their course schedule by meeting periodically on campus. Orange Unified School District has developed one online course in American Government that is taught to interested students. Several districts offer a combination of online and face-to-face courses. Other California-based virtual education programs are listed on the following two pages.

VIRTUAL K-12 PROGRAMS IN CALIFORNIA

LOCATION	ONLINE COURSE DELIVERY	COMMENT
California State University Dominguez Hills, Los Angeles area	The college webcasts high school biology course out to 25 different schools. Taught by a college instructor who has also taught high school. Includes some online components. http://dominguezonline.csudh.edu/	The college has a high school on campus. One model of CSU - K-12 interaction.
Clovis Unified, Fresno County	Use of Florida Virtual School courses. Extensive student laptop program in grades 6-12 where students use web enabled resources. Established CAL Online (Clovis Anytime Learning). www.cusd.com	The college has four to five courses and is creating two more with local teachers.
Contra Costa County, San Francisco area	Prior use of VHS, Inc., courses at Acalanes High School.	Discontinued use because of cost ($6,000 per school to belong).
El Segundo High, Los Angeles area	Taught and created VHS, Inc., web courses, as well as its own online course. www.genconnection.com/	Discontinued use in 2001 because of cost ($6000 per school to belong).
Fresno COE , Cyber High	CyberHigh - Computer-based courses with some content online. www.cyberhigh.fcoe.k12.ca.us/	Received a federal technology literacy grant to support these courses.
Imperial County, San Diego area	Use of UC College Prep AP courses, APEX and UC Berkeley courses. www.icoe.k12.ca.us/lt/	Throughout this county, the only foreign language offered to students at 14 high schools is Spanish.
Orange USD, Los Angeles area	Teachers have created their own online courses. Extensive student laptop program in grades 7-12 where students use web- enabled resources. www.orangeusd.k12.ca.us/ resourcetools/	Created government course only, pending legislation for ADA for online courses. Initiated legislation for online course ADA (AB 885).
Pacific Coast High School, Orange County, Tustin, California	Independent study courses online. www.pchs.k12.ca.us/eschool.html	County community school serving students in grades K-12 via contracted learning.
Perris Union High School District, San Bernardino	Choice 2000 Charter School. All online content synchronous via two-way cameras or television. www.choice2000.org	

VIRTUAL K-12 PROGRAMS IN CALIFORNIA

LOCATION	ONLINE COURSE DELIVERY	COMMENT
Poway Unified SD, San Diego	Teachers have created own online courses. www.learningpoint.org	Teachers have created 14 different courses. Meet with students face to face once a week.
Stanford University Education Program for Gifted Youth, Palo Alto	The Education Program for Gifted Youth (EPGY) is an ongoing research project at Stanford University dedicated to developing computer-based multimedia courses in mathematics, physics, English, computer programming and other subjects, and making these available to students of high ability in elementary and secondary school. http://www-epgy.stanford.edu/	
Sweetwater USD, San Diego, Chula Vista	Independent Study online courses. www.suhsdoptions.net/	
University of California College Prep Initiative, Santa Cruz	Offers online AP and Honors courses for districts that have limited access to college preparatory courses. www.uccp.org	

NOTES FROM THE TRENCHES: GOING TO HIGH SCHOOL AT THE UNIVERSITY

From the July 2002 Issue of Educational Pathways (www.edpath.com)

Higher education has been providing individual high school courses and complete high school diploma programs at a distance for a very long time via snail-mailed correspondence (called "paper and pencil" courses) to students who, for a wide variety of reasons, choose these viable, State-approved and/or regionally accredited alternates to a traditional bricks and mortar high school education. The University of Missouri-Columbia, for instance, started offering high school courses at a distance in 1911, and the University of Oklahoma started the same in 1913. Indiana University and the University of Nebraska-Lincoln began with similar programs during the 1920s.

Today, as the Internet drives change across a global educational landscape, these same higher education institutions have been quickly converting their paper and pencil courses to the online environment. They are also creating entirely new technology-enhanced and completely online learning environments for young students who have decided to wholly or partially opt out of their bricks and mortar high schools, as well as for adult learners seeking a flexible, more discrete way to earn a high school diploma.

Educational Pathways interviewed six leading university-based high school independent study programs being offered in both paper and pencil and web-based teaching and learning environments: Brigham Young University (BYU), Indiana University (IU), University of Missouri-Columbia (MU), University of Nebraska-Lincoln (UNL), University of Oklahoma (OU), and the University of Texas at Austin (UT Austin).

Online Enrollments on the Rise

Brigham Young University's Independent Study Program (BYUISD) offered through BYU's Division of Continuing Education is by far the largest university-offered high school independent study program in the nation. This past academic year 2001-02, BYUISD had more than 43,000 enrollments in 211 distance courses ranging from grades 7 through 12. In 1997, BYU started converting many of these courses to web-based, and they now offer 98 web-based courses. According to James Rawson, administrator for BYU's secondary education programs, enrollments in web-based BYUISD high school courses have grown from approximately 8,500 in 1999-2000 to 17,000 in 2001-02. Rawson expects the upcoming academic year will show an equal number of students taking web-based courses as students taking paper and pencil courses.

During 2001-02, at MU's "MU High School", which is part of the MU Center for Distance and Independent Study, enrollments totaled 14,481. Fifty MU High School courses were offered online, which is up from nine online courses first offered during the 1997-98 school year. According to MU High School Principal Kristi Smalley, the school's online course enrollments have increased from 437 enrollments in 1998-99 to 3,599 in 2001-02.

Other institutions are seeing less dramatic online learning enrollment increases primarily because they are in the early phases of converting their paper and pencil courses to web-based. UNL's Independent Study High School, offered through UNL's Division of Continuing Studies, began offering web-based courses in October last year and currently has 18 high school courses available online, with "several hundred" students currently enrolled in these courses, says Principal Jim Schiefelbein. UNL estimates to increase the number of web-based high school courses to 38 by this time next year and is currently developing a national campaign to market their online courses.

IU's School of Continuing Studies High School, which had about 6,000 enrollments in 2001-02, put 25 courses online beginning last summer and has about 342 online enrollments. "We wondered if we offer a course in two formats: online and print-based, will that increase our enrollments, or will we just divide the pool up?" asks IU's Joann Brown, executive director, marketing and communication. "We are finding that it does help enrollments; not dramatically, but they do increase."

UT Austin's K-12 program, offered through the school's Continuing and Extended Education Department, converted 48 paper and pencil courses since January 2001 and currently has about 300 online enrollments in its High School Diploma and Independent Learning programs. Plus, its University Charter School Online Campus had 650 enrollments during the 2001-02 academic year. UT Austin's programs are part of a five-year

continued on following page

plan, now at the beginning of its second year, to enhance and further develop its online learning offerings for high schoolers.

OU's Independent Learning High School (OUILHS) has been gradually converting courses to the online mode since 1998 but only recently started to place a stronger emphasize on its online courses. "It's been a pretty slow start for us," says Director Doyle L. Cavins. "Our emphasis up until the past six months or so has been on the college side." Nonetheless, OUILHS currently has 50 courses available online, with approximately 100 students taking courses over the web.

OUILHS is expected to grow through a stronger push to market itself through direct mail campaigns and more attendance at secondary school conferences. In particular, Cavins sees the market for independent virtual high school courses further developing in States with high drop-out rates, such as Oklahoma, New Mexico, Arkansas and Louisiana. "I see it doing nothing but growing over the next several years."

The Importance of Marketing

Indeed, effective marketing and promotional activities are frequently mentioned as integral keys to success in online education at any level. Strong marketing is one of a number of reasons why BYU, for example, has such high enrollments.

"Most of our students geographically are located from Colorado west, including Alaska and Hawaii," says BYU's Rawson. "But we are growing tremendously in other States like Virginia and Minnesota because we market heavily." Rawson and three other full-time professionals spend a lot of their time visiting school districts and State boards of education across the country to promote and ensure that BYUISD courses meet core requirements outside of Nebraska. "We cover every State," he says. "We go out and visit counselors, and we have a monthly letter that goes out to 3,000 high school counselors every month. We correspond with them, and we talk to them by phone."

At MU, where 50 percent of its student population is from Missouri, retired educators are helping to promote MU High School. "We have former teachers, principals, superintendents and cooperative extension agents go out and visit every high school in the State twice a year to stop and say hello to the counselors," says Von Pittman, director of the Center for Distance and Independent Study.

Who's Enrolling?

Independent high school student demographic information from all six institutions reveal a varied student population.

At UNL, Schiefelbein says the student body is evenly divided between males and females on average of 15 to 18 years old. "They could be performing artists, athletes, home schoolers, military dependents, or from missionary families. Other students are taking classes because of scheduling problems, remediation accelerations, they want to take courses that may not be available at their school, or they transferred and missed a sequence of a course and are trying to stay current with a class so they can graduate on time." Homebound students are another market segment, as well as adult learners who never earned a high school diploma.

"We have typical high school courses but atypical reasons why students are in our program," Schiefelbein concludes.

Regardless of who is attending university-operated independent high schools, all six institutions see their enrollments increasing steadily. Keeping up with educational technologies is high on their list of primary concerns, as well as maintaining a large enough staff to support students and beefing up their marketing efforts.

BYUISD is the strongest example of growth, having gone from 30 to close to 100 employees in seven years. BYUISD also recently upgraded its service staff from eight full-time employees to 24 full-timers. Rawson claims that 70 percent of students complete BYUISD's paper and pencil courses and 87 percent complete the web-based courses. "Counselors ask us to put more courses on the Internet," he says. "They tell us that the students like them better; they study better; they learn more; their grades go up."

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5.0 California Educational Landscape

The State of California includes just over 6 million public school students in kindergarten through high school, in 58 counties, contained in 1,048 school districts. At the high school level, there are slightly over 1.7 million students in 935 high schools throughout the State (Based on California Basic Educational Data System data - CBEDS - October 2000; the most recent data available.) Since 1996, the number of students in public schools has increased by approximately 100,000 students per year. According to the CBEDS data report, there are 648,564 additional students in private schools in California. This number has increased by about 8,000 students per year since 1996.

The State includes two different State entities that oversee the education of students in California: The California Department of Education (CDE), which is supervised by an elected State Superintendent of Education and the Office of the Secretary of Education (OSE), a position appointed by the governor. State education is monitored by the CDE. The OSE functions to advance and implement the governor's educational policies. At the local level, each school district has a governing board whose function is to hire superintendents, create district educational policies and approve courses of study.

A California educational landscape "snapshot" is provided in Appendix G.

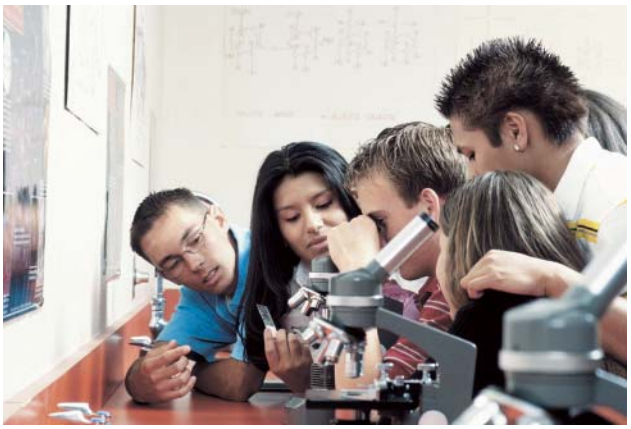
5.1 Education Administration

Statewide educational programs are administered at a variety of levels, including:

California Department of Education (CDE): Oversees all legislative and constitutionally mandated educational programs in the State, including school funding. The State superintendent is elected every four years.

Office of the Secretary of Education (OSE): Oversees the governor's education priorities. Often works in conjunction with the CDE.

State Board of Education (SBE): Sets Statewide policy specifically in regards to legislative-mandated issues, such as State testing and State content standards. The CDE implements policies/guidelines established by the State Board of Education. The governor appoints the majority of the members of the State board.



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Source: CBEDS data, October 2000

County Offices of Education (COE): Each county in California includes a COE. County offices oversee and support the school districts within each county. Included in this oversight responsibility is validating to the CDE that school districts have enough money to meet their expenses and verifying that constitutionally mandated programs, standards and staffing of schools are maintained. County superintendents are generally elected offices. Each county has a County Board of Education that advises the county superintendent.

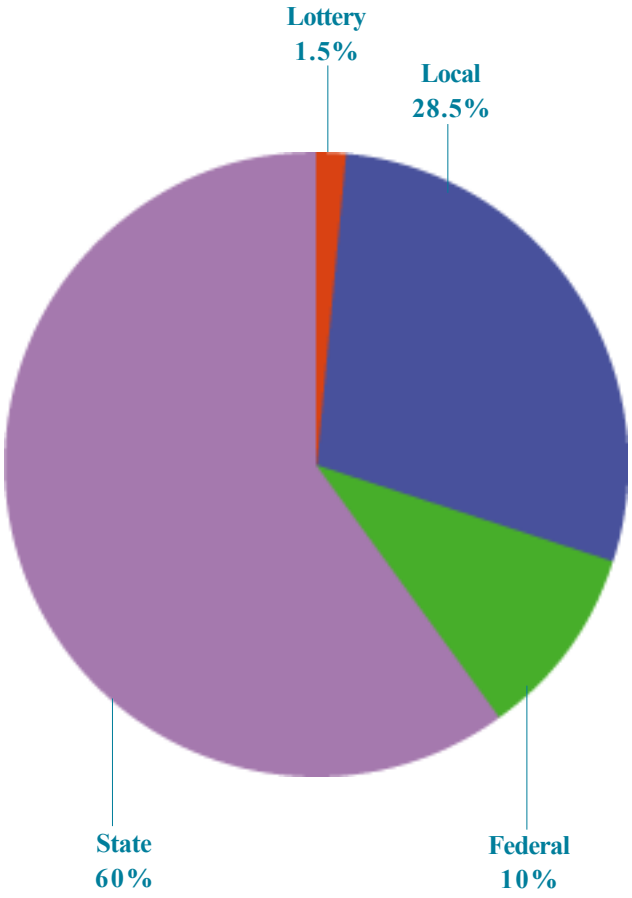
Local Governing Boards: An elected school board governs each school district in the State. School boards are responsible for hiring the district superintendent, overseeing the budget, approving courses of study, negotiating employee contracts, and all other policies that affect the education of students.

5.2 California Public Education Funding

Proposition 13, passed in 1978, caused a shift in support for schools from local property taxes to State general funds. Property taxes are still a part of schools' revenue limits, in varying amounts. The percentages of property taxes allocated to cities, counties, special districts, and school districts were set in 1978 and can be changed only through legislation.

According to the CDE Finance Department Report in 2001, K-12 funding is provided as follows:

- 60% from the State
- 28.5% from local sources (local taxes, bond measures, new construction fees, etc.)
- 10% from Federal Sources
- 1.5% from proceeds of the State lottery



Funding for K-12 Education

www.cde.ca.gov/resrc/factbook/edbudget.htm

Funding received from the State for educational programs by school districts fits into four broad categories:

1. **Average Daily Attendance (ADA) funding, allocated through seat time or independent study requirements (more on ADA below)**
2. **Lottery Funds**
3. **Ongoing allocations for a specific purpose**
4. **One-time allocations for a specific purpose**

Most funding for schools in California is based on Average Daily Attendance (ADA), and schools receive money based on the number of days that each student attends school. ADA funding varies across the State. California school districts are funded based upon a formula, which is the ADA times the individual district's base revenue limit. Average Daily Attendance is generated from the amount of time a student is actually in school. The base-revenue limit is calculated based upon an historical value that was in place before Proposition 13 (1978) and SB90, which established revenue limits in the State of California. Revenue-limit calculations and averages are based upon three types of districts: elementary, high school, and unified districts. Each of these three types has large and small districts according to student population (a small unified district is defined as a student population of under 1,501, and a large district is over 1,500).

During the 2001-02 school year, the base revenue limits per ADA, per district, were $4,089 to $6,294, and the State average was $4,595. In some years, the State has allocated "equalization funds" to bring districts up to the State average so that all districts receive the same amount of money per student. One other method of State funding allocations is based on the time value of the student's work through the independent study strategy. The State establishes a maximum percentage a district can receive through this method.

School districts also receive some moneys through the State lottery. Approximately $827 million of lottery funds are allocated to public schools each year based on school enrollment. This accounts for less than 2% of the total amount of money received by districts for educating students.

There have been State educational initiatives that allocate either ongoing or one-time funding to school districts, usually based on enrollments. Examples of ongoing allocations for a specific purpose include class size reduction funds, textbook/instructional materials funds, school library funds, and digital high school program funds. The amount allocated for each of these, although

established by State legislation, is dependent upon the State economy. One-time allocations occur from year to year depending upon whether State revenue has increased from the prior year. Past "one time" allocations for education include school building funds or AB 2882 funds that decreased the computer to student ratio at the high school level.

Proposition 98 funding guarantees education a certain percentage of funding from the State budget each year. This constitutional amendment, approved in November 1988, took effect in the 1988-89 school year. As amended by Proposition 111 in 1990, basically, this act has four provisions:

- Minimum funding guarantee for K-12 schools and community colleges
- Payment to K-14 education of 50% of the excess when State tax revenues exceed the Gann spending limit, with the remaining 50% rebated to taxpayers
- Annual School Accountability Report Cards
- "Prudent" State budget reserve

Proposition 98 may be suspended for a year by a two-thirds vote of the legislature and signature of the governor. Under Proposition 98, school revenues reflect the vigor of the State economy. When the State economy grew in the mid-1990s, school funding increased. In the 1998-99 State budget, the legislature for the first time approved more money for K-12 education than the Proposition 98 guarantee.

In addition to State funding sources, school districts supplement the State allocations with local developer fees, government grants, corporate grants, locally developed foundations, and fund raising.

Access to computers and Internet access are key issues in the planning and development of an online program. Fortunately, a number of technology initiatives have greatly increased access to computers and the Internet.

5.3 California Educational Technology Status and Initiatives

Access to computers and Internet access are key issues in the planning and development of an online program. Fortunately, a number of technology initiatives have greatly increased access to computers and the Internet.

The 2001 California School Technology Survey reports the following:

	2000	2001
Schools connected to the Internet:	80%	90%
Classrooms connected to the Internet:	58%	77%
Student/Computer Ratio:	6.97	6.37
Student/Multimedia Computer Ratio:	9.51	8.24

The current status of educational technology in California is the result of a mix of federal and State legislation, funding, and technology initiatives.

Key legislation, funding, and initiatives include:

- **Federal technology literacy grants:** Funding with a general goal to increase access to technology.
- **Digital California Project (DCP):** A multi-million dollar effort designed to build the necessary network infrastructure needed to prepare California's schools to take advantage of tomorrow's advances in network technology, administered through the Corporation for Education Network Initiatives in California (CENIC), a non-profit entity established for educational networking initiatives in California.
- **AB2882 (2001):** The Education Technology Grant Program for High Schools provided $175 million in one-time funding to reduce the student-to-multimedia computer ratio to 4.75-to-1 and provide hardware to access Advanced Placement courses online. Over 1,800 schools received 110,000 new computers under the program, which ended in 2001.
- **AB 598:** Established the Statewide Commission on Technology and Learning, appointed by the legislature and governor, and requires districts to submit technology plans to the State. The CTL is currently working on the Master Plan for K-12 Educational Technology.
- **California Learning Resource Network (CLRN):** Established to provide educators with a "one-stop" resource for critical information needed for the selection of supplemental electronic learning resources aligned to the State Board of Education academic content standards and linked to model lesson plans utilizing technology.

- **California Statewide Master Agreement for Resources in Technology (C-SMART):** Established to help schools acquire technology for teaching and learning at reduced rates. Resources available through C-SMART include hardware, software, electronic reference materials, instructional videos, and more.
- **Technology Information Center for Administrative Leadership (TICAL):** Provides a portal of administrative resources.
- **TechSETS:** Provides technical professionals in California schools improved access to training, support and other resources.
- **Digital High School Program (DHS):** Provides assistance to schools serving students in grades 9-12 so that these schools may install and support technology, as well as provide staff training.
- **California Technology Assistance Program (CTAP):** A regional technical assistance program that provides professional development coordination and services in education technology based upon local needs in each of the eleven regions in California.
- **California Student Information System (CSIS):** Established to standardize the electronic exchange of student information in the State and enable the accurate and timely exchange of student transcripts between local education agencies and to post-secondary institutions. The goal is that by 2004, all districts can electronically exchange information as students move to different schools.
- **California Public School Library Act of 1998:** Provides ongoing funding for school library resources (print and digital).
- **Library of California:** A Statewide program to provide equitable access to library materials and information resources for all Californians.

A full listing of federal and State legislation related to California educational technology is provided in Appendix H.

5.4 Education Funding and Online Education

A letter issued by the CDE on April 24, 2001 from Janet Sterling, Director of the School Fiscal Services Division, clarifies funding for regular school and for online classes in California. Following are excerpts from this letter.

"Online curriculum may be presented either in a classroom setting or through independent study. The appropriate method of attendance accounting for such classes is dependent upon the instructional setting utilized, not on the curriculum itself. Subdivision (a) of Education Code Section 46300 provides, in part:

"In computing average daily attendance of a school district or county office of education, there shall be included the attendance of pupils while engaged in educational activities required of those pupils under the immediate supervision and control of an employee of the district or county office who possessed a valid certification document, registered as required by law.

"Many schools provide an online curriculum in a classroom setting similar to all other class periods, except that, in some instances, the certificated employee acts as a 'tutor' or 'facilitator,' rather than as an 'instructor.' In this setting, a daily 'period' attendance form identical to that used in the other class periods is the appropriate attendance accounting document.

"Independent study is an alternative instructional strategy that may also be utilized to implement instruction through an online course. It is important to note that Education Code sections 51747, et seq. provide that the apportionment credit for independent study is made on the basis of the student's 'product' (study or academic work), assessed by a competent certificated employee of the district. Districts that opt to use the independent study strategy are advised to familiarize themselves with the requirements for independent study. These requirements are complex, and district compliance is rigorously audited in the annual audit required pursuant to Education Code Section 41020 . . ."

"It may be that individual students' programs consist of part classroom-based study and part independent study. Education Code sections 46110 and 46140 limit elementary and most secondary students to one day of apportionment credit in any calendar day. District procedures must prevent the claiming of any combination of classroom and independent study credits that would exceed one day of apportionment credit per day of instruction in the school's calendar. In addition, if the student is scheduled for at least the minimum day (in most instances, 240 minutes) of classroom-based study or, is assigned at least the minimum day's worth of instruction through independent study, then the attendance accounting for apportionment purposes can be determined solely from that predominant instructional setting."

5.5 Pending Legislation for Online Education in California

Pending legislation (AB 885) will give a definition for online teaching and allow school districts to receive ADA for up to two online courses.

For text of AB 885, see Appendix I.

The bill would:

A. "For the purposes of an online classroom program conducted over the Internet, as defined, in a secondary school, include as 'immediate supervision' pupil participation in an online asynchronous interactive curriculum, as defined, provided by certificated personnel, and would require schools that provide an online asynchronous interactive curriculum to meet certain requirements."

B. Allow ADA reimbursement: "A pupil participating in an online program pursuant to this section shall not be credited with more than a total of one day of attendance per calendar day or for more than a total of five days of attendance per a calendar week."

C. Allow districts to work with each other to provide online courses: "A school district offering an online course may contract with an other school district to provide the online course to pupils of the offering school district. Contract terms shall be determined by mutual agreement of the school districts."

5.6 Virtual Education in California

Virtual education activity in California falls into several categories.

- **Statewide Infrastructure Initiatives**
- **Statewide University K-12 Programs**
- **Teacher Education and Recruitment**
- **Online Course Development & Delivery**
- **Virtual Education in Schools**

Statewide Infrastructure Initiatives

California is one of the States that is providing high-speed private network bandwidth and access to the "commodity" Internet to educational and research institutions from grades kindergarten through college. Through the California Research and Education Network-2 (CalREN-2), which includes the public university systems (University of California, California State University, California Community Colleges) and leading private institutions (Stanford, Caltech), Internet2 bandwidth is provided to California's higher education community. Through DCP, the same bandwidth is brought to K-12 county offices of education, school districts and schools. According to CENIC, the organization that oversees CalREN2 and DCP, 80% of the public schools in the State have T-1 connectivity.

Statewide University K-12 Programs

Currently, there are no Statewide virtual high school operations. Statewide online programs include UCCP, which delivers AP and Honors courses to schools that cannot provide them, and Stanford's Educational Program for Gifted Youth (EPGY) (http://epgy.stanford.edu/), which supplies online math and composition courses in California and nationally. These initiatives are supplemental to existing school programs.

Teacher Education and Recruitment

A variety of teacher credential and masters degree programs in education have begun offering online courses as an alternative to face-to-face courses, and many teachers and administrators have found this mode of learning engaging.

To meet the shortage of teachers in California, the California State University system in partnership with the British Open University-designed CalStateTEACH (www.calStateteach.net), a program that is primarily online, but also has face-to-face components, allowing working adults to achieve a general education teaching certificate. This program is primarily geared toward grade school and middle school teachers, but could be expanded for high school teachers. The program started in September 1999 with 300 interns. Five hundred interns are expected to graduate in 2002, and enrollments are forecasted to increase to about 1,000 this year.

A unique aspect of the program is that the "interns," as the students are called, take their courses while they are student teaching. The entire program spans 18-months via a hybrid web-based and face-to-face/mentoring instruction and daily-classroom-integration model. The head office, located within the CSU Chancellor's office in Long Beach, provides admissions and student services. A student help desk service is located on the CSU San Marcos campus. There are five regional centers at CSU campuses that geographically cross over the State, from Fullerton, Los Angeles and Pomona in the south, to Fresno and Hayward in the north.

The faculty in this program work out of their homes and coordinate with the regional centers that are located closest to them. Program directors and other key adminis-

trators communicate regularly by e-mail and through a listserv. They also hold intermittent face-to-face meetings that alternate from south to north, as well as weekly conference calls. Faculty meet twice each year for professional development training.

The interns utilize extensive online "study guides" providing the structure and sequence to keep the interns on track. When interns first enter the program they get an "entire professional library" of textbooks, videos and CD-ROMs that are used throughout the 18 months. Interns are assigned a Learning Support Faculty (LSF) who is a faculty member from a nearby CSU campus. The LSF is responsible for a small cohort of interns and observes interns teaching at least once each month in addition to providing one-on-one assessment and guidance throughout the 18 months. Interns are also assigned an Adjunct Site Faculty (ASF), who is an experienced teacher at their school who acts as a mentor and also observes the interns in the classroom.

CalStateTeach is uniquely structured around an integrated curriculum versus course after course in traditional teacher preparation programs. Instead of taking a battery of tests and quizzes, interns build their portfolios, which consist of lesson plans, classroom management plans, their student's work, written assessments provided by mentors, and threaded discussions.

Another program that has received high praise from a number of teachers is Pepperdine University's Online Masters in Educational Technology (http://gsep.pepperdine.edu). Participants in this program finish their Masters in one year. The program includes three face-to-face, three-day seminars. The rest of the courses are conducted via e-mail, chat rooms and threaded discussions.

The development of "Tapped In" (www.tappedin.org), an online community of K-12 educators, grew from this degree program. Tapped In allows many people to meet online to discuss educational topics.

Many districts utilize various online companies for professional development. For instance, some districts utilize "Learn2 University" (www.learn2university.com), a provider of online and CD-ROM training in end-user desktop applications, to increase their proficiency with various computer software programs.

Another provider of professional development courses is CTAP Online (www.ctaponline.org/), a site devoted to helping teachers understand, apply and teach technology in their classrooms.

Online Course Development and Delivery from State Universities

Across California there are a variety of online programs offered to both teachers and students in K-12 settings. Much of this activity originates in the extension departments of the UC and CSU systems and at Stanford University:

- **CSU Dominguez Hills (http://dominguezonline.csudh.edu/) :** Provides two college courses each semester that meet the UC or CSU standard to high school students in California. The program is televised and is now delivered over the web, via Blackboard, on a continuing education basis.
- **CSU Center for Distributed Learning (www.cdl.edu):** The mission of the CSU Center for Distributed Learning is to support those engaged in teaching and learning through the development and dissemination of tools, best practices, and strategies which effectively employ the web and related technologies to improve learning and teaching. CDL is a joint project of contributing CSU campuses. It is housed at Sonoma State University and has been involved in contract course development for public and private sources. It has developed curriculum of textbook publishers and has shepherded the IMS standards movement for online learning standards. CDL also includes the Multimedia Educational Resource for Learning and Online Teaching (MERLOT), which is a growing collection of over 5,000 learning objects that are free for teachers and students.
- **UCLA Center for Digital Innovation (www.cdi.ucla.edu/):** Grant and contract funded, the Center for Digital Innovation (CDI) at UCLA receives support budget from research funds at UCLA. CDI develops very in-depth course curricula and online courses that meet a high level of academic rigor in math and the sciences. The center conducts research in online learning in addition to developing and distributing courses. CDI is under contract to provide Advanced Placement courses to the UCCP.
- **UC Berkeley Extension (www.unex.berkeley.edu/):** UC Berkeley Extension has a large active online education component that provides a limited number of AP and Honors courses that meet the UC entrance requirements. UC Berkeley Extension provides UCCP with some of its AP courses.
- **CSU Long Beach (www.uces.csulb.edu/index.asp):** This State university allows high school students to take their online courses at a reduced fee and also receive college credit for the courses. This trend continues to occur at other State universities as well.

- **UC California Digital Library (www.cdlib.org):** University of California President Richard Atkinson, who called it "a library without walls," founded The California Digital Library (CDL) in 1997. CDL staff and advisory groups are drawn from every UC campus, from affiliated research laboratories, and from the UC Office of the President. The library is built on the extensive base of UC knowledge and experience in developing and distributing digital materials. President Atkinson charged the CDL with continuing the selection, building, management, and preservation of the university's shared collections of digital resources and applying new technologies to enhance sharing of the university's physical collections.
- **Stanford's Educational Program for Gifted Youth (EPGY) (www-epgy.stanford.edu):** EPGY grew out of a National Science Grant to provide an integrated electronic math curriculum to gifted students learning at their own pace. This program has approximately 3,000 enrollments throughout California and the US. The program has expanded from math to other science and English subjects offerings. EPGY uses a mixture of CD-ROM, the web, and e-mail.

Virtual Education in Schools or Virtual Schools

California, like other States, has a number of individual virtual school programs. Poway Unified School District near San Diego provides a hybrid online model to certain juniors and seniors. Both Clovis Unified and Orange Unified have offered fully online courses to students in certain subjects. Choice2000, an individual California Charter School, provides fully online education through its charter granted by Perris Unified. Choice2000 courses require students to log on every day to do their course work. Students attend classes daily at set times. Lessons are presented both visually and verbally in the online environment.

5.7 Educational Needs That May be Met by Online Programs

A review of the California landscape has identified key groups of students who would benefit from a virtual high school program:

1. **All students:** Studies and California focus groups suggest that any student can be successful in online learning as long as the student is self motivated, has independent learning skills, and basic technology-use skills.
2. **Students who need supplements to curriculum because of scheduling conflicts, lack of course availability, or inability to attend school on a regular schedule.** For example:
   - Athletes who miss classes due to events
   - Migrant workers and children of migrant workers
   - Home-bound students
3. **Students Preparing for College**
   - Advanced Placement students
   - Honors students
4. **Charter school students**
5. **Alternate Education Students:** Opportunity, Continuation, Alternative, Independent Study and programs such as those for teen mothers (see below). In 2000, there were approximately 400,000 students participating in educational alternatives.

   Source: www.ed-data.k12.ca.us/dev/State.ASP.

   - **Opportunity-ADA funded:** Opportunity programs are run on the school campus for students who have had behavior problems in the regular school program. One teacher generally teaches this class, which includes all subjects. The ratio of students to teachers in this program is 20-25 students per teacher. According to 1999-2000 data, there were 1,262 students enrolled in this program in the State.
   - **Continuation Schools-ADA funded:** There are 523 continuation schools in the State of California. Students attending these schools generally require a different environment for learning. These schools are separate institutions and have their own principal and teaching staff. Students may choose to attend these schools or may be referred to them because of behavior or academic difficulties at the regular high school. Classes at continuation schools have fewer students per teacher and present educational content in a less structured manner than regular high schools. Some of these students may attend school for half a day depending on their circumstances. According to 1999-2000 data, there were 68,598 students enrolled in this program in the State.
   - **Alternative Schools-ADA funded:** There are 235 alternative education schools in California. This category of school offers an education different than regular or continuation schools. Generally, these schools are separate institutions throughout the State and have their own principal and teaching staff. According to 1999-2000 data, there were 61,221 students enrolled in this program in the State.
   - **Independent Study Alternative Instructional Strategy:** Independent Study funded (time value of the student's work). The independent study policy in each school district is developed by the local governing board and then approved by the CDE.

Generally, students meet one on one with a teacher about once a week or as often as necessary. Prior to starting, the student, parent and teacher must sign a written agreement. The teacher assigns work that the student completes. The teacher then determines the time value of the work, which is reported to the State for reimbursement. According to 1999-2000 data, there were 65,911 students enrolled in this educational option in the State.

6. **Remedial Students:** Regular students who have failed a course or need more time to learn course content.

7. **Special Education Students:** Students who attend school on a regular school campus are generally considered "resource" students who have some type of learning disability. Other special education students generally housed in separate schools or different parts of regular schools are students who are developmentally disabled.

8. **Court School Students:** Students who attend one of the prison schools. There were approximately 2,780 students enrolled in 1999-2000.

9. **Adult Education Students:** Students who either opt out of traditional high school or who need a few courses or credits to finish their diploma. Also in this category would be Graduate Educational Development Diploma (GED) students . In the 1999-2000 school year, approximately 452,000 elementary and high school students attended adult education programs.

   Source: www.cde.ca.gov/adulteducation/

10. **Regional Occupational Centers and Programs (ROCP):** ROCP programs are career and technical education programs, which specifically provide high school students and adults with career and technical skills to enter the workforce. Classes are available to students either during the school day, after school, or on Saturdays as elective classes, which meet high school graduation requirements. ROCP students generate ADA based upon student hours of attendance in excess of the 240-minute minimum high school day. ROCP classes are taken by approximately 500,000 college and non-college-bound students each year.

11. **English Learner Programs:** Includes second language learner elementary and high school programs. In the language census completed for 2000-2001, California school districts reported a total of 1,512,655 English learners (formerly referred to as limited-English proficient students) enrolled in kindergarten through grade twelve. This number represents about 25% of California's 6.1 million students.

    Source: www.cde.ca.gov/el/

12. **Home School Students:** The State of California does not recognize any type of home school as an acceptable alternative to regular schooling and does not fund any type of home school program. However, some public school districts or charter schools include a home schooling option as part of the independent study education option. This allows districts or schools to receive some State reimbursement. The CDE does not collect data on home schoolers. According to the Home School Association of California website (www.hsc.org), they estimate that there is "anywhere from 60,000 to 200,000 school-age children learning outside conventional school settings in California."

13. **Teacher Professional Development:** An online program would also serve teachers' professional development needs. Teachers are required to complete 150 hours of professional development to renew their credentials every 5 years. Professional development courses could help to address the issue of teachers teaching outside of their area of expertise. According to a report from the Commission on Teacher Credentialing, in 2000-2001, there were 32, 573 teachers on emergency teacher credentials, and 2,265 on waiver.

NOTES FROM THE TRENCHES: TEACHER TRAINING

The need to train teachers how to do their jobs effectively in the virtual classroom is an obviously important issue.

At Durham Virtual High School in Ontario, Canada, teacher training revolves around three modules: online tool training, provided through eCollege, which is Durham's asp/course management system provider; online pedagogy, which includes online teaching delivery strategies, as well as assessment and evaluation strategies; and quality assurance, where a group of experts go through a checks and balances procedure on the courses developed by teachers during the training period to ensure that all content is properly aligned before going live. The entire process takes several months.

"What is difficult about this whole space is that it changes so quickly that realistically your teachers need ongoing training and support," adds Todd Hitchcock, Durham's eLearning project manager. "Because they have full-time jobs teaching, it is difficult to find all the time they need. For example, I would love to have teachers trained on different forms of assessment online. While they do multiple forms of assessment, I can see that there is more that we can do. And I see that we can do more on building communities and working together."

Do-It-Yourself Model at Fairfax

At the Fairfax County School District (FCSD), the issue of teacher training was tackled by Sandy Todd, FCSD's Online Campus director, who spearheaded the development of a home-grown, 15-week teacher training program with the help of two colleagues: a creative writing teacher who currently teaches online and a technology coordinator from the district.

Like Durham, FCSD is getting ready to enter its second year of offering online courses. Their first, 15-week, teacher-training course started in January 2002. Also similar to Durham, FCSD could not accommodate all the teachers in the district who wanted to enroll. "We were only going to accept 24 teachers; we had 50 who signed up for it, and then we had to stop taking names; we ended up accepting 34," says Todd.

Todd and her two colleagues developed the training program by doing a lot of research. She says there are not many textbooks on the topic of training K-12 teachers how to teach online, so she used primarily college-level books written on the topic, attended seminars and "basically just tried to figure out what was really needed by K-12 teachers to teach an online course." The end result was the development of three hybrid five-week/five-class sessions (broken up by one week off between sessions and the Spring vacation break). Teachers meet face-to-face during the first and last class of each session, with the remaining three classes conducted online. The three-member team developed the training program as part of their full-time workload, thus saving the district development dollars. Todd said they devoted a great deal of extra effort to this project "because of our love of teaching."

The first five-week session "concentrates more on the philosophy (of online teaching and learning), what's out there in the books and articles, so they could have a real feel for what teaching online is all about," says Todd. "The middle session focuses on providing multimedia online. They learn how to create video and audio. We also go through copyright issues. The last session is about learning how to teach each other," which means they co-develop a class with their colleagues by creating and testing the actual lessons, discussion threads and synchronous chat sessions among each other. Throughout all three five-week sessions, students follow two text books and consistently participate in discussion boards and online chats. The two textbooks currently being utilized are "Teaching Online," by William A. Draves, and "Teaching Online: A Practical Guide," by Susan Ko and Steve Rossen.

VHS Training Program

The Virtual High School (VHS) offers two options for professional development of its prospective online teachers: a six-graduate-level-credit, 15-week, online course called Netcourse Instructional Methodologies (NIM), which prepares VHS teachers to teach a section of an existing VHS NetCourse, and a 12-graduate-level-credit, 26-week, online course called The Teachers Learning Conference (TLC), which prepares classroom teachers to become qualified VHS course designers and instructors who can teach a course of their own design.

Hudson High School Music Teacher Jason Caron, had this to say about his experience taking the NIM course:

". . . (we) are trained just as we will teach our future online students. I experienced everything online - from the application process to the initial introductions; to fostering and maintaining a sense of community; to 'normal' assignments, assessments, collaborative work and web research projects; to learning Lotus Notes; and application of all the above in developing the virtual course that I will begin teaching next fall. This training is intense,

continued on following page

requiring 15 to 20 (sometimes more!) hours of work per week. I found it difficult at times to balance this training with all the requirements of the rest of my life, but I found myself really taking a good look at how I 'deliver' a face-to-face course, and how I communicate. Online teaching requires clear, precise, and well thought-out communication. I experienced visual (textual and pictorial) communication, and how much one cannot rely on vocal inflections and body language. NIM was designed well and comprehensively. It was a lot of work, but it was one of the best professional development experiences I've had."

Mark Rust, a teacher at Maryland School for the Deaf, also took the NIM course, offered the following:

"It was very thorough and informative. I found the training to be quite satisfactory. The downside was the fact that I had no release time from work in order to do the course work. Consequently, there were many late nights in getting the work accomplished."

Teacher Mentoring at FVS

Some of the other elements of teacher training unearthed during these interviews include a mentoring program that's in addition to a "2-week plus" teacher training program at the Florida Virtual School (FVS), whereby experienced online faculty earn a $1,000 stipend to follow newly hired FVS teachers as mentors for one year. For the first few months, new teachers copy mentors on every e-mail sent to their students and parents. The mentors file monthly reports during the course of their term. These reports have been very helpful in monitoring the ability of new teachers to move into the online arena, says Sharon Johnston, FVS director of curriculum.

Plano ISD eSchool

At the Plano ISD eSchool - which launched in February 2001 and currently enrolls about 200 students, and is noted as a partner school of class.com - online teachers go through two phases of training, says Jean Parmer, eSchool administrator, adding that "all professional development connected with eSchool is provided in-house by Plano ISD personnel. . . The first phase (which is a 3-hour introductory training session) is an introduction to online learning and teaching with emphasis on establishing and maintaining a relationship with students, as well as information concerning the policies and procedures of Plano ISD eSchool." In the second phase, teachers attend a 1/2-day to several days-in-length training session focused on technology, depending on their level of expertise. The second phase also includes once-per-semester workshops that update teachers on policies, procedures and new course offerings.

190 Hours in Clark County

At the Cyber Schoolhouse of the Clark County School District in Nevada, Marilyn Parker, director of research, development, innovation and special projects, explains that it takes "roughly 190 hours" to train faculty in the pedagogy and philosophy of online learning, as well as in how to use all the different software applied in the development and teaching of their virtual classes.

The Cyber Schoolhouse - which will be entering its third year of operation this fall and enrolls about 200 students - currently uses three types of software for presenting their classes: Centra 99 for synchronous elements, such as live chat, whiteboarding, live application and document sharing, and live teacher-to-student and student-to-student audio; InterAct, which is a telecommunications and e-mail system product from Centrinity, Inc.; and the Lotus LearningSpace course management system, which is in the process of being phased out in favor of the Jones e-education platform.

"We really focus on teaching online and project-based learning first, before we talk about the technical," says Kralene Lee, acting director of technology innovation at the Clark County School District. The training is conducted over two weeks covering 10 full days of face-to-face training. "After that, teachers work at their own pace putting their classes online with help available (from district personnel)," adds Parker. One or two full-day training sessions are also conducted during the school year, and teachers are released from their regular classroom duties to attend.

In addition to training teachers how to use these software products, they are also trained in how to design their courses using mutli-media elements. "We start with Dreamweaver," says Parker. "We do some Flash; we talk to them about graphics and the whole philosophy of what we hope to accomplish. We are after an enriched, interactive education."

6.0 What California Thinks

In order to assess the impact of a Statewide virtual school, Californians were asked to provide input into the report through a series of meetings. Focus groups were conducted during the months of March, April and May 2002, with students, teachers, administrators and parents throughout California

Over 700 adults and students participated, representing the diversity of California. There were participants from almost every county in the State, representing small schools, large schools, charter schools, home schools, intermediate schools, high schools, and county offices of education.

Focus groups were conducted in cities from Sacramento to San Diego. The 38 adult groups, with a total of 402 people, represented schools, Statewide educational organizations, and included representatives from the California Department of Education, the California Teachers Association, the California Commission on Technology in Learning, the California County Superintendents Educational Services Association, the Technology and Telecommunications Steering Committee, and the California School Library Association. The adult focus groups were conducted by one of the authors of this report and by student researchers from the Center for Advanced Research and Technology (CART). The 24 student focus groups, with a total of 341 students ranging from 8th to 12th grade, were primarily from the Fresno county area and were conducted by student researchers from CART. Student focus groups were also conducted in Los Angeles, Sacramento, Hollister, Orange, and San Diego.

The adult group contacts were selected by contacting chair people of organizations, and then attending their regularly scheduled meetings, and by talking with school or district administrators about gathering a group of interested people. Student groups were identified partially through discussions with the diverse student population at CART, which represents 14 high schools in Fresno and Clovis, and by making arrangements to talk with leadership class students during their regularly scheduled class period at various schools. Additionally, three separate phone conference focus groups were conducted with representatives from the California Teachers Association and several company representatives.

As each group shared answers to various questions, their responses were recorded onto a computer. The facilitator in each group then transcribed the answers into a common format. The transcribed notes were then printed and put in a binder and posted to the website (www.cusd.com/calvhs). Graphs were created for those questions that could be quantified.

6.1 The Resulting Model and Recommendations

The input and ideas collected from these focus groups are integrated into the body of this report. The "collaborative" model identified in this report resulted from the collective thinking of all of these groups. Specific responses gained from each focus group can be found on the website: www.cusd.com/calvhs.

Student Recommendations

- **Course content needs to be interactive and not just text-based.** Incorporating features such as chat rooms, threaded discussions, streaming video, online simulations, and group projects makes a course more interactive.
- **Timely feedback from teachers is necessary on assignments, as well as immediate help when there is a question regarding assignments.** This could be accomplished by teacher phone calls or with teachers having "online office hours" in a chat room to answer questions. Additionally, a teacher should return e-mail responses to student questions within 24 hours.
- **Face-to-face meetings are important.** Students felt that it was important to have face-to-face meetings either with the instructor or with an "online course coach" in their local area. The amount of face-to-face meetings could be different for different subjects.

Adult Recommendations

- **The structure of a State virtual school should incorporate a State entity and local control.** The State entity would be responsible for such things as course standards, course repository and teacher

training. Local districts or regions would be responsible for areas such as course development, course teaching and student management.

- **Create quality online courses.** Adults concurred with students as to the components of a quality online course, including project based assignments, and assignments that encourage interaction between students, between students and teacher, and between students and subject matter experts.
- **Face-to-face meetings are important**. These meetings could be held by a local "online course coach" who could be from the school, district or county office and be either credentialed or non-credentialed.
- **Student support**. It is important to have a variety of student support mechanisms in place including 24 X 7 tech support, counseling services (both online and in person), library services, and online resources such as online textbooks, encyclopedias and periodical databases.
- **Guidelines are needed.** Adults repeatedly discussed the need for guidelines in the areas of intellectual property (who owns the course content?), plagiarism (how do you know the student is actually doing the work?), and teacher work issues (online teacher hours and teachers working from home).

6.2 Questions Asked

In general, the questions asked of each group were as follows:

- What types of applications/components that are on the Internet would you like to see incorporated into teaching and learning in an online course?
- What State projects/initiatives are you aware of in California that could support/facilitate a virtual high school program?
- What ideas do you have regarding how a virtual school program might be financed?
- What kind of laws or legal issues need to be considered as we move forward in creating a virtual high school?
- If you were to design a structure for a California virtual high school, how would it look? How can it best serve the needs of students, teachers, and school districts in California? Should the structure be a collaborative, competitive, school-based or stand alone entity? Should the State virtual school be scalable for school districts, should it be self-contained and self-funded?
- What type of support is needed for students to be successful in an online course (e.g. human or online)?
- What type of student would benefit most from online courses?
- How might a State virtual high school be articulated with University of California, California State University and community college systems?

The collective answers to the above questions are listed below in section 6.3, "Focus Group Analysis." Key questions analyzed below include the questions regarding a State structure, student support, and laws and legal issues.

6.3 Focus Group Analysis

Generating the most conversation was the question about what State structure would best serve the students of California. Groups identified a variety of structures, which could be characterized as centralized or distributed and competitive, cooperative or collaborative. Some groups thought that a central, self-contained virtual school system should be established similar to the structures established in other States.

Most States have established a centralized system where a State office for virtual schooling is created, the administrative staff and teachers are hired, and online courses are either created or purchased. Once established, the State entity advertised to state high schools that online courses were available for students.

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Most groups agreed that it was important that school districts cooperate or collaborate rather than compete. Similar to the purpose of the Internet itself, it makes more sense to collaborate so that every school district can contribute to the overall system and that every district would not have to create their own offerings of online courses. Participants explained the importance of a cooperative system with Statements such as, "It doesn't make sense that every district should have to create their own version of an online world history course. However, districts should be allowed to modify a course depending on the needs of local students."

Other people identified how many school districts are not able to offer certain courses and that online courses could be offered throughout the State to meet these needs. Groups agreed that the ideal model would be one that would include some oversight by a State entity, yet allow for some autonomy in the implementation by the local school district. The resulting details of this model, termed the "collaborative model" are included in section 8.6 of this report.

Student Support

The same support system is needed for a student to be successful in an online course as there is in the current system of education. Almost every group of adults and students felt strongly that a local face-to-face mentor/coach is crucial for the success of online students. The online teacher could be from a different district, but there needed to be some face-to-face contact, which could be from a counselor or paraprofessional in the student's local school or school district. There was equally strong sentiment that there needed to be 24 X 7 tech support for both teachers and students. Interestingly enough, the student groups most often mentioned the importance of parent support or parent training as being essential for the success of online students. Other important student support suggestions included online library resources, counseling services, tutorials and college and career planning. All of these student support mechanisms are important to be in place when a California Virtual High School (CaVHS) is implemented.

Legal Issues

A variety of legal issues were raised by the focus groups. Adults and students were equally concerned about online security. Focus groups suggested that an "intranet" system should be established that would address the issue of security as well as allow for the creation of an online library or online resources that could be used by students and teachers. Members of the company focus group explained that there is technology in place that allows for authentication of an individual in the system for use of online resources outside of the system. Funding and ADA issues were another often discussed topic since the State does not currently have a mechanism in place by which school districts can receive reimbursement from the State for teaching online courses. Plagiarism and cheating were other issues discussed by all groups.

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Most agreed that cheating was easier online and needed to be addressed as the CaVHS is implemented. Teachers and administrators wondered how the issue of "intellectual property" is handled regarding the content of an online course if it is not commercially purchased. Finally, adults wanted to know how a teacher could be sure in an online course that it was the student actually doing the work. The California Teachers Association representatives suggested that policies needed to be established regarding the workday of an online teacher (as compared to a workday of a face to face teacher) and guidelines for teachers working from home. Current online teachers agree that the type of assignments given online need to elicit original work from students. As the CaVHS program is established, it is important to enact policies and guidelines for teacher contracts, student work, and intellectual property.

See Appendices J, K, and L for focus group participants, graphs of responses and sample focus group reporting sheets.

NOTES FROM THE TRENCHES: QUOTES FROM FOCUS GROUPS

From students:

- "High school students would be willing to take some courses online that they might not take at a regular high school. For example, a guy may not take a dance class because of what his peers might say, but if you could do it online, other students wouldn't know."
- "I don't know if what I'm learning at my high school is the same, better or worse than in other parts of the State. With an online high school course, you would know all students were getting the same information and content."
- "Some teachers judge you by the way that you look and you get a grade based on this. In an online course, the teacher would grade you based on what you know and not on how you look."
- "One way to make sure that you know that the student is actually the student taking the course would be to invent some type of plastic mat that the student would stand or sit on that would identify the student."
- "I love online courses because it gives me more free time to work, do sports, and do other hobbies."
- "My online teacher has recorded all of his lectures in PowerPoint and put them on a CD. I like being able to watch the lectures again to review for tests."
- "E-mail creates a better connection between the student and the teacher."
- "From a company perspective, it is much easier to work with a single point of contact, rather than many."

From adults:

- There are three components that must be in place for any educational system to be successful: a) Interactivity; b) Quality teachers (See: Fried. The Passionate Teacher. 1995); c) Soundly based in education theory and practice (See: Stipek. Motivation to Learn. 2002.)
- "In the online world, you eliminate the "Pygmalion Effect" whereby students are judged by the way they look and act."
- "Need to use retina scanning to make sure the student is actually the one doing the work."
- "Be gender sensitive in developing these courses. Avoid stereotyping. (Overall, less females are in science because of the gender stereotyping that occurs in face-to-face courses.")
- "As a parent of an online student last summer, it was no stress for me. My daughter got instant feedback from the instructor and she had lots of interaction with other students. It was an excellent experience. The knowledge she gained from the online course helped her to easily move into the next regular course for English."
- "We should be thinking in terms of a non-traditional teacher with non-traditional content."
- "If teachers are working from home, similar to how things are being done in the business world, we need to think about how the teacher's work day would be defined in the online world."
- "Some students may need different support to be successful in an online course than others. There should be tiered levels of support that should include online tutorials, online mentoring, online chat or instant messaging, or face to face meetings."
- One school board member commented, "Dentists today can watch another dentist do any surgical process such as a gum procedure from a distance. Students should have access to this type of experience in a State virtual school."

7.0 Critical Operational Issues

A Statewide virtual school program should seek to serve a wide range of learners by offering core subjects, remedial work, and possibly other subjects such as test preparation. Student populations who can greatly benefit from online learning opportunities include not only "high-end" students but also at-risk students, students with emotional or physical disabilities, and students who are missing school time due to illness, expulsion, or other reasons.

Meeting the educational needs of learners in California should not be confined to fully online, timed courses led by an online teacher within the current semester system. Course content should also be offered inside learning modules that teachers can utilize within traditional face-to-face courses. Additionally, students can have access to these modules as supplemental learning tools. Such online program tools should be used by students in schools throughout California as a way to collaborate with one another on school projects, and by teachers across the State to collaborate on curriculum development. In essence, a CaVHS, over time, would become an integral part of the educational delivery mechanism for the State.

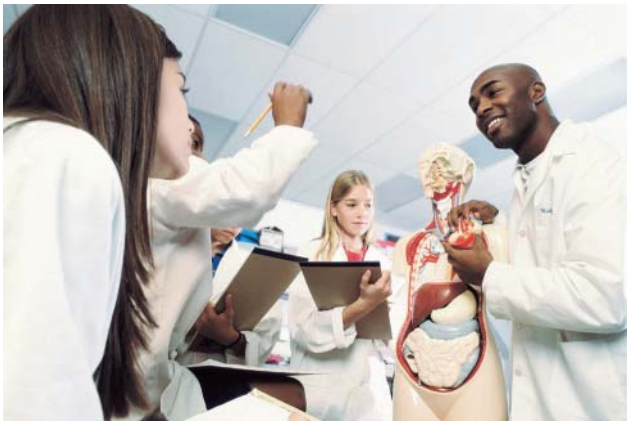
7.1 Program Vision

The vision of CaVHS needs to be embraced by all stakeholder groups from State legislators to students enrolled in the program. To accomplish this, a broad based group of people – a governing board – should develop this vision. The vision should explain how the virtual school program can be accessible to every student in grades 9-12 in the State of California, sustained over time, and incorporated within the current State school system.

7.2 Program Goals

A California Statewide online program should define a set of goals to include the following:

- Provide equity of access and opportunity for all California learners and teachers.
- Serve specific needs identified by California educators, learners, parents, and members of the larger community.



- Maximize the effective use of valuable educational resources, reducing duplicative and conflicting deployment of the teachers and technology required for online learning, and reducing costs through aggregated purchasing power.
- Assure high-quality learning experiences for all learners by setting standards for instructional design, course delivery, and student services.
- Operate through a broad collaboration that reflects numerous, diverse constituencies.

The experience of other states suggests that a Statewide online program should not serve as an autonomous school that replaces physical schools. Instead, it should extend the learning opportunities available to students and educators in existing schools while, at the same time, ensure the quality of educational resources and the effectiveness of the pedagogy, as well as monitor student learning results. This approach has numerous implications:

- Initially, the Statewide online program should not grant diplomas. Students taking online courses should continue to receive diplomas from local physical schools upon completion of those schools' graduation requirements.

The experience of other states suggests that a Statewide online program should not serve as an autonomous school that replaces physical schools. Instead, it should extend the learning opportunities available to students and educators in existing schools while, at the same time, ensure the quality of educational resources and the effectiveness of the pedagogy, as well as monitoring student learning results.

- Students should enroll in Statewide online courses through local physical schools or other entities, obtaining registration and counseling support through those schools.
- While taking Statewide online courses, students should get support through local physical schools.
- As this system matures and the technology to support it can be used in multiple ways, the same system can support fully virtual schools for populations that require it (actors, athletes, home bound, hospitalized, incarcerated) and those that choose alternatives (independent study or charter school). In addition, over time, as a CaVHS grows it could:
    - Provide the technical infrastructure, curricular support, and special services to independent study programs and charter schools. These services could become a revenue stream for the operators of the system.
    - Operate other services for fees to publishers, third-party tools and solutions providers, and educational content vendors.

7.3 Target Audience

One of the primary questions to be determined by CaVHS will be identifying the target audience for the Statewide program. Determining this target audience must be done in order to set priorities given limited resources, and it should recognize that the audience that can be served will grow over time. Determining a target audience will suggest direction for course development, support needs, professional development needs for teachers, and other elements of the program. This is an important role for the governing board.

One method would be to follow the models of Florida, Illinois, Kentucky, and Michigan and create a top-down curriculum. If this path is chosen, the primary audiences generally are developed in a logical progression beginning with AP and Honors courses that serve the equity issue for enrollment in the UC and CSU systems. Once the capability is in place to serve those populations, CaVHS can serve other populations. This method is only one approach. Others methods could include a system for California-based VHS operations to apply to be hosted by the central facility, thereby speeding up the development of efforts to reach different populations to fulfill different needs.

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Given that UCCP already has experience working with students desiring AP and Honors courses, the Statewide program should start with a similar target audience, although more broadly defined:

- **Primary target audience #1:** Students who need/desire courses, which may include AP courses, Honors or specialty courses not available within their schools (e.g., an economics or language class not available within a small rural school), and core courses necessary for graduation requirements and/or university admissions, which students may not be able to take due to scheduling conflicts or course offering limitations

In order to develop a successful online program, professional development courses must be made available to current and prospective teachers. This suggests a second primary audience:

- **Primary target audience #2:** Educators who need/desire professional development courses. Serving this audience will start with creating the courses necessary to train teachers for the online program, but should rapidly grow to include other professional development needs within the State.

Additional student populations that could be served by the online program over time include:

- **Alternate Education Students:** Opportunity, Continuation, Alternative, Independent Study strategies and programs such as those for teen mothers.

- **ROCP Students:** The use of online career and technical education programming for ROCPs in California can meet a critical need for career training in rural school districts where business and industry is weak or non-existent.
- **Remedial Students:** Regular students who have failed a course or need more time to learn course content.
- **Court School Students**
- **Adult Education Students**
- **English Learner Programs**
- **Home School Students**

While serving alternative students should be a goal of a Statewide online program, several factors make the learning needs of alternative students more difficult to serve. For each population these factors include some or all of the following:

- A lack of a physical school as a "home base," which is necessary to obtain enrollment, advising, and mentoring (e.g., adult learners, home-school students).
- A lack of a predictable pattern of timing for course entry.
- A need for courses, such as remedial work, applied tech, and vocational support, different from those typically supplied by commercial content providers
- A need to provide more individualized, face-to-face support than is required for conventional students.

7.4 Curriculum

Identifying the target audience leads to some curriculum decisions; i.e., if the primary target audience is students needing one or a small number of courses, then there is no need to initially develop a full core curriculum. Instead, courses will be chosen to meet existing gaps and fill unmet educational needs. Over time, the number of courses developed will increase into a comprehensive curriculum.

Content Development

There are two basic methods for acquiring courses:

1. Purchasing or licensing courses from other providers, either commercial (e.g. APEX Learning, class.com, or a content development company that develops courses specifically for the program) or non-commercial (e.g. FVS or an existing California program).
2. Developing courses on its own. Courses that are brokered or bought from other companies or organizations may need to be customized, if necessary, to meet State standards and/or specific learner needs by teachers or instructional designers. If CaVHS chooses to develop its own courses, it may do so in house with existing staff, or with contract staff, or by contracting with multiple content creators, or using one company to develop all courses.

A viable approach to content development given limited budgets and time pressures, which UCCP has used previously, is to first adopt content from other sources, either commercial vendors or other programs, then adapt that content to specific standards and program goals, and finally, as resources allow, to create content specific to the program.

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7.5 Review and Quality Assurance Process

Essential components of quality review and assurance at a programmatic level include:

- **Courses:** Development of high-quality standards-based courses that are improved continuously (both in terms of content and pedagogy).
- **Learning:** Providing a structure and process for improving student learning in the online environment.
- **Teachers:** Providing strategic professional development for online teachers and student support personnel.
- **Evaluation:** Collecting and using quality data concerning course quality, student learning, and feedback.

Quality assurance for each course should have two components:

1. A comprehensive evaluation and approval of course content prior to use by students to determine quality of content, compliance with State content standards, and best online pedagogical practices, which will include:

- Curricular design and development
- Instructional delivery and practices
- Student services and support systems
- Technical infrastructure

2. An ongoing comprehensive evaluation and improvement of course content and online pedagogy during and after utilization with students.

7.6 Course Pacing

Course pacing is particularly important when considering teaching and support issues. Both teaching and support become more challenging if courses are self-paced, because students are at different points in the course and likely at different levels of comfort with both the content and technology. Pacing of courses also has implications for how teachers can use the course platform to facilitate student-to-student interaction. One of the advantages of online courses, however, is the ability to have students learn at their own pace.

There are several course pacing options, including:

- Course operates on one timetable, with a set beginning and end date.
- Course is completely self-paced.
- Instructor makes a recommendation after specified trial period and invites/assigns students to join appropriate timetable for completing coursework.
- Student picks a timetable at the beginning of the course and may be allowed one switch within prescribed time period.

The experience of instructors in many online programs suggests that the self-paced option should be augmented. After experimenting with the completely self-paced option, FVS, for example, has found that offering three timetables for students to follow (accelerated, standard, and extended) is more efficacious for both students and instructors. The accelerated pace allows for students who wish to complete a course quickly to do so. The extended timetable accommodates students who need more time than the standard, while ensuring that the course does not extend indefinitely, as a self-paced course could. Kentucky Virtual, for example, is much more flexible with course pacing and allows students to start courses on their own schedule, subject to approval by the student's school.

7.7 Support for Students and Teachers

Technical support

Technical support should be provided to teachers and students through an initial orientation course, context-sensitive help within the course management system, as well as e-mail and possibly telephone support. Providing 24 X 7 tech support and curriculum support for teachers and students is a crucial component for a successful State virtual school program. The exact nature of technical support will depend partially on the commercial providers, because some companies offer technical support at different levels (phone or e-mail, phone can be business hours only or 24 X 7, or in between). The goal, however, will be to ensure that both students and teachers are well prepared for courses before beginning the course, and they are able to quickly obtain help if they have problems. The technology should augment the learning experience and never detract from it.

Instructional Design

Instructional design specific to online courses is a key element in the development of courses. Online learning provides opportunities to reach students with different learning styles, in some cases more effectively than classroom teaching. Online teaching, however, requires different skills than classroom teaching, and teachers will be expected to be experienced in online learning pedagogy. In addition, an extensive quality assurance program should be developed to ensure the best use of online learning technologies.

Teaching and learning communities

In addition to specific courses, the online technology allows for the development of teaching and learning communities that can be used by both teachers and students to enhance their educational experience. Features such as shared resources, listservs, discussion boards, and synchronous communication tools will help teachers who are geographically dispersed to best use online resources. In addition, students can potentially use these resources across different courses in order to create student-based learning communities.

Additional student support

In addition to technical support, students will benefit from an orientation course, which may include a face-to-face session if possible and appropriate. For traditional high school students, involving parents in the initial orientation can be beneficial as well.

Ongoing local support is a key factor in student success. In other States, such local support is most often supplied by schools within Statewide or regional programs. The support person is typically not a subject matter expert, but he or she is familiar with both the online technology and administrative elements of the online program, and thus provides both local technical and administrative support for the student. This person may also serve as the contact between the Statewide program and the local school. Depending on the student and the nature of the online program, the local support person may be closely involved with the student, for example monitoring progress toward completion of the course.

Some programs (e.g. FVS) contact their students prior to the start of courses, to ensure that the students are prepared for an online course and understand what taking an online course entails. This type of virtual advising, which is outside of any single course, can be extremely valuable to students.

Additional services can be provided to online students depending on the goals of the program. For example, tutoring services can be provided online, either developed by the State virtual program or by contracting with a commercial tutoring provider. Administrative functions such as registering for courses, viewing a course catalog, and other similar services should be available through a single website. Additional resources, such as an online bookstore, library services, and additional online services may be added over time. These services are less important if the program is serving primarily students who attend a physical school, and more important when serving students for whom the online program is providing all their courses.

7.8 Assessment

Accountability is the chief focus of the Bush administration's education agenda. President Bush's "No Child Left Behind" program administered by the U.S. Department of Education, enacted in January 2002, has as its focus a mandate to assist schools with achieving better per student performance. The basis for this is annual State testing. Following results achieved in Texas and other States, the Bush administration hopes to encourage such testing in all States.

Assessment, like other terms in education, has a number of meanings. It can refer directly to a test that is given in a given class. It can refer to an end-of-class activity having to do with assessing learning. It can refer to assessing the effectiveness of an education program. For the purposes of this report, assessment has to do with the use of testing and accountability using electronic means. The computer and network are particularly well suited to gathering and reporting data and automatically monitoring progress of students, classes, schools, districts and entire States.

In the context of schools performing to State or national standards, assessment refers to Statewide tests that determine the viability and, in some cases, the funding for a school or school district. In this case, the assessment of a school's performance is used to hold the schools accountable for their performance, which could mean receiving incentive funding bonuses, being penalized, or the local governing board losing the right to operate the school district.

A number of States have mandated annual tests that are correlated to State standards. While designed to make sure that "no child is left behind," the purpose of these tests is to assist in increasing student achievement. This goal can be assisted by electronic means. Eight States are currently piloting State-administered online assessments.

If on-going assessments – daily, weekly, term test – were built into an electronic system where results are posted in real-time, progress against State standards could be monitored on an on-going basis. Such testing regimen could provide indicators of student, class, and school success on the annual test. In the case of virtual schools, the ability to test within the system is present. While students may need to go to a facility for proctored exams, their weekly work, pre-tests, and self-assessments could be among the tools that guide them to better performance.

This report strongly suggests that such on-going testing be implemented so that the annual test is not a single event in the life of the student and school, but merely a confirmation or fine tuning of results already gathered and addressed.

The course management systems, some of the electronic testing systems, and the electronic test bank systems of the publishers are able to fulfill this function. In a State-wide, standards-driven system, as this report recommends for California, these features could be commonplace, creating the ability to self assess, adjust, and be tested formally all as part of the process of learning.

7.9 Access

As online learning becomes increasingly integrated into mainstream education, allowing for accessibility for disabled students becomes increasingly important. Accessibility concerns, assistive technologies, and similar issues constitute a rapidly changing field.

For more information, see Appendix M.

There are numerous types of disabilities that may affect students. These include, but are not limited to, vision, hearing, learning, mobility, and ergonomic. All of these disabilities can exist to varying degrees, with implications for how the disability is addressed via technology or other methods. For example, a student may be visually impaired and use a screen magnifier.

Because of the relatively high visibility of some assistive technologies such as screen readers, the fact that the largest disabled population is comprised of learning-disabled students is often overlooked. By comparison, vision disabilities comprise only about 1-2% of the disabled population. This has implications for how teachers address disability issues, because learning disabilities may be more easily addressed through teaching methods instead of through assistive technologies.

Technology

A variety of assistive technologies exist for disabled students, including:

- Screen readers and speech synthesizers that enable blind persons to use websites.
- Screen magnifiers that enlarge text and graphics for visually impaired persons.
- Special word processing systems that help hearing impaired persons with written language difficulties.
- Voice input technology and keyboard modifications that help people with physical impairments to produce written materials.
- Spell-checkers, screen-readers, text enlargers and smart word processors that help learning disabled students with writing.

These technologies augment efforts to make online courses accessible. They do not replace the need for teachers and content developers to be trained in and familiar with accessibility issues.

7.10 Teacher Recruitment, Preparation and Support

Clark (2001) identifies several types of possible teachers for online programs:

- "Regular" K-12 staff, meaning existing teachers currently working for a school, taking on teaching online courses as part of their workload.
- K-12 staff "on the side," meaning existing teachers who take on teaching online courses as a separate contract.
- Full-time staff of the online program.
- Part-time or contract staff of the online program.

CaVHS should seek teachers who are qualified in their content area and enthusiastic/knowledgeable about teaching in the online environment, recognizing that the particular demands of online instruction may suggest a need to emphasize qualifications that are particular to this type of education, e.g., teachers who are skilled in online pedagogical theory and application.

Regardless of prior experience and licensure, all online instructors should take professional courses in the design and delivery of effective online learning. Professional development will be a prerequisite to teaching any course, as well as a continuing requirement for online instructors. Portfolios and other exhibitions of mastery may substitute for required professional development.

There are trade-offs between employing teachers part-time versus full-time. While a program is developing and there are not enough courses and students to warrant full-time teachers in numerous subjects, using part-time teachers on contract keeps direct salary costs low. However, because of the larger number of part-time teachers, training needs are higher than they would be for full-time teachers, and turnover may tend to be higher with part-timers. Some Statewide programs have suggested that the best model may be a combination of full- and part-time teachers, where the full-time teachers may be involved in content development and course evaluations and revisions when they are not teaching full-time. This hybrid model will control costs while developing in-house teaching and content expertise in the program.

Interesting Data From FVS

For the simple reason that it has the largest enrollment base in the country, Florida Virtual School (FVS) has some interesting data about students taking online courses.

Sharon Johnston, director of curriculum at FVS, says that for the 2001-02 academic year, FVS is anticipating a completion rate of 88.59 percent for 8,241 enrollments. Johnston claims FVS is working with all levels of students, including rural students, minority students and students from what Florida considers to be low-performing schools, all of whom are given admission priority mandated by the State of Florida. Johnston attributes the high completion rate to a number of factors.

It all starts when students register and fill out a questionnaire that gives teachers a good sense of what kind of student will be entering their class. Teachers use the questionnaire as the basis of a welcome phone call they make to every student under their wings. “We felt it was very important to ask questions up front to help us as teachers find out just how the student plans to complete his or her course,” says Johnston. “The student is not activated into the course until the teacher makes this phone call.”

She adds that many of the questions are seemingly simple but are actually very important. For example, students are asked about the location of the computer they will be working on. “We found that some were saying they would go through their course on their grandmother’s computer who lives five miles away,” Johnston says rhetorically. In such cases, teachers would advise students to think harder about computer accessibility issues and suggest utilizing a nearby public library’s Internet-connected computers.

For example, “quite a few of our home-school students in Orange County have used the public library because it has 20 computers and allows them Internet access (sometimes unlimited depending on requests),” says Johnston.

“We also ask them questions like do you have any technical support at home? That is an important question, and it’s really comical because most of the time they will say my little brother or sister, who is 11, happens to be more of a tech resource than their parents.”

Other questions may revolve around scheduling and time-management issues, especially if the student has listed on the questionnaire that her or she holds a part-time job.

Also during the welcome phone call, teachers make it a point to speak with parents to open up communication lines and assure them that they are available for consultation/discussion at any time (teachers have a business phone number and beeper where they can be reached).

Another critical factor related to a student’s success deals with allowing students to submit their assignments and tests more than once, says Johnston. “Kids see they have a chance; they can submit a 50 (test or assignment score) and the teacher will give them feedback so the student can resubmit without their grade being jeopardized.

“There is this formative process that I really like,” Johnston continues. “I think it is one of the reasons why kids aren’t so intimidated as they come into this environment and see that this is a place where we are really interested in taking you to the next level, and we will do it together.”

In addition to all of the aforementioned, FVS teachers must log in student progress reports at the end of each month and call parents and students once each month regardless of how well a student may or may not be progressing.

Another factor that seems to be helping is the incorporation of synchronous elements into FVS classes, adds Johnston. “This is the first year that we have had synchronous chat that is useable (through e-education). It’s wonderful. It has math notations. The teachers love the whiteboard math equation feature. We can also push students to look at urls together and chat while they are there. I can give students questions about a url they are looking at and let them explore and come back in five minutes to chat about what they have found.

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Advice from a Digital High School Coordinator

Jerry Lapiroff, digital high school coordinator at John F. Kennedy Technology Magnet School in Fremont, California, has some straight-forward remarks about how students can succeed in the online environment, as well as what he thinks might work in the State of California. Lapiroff has supervised about 200 online students at JFK taking classes through VHS, Inc., since 1997. JFK is a large multi-ethnic school with 60 percent minority students, mostly Asian and Hispanic

"Kids who are independent-minded and self-motivated can do very well in these classes," says Lapiroff. "But sometimes the kids who are the sharpest and most involved need reminders to stick with it, because they are usually the ones who have more activities in their lives. . . If you are a high school kid taking five classes, and you have a priority sheet, the minute the pressure is on, the virtual class moves to the bottom of the sheet because the teacher is not there to face you. That's a real factor to deal with."

So Lapiroff strongly advocates having at least one adult at schools to take charge and monitor the activity of online students on a consistent basis. He also explains that online teachers must be charismatic and hard working.

"For the responsible teacher who wants to maintain the same level of connection to students (as their face-to-face classes), this is a very different form. Running a net course and keeping them all engaged, and getting them to do group projects is very labor intensive. In the regular classroom the kid has contact with you everyday just by being there. In the virtual classroom, unless you provide specific feedback to students frequently, they will lose contact with you.

"It is important to structure the program correctly at the school level," he continues, "Either the students have access at home or enough access at school to handle the part of the course that is online."

Tapping into California Teachers

Regarding UCCP and the State of California, Lapiroff made the following comments:

"UCCP can tap into a lot of talented teachers in California if they want to develop their own courses. There are teachers in this State who have been involved in online education and know how to develop courses. They are skilled at it, which was not the case five years ago. By going through the research community, they might not find these people." He adds that researchers need to go into the classroom more to get a better sense of what it's really like to teach at the K-12 level. He also believes that the UCCP program needs to be more than an Advanced Placement (AP) program, "because otherwise they do not tap into the idealism of the teaching staff." Also, he says, in addition to AP classes having college content, they must also have "high school pedagogy."

Articulation of credit for college-level online courses is another important issue. He says that in the past virtual college-level courses have been difficult to get transferred into California colleges and universities. However, he adds that since UCCP is university-centric, "I would assume there would be no problem getting UCCP courses accepted by colleges and universities as college prep electives."

Finally, Lapiroff says that he would prefer a teaching and learning model "where there is a combination of face-to-face and online asynchronous. I would start with a face-to-face session where the students and teachers meet at the beginning, and then I would have one more toward the end of class. You can do that in an urban area and get them together at a university extension site. This would add another reality to the class, and make it familiar. Combine that with having an adult on site at the schools who is highly engaged with the project, and you'll have fewer kids drop out."

8.0 Operational Models

California should develop a plan to create a virtual education Statewide project. The plan should assess the current technology initiatives existing in the State to identify what role they may play in the establishment of a Statewide virtual school system. This planning period should include funding for small pilot programs for planning and implementation to begin to establish the vision of the overall system. The planning process should involve educational entities, including the California Department of Education; the Office of the Secretary of Education; the University of California; the California State University; the California Community Colleges; significant State organizations, such as the California Teachers Association, California County Superintendents Educational Services Association, the Association for California School Administrators, and the California School Library Association; and those entities already involved in virtual schooling, including the UC College Preparatory Initiative, Poway, Clovis and Orange Unified School Districts.

8.1 Infrastructure Development

There must be a systematic plan for the development of course content and the deployment of technology to manage and deliver those courses on an on-going basis as part of the core educational infrastructure of the State.

California has laid the ideal foundation for the systematic development of online education that can be integrated into the current educational system. The virtual school system should become a part of the State's responsibility and another important educational option for students that routinely provides high-quality, consistent education supplementation and resources, as well as provides immediate data feedback on performance and areas of weakness. The technology and educational initiatives at both the K-12 and higher education levels have created a fertile ground within which a virtual school system can grow. The capability to reach populations that are under-served, to provide for Honors and Advanced Placement course delivery, to provide teacher education, and to meet special needs are the hallmarks of a system that is able to become part of a State's core educational infrastructure. Designing a system that accommodates California's size, diversity, organizational complexity, as well as one that harnesses its corporate, research, and university assets can be accomplished with systematic planning.

8.2 Virtual High School Planning and Development

Today, most Statewide virtual high schools tend to be primarily "top-down," with a central administration for course development and deployment, but with course delivery relying on some local support for students. In other virtual operations, the virtual high school activity is more "horizontal," with either a school developing its own courses or a consortia sharing courses and using pooled technology resources. Since education is a highly decentralized enterprise that also has highly centralized regulation, the virtual school model should incorporate both of these facets.

"Think globally (across the State), act locally (at the county office, district or school level)" applies to a Statewide VHS effort in California. Empowerment must be shared between a central operation that can aggregate knowledge and purchasing power and incorporate standards development. Additionally, the numerous county offices, school districts, and individual schools can monitor effectiveness and modify systems to meet local needs and goals.

A Commitment to Standards

Just as State and federal teaching standards have evolved and are part of good educational policy and practice, technology and content standards, which are now being actively developed, need to be part of any future system. Without them, it is cumbersome to classify courses and resources to easily find them or to effortlessly share them. The State has already established content standards in curricular areas. Technology standards and pedagogical standards must also be developed for online courses.

"Think globally (across the State), act locally (at the county office, district or school level)" applies to a Statewide VHS effort in California. Empowerment must be shared between a central operation that can aggregate knowledge and purchasing power and incorporate standards development, while the numerous county offices, school districts, and individual schools can monitor effectiveness and modify systems to meet local needs and goals.

Harnessing Unique Resources

Unlike many other States, California has unique capabilities:

- A powerful large bandwidth network serving K-20.
- Online course development that has begun in several K-12 school districts, in the community college system, in the California State University system and in the University of California system.
- Technology companies such as Cisco, Sun, HP, Apple, Macromedia.
- A large concentration of world-renowned media development and distribution companies.

The Statewide online effort must establish a set of common standards and specifications. The success of any long-term program that can scale to thousands of users must rely on standardization of course specifications, technology, and pedagogical standards, to meet State and national curricular standards.

While this report has so far covered VHS models in the mold of Florida, Illinois, Kentucky, Michigan, and West Virginia, there are other schemas for conceptualizing Statewide virtual education. The models so far discussed are primarily courses that are assembled and delivered through a course management system or the linking of registered students to third party course content. States have developed a VHS program and then solicited students from districts throughout the State to enroll in it. For the purposes of a system to better meet California's future needs, it is prudent to think through other possibilities and approaches.

The approach to this analysis is based on looking for a virtual school solution in California that:

A. Can integrate with some or all of the established technology initiatives in the State.

B. Will establish an infrastructure and delivery mechanism for State programs, courses, and resources that can be durable and foundational, and become an integral part of the State's educational system.

C. Will be useful for delivering resources of all sorts to schools and students alike, virtually or face-to-face.

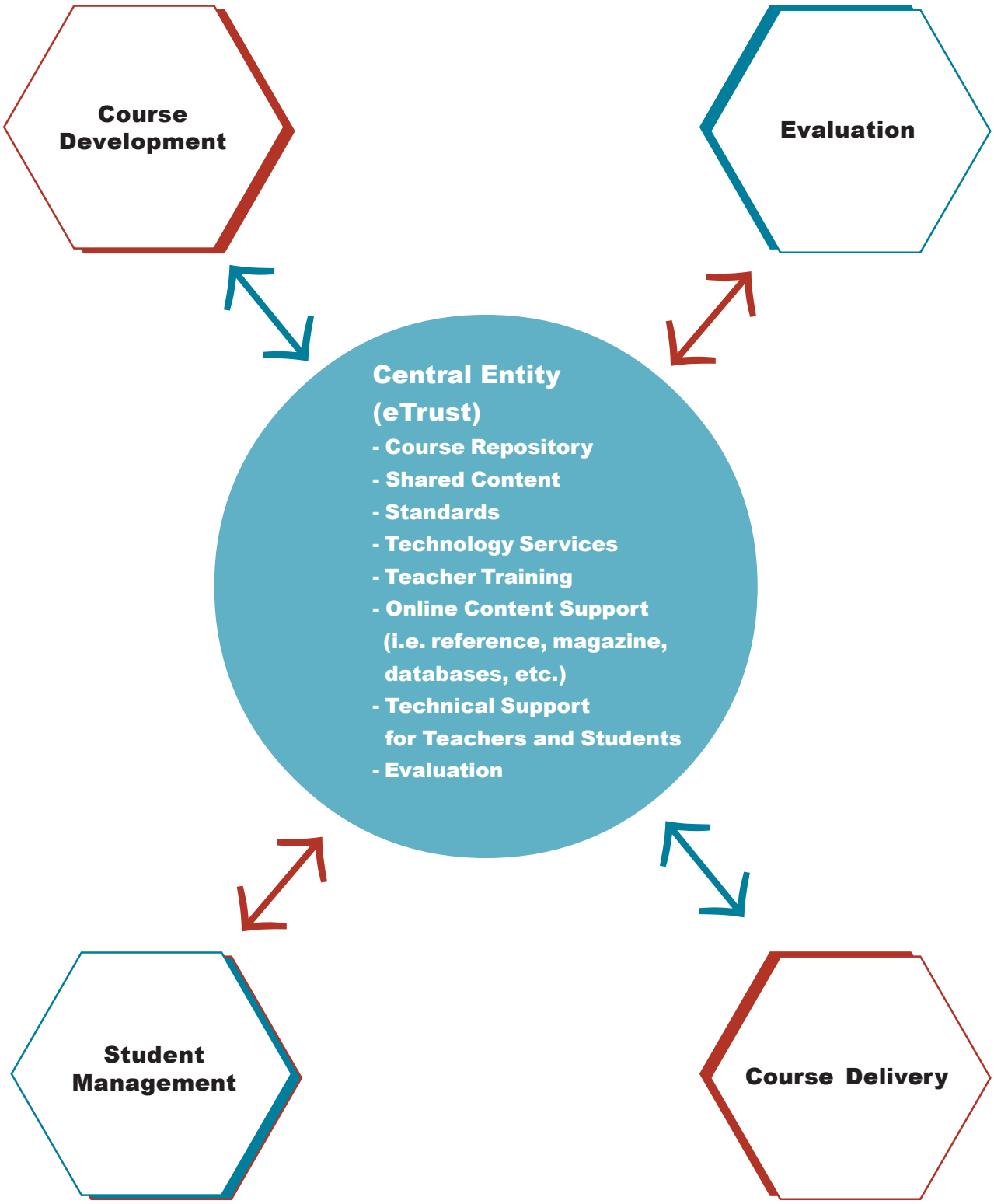
California's needs surpass the ability of a central, top-down model of course development and delivery and require a more consistent methodology than horizontal course creation among schools by themselves.

8.3 Establishing the California "eLearning Educational Trust"

According to Webster's dictionary, a trust is an entity that "has been given ownership of property, which is to be kept, used, or administered for another's benefit." A California eLearning Educational Trust (eTrust) should be developed in such a way that it can benefit all students and be integrated with the current educational system in the State. The eTrust would be an entity established to create the system by which a State virtual school would be implemented and maintained. This entity would begin as a planning group and eventually become the "trustees" of the program (governing board) once it is established.

This model is designed to facilitate input and courses from multiple virtual school agencies, because members would develop courses based on common standards and course specifications. An open system integrated with the appropriate technology allows for the development of courses more quickly and allows users to modify courses as needed rather than waiting for the courses to be updated by a central office.

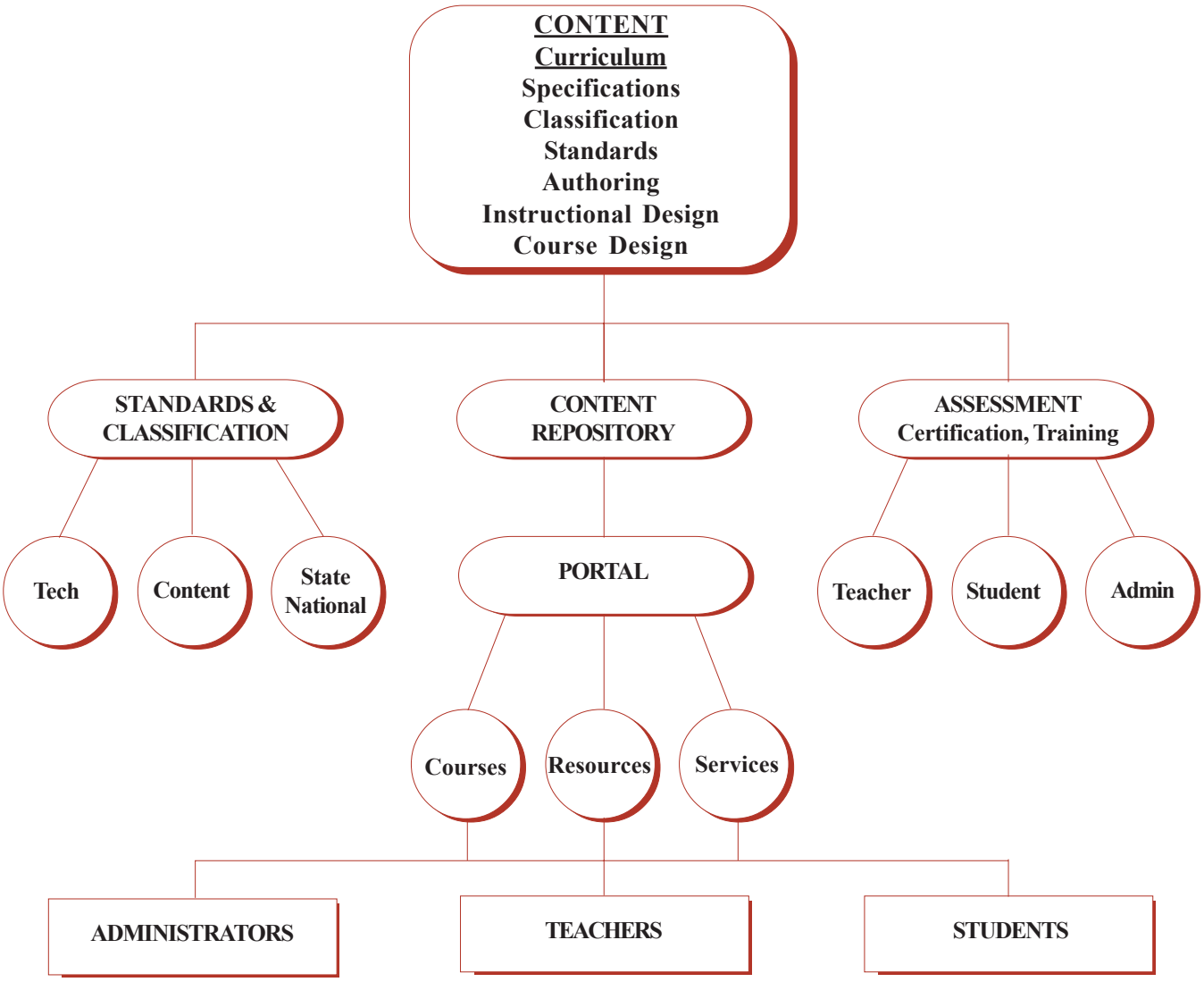
The California eLearning Trust (eTrust)



The eTrust would be formed around three functions: content, technology, and administration.

Content

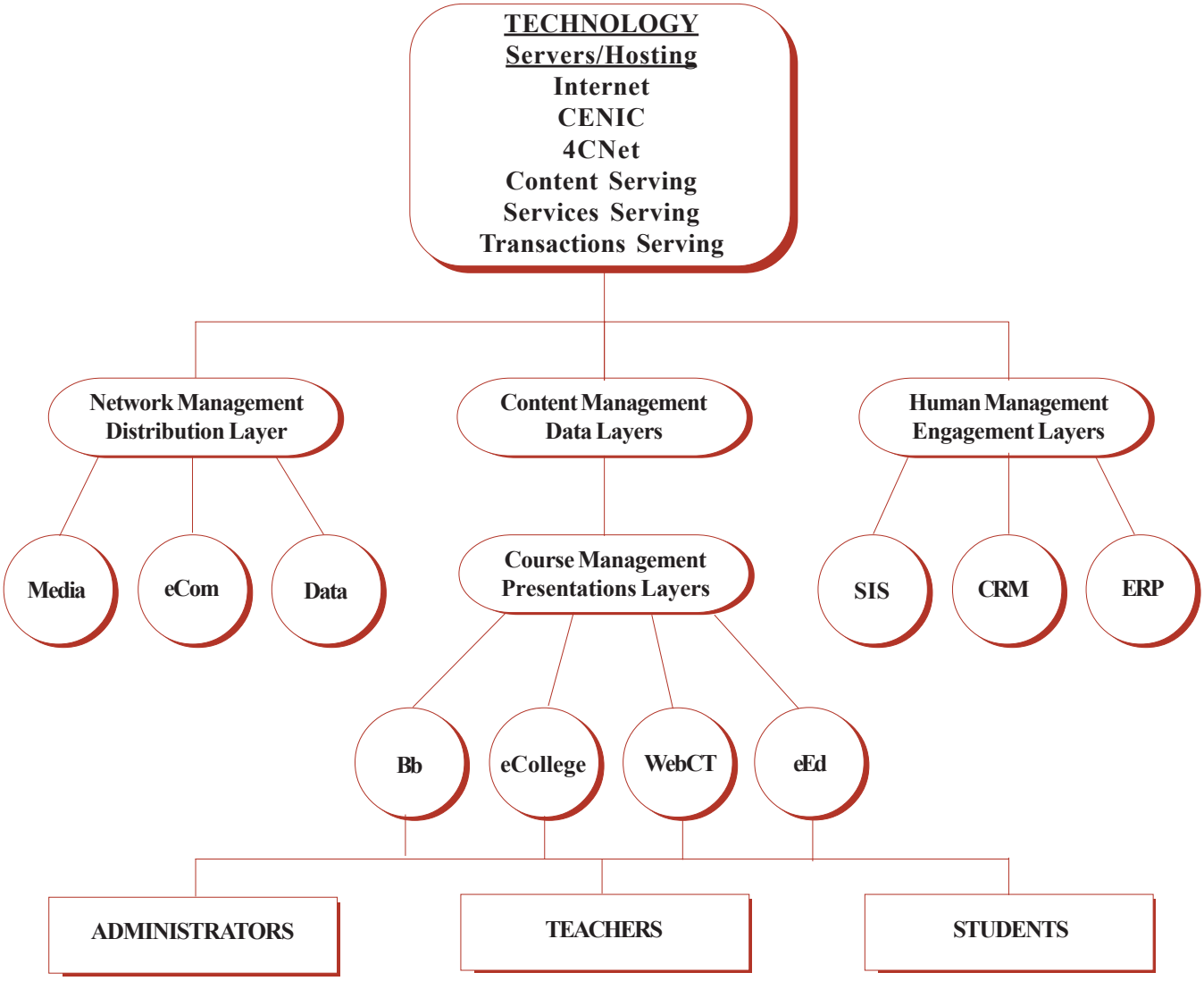
The California eTrust model would support a centralized curriculum organization that would work on promulgating standards and course specifications; managing a content, course, and resource repository built to those standards; and make sure that assessment and training were aligned with State, and national standards.



Technology

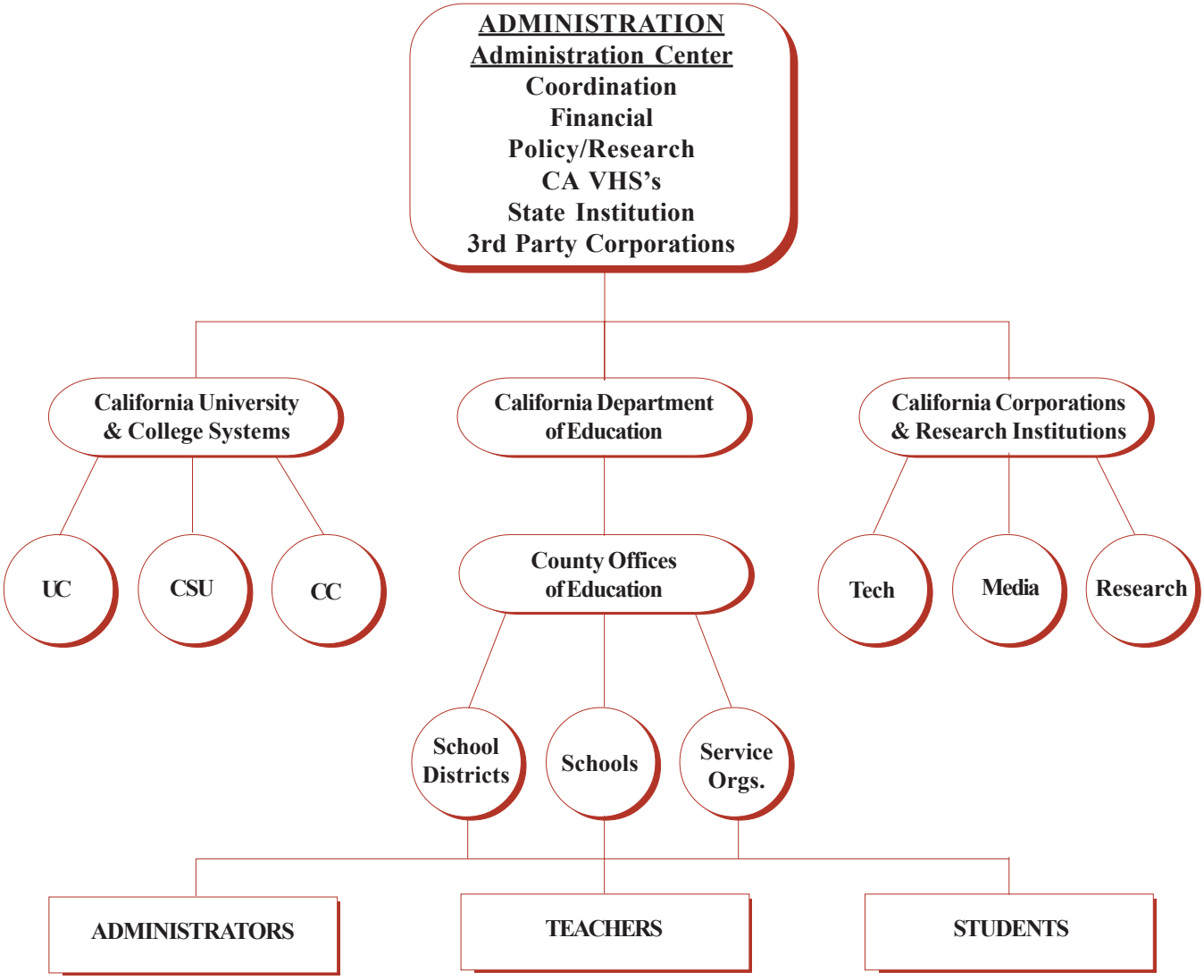
The eTrust model is designed to centralize the operation of core technologies. Additionally the eTrust will set standards and specifications, ensuring that school, district, or county offices pursue singular paths in technology decisions that will be intrinsically compatible, by mandate and design, to the central operation.

In the diagram below, it is clear that a course management systems (CMS), which is the most observable piece of a virtual education system, is only one piece in a much larger systematic puzzle.



Administration

The diagram below details the administrative component organization. These groups would ensure that decisions related to the technology and curriculum components facilitate the creation of efficient and productive virtual schools for the State.



Possible examples of agencies that could be supported by the eTrust include:

- A special needs and independent study VHS could be opened with specific programs designed for special needs. These programs would have access, through the system framework, to other resources developed by other agencies.
- UCCP could use the central technology and administration to support Honors and Advanced Placement students. Use of other resources developed by other agencies would broaden support for these students.
- Large school districts could operate their own virtual high schools that would both create courses and resources and also access other courses developed in the system.
- Courses already developed in local school districts could be redesigned to meet State specifications so they could be shared with other member agencies in the State.
- The system could house or provide access to approved 3rd party content and course vendors.

Various agencies would become part of the eTrust in a "subscription type" process that could include funding from the State or corporate grants. Subscribing to the infrastructure-building approach to California's model by having individual virtual schools begin the process, and then build up sub-specialties, will take the State in the direction of having specialization quickly.

8.4 eTrust to Support Multiple Virtual Schools

The size and complexity of California and the current virtual education initiatives that are already underway in the State demonstrate that there are likely to be multiple virtual schools operating in the State. As a result, the eTrust model has been designed specifically to support multiple school efforts through a central entity that establishes the course, technology, content, and curriculum standards and specifications necessary for virtual school operation in California. Secondly, the eTrust will maintain a full course, resource, and services repository that holds all of the courses and resources from all of the virtual school operations in the State. This model will mirror or serve as central hosting for any State-sanctioned virtual education in the State.

Through this multiple virtual school model, Los Angeles Unified would be free to operate their virtual high school academy (LAVA) and the UCCP would be free to operate its College preparation virtual school, should that evolve, but the courses in each of those virtual schools would be built under the State's specifications and standards. In this central scenario, it would be possible for a student, school, or district to access courses through the eTrust itself, provided the permission and cost structure was set by the individual virtual school.

Thus, there could be multiple points of access to the virtual schools in the State. They could be accessed singularly or they could be accessed through the eTrust. The eTrust, over time, may evolve into a single virtual school for the State. However, given the complexity of California, it would be unlikely that a single virtual school could be agreed upon by all the players. The models in Florida and Michigan would be difficult to institute in California and may not be able to serve all the needs of the State.

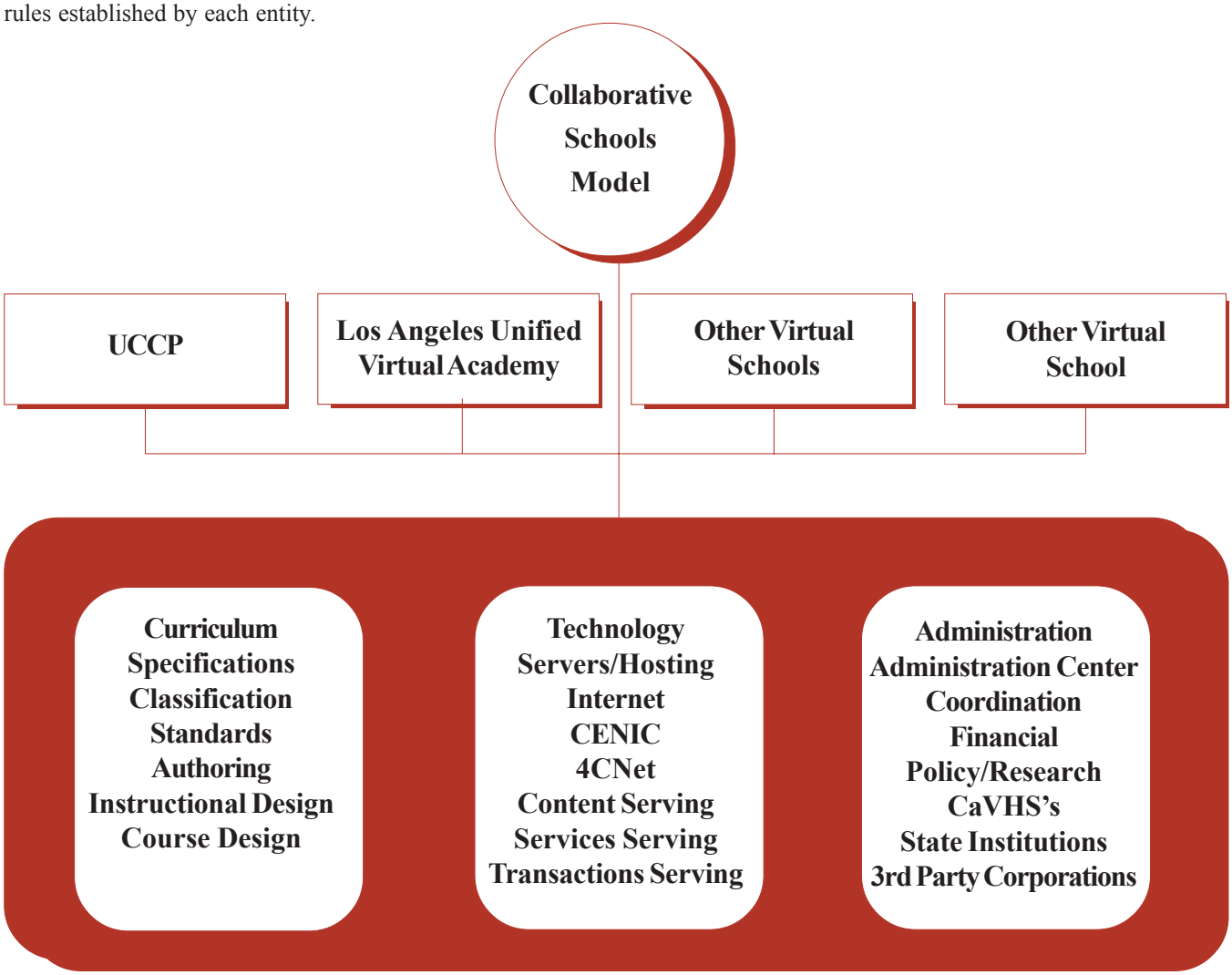
The eTrust/multiple school model, however, has strength in being able to foster specialized virtual schools, as are needed for Advanced Placement and Honors Courses or in a varied urban setting like Los Angeles. It is possible that participation in the eTrust would be designed as necessary to receive State funds and average daily attendance fees should those be available to virtual schools.

The eTrust can also support a collaborative model that allows all schools to construct courses and resources and provide services. The collaborative model within the eTrust discussed here is a virtual school structure in which any school could make or use courses made by other schools. The eTrust would be the home for these courses constructed to the common standards and specifications.

The eTrust model has been designed specifically to support multiple school efforts through a central center that establishes the course, technology, content, and curriculum standards and specifications necessary for virtual school operation in California. Secondly, the eTrust will maintain a full course, resource, and services repository that holds all of the courses and resources from all of the virtual school operations in the State.

COLLABORATIVE MODEL WITHIN THE eTRUST

As the chart below indicates, the eTrust is like the "mother ship" able to provide the support, services, and standards for separate virtual schools. Access is available through the separate schools or through the eTrust itself, depending on the rules established by each entity.



8.5 Bringing the eTrust to Life

An eTrust planning committee should be established to set the overall vision for the virtual school system; to develop common standards and specifications; to foster the creation of the State virtual school system, adhering to common standards and specifications; and to maintain and monitor the overall system. Members of this committee should consist of people from agencies, institutions, and organizations who will be affected by a State virtual school. Individuals may be appointed or developed as an *ad hoc* committee and should include teachers, administrators and consultants from school districts, the California State Department of Education, the Office of the Secretary for Education, the University of California, California State University, CENIC, and other affected groups.

An eTrust planning committee should be established to set the overall vision for the virtual school system; to develop common standards and specifications; to foster the creation of the State virtual school system, adhering to common standards and specifications; and to maintain and monitor the overall system.

8.6 A Collaborative Model Within the eTrust

California has a number of educational entities that currently provide some form of virtual education or have some form of technological or instructional resources.

Coordination among the various California entities is necessary. In its absence, unnecessary duplication will occur. These virtual school entities in the State should be encouraged to collaborate and to form the first stages for the overall system. The University of California in collaboration with the California Department of Education and the Office of the Secretary of Education should establish the eTrust planning committee.

Research with a variety of stakeholder groups (teachers, students, parents, administrators) suggests that a California virtual high school system should incorporate a centralized/decentralized approach with the following elements and ideas:

- A central entity (central or State office) which sets standards, approves online courses, becomes a repository for online courses, and provides some teacher training.
- A subscription-based process whereby member school districts would contribute something to the State virtual school program either by creating courses, providing and/or providing teachers, recruiting students, or providing money for local students to take online courses.
- Local districts should receive financial incentives to provide online teachers and participate in the State virtual school program.
- Entrepreneurial teachers should be able to receive financial incentives for creating an online course that meets standards of the Statewide program.
- Initially, the virtual school would be a supplement to existing high school programs.

Some of the ideas for this model came from the structure established for schools who have become part of Project EAST, a dynamic, performance-based learning environment for students in grades 9-12 utilizing project-based service learning, integrated with advanced technological applications.

Central Entity and District Responsibilities

School districts ultimately have the responsibility for educating students. Within the eTrust, courses could be developed by institutions other than a school district (e.g. a university or third party). A central entity would guide the course development and approval process whether from a university, from a school district, or from a company. This central entity would also arrange any contractual issues with institutions other than school districts so that the content would be available to member school districts.

For a list of responsibilities as they relate to State (central entity) and district levels, see Appendix N.

California Virtual High School Program Governing Board, Bylaws and Central Entity Staff

A governing board will be its own separate State entity and will oversee the policies and administration of the program. The board will collaborate and communicate with the California State Board of Education. A centralized staff, including an Executive Director, will need to be hired to implement the vision of the governing board and CaVHS.

For information on the formation of the governing board, see Appendix O.

Collaborative Structure, State Incentives and Suggested Fee Methodology for Participating School Districts

As part of joining CaVHS, school districts would contribute to the system by providing teachers, by developing courses, and by paying fees for a variety of online content geared for both teachers and students. Districts that participate by developing an online course, or providing an online teacher, would receive incentive money from the State virtual school program and/or would not pay as much tuition for local district students to take courses through the State system.

Teachers of online courses could be hired to teach one course section over and above their typical school day, or as part of their retirement, or as part of their typical school day. CaVHS would work out the contractual arrangement with the teacher and the local district, as well as provide the teacher training.

Incentives for course development would be a one-time fee paid to a district, while incentives for online teachers would be an ongoing incentive paid by the State.

Other districts would contribute to CaVHS by paying a fee based on student enrollments in online classes within their district and whether or not the district had contributed any human resources to CaVHS. Fees would also be charged for teachers and students who wanted to use the online content as a resource or enhancement to their face-to-face classes. This fee would be similar to the way academic, public, and school libraries pay site-licensing fees for online periodical databases.

Teachers could also use various CaVHS content for professional development, whereby they learn new methods for the use of educational technology. Additionally, students could access various CaVHS content to increase their knowledge in a subject or as a way to relearn material that they may not have understood the first time it was taught. Remedial students could also gain from the online content because they could review the content as often as needed.

An outline of a virtual school program's responsibilities and operational issues is located in Appendix P.

9.0 Financial Issues

Clark (2000) identifies three types of funding mechanisms for Statewide online programs:

- **Funding from State agencies**
- **Per-student tuition fees**
- **A barter system in which each school district typically pays an up-front fee and provides resources such as a teacher in exchange for course seats to be used by the district's students**

Clark notes that "alternative funding sources are not readily apparent" and that sustainability is a key concern of many Statewide programs. In a survey of all online programs (not just Statewide programs) Clark reported that 73% of programs charged tuition. The same study showed that online programs received an average of roughly $1 million in non-tuition funding (typically State or federal funds) per fiscal year in each of the last two years.

Funding from State agencies allows online programs to charge lower (or free) tuition, increasing equity of opportunity for poorer districts in particular. At the same time, this greater reliance on State appropriations or grant funding makes the online program more susceptible to economic downturns and other budgetary pressures. Setting tuition at a level lower than the marginal cost of adding the student to the online program means that increased appropriations are necessary as the program grows. The barter system allows for schools and districts to supply teachers and other resources in place of higher tuition fees, but is logistically more difficult to administer.

9.1 Funding of Programs in Other States

Of the funding mechanisms described by Clark, the combination of funding from State agencies together with tuition fees is most common among Statewide online programs. Illinois Virtual High School (IVHS), for example, was planned and created through a series of State and federal grants totaling roughly $800,000 between late 1999 and 2001. (Note that this sum does not include significant separate funding provided to Illinois colleges and universities that went, in part, to create courses for Illinois Virtual.) IVHS now typically charges $300 per student per course and has formal agreements with member districts whose students take IVHS classes. IVHS acknowledges that the $300 fee is higher than some districts can easily

afford, and in some cases districts apply for grant money or other funds to pay IVHS student fees. IVHS leaders feel, however, that the best revenue model to ensure sustainability is to charge a fee that covers operating costs (i.e., technology and support fees to a vendor, and teacher pay).

Michigan Virtual High School has a similar financial model. Operating costs are covered by tuition fees, which are paid by schools in one of two ways. Schools may pay a fee for a single course, which is $335 per student per course. Alternatively, they may become "members" by paying a fee that is determined by the size of the school, up to a high of $5,000 plus $.50 per student for the largest schools in the State, which entitles the member to 60 course seats.

Florida has taken a different approach to funding its virtual school, with the State of Florida providing all the funding so that there are no tuition charges. Total funding over the past five years has been approximately $23 million, with funding for the current fiscal year at $5.7 million. FVS is currently a line item in the State budget, operating on yearly appropriations. Partially because of the free tuition, demand at FVS far exceeds the supply of course seats. In the 2002-03 school year Florida Virtual has 62 courses and 8,200 students, with additional demand of at least 1,000 students.

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Because no Statewide K-12 online program has been developed without State or Federal funding, it is clear that a California Statewide online program will require substantial start-up monies from State and/or federal sources. Although some alternative funding sources may be available, the budget in the program's first few years of operation may be driven largely by the availability of funding from government sources.

9.2 Tuition

Tuition alternatives include:

- Charge a fee in the neighborhood of $330 per student per course, which Clark (2001) identified as the mean tuition charge for Statewide programs, for all students, regardless of the student's home school and district.
- Charge a $330 tuition fee, but allow schools or districts in low-income areas to pay a lower fee. The fee structure would be determined through some sort of means testing, possibly based on number of students receiving free or reduced priced lunch or some other existing mechanism (to avoid the additional administrative costs of putting in place a means testing procedure specific to the online program).
- Charge a lower fee, possibly in the range of $100. Such a fee would offset some operating costs, but allow participation by most schools and districts.
- Charge a district membership fee, which would essentially be a bulk purchase of seats. This fee could be an either/or option for districts, which could choose the membership fee or pay for individual seats. In either case, member districts should have the ability to purchase additional seats above the number provided by the membership.
- Allow all students to take courses at no charge, ensuring access without regard to schools' or districts' ability to pay. This model assures equity and is more consistent with the philosophy of public K-12 schooling. Anticipated demand will be higher, and California will have to determine a mechanism for allocating courses among students when demand exceeds supply.
- Charge the full tuition necessary to cover all costs of operating the online program, so that no State funds would be required. In this case, anticipated demand would be low, and participation would be limited to affluent schools and districts that could afford to pay high tuition fees, or those that could secure additional funds to pay tuition.

- Purchase additional seats above the number provided by the membership.

If tuition is charged to schools and/or districts, the dollars will essentially come from ADA-based funding. Therefore, if schools are charged tuition (as is done in other States), this becomes a challenge to the schools, and tuition must be kept low or there will not be local support. If tuition is kept low, the bulk of the ADA would be retained by the conventional school, which would register and provide local support services for the student. This would help to avoid a situation where the online program is considered a competitive threat by existing schools.

9.3 Financial Recommendations

To establish a State virtual school program, initial start up monies will be needed. These monies could come from the State legislature, federal grants, corporate grants, or corporate partnerships. Start up funds in other States has ranged from $2-$15 million. Depending on the model chosen by the State, $5 million would be needed in the first year of operation. This would include establishing a State virtual school office, staff, and the technology infrastructure needed to support the implementation of the program. It is recommended that the virtual school program work in collaboration with the other State technology initiatives and the developing Digital California Project. These types of collaborations may reduce costs in the long term.

A suggested funding structure for a collaborative model is outlined in Appendix Q.

10.0 Key Metrics

Regardless of the model chosen, key metrics will be developed for the program to ensure that goals and objectives are met. Some of these will likely vary depending on the model, but others will be common to different models.

10.1 Goals and Objectives

An Executive Director (to be enlisted), in conjunction with the Governing Board, will develop a set of programmatic objectives. These will include key metrics for determining achievement of program goals, which will be married to the educational benefits of the program. The Executive Director will also set a timeline for analysis in order to ensure that metrics are measured and reported on a regular and timely basis.

10.2 Measures of Success

Measures of success are expected to include:

Program utilization

- Number of online course enrollments
- Number of students served
- Number of students served for whom comparable courses were otherwise unavailable or available only at great cost or effort
- Course completion rates
- Course/teacher evaluations by students

Educational benefits

- Changes in test scores of students who take online courses
- Changes in educational attainment of students who take online courses
- Changes in academic achievement of students who take online courses
- Changes in educator practices in design and delivery of instruction
- Changes in educator practices in uses of technology

10.3 Independent Evaluation

In order to ensure impartial analysis of key measures of success, the program should hire a contractor to conduct an independent evaluation of the success of the program. This project evaluator would survey students, teachers, administrators, and other stakeholders, collect and analyze data, and report to the Governing Board on the level of success of the program. Independent evaluation is a key to success for an online program because online education is relatively new and considered unproven by some.

California, with its unique educational, corporate, technological and entertainment resources, is perfectly positioned to develop a virtual school system to better serve the needs of students. A conscientiously planned and successful virtual school system can further enrich and enhance the current school system.

Section III

11.0 Conclusions and Recommendations

The conclusions set forth in this report are the result of a review of the literature, and interviews with virtual school operators and virtual school companies across the nation, and interviews with over 700 California administrators, teachers, students and parents.

The concept of virtual high schooling in the United States is six years young. Unlike any other educational delivery system, it has not developed as part of mainstream education. Education, as we know it in the United States, gradually migrated from the one-room schoolhouse of the agricultural age to the school district of the industrial age. It is time to embrace an educational delivery system for the Information Age. Because high school students have already been successful with online courses in every State, virtual schooling will mature and online courses will soon become part of mainstream education across the nation. California, with its unique educational, corporate, technological and entertainment resources, is perfectly positioned to develop a virtual school system to better serve the needs of students. A conscientiously planned and successful virtual school system can further enrich and enhance the current school system.

Research and data indicates that there are four key program variables that must be addressed for a State virtual school to be successful - **Policy, Curriculum, Delivery, and Acceptance**. These variables and their essential elements are listed and expanded further on the following pages.

Essential Elements of Key Variables: Policy, Curriculum, Delivery, Acceptance

POLICY

1. Equity	Equal access to high quality courses and resources.
2. Efficacy	Online education, a consistent way to obtain proven results.
3. Efficiency	Central cost and time savings over multiple local activities.
4. Performance	Proven results and retention from personalized delivery.
5. Accountability	Results from assessments are on-going and built-in.

CURRICULUM

1. Standards	Teaching, content, and technology standards are key State issues.
2. Specifications	Course building specifications must be spread across all efforts.
3. Classification	Naming of courses and resources has to be standardized.
4. Pedagogy	Constant revisions are needed for online pedagogical methods.
5. Assessment	Assessments of all sorts need to go online for easy data access.
6. Support	Guidance for teachers who want to develop or teach online courses.
7. Intellectual Property	Guidelines established regarding who owns the course content.

DELIVERY

1. Portal	Where courses, resources, and services are found, matched to users.
2. Platform	The course and resource delivery vehicle must be flexible.
3. Services	Range of student services must be available to students/teachers.
4. Repository	Courses and Resources must be stored with student use data.
5. Registration	Student information systems need to "know" and help each student.
6. Authorization	Safety and information access and control are essential.
7. Support	Online resources and 24 X 7 tech support are needed for student success.

ACCEPTANCE

1. Governmental	Executive and key legislative champions are necessary.
2. Departmental	Department of Education, Secretary of Education must legitimize.
3. University	Admission standards play key role in quality of State education.
4. County	County Offices serve as policy, administrative, financial advisors.
5. District	District provides engine for education delivery and acceptance.
6. School	Schools implement and validate program through performance.
7. Student	Provide the demand, adapt well to online or mixed teaching.
8. Family	Families have choices and better ability to understand offerings.

Policy

Policy must drive the adoption of virtual schooling. In all the cases examined, high level policy makers, including the governor, speaker of the house, secretary of education, or State superintendent, moved the policy agenda forward. Policy issues almost universally started with equity issues, providing access to the courses that were needed to gain admission to State universities. The group advocating for the virtual school were able to demonstrate to the policy makers satisfaction the efficacy of fully online and hybrid courses in the high school learning process. These programs were put to the test, performance being a key variable in continued or accelerated funding. Although not incorporated yet, virtual school systems can deliver a higher level of accountability, as the results are captured in the software and available for scrutiny and study.

Curriculum

Virtual education is unique in that the curriculum can be developed, monitored, and adjusted electronically. The process is open and not locked away in lesson plan books or a teacher's memory. Uniformity in development is important so that curriculum can be aligned with standards and can later be updated. Standards include State and national curricular standards, technology standards, and content standards. If these are set by the virtual school centrally, local changes can be tracked. Course specifications can be developed to meet uniformity and interoperability standards. Classification of courses, resources, and services is very important. Using common naming regimes and publishing glossaries are essential to a well-developed virtual school curriculum. Pedagogical models vary greatly. Developing or adopting a model that can be described is very important to knowing what works and why. A curriculum support group is critical to the teachers and mentors using the online curriculum or advising in its use. While intellectual property issues have not been large in high school, they are bound to become so. Thus, having intellectual property capabilities is important. Many programs today mix materials that have originated with corporations with those that are produced in-house. Tracking those materials in the curriculum is necessary for later accounting to its owners.

Delivery

Virtual education relies on a number of technologies that have proven themselves in higher education and corporate training. From the user's perspective, the portal is a "door" into the virtual education activity. It is a web system that controls entrance and access and provides information and general guidance. Only students, administrators, teachers, or parents with prior authorization can enter. This is regulated by the student registration software or by authorization software into which pass words or other forms of authentication are provided. The platform refers to the software application in which course content, schedule, class communications, grades and other virtual school activities are contacted. This could be one software application or several. Once the platform is in use, user support is critical to the functioning of the virtual school; this can be in the form of technical support on using the platform or student support, even tutoring or mentoring, on the curriculum.

Acceptance

When education practice is in transition as it is with virtual education, acceptance must evolve after the system is mandated by policy. Acceptance comes, certainly, at the governmental and departmental levels in which it is legislated or mandated into existence. This acceptance, however, needs to be monitored as the virtual school practice proceeds. Acceptance at the university level, especially at the State-funded universities in the home State, is essential so students can easily go on to college with the appropriate grades and education in high school. Hopefully, the colleges and universities will play a role in approving, directly or indirectly through standards, the virtual curriculum. Within the school hierarchy, acceptance at the State Department of Education is essential in signaling the policy change to the State's county offices of education and school districts. As changes are put into practice, their effect is seen at the school, student, and family levels. Their acceptance then signals success or failure to the State-level agencies. Managing the explanations of virtual education and managing the results is key in the acceptance of virtual education programs.

11.1 General Recommendations

The survey of other States and of virtual activities in California does not automatically suggest a single model that is correct for California. The following general recommendations have been extracted from the experience of other States plus the realities of California's educational landscape:

- California's investment in virtual education must be seen as part of its overall educational infrastructure, stretching from K to 20 and not as an isolated program.
- Institutions and individuals must be placed into a structure where incentives can be given to the participants and the system is successful because everyone is contributing to the common good. Otherwise, the program can become isolated and later segmented.
- The entity in which the structure and responsibility is placed must be managed as a public entity with academic goals but with business management. The governing board should be a collaborative effort from academic, governmental, and commercial entities.
- Solutions must be sought that are durable, standards-based, and result from the best thinking in government, business, and non-profit education and research.
- Programs, even if intended for large-scale distribution, should start small, but be designed to scale by factors. This requires the right components to be devised from the beginning that include standards adherence, course specifications, classification specifications, and operating agreements between producers and users that coordinate products to be useful across a wide spectrum.
- The issue of financing virtual education deserves separate consideration and sophisticated modeling. Significant start-up funding is needed to implement this plan. Funding is not simply an issue of charging for courses or re-directing ADA payments. Front-end investment, operating costs, and receipts have to be considered alongside the technology and course development. This is a transition in which education practice is going to slowly transform. There is currently not one State virtual school program that is completely financially self-sufficient and does not receive some State allocation each year.
- A systematic approach to a virtual school should include planning and participation from all relevant companies, governmental and research bodies, and educational organizations throughout the State.

11.2 Recommendations for development of online teaching and learning best practices

- Course development specifications and curricular content quality standards need to be created and enforced.
- Ensure each course is reviewed for curricula, instructional design, and pedagogical content standards.
- Ensure that course reviews include assessment standards.
- Create technology standards for course content development, and subject existing courses to new technology standards.
- Provide online instructor pre-training and certification before qualifying as an online instructor or faculty.
- Use pre-learner "readiness" assessment; ensure local support mechanism and good technical support.

11.3 Technology Recommendations

Content development should be CMS-independent.

For a State VHS, course content should be largely CMS platform independent for at least two reasons. First, educational objectives should take precedence over exploiting the particularities of a given system. Second, the CMS market is not fully developed and is analogous to the PC market in the early 80's, which had a plethora of platforms prior to a shake-out. An educational institution that doesn't want to put "all their eggs in one basket" will develop its course content around a set of features that are roughly identical on the two or three best systems. This will avoid the necessity for costly conversions later on.

There is an industry consensus that a database-driven CMS is the right solution for giving institutions both the flexibility for content maintenance and development of courses and for indexing and cataloging course content.

Content should be developed in XML

A second issue is that content should increasingly be developed in XML (Extensible Markup Language) rather than HTML (Hyper Text Markup Language). Most of the Web community is moving towards XML because XML identifies the structure of content while HTML only indicates display characteristics. It is not necessary to store XML tags in a database if the database stores structured information. Rather, XML tags can be used to import into and export from the database in a way that preserves the structure. XML tags greatly facilitate the searching, indexing, reorganization and repurposing of content.

If using a commercial CMS, develop an exit strategy.

Before adopting any CMS system, the virtual school should develop an exit strategy for transitioning out of the system should the vendor go out of business, another vendor offers a superior product at a later date, or the institution decides to build its own system. For the first implementation of a major Statewide system, California should be careful not to lock itself into a vendor's system for the long term just to satisfy immediate, short-term needs.

Build content to be portable.

An important consideration is portability of course content between systems. The IMS and SCORM standards address this issue of portability, and all major vendors claim some level of compliance with the IMS standards. However, IMS and SCORM standards are still under development.

A prudent way to test the portability of courses before making a major institutional adoption of a CMS would be to take a sample course that has been developed and port it in and out of the various CMS. Also, it should be noted that to some degree porting problems are not entirely the responsibility of the vendors. The State virtual school program could greatly facilitate the porting of courses by developing course development guidelines that cover issues like cross CMS development, Window/Mac development, IE/Netscape development, etc. By avoiding certain bad development habits, one can greatly reduce time and trouble of converting courses.

The CMS must integrate with student information and administrative systems.

Within the higher education community, there is increasing recognition of the importance of being able to integrate the CMS system with legacy Student Information Systems (SIS) and Enterprise Resource Planning (ERP) systems as well as other 3rd party assessment, gradebook and synchronous classroom tools. The IMS interoperability standard addresses how systems can communicate critical data via structured XML. The overall CaVHS system that is developed should integrate easily with student information and administrative systems.

Address needs for math and science notations.

The web does not generally display these notations, despite the fact that physicists created the web. In the past, content creators had to create GIF of JPEG images, for example, with math equations in them. While adequate for presentations, this is not a good method within an interactive learning environment. Also, course maintenance, searching and cataloging of content is difficult when utilizing GIF or JPEG images. Some systems are integrating WebEQ, which allows students and teachers to write math equations (stored internally in MathML, an extension of XML). Other vendors have licensed Link-Systems' whiteboarding software that has tools for writing math equations.

Plan for future bandwidth increases.

Online education will change dramatically as soon as bandwidth increases to adequately support audio, video, and synchronous tools. While distance learning tends to be asynchronous, synchronous whiteboard presentations with instructors in real-time audio commentary fit the model of current offline classroom teaching and will undoubtedly become an important form of online instruction. Currently, bandwidth limitations make the audio quality so poor that it is more distracting than educational, particularly in such areas as language instruction. Similarly, streaming video is primitive when compared to established technologies like videotape. CaVHS should be able to easily integrate all types of media into the online education system.

Develop open source options as an alternative to commercial vendors.

There are some open-source options such as MIT's Open Knowledge Initiative and the UC Irvine Center for Distance Learning's system. This is a viable strategy. One of the first tasks of a State virtual school should be to develop clear guidelines on how an open architecture would meet the State's objectives. It is important for the State system to stay as close to the IMS and SCORM standards as possible. It is important that whatever content is used and/or created can be used on a variety of CMS.

Courses must align to State content standards.

Courses must align to State content standards (including reasonable expectations regarding the breadth and depth of content within the term of the course), meet quality assurance criteria established by the Statewide online

program, and address accessibility issues. The CaVHS should work in collaboration with the California Department of Education to ensure that online courses meet State content standards. A system similar to the State textbook adoption process could be utilized to ensure that online courses meet State standards.

Depending on how courses are created, the State program may consider developing in-house course creation and review teams that would consist of an online teacher, a content specialist, and a specialist in online pedagogy to conduct quality assurance reviews.

Virtual school technologies should be deployed in a scalable system.

Virtual school technologies should be deployed in a scalable system that will become part of the core educational infrastructure of California.

The State should develop a collaborative virtual school system.

The State should develop a collaborative virtual school system that includes a course repository, course content based on technology and standards, and the open development of courses that is available to all students and schools.

11.4 Specific Operational Recommendations

The following specific recommendations are suggested as initial steps in building a Statewide California virtual school infrastructure.

- Establish the eTrust planning committee including representatives from the California Department of Education, the Office of the Secretary for Education, the University of California, school districts, other higher education institutions and applicable educational organizations to move this vision forward.
- Implement a collaborative model for virtual schooling as part of the eTrust. School districts should receive incentives for participating and also contribute in some way to the success of the overall system.
- Invest or designate a central operator of the technology resources, to set standards, operate central technologies that save funds, provide efficiencies, and are part of the State educational apparatus.
- Adopt common content and technology standards and common course and resource specifications, which ensure that courses developed in one place, can be used in another.
- Design a central course repository to house approved and developed courses.
- Set up meetings and discussions with the major textbook publishers about delivery of their digital content, exercises, assessment software and test banks, all with appropriate tagging to communicate with the repository.
- Incorporate and identify how current State technology initiatives (e.g. Digital California Project, Digital High School Program, California Technology Assistance Project, and Statewide Education Technology Services) can be utilized for the development of the State virtual school system.
- Establish within the UC System a virtual school research and operations center to conduct research, extract best policies and practices, and align with national virtual school movements.

11.5 Research and Planning Recommendations

The following three issues provide a systemic basis for virtual education delivery. Together, they could confirm a basis for mainstreaming virtual schooling. California's support for their study can help California and the other States have a consistent understanding of virtual education's costs and benefits.

Performance

Performance data, trends, and qualities need to be distilled and methods established for measuring virtually delivered instruction and resources compared to classroom and traditional delivery. The attributes that contribute to performance differences need to be isolated and their operations analyzed so that they can be replicated on an on-going basis.

Economics

Because online programs are relatively new, the economics of virtual education are not yet well understood. The cost of the programs appear expensive to policy makers and administrators. However, there are no metrics to establish what one dollar of virtual education buys versus one dollar of on-the-ground education. The analysis that is necessary is not a direct comparison as indicated in the performance question, but a full cost of educational delivery methodology that suggests what components are appropriate at what cost toward what performance metric.

Information technology structure and standards

The information technology and virtual education structures and standards that exist in virtual schools have been adopted and adapted from systems in higher education and corporate training. They have not been designed for schools specifically and systematically. Courses, resources, services, and assessment need to be standardized so that they can be continually evaluated and correlated in real time to feedback on-going performance results and metrics. Continual feedback, designed for school environments, which correlates to State standards and State testing needs to be built into a dedicated system. The design specifications and data reliance cannot come from vendors alone.

11.6 National Recommendations

The following recommendations are generated to allow virtual education to be legitimized at a national level in a way that saves other States, districts, and schools time, money, and experimentation that can be easily found in a nationally-sanctioned body.

National research and evaluation agenda

Given that virtual education is assisted by technologies that can track usages, performance, attendance and other variables, and that these can easily be correlated with other information and demographics, it is recommended that a research and evaluation agenda be established to measure performance, to determine how to address educational deficiencies, and to bolster teaching and learning standards. The US Department of Education or a non-profit corporation or foundation can take on the responsibility of managing the data, its presentation, and its utilization.

Virtual school national policy, practice and technology council and clearing house

As more virtual schools come into existence and as more States develop such programs, the need arises for a central body to maintain a policy dialogue so that best practices and best policies can be rapidly understood and shared. Likewise, the need to have a reliable clearing house on policies, best practices, and State programs would be extremely useful and help the standardization process. This recommendation can easily be combined with General Recommendation # 1 and # 2 and managed by one national organization.

Note: The US Open eLearning Consortium (www.ctlt.org/projects/us_open_e_learning) is in the initial stages of implementing projects along the lines of these national recommendations. California should be involved with this organization and these beneficial projects.

11.7 Recommended Implementation Guidelines

The following suggestions can be acted on independent of official authorization such as enabling legislation. Implicit in these guidelines is that they can be applied to test, model, and begin processes that can inform the official infrastructure development for the State.

Report follow-up

- Distribute report as a draft and solicit reaction and participation in forums.
- Present draft report to other state virtual schools and solicit comments.
- Establish an informal network of virtual school operations in the State.
- Publish report in final form as publication and website.
- Establish a planning group to explore virtual education infrastructure issues.
- Establish a dialogue and contribute to national virtual education organizations.

Virtual School Planning and Implementation

- Establish the California eTrust planning committee composed of representatives from K-12 school districts, UC, CSU, CC, CDE, OSE, CENIC/DCP and educational organizations such as the California Teachers Association, California County Superintendents Educational Services Association, and the California School Library Association.

Specific tasks:

- Establish technology standards and services, online course standards and pedagogy, and virtual school resources.
- Identify and pursue funding, operations, administration.
- Bring virtual school operators together to discuss common development pathways.

- Establish the California eLearning network composed of individuals from K-12 school districts, UC, CSU, CC, and CDE to collaborate regarding common virtual school standards.
- Expand and coordinate UC Gateways and California Colleges portals.
- Establish ongoing coordinated research regarding virtual schooling.

For a brief outline regarding CaVHS marketing and public relations, see Appendix R.

A suggested five-year implementation timeline is listed in Appendix S.

11.8 Conclusion

Virtual Education is Here to Stay

The survey work leading to this report and the analysis contained in the report makes clear that virtual education is here to stay and that it is a growing part of the educational delivery landscape in US education. This phenomenon, in its early stages, affords States the ability to deliver courses and course materials to students with unmet curricular needs or with flexibility in meeting the demands of complex scheduling. Teaching, curriculum expertise, and pedagogy can be combined in virtual educational systems to provide master learning experiences that can be repeated in a highly consistent manner to a large number of students. With a shortage of teachers in general and a shortage in demanding curricular areas, virtual education offers an efficient way to augment classroom teaching and learning and to provide singular learning experiences to students who are either better suited to this form of learning or, by necessity, cannot be present in school. It also provides a method of timely and updateable delivery into every classroom, every day.

Virtual education also can address challenging equity issues relating to access to quality education regardless of the quality of the school or district of attendance. Consistent with the national "No Child Left Behind" program, virtual education has a place in US education for students, teachers, administrators, and parents.

American society is increasingly reliant on Internet and web-based technologies to extend otherwise land-based activities in manufacturing, shopping, health care, finance, government, and publishing. Individuals in the work place and at home are increasingly using computers and the Internet, as they are also doing in schools. As electronic activity of this nature becomes the norm for society, its application in schools is assured. How this is accomplished, and to what ends, are being explored in the large virtual education operations in States like Michigan and Florida.

Those projects were initiated with excess State funding but have grown into part of those State's delivery of education to its population. Likewise, a number of other States, such as Alaska, Illinois, Kentucky, Mississippi and West Virginia have enacted such Statewide systems. This new form of educational delivery takes its place alongside the traditional classroom and has antecedents in the State-funded correspondence schooling available in many States, concentrated in such States as Nebraska, Texas, and Utah. It is also related to, and may help fulfill, the needs of charter schools that often are mission-focused but resource-constrained.

Expansion is Occurring Rapidly and Research Needs to be Broadened

State-funded virtual education has arisen out of a combination of need, availability of technology, and the opportunity to innovate by forward-thinking educators and political leaders. The data from a variety of sources concludes that the virtual education trend is expanding more rapidly than was expected. This expansion is occurring without primary research being conducted on its nature or its efficacy. While individual programs are being continually evaluated, wider research and longitudinal studies have yet to be commissioned. Likewise, the exact purposes to which virtual education and information technology can be applied, as a matter of policy, is not well thought out. In fact, the dialogue has yet to be defined either in the efficacy research or the policy implications. Finally, economic analyses have not been applied to the efficiencies possible through virtual educational structures. The cost of certain problems simultaneously in 100 schools may be significantly reduced by central services mediated by technology, the phone, and local intervention as necessary.

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Full-Scale Transformation of Education is Possible

Another observation drawn from this work is that virtual education – online courses, resources, and services – is just the beginning of what promises to be a full-scale transformation of education practice. Just as it is clear that equity access to Advanced Placement and Honors courses is a likely entry point into virtual education practice; once established, these virtual education programs are a likely beginning point for other infrastructure issues in K-12 education.

Today, central instructional services using the web are basically carried out in a manner not inconsistent with the sale of textbooks or other materials. Online courses or online school programs are contracted for or provided based on State funding. They incorporate a series of sales of courses and related services – counseling, mentoring, advising, and training. Just as publishers make editorial decisions on what to commit to print, virtual education operations in different States make choices of what to produce themselves and what to acquire from 3rd parties. Just as the States now control adoptions and distribution of certain physical materials or they promulgate the rules for alternate education delivery, such as charter schools, it is possible that the virtual education infrastructures will become part of the State's educational apparatus, consistent across the nation.

In time, these technical-curricular infrastructures for providing resources to students, teachers, mentors, and administrators in a State will be much more sophisticated and there will be inter-operability between States in the use, sale, or barter of State-created courses, resources, and services. To date, the larger operators, such as the Florida Virtual School, have been selling their courses and their knowledge for running virtual schools. Michigan's Virtual School has also created stand-alone courses for sale and for advising, as well as having developed a student information system (SIS) that can be marketed. Should these States go to the marketplace and compete with corporate offerings or should there be a series of standards and exchanges where States work with each other and with the corporations?

Infrastructures in the active States and large school districts are composed chiefly of course management systems (CMS), student information systems (SIS), and a variety of products that extract and report data on student performance. These systems may or may not tie into a State, country, district, or school enterprise resource program (ERP), such as financial and human resource software. Since the level of sophistication of such systems is complex and expensive, the burden for operating such systems can be operated more efficiently by larger better-funded State agencies. However, since existing State departments of education are not conditioned to select and operate such systems that include teaching and learning delivery, the burden is shifting from the existing State departments in most of the early-adopting States to separate operations that operate the teaching and learning and registration and tracking functions. Missing in this equation, but important to the future of virtual schools, is the separate management of teaching content – core curricular content, supplementary content, test and assessment resources. Such systems in the corporate training world are known as Learning Content Management Systems (LCMS). Also, missing is a common way to report and track performance and accountability data.

As this learning curve is better understood, new States choosing to build virtual education capability may do so directly from their departments of education.

What does the future hold?

Based on what has occurred in corporations; non-profit organizations, such as hospitals; and in local, State, and federal government; more and more services core to the operation of the school and core to the teaching and learning mission will become web-based. Advances in web-services technologies, in course repository technology, in data reporting, and in customer (student) relations management technology will make it easier and easier on administrators, teachers, students, and parents to have all the resources necessary for success. More accurate and plentiful data on performance will become visible, and

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more precise levels of control and accountability in the day to day education process will be further developed and implemented. With better systems in place, it may be possible to use State and federally mandated annual testing simply as a benchmark in an existing daily practice of tracking performance data and feeding back to students, teachers, and schools.

States are likely to build large electronic infrastructures, housed centrally to distribute, manage, and track courses, resources, and services. Such central services, properly constructed, would enable local autonomy, but would mandate consistency based on sets of standards – curricular, technical, content, and data. In order to facilitate obtaining federal monies and large non-profit and governmental grants, these standards should be universalized by the States. While standards require a great deal of debate and discussion, conventions can be established to facilitate the development and adoption of standards while allowing cross-State and intra-State practices to begin to generate evidence of what works and does not work.

The emphasis today in existing virtual education operations is on course construction and delivery systems, primarily course management systems (CMS). By the nature of the vendors producing such products, these products are competitive and, therefore, not yet interoperable. Likewise, how data is tracked and passed on is different from one system to another. This amount of heterogeneity is necessary in the competitive corporate sector, but is costly and inefficient for school systems. It also forces different States to choose different platforms and thus decreases the likelihood of setting up course exchanges in States and between States.

Another constraint in virtual education is the ability to receive core content from publishers in digital form. The process for housing, tagging, and delivering core and supplementary content is much less developed than the CMS technology. There are no standards or even dialogue about how such standards are going to be achieved. There are only a few textbook publishers that provide digital content from their textbooks and supplements for school use. While, to some extent, publishers work with the CMS vendors in the higher education space, little has been done to facilitate virtual education in the schools. As a consequence, there is no standard practice within virtual education operations with textbook publisher content. Further, there is a trend in certain online programs being built for virtual education distribution of leaving out, or making optional, the use of a textbook altogether.

Finally, when the day arrives that publisher content is readily available in digital form and course management systems allow easy transferability of courses and resources, what will facilitate the development, management, and distribution of teacher and student-generated materials that need to be coordinated with the courses and the publisher content? Such questions are the ones that will occupy the next generation of virtual education operations and will be central in the conceptualization of Statewide virtual school activity in California.

As a consequence of the Tower-of-Babel syndrome, it is strongly suggested here that the States look at database software that is available, or can be developed by one or more States, in concert, that allows the course content, course data, resources, services, and accountability data to be housed at a level separate from the display and manipulation of that content. Such database software systems are under construction and have been tested, but none is specifically designed for this function. While higher education institutions rely on sophisticated software packages for CMS, SIS, ERP, CRM, and content functions, they do not confront the problems that schools do. There are rarely hundreds of institutions that must have materials in a consistent manner across all of the institutions as do schools.

When schools initially were wired and Net Day events led to Internet and cable connections across thousands of US schools, when debates were held about whether to build a computer lab or put computers in the classroom, and when

The view of the future is fairly bright. As reported by the Peak Group (2002) and Education Week (2002), the rate of adoption of virtual educational solutions is more rapid than news reporting or even trade or association reporting would suggest. The need for it, and its ability to fill these needs, is confirmed. With schools failing; with high drop-out rates rising; with the inability to teach difficult high school subject matter with consistency and quality; and with the school population, especially the student populations, computer ready; it is important that these tools and infrastructures help universalize quality education.

the type of hardware to be purchased was the common concern, thousands of separate discussions occurred across the country, all very similar. While California contemplates its virtual education future, it is important that the separate conversations be combined within the State and between the States. The educational engines that are getting built digitally will be important contributors to the economic well being of the nation and the cities, counties, and States in the country. As a result, the stakes involved, and the attendant costs of such efforts, are so important that best practices need to be applied evenly not only to technology implementation and pedagogical design and delivery, but in the organizational nature of the decision making that creates virtual school structures and operates them. This way, the simultaneous, but disconnected, discussions that abounded in the way schools were wired will not be visited on the issues of infrastructure development. Coordination is important for holding costs down while increasing quality of delivery.

Facilitating Uniformity

To facilitate uniform development of standards, of decision-making, and evaluation of results and accountability data, it is important that a number of Statewide and nation-wide dialogues begin and, perhaps, be institutionalized in their own structures. Virtual education, by its very nature, crosses into existing domains of organizational, governmental, and administrative functionality. Within a State like California, and elsewhere, it is necessary to coordinate the benefits of virtual education with each critical structure in the State and reach agreement on how courses, resources, and services are going to be made available and how data will be housed and evaluated. In this context, it is important to have benchmarks, learning curves, and best practices codified to guide action in an adopting State. Likewise, it is important that national groups, or multi-State groups, share their knowledge and, collectively, commission the kinds of studies that can help guide policy makers to make informed decisions and provide administrators with the tools to implement new systems.

The view of the future is fairly bright. As reported by the Peak Group (2002) and Education Week (2002), the rate of adoption of virtual educational solutions is more rapid than news reporting or even trade or association reporting would suggest. The need for it, and its ability to fill these needs, is confirmed. With schools failing; with high drop-out rates rising; with the inability to teach difficult high school subject matter with consistency and quality; and with the school population, especially the student populations, computer ready; it is important that these tools and infrastructures help universalize quality education. At the same time, it behooves the States, in tight budget times, to perform the necessary economic analyses to find the advantages inherent in using distributed technologies to enhance educational performance and to reap the economic rewards provided by State and federal governments for doing so.

Transforming the Distribution of Education

It is hoped that the insights gathered in this report will assist California in addressing some of the challenging educational delivery problems facing the State at a time of budget constraints. Within the State, the success of programs like UCCP, which addresses underserved and access issues for Advanced Placement and Honors high school courses, lead the way for more comprehensive programs. With the daunting problem of not enough classrooms in the Los Angeles Unified School District, the establishment of the Los Angeles Virtual Academy will begin a process in the nation's second largest school district to transform the distribution of general high school education and teacher training. As the universities in the

It is important that national groups, or multi-State groups, share their knowledge and, collectively, commission the kinds of studies that can help guide policy makers to make informed decisions and provide administrators with the tools to implement new systems.

State confront lower math and science scores, the need to bolster teaching and learning of algebra and other subject matter necessary for school graduation and higher education admission becomes a problem not just of the school systems, but of the university systems.

California has an unparalleled abundance of richness in technology development, content development, education and policy research, in higher education practice, and in school experimentation. The State has a chance, based on this one-of-a-kind resource base, to reclaim the progressive position among the States as a leader by deploying these resources in a coordinated way for the benefit not only of the State's students and to find economic efficiencies in the delivery of education, but also for the pride and performance of the companies, institutions, and organizations within California.

The California Virtual School Report
A National Survey of Virtual Education Practice and Policy with Recommendations for the State of California

Section IV
Appendices & Bibliography

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Appendix A: Research into online education performance

Student achievement, student learning styles and performance is comparable in online courses and traditional courses.

Arbaugh, J. B. (2000). Virtual classroom versus physical classroom: an exploratory study of class discussion patterns and student learning in an asynchronous internet-based MBA course. Journal of Management Education. 24(2), 213-234.

Erwin, T. D. and Rieppi, R. (1999). Comparing multimedia and traditional approaches in undergraduate psychology classes. Teaching of Psychology. 26(1), 58-61.

Ryan, R.C. (2000). Student assessment comparison of lecture and online construction equipment and methods classes. T.H.E. Journal. 27(6), 78-84.

Online learning needs to be collaborative to see benefits over face to face learning.

"When students are actively involved in collaborative (group) learning on-line, the outcomes can be as good as or better than those for traditional classes, but when individuals are simply receiving posted material and sending back individual work, the results are poorer than in traditional classrooms."

Hiltz, S. R; Benbunan-Fich, R.; Coppola, N.; Rotter, N.; Turoff, M; Measuring the Importance of Collaborative Learning for the Effectiveness of ALN: A Multi-Measure, Multi-Method Approach. (2000)
Journal of Asynchronous Learning Networks Volume 4, Issue 2,September

Student achievement and online learning strategies are correlated.

Shih, C. C., Ingebritsen, T., Pleasants, J., Flickinger, K., & Brown, G. (1998). Learning strategies and other factors influencing achievement via web courses. (ERIC Document Reproduction Service No. ED422876)

Pedagogy is important compared to media format.

"Learning effectiveness is a function of effective pedagogical practices, not which delivery media is being used."

Measuring Learning Effectiveness: A New Look at No-Significant Difference Findings. Ernest H. Joy II and Federico E. Garcia, Journal of Asynchronous Learning Networks, Volume 4, Issue 1 - June 2000

"Good human facilitation can compensate for most other deficiencies, while state-of-the-art technology and fancy graphics alone cannot sustain student interest and motivation."

Spitzer, D.R. (2001). Don't forget the high-touch with the high-tech in distance learning. Educational Technology, 41, (2), 51-55.

Need to use a variety of online approaches.

Levin, J., Levin S. R., & Waddoups, G. (1999). Multiplicity in learning & teaching. Journal of Research on Computing in Education, 32(2), 256-269.

Online course work is considered to be more time-consuming from the perspective of both the students and faculty.

Gaud, W. S. (1999). Assessing the impact of web courses. Syllabus, Nov./Dec. 1999, 49-50.

Kroder, S. L., Suess, J., & Sachs, D. (1998). Lessons in launching web-based graduate courses. T. H. E. Journal, 25 (10), 66-69.

The large bulk of correspondence required for online courses is a learning disadvantage.

McLellan, H. (1997). Information design via the Internet. (ERIC Document Reproduction Service, No. ED 408 942)

Appendix A: Research into online education performance

Outcomes are improved by using online delivery over traditional distance but at an increased cost.

The Economics of Online Delivery
Greg Webb, Paper presented at ANTA NET*Working '99 Conference
Melbourne, Australia, 1 - 3 September 1999
www.nw99.net.au/papers/webb1.html

Sustaining collaborative learner dialogue is hard

"Even high quality courses, the biggest challenge is to ensure sustained, deep dialogue, and collaboration among students, and providing consistent and on-going feedback to facilitate self-assessment."

Yamashiro, K. and Zucker, A. Expert Panel Review of the Quality of Virtual High School Courses: Final Report. SRI International Report. Prepared for the Virtual High School. November, 1999.

9.5% of full-time faculty and staff indicated that they had taught at least one nonface-to-face class

Wirt, J., Choy, S., Gerald, D., Provasnik, S., Rooney, P., Watanabe, S., Tobin, R., & Glander, M. (2001). The condition of education, 2001. Retrieved July 29, 2001, from National Center for Education Statistics
Web site: **http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2001072**

Online moderation improves online learning.

Fostering Effective Instruction in a Virtual High School: A Netcourse for Teachers. Sherry Hsi, Paper presented at the Annual Meeting of the American Education Researcher Association for Division C: Section 7, Technology Research. Montreal, April 19-23, 1999. **www.concord.org/~sherry/papers/aera99/tlc/HsiAERA99tlc.html**

Speaking in Voices: Effective Techniques for Keeping Web Discussions Running Smoothly, by Sarah Haavind, @Concord Newsletter
www.concord.org/library/1999winter/speakingvoices.html

Facilitating Online Learning book
www.concord.org/library/2000fall/facilitating.html

Salmon, G. (2000) E-Moderating: The Key to Teaching and Learning Online (Open and Distance Learning Series), Kogan Page Ltd.

Unmoderated courses lead to failure.

Factors for Successful Implementation of CMC in a University Classroom
Jennifer Smolka, University of North Texas
www.smolka.net/CMC/CMCinED.html

Carefully designed questions keep asynchronous discussions on topic.

www.aln.org/alnweb/journal/Vol3_issue2/beaudin.htm

Barriers to use include lack of teacher training.

Educational Electronic Networks: A review of research and development
James Levin, Cathy Thurston University of Illinois
www.ed.uiuc.edu/tta/papers/Levin-Thurston-96.html

Technology has revolutionized both the process and the business of learning.

"Building the Net: Trends Report 2000"
www.trendsreport.net/summary/summary.html

Appendix A: Research into online education performance

University Faculty workload is a key issue" in the growth [or lack of growth of distance education

National Center for Education Statistics report on The Condition of Education, 2001

Faculty must be trained in the skills required for online education.

Cyrs, T. E. (1997). Editor's notes. In T. E. Cyrs; R. J. Menges; & M. D. Svinicki (Eds.), Teaching and learning at a distance: What it takes to effectively design, deliver, and evaluate programs (pp. 1-4). San Francisco: Jossey-Bass.

Gunawardena, C. N. (1990). Integrating telecommunication systems to reach distance learners. The American Journal of Distance Education, 4(3), 38-45.

Olcott, D., Jr. & Wright, S. J. (1995). An institutional support framework for increasing faculty participation in postsecondary distance education. The American Journal of Distance Education, 9(3), 5-17.

Faculty are more likely to incorporate online community building strategies after experiencing successful online examples.

Folkestad, L. S., and Haag, S. (2002) Arizona State University Faculty development: The value of an online experience. AERA paper, New Orleans, April.

Faculty persist in using traditional assessment methods, but are more likely to incorporate alternative assessment methods after they have experienced it online.

Folkestad, L. S., and Haag, S. (2002) Arizona State University Faculty development: The value of an online experience. AERA paper, New Orleans, April.

Learning how to develop online courses is best accomplished "by doing."

Folkestad, L. S., and Haag, S. (2002) Arizona State University Faculty development: The value of an online experience. AERA paper, New Orleans, April.

WebCT

WebCT has been leading the market with their Campus Edition product. They have announced a new system called Vista based on a database model. They have committed to updating Campus Edition through 2006 and supporting through 2007. Campus Edition will be a cheaper product in the $30K range. Vista is a much more sophisticated system in the $100K range. While WebCT does offer hosting, their model is to sell the system to the educational institution for them to administrate themselves. The Vista system won't be widely available until 2003 (with trials starting in 12 schools in June 2002). Campus Edition and Standard Edition currently have about 2,800 installations.

Core Technology

Campus Edition is based on PERL & C-code running on Apache & Unix. This is HTML flat-file with no database component. WebCT has been planning for some time to switch to a more flexible database approach and is finally almost ready to release Vista, which is based on Java J2EE, Oracle and Bea WebLogic application server cluster. While the Vista architecture is sophisticated, flexible, scalable and good for integration, WebCT is clearly scrambling to catch up to the technical innovations of their main competitor Blackboard. While Oracle is the most hardy and scalable relational database available, Oracle single application licenses run an additional $8K per processor on top of the WebCT system. Campus' Edition's PERL/flat-file architecture is neither efficient, nor flexible.

Standards Compliance

Both Campus Pipeline and Vista claim to support the IMS 1.0 spec. There was also some sort of implementation of the IMS API to allow backend integration (e.g. with SIS & EPR systems). Both systems support the use of XML stylesheets for display of content. Vista has W3C level 1 compliance. It complies with ADA section 508.

Content Import

Vista support loading content via an IMS API. Vista also complies with the IMS spec for importing and display of assessment data so assessment data can be created with other tools (e.g. Question Mark) and loaded into Vista.

Database

Vista stores all course content & user data in the database in XML format in content objects using style sheets to determine display characteristics. Part of the price tag for Vista includes a service contract including Oracle help (it is unclear whether schools are required to have their own Oracle database administrator).

Integration with other Systems

Vista has an Open architecture for tools and services using Java beans. This means assessment and content engines can be replaced. Java J2EE architecture allows institutions to replace parts of Vista with alternative GUI's or under-the-hood logic by rewriting the code on the service or tool level. The new J2EE code can be plugged directly into WebCT Vista.

Collaborative Tools

Vista has instant messaging built in, chat & whiteboard, e-mail centralized in My WebCT, subscribe & multiple threading in discussion groups, drag & drop file uploading, an HTML editor with spell checker included, and a multimedia database which links into content.

Vista has institutional courses with sections models (this is important if corrections are made to courses that have to be propagated to numerous sections). Blackboard doesn't have this feature.

Vista also supports numerous user types, including designer, instructor, admin, data miner, student advisor, mentor, TA. It has a flexible authorization rule structure to all for many user types.

Course Development

In November, Campus Edition 3.8 will come out with a drag & drop web development tool. This allows developers to edit HTML pages on their local computer and drag them into a folder on their desktop to automatically post them on the WebCT folder. They are also adding an HTML editor and their file manager can set metadata. They are also adding WebEQ (based on MathML) to support math notation.

Content Import/Export

Both Vista and Campus Edition are built on XML schemas. You can export content and export assessment questions in IMS. You can export user data in XML. The systems support CGI scripting.

SIS/ERP Integration

WebCT provides backend support for Student Information Systems. They support auto-signon via a portal. Campus Edition supports Banner & SCT with the Mecury Message Broker middleware (for an additional $35-$75K). In Q4, Vista and Campus Edition will support a built-in communication layer for SCT, Datatel, Peoplesoft. This is a protocol adaptor that allows third-party software to communicate via IMS standards to the Oracle database. No one else is doing real-time integration at this time.

They handle external authenication via LDAP DB/SSL. Campus Edition (CE) and Vista are highly secure with prepackaged security and custom work available. The server on the campus calls the WebCT server for password encryption by MIT encryption (Kerberos).

Grading

Grades can be exported directly to SIS.

Portal

WebCT has a portal product: Uportal which connects to My WebCT.

Collaborate Tools

WebCT supports course mail that is logged and kept separate. All assignments have grades. It supports private chat and whiteboard for groups.

Customization

Navigation can be customized with different user interfaces.

Blackboard

Blackboard is a vendor who was chosen to be the reference platform for IMS, so they work relatively closely with that standards committee. Blackboard has a clear vision for where they think the industry is going. Their building blocks initiative is designed to give a great deal of ability to integrate Blackboard with third-party software.

Core Architecture

Blackboard supports both Unix and Windows installations. For Windows, they offer a Windows 2000 or NT4 version connected to SQL 2000 or SQL 7 (with Microsoft IS web server). For Unix, they offer either Sun Solaris or Redhat Linux and Oracle 8i (with Oracle 9i upcoming) with Apache web server. They are currently using the BEA WebLogic application cluster server but are moving to Tomcat in release (Beta release in the fall). Some portions of Blackboard appear to be in PERL using an object-oriented model and some Javascript. Clients are assumed to have IE 4.x or NS 4.x and above.

Integration w/ SIS & ERP

Blackboard offers granular authentication. Default security is proprietary and can work with centralized Java-based authentication. End-user authentication can be replaced by a Java API. [Blackboard enterprise data and be used with other systems to enroll users, delete users, update gradebook entries and post announcements.

Blackboard offers two Java API's to facilitate integration of Blackboard with legacy systems. The End User Authentication API and Snapshot API are tools which can be used to integrate Blackboard with SIS & ERP systems on either a real-time or periodic basis. With Blackboard's building block architecture, institutions can replace individual components of their gradebooks, etc. that might better meet their needs. Building blocks allow granular access to individual objects in the system.

For example, Syracuse University, with 150,000 full-time students integrates Blackboard to the NCS Pierson SASI enrollment management system.

Blackboard 5.x offers two-way wireless reading and posting of discussion groups (via PDA).

Another example of a building block that has been implemented is a WYSWYG (HTML) editor integrated with the drag & drop file manager.

Many schools use a diversity of different gradebooks and assessment engines. The building block architecture would allow a given school to support multiple implementations on the same Blackboard system.

The building blocks initiative is based on Java (J2EE) technology. They also have a .NET initiative in the works.

Another example Blackboard gave is that one could replace their Virtual Classroom tool with a commercial tool like WebEx by building a SOAP/UDDI interface and a Java wrapper.

Regarding custom portals, Blackboard notes that all but two to three present of their K-12 customers are satisfied with the built-in Blackboard portal.

Blackboard 5.5 is available now. Release 6.0 will be available this summer.

Standards & Course Import/Export

Blackboard was founded with the charter of being the lead technical vendor on the IMS committee. Blackboard claims compliance with AICC, ADL, SCORM and ADA section 508. A compliant IMS manifest can be exported that works with the SOAP standard. When you import or export courses you zip all the files together with the IMS manifest. Compatibility between vendors depends somewhat on which version of IMS the vendor has implemented. Blackboard also has one person on staff that focuses on ADA/section 508 issues. Blackboard recently launched a program called Easy Switch, which provides tools for migrating WebCT content to an IMS-based format used by Blackboard.

Collaborative Tools

Blackboard offers a community portal. They also have a proprietary whiteboard integrated into their Virtual Classroom. The Virtual Classroom is a Java-based synchronous tool that includes 2-way chat. In the Virtual Classroom, you can type of any whiteboard or web page. They will support math notation via integration with the equation editor WebEQ. They also provide a dictionary & thesaurus. All chats are archived. Discussion forum gives teachers great flexibility to customize rules (e.g. file attachments allowed, anonymous posts, okay to edit after post, ok to remove, allow new threads). K-12 can use existing e-mail (or mail spinner?). Students don't see e-mail addresses.

Course Development

Modest knowledge of HTML is helpful (but not entirely necessary) for course development. You will be able to move Microsoft published content (e.g. Word,

PowerPoint, etc.) into Blackboard with a single click by the end of the year. Windows Media Player, PowerPoint presentations and AVI media player can be embedded into the Blackboard screen space. An equation editor will be added in release 6. The assessment engine will be greatly improved for release 6.

Blaclboard's instructor-view statistics shows very comprehensive charts -- very useful for distance learning.

eCollege

eCollege uses an ASP (hosting) model. In K-12, they have statewide systems in Kentucky, Illinois, and Mississippi. They serve mostly the 9-12 market, but do have some 3rd grade & middle school clients.

Core Technology

eCollege is unique in basing their architecture on Windows technology. Their system is based on the DNA 2000 model with a SQL server. The code base is in Visual Basic. They are committed to implementing .NET services. Client platforms include PC & Mac, Netscape & IE. Clients are assumed to be connected on 28.8 modems (with whiteboard feature running a little slow). They are in the process of formalizing their .NET initiative, but expect to have .NET services by the end of this year or beginning of next.

Database

Student data and exams are kept in the database. Course content appears to be in HTML files. Some database support for XML.

Content Import/Export

eCollege supports an XML export schema based on IMS. They also offer content/course development services. Their database does support some XML markup based on IMS.

Authoring Tools

Support for visual HTML editor. WYSWYG. You can also author offline using Word, PowerPoint, etc. No support for CGI scripting. There is also a tool to import content developed on Microsoft products (e.g. Word & PowerPoint presentations).

Customization

Support for heavy customization of look and feel. Style manager allows users to customize the look & feel on either the admin or instructor level. A unique feature of eCollege is that you can tailor assignments to different users or groups.

Math Notation & Whiteboard

eCollege will be adding an equation editor to their system. They currently license the Link-System whiteboard (with support for math notation). They have about 900 whiteboard sessions per week.

Wireless

eCollege is doing some development on downloading a calendar to PDA devices.

Support

eCollege offers a two-day face-to-face training program for instructors to familiarize them with online pedagogies, with exposure to on-staff instructional designers. They also have online training courses for e-certification, which covers advanced multimedia. eCollege feels they have the best student support in the industry. They have 24 X 7 phone & e-mail support + student online tutorials & context sensitive help. They also take pride in their Section 508 compliance (see www.ecollege.com\access).

Course Development

They also offer course development support packages. They are currently co-developing curricula with the state of Kentucky. The eClassroom division specializes in the secondary school market. eCollege has the most statewide virtual high school adoptions of any vendor. Once a year they hose a Content Sharing Consortium to facilitate exchange of courses between schools. They also offer client consulting services to help clients develop courses. About 5,000 courses have been built in the eCollege system. About 10% are for the K-12 market.

Math Notation

Currently instructors must insert GIFs for math & science notations. The August release of the system will include an integrated equation editor (WebEQ).

Assessment

System includes ability to export exams to XML format. Questions can be randomly selected from a question pool. Tools to (batch) upload questions authored offline in Ascii format will be released in the next 8 months.

Disability Access

eCollege prides itself on its level of disability access and compliance to the 508 standards. They work closely with the Colorado Federation for the Blind on user tests. The Help Desk and their Instructional Designers are all trained to address disability issues.

Collaborative Features

eCollege has a good implementation of threaded discussions that has lots of extra little features (easy to expand sections, clear read/unread icons, etc.). ClassLive is a synchronous tool allowing chat and whiteboard presentations with math notations (using the Link-Systems whiteboard). System also allows for document sharing (necessary for collaborative exercises). To protect students privacy, e-mail addresses are not listed, but students can mail to other students on the class list.

Gradebook

The eCollege gradebook is tightly integrated to the content area. Any activity where the student views content can be graded. All content areas can be accessed from the gradebook. User activity is tracked to the minute in content. All content is archived forever including courses, e-mail, whiteboard sessions & chat.

Server Reliability

eCollege has 2 data centers both with redundant servers.

Features for the next release

Drop box, MathEQ, ClassLive with 1 way live audio, personal student homepages and a new calendar with integrated scheduling which can be exported to PDA's and Outlook Express.

Jones e-education

Jones uses an ASP hosting model but would consider setting up redundant servers for a large (1/2 million+ enrollments) customer. With their existing infrastructure they can handle approximately 60K enrollees (defined as a 32 hours+ course), but can scale up 5x quickly by adding Sun hardware. Their loads are kept at about 50% capacity.

System Core Technology

Server architecture is based on Java, J2EE, JSP, Sun Unix equipment. Oracle database and Veritas backup software. The choice of Unix & Oracle show a commitment to scalable technology. Software is in it's 2nd generation (1st generation was based on MySQL and PHP and is still deployed for some customers). Jones does suggest a very low minimum platform for the students (133HMz PC or 100MHz Mac). However, the minimum client platform is really more a reflection of the choice in courses (e.g. how much bandwidth the course media needs). Consistent with industry at large statistics, only 2.8% of Jones customers are Mac-based and 3.3% Unix-based. While some believe that the Mac has more of a presence in K-8, others say PCs dominate in 9-12. The Jones user-base focuses on IE 5.0 & 5.5 browsers (but includes support for IE 4.0+ and NS 4.6 & 4.8+ & 6.1 & 6.2). Use of Netscape browsers below 6.0 is dropping off quickly.

Database

Courses & student data are stored in an Oracle database. Regarding content, instructors/course developers make HTML pages, zip them together and upload them to the system. The database only tracks the filenames of the HTML files. The instructor content is displayed within a frame with system navigation and logos in an outer frame. Jones is increasingly storing XML in the database and are migrating their exam info to 100% XML.

Standards

SCORM 1.2 is being adopted by a lot of companies. Jones has partial IMS compliance with import and export of content. Little content is currently available in IMS format except in the corporate world. Higher Ed has not (yet) adopted standards. However, in K-12 content is often started with grant money, schools will quickly see the advantage of sharing content using reusable content models.

Course Structure

Supports both distance learning and supplementary class web sites. Jones feels the ease of use of their system is superior to their competitors. Instructors are given two hours of training. Chat is heavily used in courses. Courses are instructor led but not synchronous. However, many instructors use chat for synchronous office hours. Whiteboard is a star feature. Whiteboard includes instructor-controlled chat. Instructors can preload a slideshow. Whiteboard includes graphic calculator & symbol library, raise hand and one-way voice over (instructor talks during whiteboard presentation).

Course Content

About 1,300 courses have been developed on the Jones e-education system (a much smaller percent are appropriate for the K-12 market). Jones coordinates to help make these courses available to other institutions, but has no responsibility for quality control. Jones has created 27 masters' degree and 55 certificate courses under its own label. Jones supports self-administered distribution of courses. Interested institutions should provide demo versions of their courses (e.g. sample lessons).

Development Tools

Developers can use standard HTML editors and Flash to create courses. A WYSWYG HTML editor will be included in the next version of the Jones System (available May 18). They offer 100 course HTML templates, which can be used to create courses.

Course Import/Export

Course import/export tools exist. Course developer makes course in HTML and zips files together to be uploaded to the system. Jones makes few assumptions of the organization of courses. Course HTML pages are displayed in a frame. Custom institutional banner can be displayed in the outer frame. Tools for mass importing courses from other systems could be developed for a large client.

Standards

Jones has developed some tools to add in moving content from Prometheus and could do similarly with other systems if there was enough demand. They do support IMS import/export. They have not implemented SCORM but are moving in that direction. They plan to implement SCORM compliant test banks this year.

Integration to 3rd party SIS & ERP

Integration work can be done at cost to client or even at cost-share on more popular platforms. Currently, there are several tools for student administration built into the Jones systems, including manual administration (e.g. self-support to add & delete students). There is a bulk user upload utility (user info must be put in Jones specified format). Enrollment information can be put in a flat file for periodic (e.g. 1 to 3 times a day) synchronization with the Jones system.

Library

Jones offers an e-global library (to fulfill their requirement for accreditation) including the GIU academic research library. They have a staff of 40 maintaining the library. The library would be useful for 9-12, but not suitable for K-8.

Assessment

Jones supports full-featured assessment. Assessment test banks created with other IMS tools like Question Mark can be imported into the Jones system. Jones has done custom integration of an assessment tool for one client.

Collaborative Tools

Jones feels that the collaborative tools offered by the primary vendors are essentially equivalent. However, they feel theirs excel in ease-of-use. They have two user interface designers on staff.

Tracking

The Jones system tracks entries in course & minutes.

Multimedia

Jones did make a significant investment in close circuit-TV education 17 years ago, but that holding was sold off. While they retained the rights to use content developed for close circuit, little applies to the K-12 market. Jones supports Real media and Windows media (and QuickTime downloads, not streaming).

Wireless

Jones is doing some experimentation with wireless & PDAs. Primarily they use it for notification & scheduling information rather than course content. Jones notes an increase in the adoption rate of PDAs in the high school market.

Jones' focus is on the 9-12 space (rather than the whole K-12 spectrum) for both in-classroom and self-paced instruction. They see the wiring and technology more readily available at the high school level.

Jones wants to acquire and resell high quality content. They want to sell the system and content together. They are interested in developing a cost-effective content distribution system for 9-12 and two-year colleges.

They see some special opportunities in California relating to the migrant population (who would appreciate the continuity of distance learning courses accessible from multiple locations) and from the home schooling market.

Support

Jones offers 24 X 7 support for their CMS. Their development staff is 22 people. They have redundant servers both located in the Denver area.

Open Source

Larry Cooperman, Director of the Distance Learning Center at UC Irvine has adopted a different approach than using commercial vendor CMS systems. The Center originally used the Prometheus CMS. However, they decided to discontinue the Prometheus CMS when it was purchased by Blackboard. UC Irvine decided that it wasn't in the Center's interest to depend on commercial vendors to provider their course management system solutions. The Center felt that the level of customization offered by Blackboard and other vendors was not sufficient. The Center wanted more control over the user interfaces. Although Blackboard's building blocks initiative was a step in the right direction, the Center felt that the ability to customize the system depended on which API's were being published. In short, they wanted more control.

In collaboration with UC Irvine's Electronic Supplements Group, the Distance Learning Center built their own CMS based on open source technology. The core technology is LAMP, an acronym for Linux, Apache, MySQL and PHP. These are all solid open-source technologies well suited for this type of application. The Center is considering releasing their system as low cost CMS next year.

The Center's CMS uses a sophisticated database model for content hierarchy using media layers where pages are organized in topics which are organized in lessons and courses. Ultimately, the Center plans on supporting IMS & SCORM standards. They have adopted Kerberos authentication plus a secondary authentication scheme. They also provide a set of templates that allow developers to change the look and feel.

Independent of decisions made regarding the selection of technologies (i.e. courseware management systems and the underlying server solutions), the most important step UCCP can take as it moves ahead is to base its future courseware development efforts around the concept of "learning objects".

This section provides a brief description of the concept of "learning objects" followed by a summary of the primary benefits, a brief discussion of standards, and, finally, a set of recommended next steps.

Concept Description

If one considers learning content in its most basic form, it is composed of digital media assets – the text, images, animation sequences, sounds, video clips, HTML documents or XML documents. Typically, the various assets that compose the content included in an online course are linked together into a loosely coupled relationship through references in an HTML page. A learning object represents an evolution of this approach, where the assets that compose a given component (e.g. presentation, assessment, exercise) are packaged into a tightly coupled unit that is uniquely identified through a set of attributes, such as title, author, creation date, topic area, level of difficulty, etc. Considered from this perspective, a learning object is nothing more than the packaging (or "encapsulation") of one or more assets together into a uniquely identifiable object.

Based on the content within, a given learning object may be one of several types. It may be a multi-segment presentation composed of a series of text-only HTML pages. It may be an interactive exercise composed of a series of interrelated Flash animations, or it may be a graded multiple choice assessment generated by a survey/assessment engine, where the content contained in the learning object is an XML document in which the text of the questions and answer options are described.

There are no restrictions regarding the size of a given learning object or the "level of granularity" at which a collection of learning objects is built. These are issues that are determined on a case-by-case basis in the context of a given learning environment based on a combination of instructional design and production considerations.

Related, but independent of the content contained within a learning object is the "meta-data" with which the learning object is described from the outside. Meta-data (data about data) is made up a set of attributes that together describe the content contained within the object. Some attributes contain data used for display purposes, (e.g. the title of the object, a description of the contents of the object, a representative icon or image for the object), while other attributes are used for indexing and uniquely identifying the object. Typically, the meta-data surrounding a learning object is captured in the form of an XML document, in which the entries for the various attributes or "tags" used to describe the object are contained.

Collections of learning objects – the presentations, exercises, and tools that compose a given course offering. or set of course offerings – are typically stored in a database. Each object in the database is identified first by its' type (presentation, assessment, tool, etc.) and second through the attributes (or "tags"), such as name, date created and topic area, that uniquely identify the object.

In addition to the base level Learning Objects that compose the content of a given online learning experience, most courseware management systems also define a higher level set of learning objects, such as "units" or "modules,"where the content of the object is composed of a set of base level learning objects (i.e. the individual presentations, assessments and exercises). These higher-level objects typically define the aggregation and sequencing of base-level objects and have there own unique set of meta-data attributes. And, at an even higher level, there are "Course" objects, which are composed of units or modules.

Benefits

So why is it that there is such a buzz around the concept of learning objects? The answer is that embodying learning content in the form of learning objects provides several important advantages for learning content publishers. Learning content embodied in the form of learning objects makes content reusable, portable, shareable and adaptive.

Reusability

Breaking down or "chunking" content into learning objects creates the potential for content to be reused across courses. For example, a presentation on the principles of democracy originally packaged as a stand-alone learning object in the context of an AP course on U.S. history could be reused in the context of an AP course on European history or an introductory course on political science. One of the challenges to achieving object reuse is conceiving of the learning object as a stand-alone entity, independent of the learning context in which it appears.

Portable

This advantage alludes to the promise of content becoming portable across courseware management and/or learning management systems. Put simply, the idea is that a publisher can create a collection of learning objects surrounding a particular topic and those objects may be delivered across a range of courseware delivery systems. This advantage is, of course, dependent on there being a set of industry standards for describing learning objects and the support of the CMS providers for such standards.

Shareable

Separate from portability is the opportunity learning objects present for sharing content created by different publishers. For example, it is conceivable that learning objects created by UCCP could be used by the State of Wisconsin and vice versa, independent of the courseware management system that each state may be using. Testimony to the importance of shareability is the acronym SCORM, which stands for Shareable Content Object Reference Model – one of the most significant learning object standards initiatives today.

Adaptive

A long-standing aspiration among leading thinkers in the online learning industry has been to create highly adaptive personalized learning experiences, where content is served to a learner based on his/her individual strengths and weaknesses. For example, imagine a scenario where the sequence of learning objects presented to a given student is determined dynamically, based on the student's performance on a previously completed assessment. This concept is based on marrying content stored in the form of learning objects with courseware delivery systems that possess the intelligence (in the form of rules) to dynamically determine the composition and sequence of learning objects to serve to the individual learner. This vision of a dynamic, adaptive system that creates a highly personalized experience for each learner is predicated on adopting a learning object based approach towards courseware design and development.

Standards

One of the keys to realizing the benefits of a learning object-based approach to courseware design and development is the widespread adoption of industry standards that establish a common way (i.e. set of attributes) of describing learning objects. There are several efforts under way to establish standards for learning objects, the most significant being those undertaken by the Advanced Distributed Learning (ADL) Initiative (www.adlnet.org) and the Instructional Management Systems (IMS) Global Learning Consortium (www.imsglobal.org). There are other efforts under way, but these are the two primary standards-setting bodies within the learning industry. The good new is that, at this point, the two organizations are working together towards a common goal. Further good news is that both organizations have done a very good job of documenting the standards they are developing, and, as a result, there is a lot of very good information available to those who wish to develop an understanding of the issues surrounding the adoption of a learning object-based approach.

For more information on standards, see Appendix D.

In an ideal world, one would, of course, wait until the standards are fully defined before proceeding to adopt a learning object-based production and delivery model. However, in the not-so-ideal world in which we live, the standards are not resolved and won't be for several more years. In the meantime, publishers, including UCCP, must continue courseware development and do their best to prepare themselves for the standards when they emerge.

Next Steps

Despite the lack of a final set of standards, there is much that UCCP can, and should, do to make progress towards the adoption of a learning object-based approach to the design and development of the courseware it produces. Listed below are the recommended steps:

- Make a definitive commitment to adopting a learning object based approach and communicate this commitment both inside and outside the organization.
- Research the emerging industry standards as a way of learning about the issues associated with learning object design and to ensure that, while the standards continue to evolve, that any work done in the interim is conceived with the eventual standards in mind.
- Develop a model for producing object-based courseware. If you think of your courseware as composed of content objects – it simply becomes a matter of the types of objects you create, who you provide the authoring responsibility, the tools you provide them and views through which those objects may be presented. Developing a model starts by examining the objectives for courses and developing a generalized model for courseware production. The key components of the model are the definition of a taxonomy of object types from which courses will be composed and a set of system designs for both production and delivery.
- Consider Learning Object based design from an instructional design standpoint in order to develop guidelines and conventions for courseware design. For example, one implication of adopting an object based design approach is that the scripted introductions to a given component or module can no longer include an explicit reference to content in a previous section.
- As a by product of developing an object based production model and considering the instructional design implications, UCCP should develop a set of requirements surrounding the adoption of a learning object-based approach that can be used to evaluate third-party courseware management systems and/or other infrastructure components. With this set of requirements in hand, UCCP should challenge the various vendors to describe how their system can or will support the requirements that are developed.

Appendix D: Online learning specification and standards efforts

There are a number of important specification and standards efforts that are important to understand. Specification and standards are different, so it is important to understand the context of these efforts. In simple terms, on-line learning specifications are early efforts to codify the ways that various pieces of the on-line learning infrastructure interoperate. For example how is information shared between a student information system and a learning management system or how is learning content packaged.

Later in the process, standards organizations evaluate and message these early specification efforts to formalize the definitions of how these pieces interoperate. A simple way to think of a standard is to understand the difficulty of having each electrical outlet in ones house have a different configuration.

Both standards and specification seek to mitigate some of the impacts of proprietary systems and the attendant lock-in that results. It is important to emphasize that there is no complete specification/standards-based on-line learning environment. Specifications and standards address very specific issues. However, many of these specifications provide greater flexibility as technology moves forward, and mitigates some of the costs of moving from one on-line learning environment to another.

Selected On-line learning Specification/Standards Efforts

IMS

The IMS Global Learning Consortium defines and delivers interoperable, specifications for exchanging learning content and information about learners among learning system components. A goal of these specifications is to make learning easier and cheaper to deliver anywhere and anytime, as well as to create new mechanisms, new contexts, and new products for education and training. IMS specifications are becoming worldwide de facto standards for defining acquisition requirements and for delivering learning products and services. IMS membership includes vendors, government organizations and universities from around the world.

www.imsglobal.org

SCORM

The Sharable Content Object Reference Model (SCORM) is a collection of specifications adapted from multiple sources to provide a comprehensive suite of e-learning capabilities that enable interoperability, accessibility and reusability of Web-based learning content. Originally formed to meet the U.S. Department of Defense needs for web-based learning content, the SCORM initiative now has broader interest including the academic community.

www.adlnet.org/Scorm/scorm.cfm

Schools Interoperability Framework (SIF)

The Schools Interoperability Framework is an organization of over 100 software vendors, school districts and other organizations active in K-12 education. The goal of SIF is to create a set of rules and definitions that will allow software programs from different companies to share information. Much of the work of SIF has been in the area of exchanging information between disparate systems e.g. the student information system to the library system. There is applicability of the SIF Specification in the exchange of information with the Learning Management System.

www.sifinfo.org/

IEEE Learning Technology Standards Committee (LTSC)

The LTSC develops accredited technical standards, recommended practices and guides for learning technology. The LTSC coordinates formally and informally with other organizations that produce specifications and standards for similar purposes. Much of the work for final standards is based on the contributions of specification developing organizations. However, the LTSC does have workgroups that develop specifications as well.

http://ltsc.ieee.org

Appendix E: Commercial vendors in elearning

Technology deployed for virtual educational purposes is concentrated in a handful of companies. The names of the key players and the nature of their products is subject to change every year to 18 months as upgrades and product changes occur and as companies come into existence or go out of business.

The reality of a fully digital and distributed virtual system is still on the horizon. A fully developed set of content and technology standards, for example, is several years distant.

The following list of companies is not exhaustive. The companies were chosen to illustrate the most common names in the elearning or virtual education world. Many of these companies began their activities in the higher education or corporate markets. The K-12 virtual education market is still in its infancy and the present solutions have been largely adapted to the K-12 world, not designed for it.

Hardware/Technology Companies

There are a number of computer manufacturers. The term "Hardware/Technology Companies" refers to companies that provide primary underlying technologies, such as operating systems, and may also sell hardware.

Apple

Apple was a pioneer in bringing computers into the classroom. The company still owns a relatively large share of the school market compared to its presence in the business and home computing world, which is dominated by PC's. Apple has always maintained a number of programs for school that have provided resources to the school. Its new line of computers, serving solutions, and wireless computing options are designed to fit well into the school environment. The presence of Apple computers and solutions are growing more rapidly in grades K-8 than in grades 9-12. A newly initiated program provides a best practices content management and community website open to educators, administrators, and course developers. Apple's operating system has recently changed from its proprietary OS9 and below to a UNIX-based OS10 product, compatible with robust serving environments.

IBM

IBM is a computer manufacturer and technology solutions company. The company has evolved from purely PC and laptop sales into an enterprise solution company. Typically, IBM users third party providers to engineer large-scale serving, hosting, and network support for businesses and institutions. IBM is beginning to compete on the statewide and large educational technology implementation projects. IBM does maintain a course and content management system, Learning Space, that is in use by some virtual schools, including VHS, Inc.

Microsoft

Microsoft dominates the desktop applications world. Microsoft Office and its component products Excel, Explorer, PowerPoint, and Word are commonplace. Microsoft operates an educational site on MSN, has the most popular browser (Explorer), and has content and K-12 operation in its Encarta Server product. The Microsoft operating systems, Windows and NT, are two of the five prevailing computer operating systems (Apple, Linux, UNIX). Microsoft develops and supports the SQL database that is prevalent on NT servers. Microsoft has range of media tools and media players. Microsoft has a marketing partnership with Blackboard, the course management company.

Microsoft is in the midst of a wholesale change in how the company will operate. It is in the early stages of reconfiguring its entire business to a web services model, called .Net (dot net), which will allow numerous Microsoft and other systems to operate via the Internet and be able to swap out one solution for another. In this vision, software will be less something you purchase in a box and more something that is downloaded and updated automatically from the web. The .Net strategy and technology at Microsoft will become more prevalent in the next year. To date, there is not a complete .Net education solution, but as Microsoft begins to set up and market various "vertical" markets, education undoubtedly will be among them. Microsoft has adapted its own programming language (C Sharp) for developers to use in .Net applications and for interactions with its own applications. While the .Net strategy will open Microsoft up to interoperations with other technologies, it is primarily a proprietary technology company, as opposed to an open source provider.

eCollege runs on a full Microsoft implementation. Blackboard, while a Microsoft marketing partner (Microsoft has invested in Blackboard) is still primarily running on Sun servers and is written in Java. This will change over time to Microsoft .Net web services model.

Sun

Sun Microsystems is a technology company that makes server hardware, UNIX based computers, and has developed the JAVA programming language (and its variations). Sun is traditionally seen in large-scale serving environments that support the largest most complex data needs ranging from government to large corporate installations. Sun technology is commonplace on large university campuses and in research facilities. Sun solutions for school use are aimed at sales of servers and use of Java-based code for writing "open" systems. Sun serving technology and code base is prevalent in all the course management systems (CMS).

Course Management Systems Companies (CMS)

(For more information on CMS providers, see Appendix B.)

Course management systems tend to be the most visible aspect of virtual education. When teachers, students, and administrators look at an online course, they are seeing it through the CMS. When districts or virtual schools choose a CMS, they compare the features, functions, price, and available courses between the platforms. The CMS products listed below are the larger names in the business. These software systems emulate the classroom. They have features like common calendars, chat and threaded discussion capabilities, and are used for mounting course content and managing grades.

Each of the systems is challenged by market pressure to adopt interoperability standards and to "open" up their systems to make integration with other applications easier

Blackboard

Blackboard has roots in university life. Its early products tended to be mounted on a local server and used by a university department and, in some cases, the campus. Today, each of these products has or soon will have an enterprise version that is used across the campus enterprise. Blackboard is slowly transforming its CMS from a strictly proprietary system to a system that has "building blocks" that can be designed to allow third-party applications and software to interact directly with Blackboard's enterprise product. An example would be an external grade book application that could be integrated into the Blackboard application. Blackboard claims more than 200 licenses sold to K-12. However, the majority of these licenses are the less expensive, non-enterprise systems. Blackboard either licenses its software directly to a campus that hosts the application or Blackboard can host the software at its co-location center, an ASP model (Application Service Provider).

eCollege

eCollege is an ASP (Application Service Provider) exclusively. This means that their software resides on their servers and the use of eCollege occurs over the Internet. For a school or school system this allows that system to forego ownership, management, or service of the software. Fundamentally, eCollege and Jones e-education are service-oriented companies. This means that there is a full range of services available. In the case of eCollege, the services include course development, instructional design, student services, training, and course conversion from one platform to the other.

eCollege is in the process of evolving its software. As the only one of the major platforms that is fully built on Microsoft technology, they will build a new version of their system consistent with Microsoft's new .Net emphasis on web-services. This will allow eCollege to be able to have a more flexible system and to offer its clients more choices that they can control, with the central service still being provided through the ASP.

eCollege is dedicated to K-12 sales as well as higher education. eCollege won contracts for the states of Illinois, Kentucky, Mississippi, and Alaska.

Jones e-education

Like eCollege, Jones is an ASP provider of hosted software and services. The Jones platform and company is focused more exclusively on K-12 than the other platforms, but has a much smaller client base. Jones has course building and students services capability and, unlike any of the other companies, maintains a digital library project that houses all media forms.

Jones won the contract to power the Florida Virtual School, the largest of the State VHS projects. It is also active in other large school districts.

WebCT

WebCT is one of the early course management systems. Its new product, Vista, will join the other three platforms at the enterprise level, meaning that the software will report out to a common database that is used by schools or campuses for other software applications. WebCT, like Blackboard, is primarily a licensed software, mounted on the school site, but is also available in a hosted, or ASP, form. WebCT's new platform will be sold primarily to higher education. However, the WebCT sales force will also call on K-12. The company does not have any dedicated K-12 licenses, though there are K-12 installations in the U.S. and Canada that use WebCT. The current strategy going forward is to sell to schools through higher education clients that have or want to have relations with their school districts or county offices.

Student Services Companies (Hosting, Support, Course Development, Tutoring)

If a school wants full services such as student support, application hosting, course construction or course conversion services, those can be contracted on an a la carte or full-services model. The primary purveyors of these services are Embanet and Collegis. These companies will also provide integrations services for combining various technologies necessary for virtual education. Other companies provide online tutoring services that are specific to particular subject matter or specific courses. Smarthinking and Tutor.com are examples of the leading tutoring services.

Learning Management Systems Companies (LMS)

The LMS, as opposed to the CMS that was developed for and on college campuses, was developed exclusively in the training field. The systems are designed to work with

individual learners, not class or cohort-based models. These systems, however, are able to work directly with a single learner in an adaptive learning mode. As the student misses questions, certain LMS's are designed to present individual modules to that student on the areas they are weakest. These systems are seen predominantly in the training field, but some LMS functionality is being requested in K-12 CMS products. The predominant systems are Docent and Saba, though there are a number of systems. Both have education clients for technology training programs.

Learning Content Management Systems Companies (LCMS)

As more and more content populates the web, companies with high volumes of dynamic content began to rely on content management systems. As training companies began to increasingly manage more and more learning content, the term Learning Content Management System (LCMS) arose. A LCMS will allow content to be saved as "objects" and classified by function and display through the use of XML tags. These systems have not yet been adapted directly for online or virtual education. However, a number of companies are designing such system. A system tuned for K-12 use could contain rules directing master content to be parsed for varying uses and users. Such systems, adhering to content standards (SCORM, IMS) could allow content and courses to be authored once, but used in different CMS or LMS products. Companies entering this space include EduLink, DigitalConcepts, and Theorix.

Student Information Systems (SIS)

Of the various software necessary for online or virtual education, the SIS is the one with which school systems are more familiar. These systems officially identify the student, provide means to authorize the student into a learning a learning or school environment, and passes grades to the student transcript. While there have been a number of systems in existence over time, there are a breed of SIS that is in use in higher education and, therefore, can be integrated with CMS or LMS product. Familiar SIS names are Datatel, Banner (SCT), and PeopleSoft.

Enterprise Resource Planning Companies (ERP)

ERP software refers to the suite of software used for administrative or back office needs for finance, accounting, human resources, supply management, and other functions. In the past, these software products were individual applications. The ERP systems combine the functions. Often state-wide, county office, or district ERP implementations can be very expensive, especially if individual legacy applications have to be converted into the new ERP application. ERP vendors include PeopleSoft, IMB, Oracle, and the large consulting firms (Accenture, PriceWaterhouseCoopers, Deloite Touche).

Database Companies

Earlier CMS, LMS, ERP, and SIS applications had their own proprietary mechanisms for storing data. As the enterprise, or across the system, applications began to be developed for large network applications, it was necessary to standardize on common database systems. Most prevalent in enterprise applications are either Oracle or SQL data standards. SQL is most closely aligned with Microsoft and NT networks, while Oracle can operate with all systems. IBM also has an enterprise database type.

Appendix F: Server solution selection – Sun vs. Microsoft

Overview

One of the important choices facing virtual education providers as they looks ahead is the selection of the server solution upon which the combination of services and courseware will be hosted. For the purposes of this document server solution is defined as the combination of hardware and software (operating system, application server and application components/services) that compose the server environment.

The two server solution providers that define the market are Sun and Microsoft. In the case of Sun, the solution is referred to as the Sun Open Net Environment or SunONE, (wwws.sun.com/software/sunone/) and in Microsoft's case the solution is referred to as .NET (www.microsoft.com/net/). The two solutions provide competing visions and architectures for the development and deployment of web based applications and services. Based on a set of competing technologies, each solution boasts wide spread support from third party developers, some of whom offer products on both platforms and some of whom offer products unique to one or the other. The question confronting virtual education providers boils down to which server solution offers the best solution both in the short-term and in the long-term.

In attempting to answer the question, this section takes the approach of looking at the question from the standpoint of the various audiences potentially affected by the selection: end user, designer, developer, administrator and manager/operator. There is a section devoted to each audience, which concludes with a statement identifying whether the advantage goes to Microsoft or Sun, or neither.

End user perspective

From the perspective of the end user, the selection of the underlying server solution is of no consequence. Assuming the goal is to deliver HTML based content and services targeted at either a Netscape or Microsoft browser, (vs. creating a proprietary client), the server solution selected will make no apparent difference to the user. The simple fact is that there is nothing, from a content or an application standpoint, that one can deliver using the SunONE solution that you can't replicate on the Microsoft .NET solution and vice versa. This is generally the case and it holds true in the context UCCP.

Designer perspective

The use of the term "Designer" refers to those designers who are responsible for any system or component design (in the event that a virtual education provider were to decide to develop it's own custom environment) and to instructional designers and content designers responsible for courseware. In either case the server solution is irrelevant.

In the case of system/component designers, both platforms provide roughly equivalent support the development/deployment of advanced web site designs featuring dynamic, data driven, personalized content delivery, advanced server side application logic, media rich content (e.g. streaming Audio and Video). Further, they both offer equal support for the most significant industry standards: XML, CORBA, UDDI, SOAP, etc..

Alternatively, content designers and instructional designers are insulated from the underlying server solution. At this level, the selected courseware development environment dictates the design choices. Whether it is a commercial CMS system or a custom developed courseware development environment, the capabilities and features offered will be independent of the underlying server solution. Furthermore, it is also worth noting that the portability of courseware content is also entirely a function of the courseware development environment and therefore entirely independent of the underlying server solution.

Developer perspective

From the perspective of the software developer, the situation is a bit of a paradox. It makes a huge difference and at the same time makes no difference at all. In the case of development for the SunONE solution, application developers are working in the Java (Java 2, Enterprise Editions or "J2EE") programming environment, which dictates the selection of tools and more importantly the knowledge and expertise required to be successful. Conversely, application developers working in the .NET environment are working in Visual Basic or C++, or Microsoft's recently introduced C# language. As a result, they are dealing with an entirely different set of tools and require knowledge and expertise specific to .NET.

There is, of course, a great deal of debate surrounding the strengths and weaknesses of the respective environments, but for the purposes of this review, the rhetoric aside, it is assumed that a skilled developer versed in the intricacies of the Microsoft .NET web development environment can

effectively deliver the same content and develop the same services and application as a skilled developer in the SunONE environment for roughly the same cost. The bottom line is that both offer state of the art development environments for creating rich and robust, object-oriented Internet applications and services.

That said, the real issue from a developer perspective comes down to the disposition and expertise of the development resources to which you have access. Individual developers and development shops typically invest in becoming expert in one environment or the other. They either specialize in Microsoft-based development or Sun/Java-based development. There are, of course exceptions, but if a virtual education provider intends to do any custom development, it needs to review the "religion" of its potential development resources.

Due to Sun's strong position in the higher education marketplace (and that of the Unix environment upon which it is based), the likelihood is that programming resources internal to the University of California will tend toward having expertise in the Sun/Java environment. Outside of the university environment, the situation will be mixed and will require any virtual education provider to make sure to evaluate potential partners on the basis of their "religion".

Administrative perspective

The situation with administrators is very analogous to that of developers. Both environments are unique and different and offer varying strengths and weaknesses, and, like developers, most administrators are expert in one environment or the other. Broadly speaking, they either specialize in Window-based server administration or Sun/Java-based server administration.

As a result, the administrator resource situation is similar to that which is anticipated to exist with developers. Due to Sun's strong position in the higher education marketplace (and that of the Unix environment upon which it is based), the likelihood is that administrative resources internal to the University of California will be disposed to the Sun/Java environment. Outside of the university environment, the situation will be mixed and will require a virtual education provider to make sure to evaluate potential partners on this basis.

Site owner/operator perspective

From the standpoint of the management responsible for UCCP, the determination of Sun vs. Microsoft is a product of evaluating the options available for each of the four components or "layers" that make up the server solution - hardware, operating system, application server, application components/services.

Server hardware

In the case of the hardware selection, both the Sun Solaris and Window operating systems will run on Intel based servers. However, the Sun Solaris environment has also been optimized to run on Sun's line of SPARC based servers. In this analysis, there is no attempt to evaluate the price performance of SPARC vs. Intel. As a result no advantage is given to either solution in terms of hardware support.

Operating System

As for operating system selection, the SunONE compatible application server products offered by Sun and others are typically capable of running either on top of Sun's Solaris operating or the open-source Linux operating system. In the case of Microsoft, the operating system upon which Microsoft has designed its suite of application server products is by definition Microsoft's Windows NT operating system.

In this analysis there is no attempt made at comparing the performance and reliability of Windows vs. Unix based operating systems.

The table below offers a quick reference for a comparison of the two environments.

Comparison of Sun and Microsoft Environments				
	Hardware	**OS**	**Application Server Vendors**	**Components/Services**
Sun	SPARC/Intel	Sun Solaris Windows	Sun, HP, IBM BEA, Apache	Sun and third party
Microsoft	Intel	Windows	Microsoft	Microsoft & third party

Appendix F: Server solution selection – Sun vs. Microsoft

Application Server

In the application server domain, Microsoft is ostensibly the sole vendor of application server products for the Windows NT operating system. In the case of Sun, there are a myriad of commercial application server vendors from Sun itself to IBM, H-P, BEA Web Logic and the list goes on. In addition, the Sun environment boasts a complement of open-source application servers, most notably the one offered by the Apache Software Foundation, which is considered the leading open-source application server alternative. Between the range of commercial offerings and the open source alternatives, this is an area where, based on selection alone, the open architecture approach taken by Sun offers a distinct advantage for web site developers.

Applications and Services

In the application and services area, both platforms boast support from a broad range of vendors. In fact, in many instances, the major vendors of, for example, communications tools and content management systems offer product for both platforms.

Generalities aside though, the question for the UCCP initiative is which platform offers the best foundation for the e-learning environment it intends to provide.

Near Term:

The answer to this question in the "near-term" is largely determined by the selection of courseware management systems available in the respective environments. The table below is a sampling of the leading hosted (vs. ASP model such as Jones and eCollege) courseware management systems presently offered for both environments.

The table below is a sampling of hosted courseware management systems (vs. ASP models such as Jones and eCollege) presently offered inside both environments.

Sun	Microsoft
Blackboard	Blackboard
WebCT	WebCT
Lotus Learning Space	Virtual U.
Intra Learn	IntraLearn
Top Class	Top Class
Click2Learn	
First Class	

It is difficult to draw too many conclusions from examining this list. The two leading hosted courseware management systems, Blackboard and WebCT, are available on both platforms, and beyond these two there is a roughly equivalent range of options.

The other factor to consider in looking at the relationship between courseware management systems and the underlying server solution is the long-term strategy adopted by the UCCP/Virtual High School initiative. If it is determined that in the long term, there is a desire to configure and build a custom environment to host AP courseware on one or the other server solutions, then it makes sense that the courseware management system selected be hosted in the same environment to minimize the amount of effort involved in the eventual transition.

Long Term:

The question of which platform will provide the better foundation for UCCP in the "long-term" is a more difficult question to answer.

On the one hand, it is certain that the features and capabilities of the various courseware management systems will continue to evolve and improve over time and it may be that the needs of UCCP will best be met by adopting one of the commercial courseware management systems for its long-term solution. If this is the case, the evaluation will really center around the features and capabilities of the CMS system, and the selection of the underlying server solution is rendered secondary.

Alternatively, it may be determined that the desired approach is to develop a custom environment composed of a constellation of custom and open-source, third-party application and service components hosted on a commercially available application server. Should this approach be adopted, there are some key differences between the way in which Sun and Microsoft are approaching the elearning market that are worthy of consideration.

Sun vs. Microsoft Primer

From a technical standpoint, the simplest way to characterize the difference between Sun and Microsoft's strategy towards web development is the following: Sun's strategy is "one language, multi-platform," while Microsoft's strategy is "one platform, multi-language." Sun's web development architecture is predicated on applications and services developed in Java, (specifically the Java 2 Enterprise Edition environment) and deployed across operating system and application server offerings from

multiple vendors. Microsoft's architecture is predicated on applications and services developed in any one of a number of programming languages (Visual Basic, C++ and Cobol) deployed on a single vendor (i.e. Microsoft) operating system and application server foundation.

While it is generally acknowledged that Sun is much further along in the evolution of its strategy, with most of the key components in its architecture shipping today, Microsoft is putting tremendous energy behind it's competing .NET initiative and the impact on the long term direction of the market should not be underestimated.

Summary of Sun's elearning strategy

As one might expect, Sun's approach is predicated on a standards-based, open-architecture model. This approach offers advantage for both developers and customers. On the one hand, this approach creates opportunity for third-party developers interested in creating products to fill out the framework. On the other hand, it provides customers a vendor agnostic environment in which components provided by different vendors are interoperable and may be mixed and matched.

Sun is well on its way to the definition of this open-architecture model. It has released a technical white paper on its' "elearning Reference Architecture" (http://www.sun.com/products-n-solutions/edu/commofinterest/elearning/pdf/Elearning_Reference_Material.pdf) . A preliminary review of the architecture suggests that it is a thorough and well-thought-out model for hosting state-of-the-art elearning content and services. As evidence of the strength of the architecture, Sun is focusing attention on an initial deployment in England. Referred to simply as the "eUniversity" initiative, a consortium of colleges and universities is collaborating on the development of an elearning platform targeted for a January 2003 release that is based on Sun's "elearning Reference Architecture." In addition, Sun has articulated its elearning vision through several other white papers that can be found in the "Global Education and Research" section of the Sun website (http://www.sun.com/products-n-solutions/edu/index.html).

The good news/bad news of Sun's approach is that its' success relies heavily on the timeliness and quality of products developed by the various third party application service providers. That said, Sun has a history of successfully garnering significant third part support for its open architecture initiatives, which makes the elearning Reference Architecture worthy of consideration by management of the UCCP/Virtual High School initiative as it looks ahead.

Summary of Microsoft's elearning strategy

Just as one would expect Sun to adopt an open architecture solution to elearning, so too, one would expect Microsoft to take a more active hand in developing a more singular solution featuring an integrated suite of Microsoft and third party product based on Microsoft .NET technologies. In this case, the partner with whom Microsoft has chosen to partner is Blackboard. The partnership however was announced over a year ago (April 2001) and there has thus far been little evidence of progress to date. As for any sort of reference architecture or other technology strategy announcements in the context of the overall .NET initiative, there has been nothing thus far announced.

In the meantime, Microsoft has made a point of announcing its support for various industry standard efforts surrounding content packaging. Specifically it recently announced the Learning Resource iNterchange (LRN), which is Microsoft's implemen-tation of the Instructional Management Systems Global Learning Consortium (IMS) Content Packaging and Metadata Specifications. LRN also supports the Sharable Content Object Reference Model (SCORM) reference model developed by the ADL. While this is significant, Sun has announced its support for the same standards and so Microsoft's position is not unique.

Appendix G: California educational landscape snapshot

From the California Department of Education, available at: www.cde.ca.gov/resrc/factbook/

Number of school districts, 2000-2001:

Unified	326
Elementary	567
High	92
Other	63
Total	**1,048**

Number of public schools, 2000-2001:

Elementary	5,368
Middle	1,156
Junior high	21
High	935
K-12	54
Continuation	523
Alternative	235
Community day	244
Special education	125
Other	100
Total	**8,761**

Number of students in public schools, 2000-2001:

Kindergarten and grades one through eight	4,264,411
Grades nine through twelve	1,707,952
Ungraded programs	78,532
Total	**6,050,895**

Number of students in private schools, 2000-2001:

Total	**648,564**

Racial and ethnic distribution in public schools, 2000-2001:

Teachers	**Number**	**Percent**
American Indian or Alaskan Native	2,119	0.7
Asian	12,680	4.2
Pacific Islander	545	0.2
Filipino	2,946	1.0
Hispanic	38,751	12.9
African American	15,224	5.1
White, not Hispanic	224,657	74.5
Multiple or no response	4,439	1.5
Total	**301,361**	**100.0**

Students	**Number**	**Percent**
American Indian or Alaskan Native	51,926	0.9
Asian	484,220	8.0
Pacific Islander	38,651	0.6
Filipino	144,759	2.4
Hispanic	2,613,480	43.2
African American	510,779	8.4
White, not Hispanic	2,171,861	35.9
Multiple or no response	35,219	0.6
Total	**6,050,895**	**100.0**

Number of full-time teachers, 2000-2001:

Elementary schools	162,951
Middle and junior high schools	48,638
High schools	69,291
Other (includes continuation high schools)	20,481
Total	**301,361**

Funding for K-12 Education, All Sources and Proposition 98
2001-02
(Dollars in Millions)

Sources of Funding	**Funding from All Sources***	**Funding Guaranteed by Proposition 98**
State General Fund	$32,087	$28,808
State Lottery	$827	-
Other State Funds	$140	-
Federal Funds	$5,388	-
Local Property Tax	$11,824	$11,667
Local Debt Service Tax	$612	-
Other Local Funds	$2,843	-
Total	**$53,721**	**$40,475**

*Includes California Department of Education state operations, state special schools, state school facilities bond repayments, state contributions to State Teachers' Retirement System, State Library, and Commission on Teacher Credentialing.

Appendix H: Federal and state legislation related to CA educational technology

Year 2002:

Federal Technology Literacy Grant Part A

Funding is available to reduce the student-to-multimedia-computer ratio to 10-to-1 or better in 4th-8th grade classrooms. Eligible districts are those with at least 40% of the total student population eligible for free or reduced price meals in the National School Lunch/Breakfast Program. Grant amounts will be calculated based upon data submitted in October 2001 for CBEDS and the 2002 Online California School Technology Survey.
Funding: U.S. Department of Education Administered by: CDE.
Website: www.cde.ca.gov/tlc/

Federal Technology Literacy Grant Part B

Competitive grants available through CDE. Criteria still being established. Funding available in September 2002, so applications should be available prior to this.
Funding: U.S. Department of Education Administered by: CDE.
Website: www.cde.ca.gov/tlc/

Year 2001:

Project EAST (Environmental and Spatial Technology)

The Environmental and Spatial Technology (EAST) model is a dynamic, performance-based learning environment for students in grades 9-12 utilizing project-based service learning, integrated with advanced technological applications. The setting for this model is an interdisciplinary laboratory environment where the intellectual and problem-solving growth of students, rather than the technology, is the focus.
Funding: State Legislature Administered by: CDE

AB 620 High Tech High School Grants

This act provides up to three one-time grants to eligible school districts or charter schools for the purpose of establishing new high-tech high schools that will begin serving students no later than September 30, 2002. One-time grants total $2 million each. A "high-tech high school" means a public comprehensive high school maintained by a school district or charter school that offers a very rigorous college preparation curriculum with an emphasis in science, mathematics, and engineering, and also may include digital arts and media. Technology shall be integrated throughout the curriculum and shall be a fundamental tool for both teaching and learning.
Funding: State Legislature Administered by: CDE and OSE

Year 2000:

Digital California Project

The Digital California Project is a multi-million dollar effort designed to build the necessary network infrastructure needed to prepare California's schools to take advantage of tomorrow's advances in network technology. In essence, we are developing an advanced-services network to serve the entire K-20 education and research community. Administered through CENIC (Corporation for Education Network Initiatives in California), a non-profit entity established for educational networking initiatives in California.
Funding: State Legislature Administered by: CENIC
Website: www.cenic.org

AB2882 The Education Technology Grant Program for High Schools

Provided $175 million in one-time funding to reduce the student-to-multimedia computer ratio to 4.75-to-1 and provide hardware to access Advanced Placement courses online. More than 1,800 schools received 110,000 new computers under the program. Ended in 2001.
Funding: State Legislature Administered through: OSE and CDE

Appendix H: Federal and state legislation related to CA educational technology

Year 1999:

CSIS The California Student Information System
CSIS was established to standardize the electronic exchange of student information in the state. The purpose is to enable the accurate and timely exchange of student transcripts between Local Education Agencies and to post secondary institutions. The goal is that by 2004, all districts can electronically exchange information as students move schools. Ongoing funding.
Funding: Ongoing
Website: www.csis.K-12.ca.us

Library of California
The Library of California is a statewide program to provide equitable access to library materials and information resources for all Californians. Administered by the California State Library, seven regional library networks provide the regional services specified in the Library of California Act.
Funding: Ongoing
Website: www.library.ca.gov/loc/

AB 598 Establishes Commission on Technology and Learning
CTL purpose is "to make policy recommendations to the State Board of Education in areas that include statewide planning for education technology, including a statewide master plan for use of education technology in the elementary and secondary instructional program, dissemination of technology resources, and development of guidelines for ongoing comprehensive statewide evaluation of all technology, telecommunications, and distance learning programs that directly and indirectly affect California education in kindergarten and grades 1 to 12, inclusive."

Districts must create a technology plan and submit it to the CDE. After January 1, 2002, Education Code section 51871.5 requires that a school district have a local technology plan before the California Department of Education (CDE) can award any technology funding to the district.
Funding: State Legislature Administered by: CDE Ed. Tech. Office
Website: www.cde.ca.gov/ctl/index.html

CLRN California Learning Resource Network
Established to "provide educators with a "one-stop" resource for critical information needed for the selection of supplemental electronic learning resources aligned to the State Board of Education academic content standards and linked to model lesson plans utilizing technology.
Funding: Ongoing
Website: www.clrn.org

CSMART California Statewide Master Agreement for Resources in Technology
Statewide project designed to help schools acquire technology for teaching and learning, without breaking the budget. Resources available through C-SMART include hardware, software, electronic reference materials, instructional videos, and more. C-SMART negotiates to create opportunities for California schools and districts to participate in discount buying and licensing of these products.
Funding: Ongoing
Website: www.c-smart.org

TICAL Technology Information Center for Administrative Leadership
Portical is a Portal full of administrative resources. These resources have been collected and organized by practicing administrators and meet criteria judged to be of value to other administrators. You will find these resources organized in a large database that can be searched by several means including TICAL's own specially constructed matrices.
Funding: Ongoing
Website: www.portical.org

Appendix H: Federal and state legislation related to CA educational technology

TechSets

TechSETS is focused on providing technical professionals in California schools improved access to training, support and other resources. The TechSETS site is arranged in six major areas: About, Training, Support, Tools, Members and Help.
Funding: Ongoing
Website: www.techsets.org

Year 1998:

AB 1761 Statewide Education Technology Service

Established four technology initiatives in the state: 1. CLRN, 2. CSMART, 3. TICAL, 4. Tech Sets.
Funding: State Legislature Administered by: CDE Ed. Tech. Office
Website: www.cde.ca.gov/sets/

AB1339 Technology Staff Development

Provides ongoing funding so that training in education technology can be integrated into all professional development in grades 4-8. Funding of up to $20 per student will be provided to eligible schools. Eligible schools must have computer to student ratio of 6 to 1, a way to project computer image, and connections to Internet in core classrooms (language arts, history, science, and math).
Funding: State Legislature Administered by: CDE Ed. Tech. Office
Website: www.cde.ca.gov/edtech/etsd/

Year 1997:

Digital High School

Provides assistance to schools serving students in grades 9-12 so that these schools may install and support technology, as well as provide staff training. The installation support is provided through the Technology Installation Grant, a one-time $300 per student amount.
Funding: State Legislature Administered by: CDE Ed. Tech. Office
Website: www.cde.ca.gov/digitalhigh/

Year 1996:

CTAP California Technology Assistance Program

CTAP is a regional technical assistance program that provides coordination and services in education technology based upon local needs in each of the eleven regions in California. There are 11 CTAP regional leads, one for each of the 11 California County Superintendents Educational Services Association (CCSESA) regions. Each CTAP region has developed and is implementing a plan to provide technical assistance in six key areas: staff development, learning resources, hardware and telecommunications infrastructure, operating and maintaining education technology infrastructure, coordination with other federal, state and local programs, and funding for technology.
Funding: State Legislature Administered by: CDE Ed. Tech. Office
Website: http://ctap.K-12.ca.us/

Appendix I: Proposed Bill AB 885

BILL NUMBER: AB 885
AMENDED BILL TEXT
AMENDED IN SENATE JUNE 4, 2002
AMENDED IN SENATE MAY 20, 2002
AMENDED IN SENATE JANUARY 18, 2002
AMENDED IN SENATE JULY 2, 2001
AMENDED IN ASSEMBLY MAY 31, 2001
AMENDED IN ASSEMBLY MAY 15, 2001
AMENDED IN ASSEMBLY MAY 1, 2001
INTRODUCED BY Assembly Member Daucher

FEBRUARY 22, 2001
An act to add Section 46300.8 to the Education Code, relating to public schools.

LEGISLATIVE COUNSEL'S DIGEST
AB 885, as amended, Daucher. Average daily attendance: Internet classroom. Existing law prescribes the method for computing average daily attendance of pupils under the direct supervision, as defined, of school district personnel for the purpose of determining school district apportionments.

This bill would, notwithstanding any provision of law, for the purposes of an online classroom program conducted over the Internet, as defined, in a secondary school, include as "immediate supervision," pupil participation in an online asynchronous interactive curriculum, as defined, provided by certificated school personnel, and would require schools that provide an online asynchronous interactive curriculum to meet certain requirements. The bill would permit courses other than high school courses to be eligible for online classroom programs only pursuant to a waiver from the StateBoard of Education.

Vote: majority. Appropriation: no. Fiscal committee: yes. State-mandated local program: no.

THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:

SECTION 1. The Legislature finds and declares all of the following:
(a) California suffers from a shortage of teachers.
(b) Many schools are unable to provide advanced placement courses to their pupils.
(c) Many schools have difficulty providing courses in hard-to-staff subject areas.
(d) California has a diverse pupil population of varying learning styles.

SEC. 2. Section 46300.8 is added to the Education Code, to read:
46300.8. (a) (1) Notwithstanding any other provision of law, for the purposes of an online classroom program conducted over the Internet in a secondary school, "immediate supervision" includes pupil participation in an online asynchronous interactive curriculum provided by a certificated teacher. The certificated teacher responsible for the program shall be online and accessible to the pupil on a daily basis to respond to pupil queries, assign tasks, and dispense information. The course shall be approved by the governing board of the school district.
(2) For purposes of this section, an "asynchronous interactivity curriculum" is means a curriculum whereby the pupils and teacher interact using online resources, including, but not limited to, discussion boards, Web sites, and e-mail. However, the pupil and teacher need not necessarily be online at the same time.
(3) For purposes of this section, "internet" "Internet" means the global information system that is logically linked together by a globally unique address space based on the Internet Protocol (IP), or its subsequent extensions, and that is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite, or provides, uses, or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure described in this paragraph.
(b) A pupil participating in an online program pursuant to this section shall not be credited with more than a total of one day of attendance per calendar day or for more than a total of five days of attendance per a calendar week.
(c) The total number of pupils participating in any given online classroom program pursuant to this section shall not exceed the average class size for similar courses in high schools of the school district offering the online classroom program.
(d) A teacher may teach pupils in one or more online courses pursuant to this section only if the teacher concurrently teaches the same course to pupils in a traditional in-classroom setting at the providing high school or has done so previously within the immediately preceding two-year period. The curriculum and activities shall be the same for the online course as for the traditional in-classroom course.
(e) Any teacher teaching in an online classroom program shall hold the appropriate credential.
(f) A school district offering an online course may contract with an other another school district to provide the online course to pupils of the offering school district. Contract terms shall be determined by mutual agreement of the school districts. School districts that provide online courses pursuant to the contract, shall contract directly with the offering school district and shall not enter into direct contracts with the pupils of the offering school district.
(g) Statewide testing results for online pupils shall be reported to the home school district of the pupil.

(h) Only high school courses shall be eligible for online classroom programs. School districts may, however, apply for awaiver from the State Board of Education to teach online courses to pupils in additional grade levels, and the state board may grant the waiver.

(i) A pupil shall not be assigned to an online course unless the pupil voluntarily elects to participate in the online course. The parent or guardian of the pupil shall provide written consent before the pupil may participate in an online course.

(j) A pupil may take up to two online courses per semester provided that the pupil is concurrently enrolled in traditional in-classroom courses. The governing board of a school district may waive this requirement for pupils who are unable to attend regular courses at a schoolsite.

(k) A school district that chooses to offer an online course, or to contract pursuant to subdivision (f) to provide an online course, shall develop policies addressing all of the following factors: test integrity, evaluation of the online courses including a comparison with a traditional in-classroom courses, a procedure for attaining informed consent from both the parent and pupil regarding course enrollment, the teacher selection process, criteria regarding pupil priority for online courses, equity and access in terms of hardware or computer laboratories, teacher training for online teaching, teacher evaluation procedures, criteria for asynchronous learning including the type and frequency of the contact between pupil and teacher, pupil computer skills necessary to take an online course, and the provision of onsite support for online pupils.

(l) School districts that provide online classroom programs shall verify that online pupils take examinations by proctor or that other reliable methods are used to ensure test integrity and that there is a clear record of pupil work, using the same method of documentation and assessment as in a traditional in-classroom course.

(m) A school district that provides online classroom programs shall maintain records to verify the time that a pupil spends online and related activities in which a pupil is involved. The school district shall also maintain records verifying the time the instructor was online.

(n) Minutes of pupil participation in online courses complying with subdivisions (a) to (m), inclusive, shall qualify for average daily attendance purposes within the structure of the 240 minute school day as set forth in Section 46113. Regional occupational programs may offer or contract with school districts to provide online courses; however, the minutes of pupil participation in those courses shall not be counted for average daily attendance purposes.

(o) The purposes of online classroom programs conducted pursuant to this section include all of the following:

(1) Providing expanded educational opportunities for pupils attending schools with limited educational offerings.

(2) Reaching out to pupils in schools where advanced placement courses are not available.

(3) Providing quality educational services in courses for hard-to-staff subject areas in schools where a shortage of teachers make these classes unavailable.

(4) Ensuring that courses provided over the Internet are at least as challenging as courses provided in a traditional educational setting.

(5) Ensuring high teacher quality for online classroom purposes.

(6) Ensuring pupil testing integrity for online classroom purposes.

(7) Ensuring accountability for the purposes of verifying the active involvement of all pupils participating in courses provided over the Internet.

(p) For each online class provided pursuant to this section, the governing board of a school district shall make findings of compliance with this section, including, but not limited to, the immediate supervision requirement.

(q) Notwithstanding any other provision of law, this section does not apply to online courses offered through a program administered by or coordinated through a California public postsecondary educational institution.

Appendix J: Focus group participants

This appendix identifies the people and locations of those who participated in the focus group process. Over 700 adults and students participated, representing the diversity of California. There were participants from almost every county in the state, representing small schools, large schools, charter schools, home schools, intermediate schools, high schools, and county offices of education. There were 38 adult groups, with a total of 402 participants. There were 24 student groups, with a total of 341 students ranging from grades 8-12. More specific details of the focus groups can be found online at www.cusd.com/calvhs.

Student focus groups included students from:

Canyon High School in Orange
Villa Park High School in Orange
Dorsey High School in Los Angeles
Einstein Middle School in Sacramento
Kerman High School in Kerman
Mt. Carmel High School in Poway
San Benito High School in Hollister
Sanger High School in Sanger
Buchanan High School in Clovis
Clovis East High School in Clovis
Clovis High School in Clovis
Bullard High School in Fresno
DeWolf High School in Fresno
Edison High School in Fresno
Fresno High School in Fresno
Hoover High School in Fresno
McLane High School in Fresno
Roosevelt High School in Fresno
Sunnyside High School in Fresno
Center for Advanced Research and Technology (juniors and seniors from Fresno and Clovis)

Adult focus groups included teachers, administrators and parents from:

Organizations

Alliance for Distance Education in California
California Commission for Technology and Learning
California County Superintendents Educational Services Association, Technology and Telecommunications Steering Committee
California Department of Education
California School Library Association
California Teachers Association
Central California Educational Technology Consortium
Central Valley School Library Consortium
·Computer Using Educators
CTAP – State Coordinating Council Representing all regions in the state
CTAP – Region VII Steering Committee
Digital California Project Program Steering Committee
Fresno Public Library

County Offices of Education

Fresno
Kings
Los Angeles
Madera
Mariposa
Merced
Monterey
Orange
Sacramento
San Diego
San Luis Obispo
San Mateo
Tulare
Tuolomne
Ventura

School Districts

Archdiocese of San Francisco
Atwater Unified
Central Unified (Fresno)
Clovis Unified
Fowler Unified
Fresno Unified
Hanford Unified
Kingsburg Unified
Kings Canyon Unified
Long Beach Unified
Los Angeles Unified
Madera Unified
Mendota Unified
Orange Unified
Palos Verdes Unified
Poway Unified
Sacramento City Unified
San Benito Joint Union
San Juan Unified (Sacramento)
Yosemite

Higher Education Institutions

California State University, Fresno
California State University, Dominguez Hills
·California State University, Northridge
California State University, San Diego
Cerro Coso Community College (Kern County)
Coastline Community College
Fresno City College
Fresno Pacific University

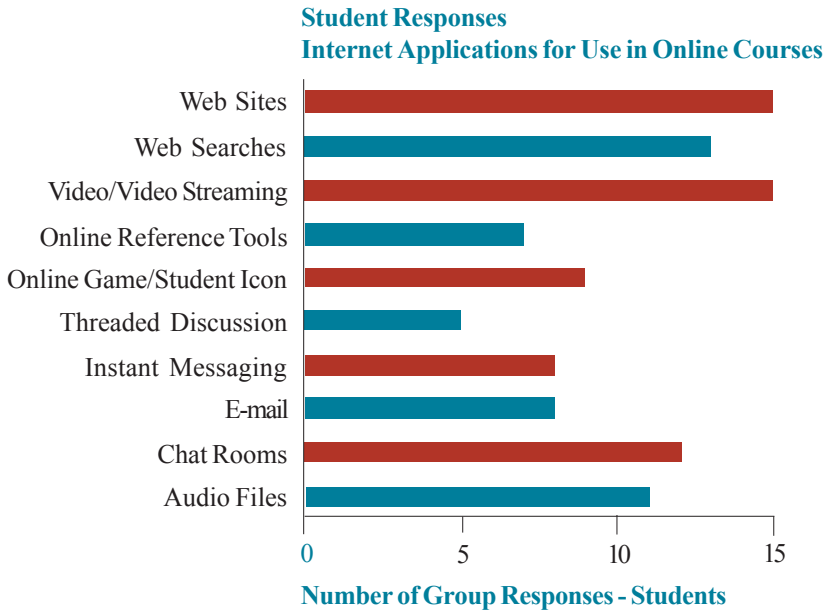
Companies

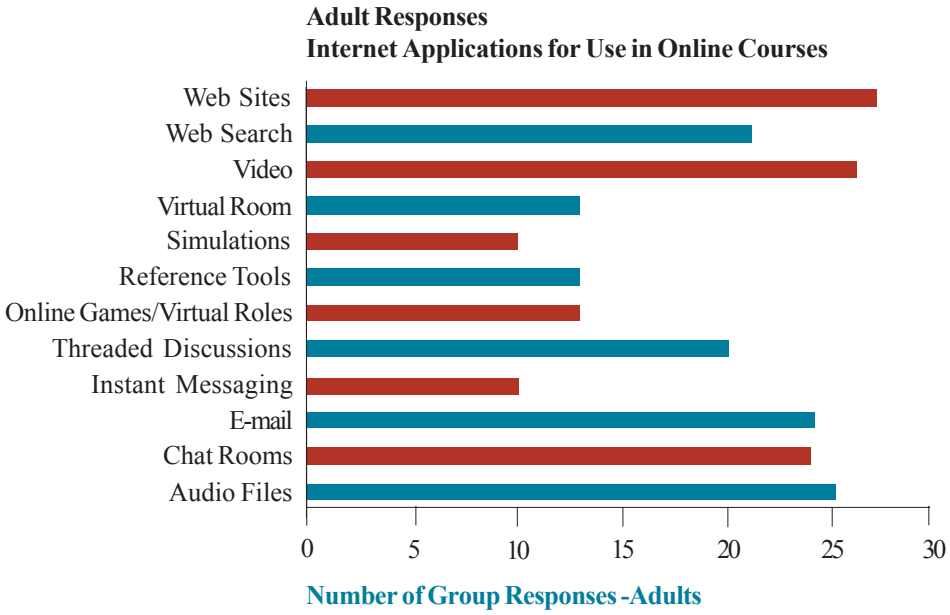
Apple
BigChalk
Follett
IBM
McGraw Hill Digital Learning
Microsoft
Netschools (Nova Net)
Pacific Bell
Wire One Technologies

Appendix K: Focus Group Results

Note: There were a total of 24 student focus groups and a total of 38 adult focus groups.

Question 1: What current or future Internet applications should be incorporated into online courses?

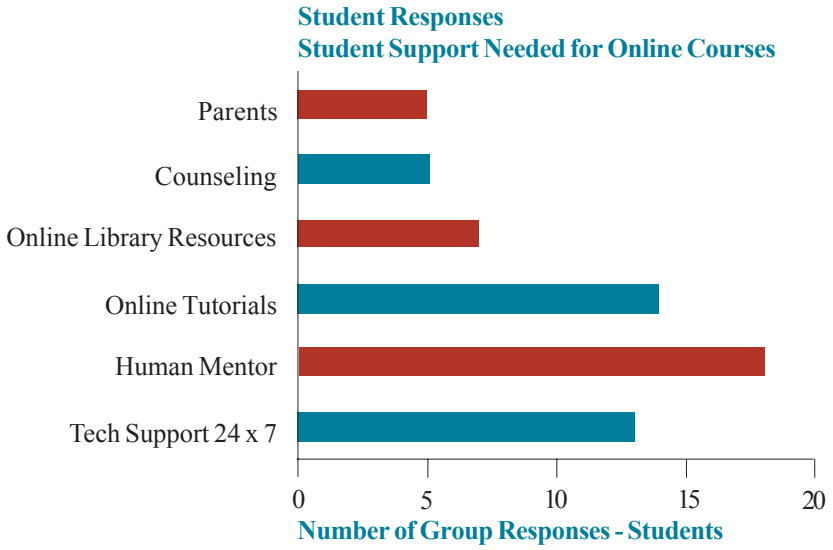


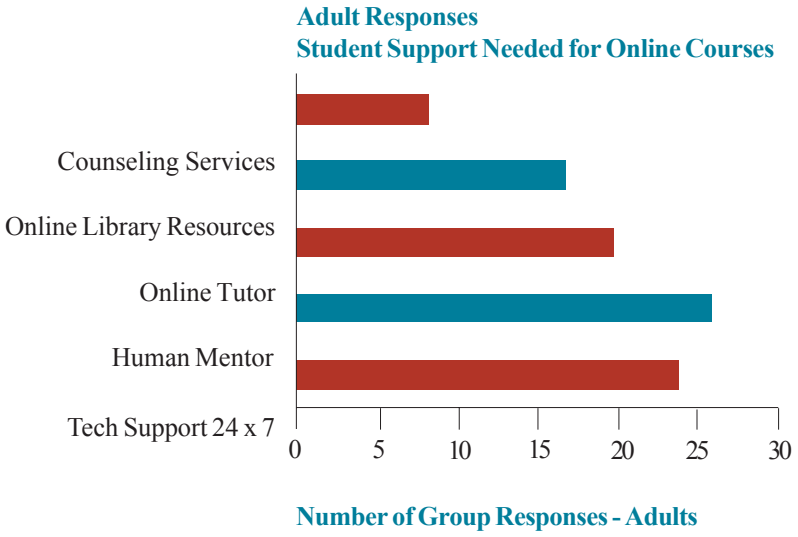


Appendix K: Focus Group Results

Note: There were a total of 24 student focus groups and a total of 38 adult focus groups.

Question 2: What type of student support is needed for students to be successful in an online course?

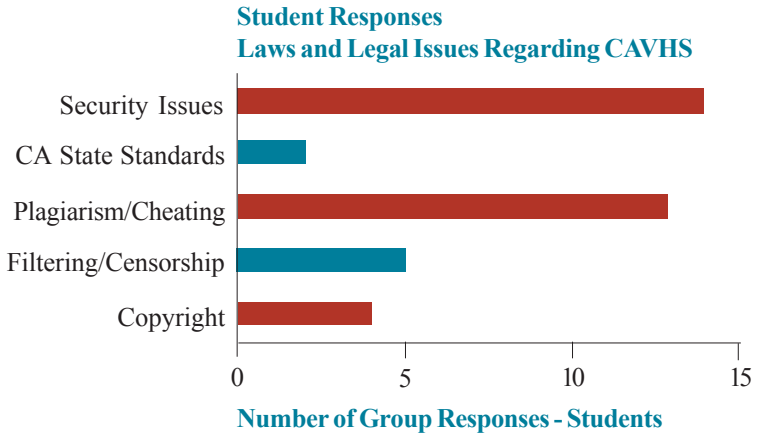


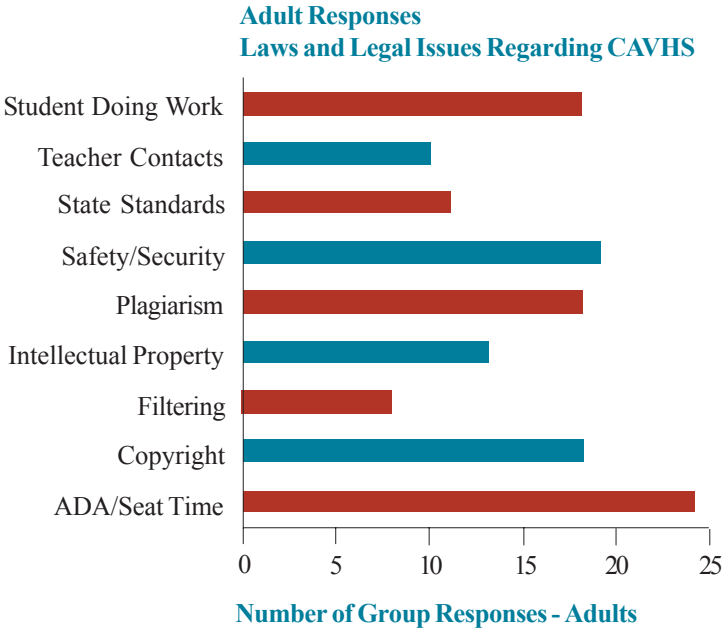


Appendix K: Focus Group Results

Note: There were a total of 24 student focus groups and a total of 38 adult focus groups.

Question 3: What laws or legal issues need to be addressed for a statewide virtual school?





Appendix L: Focus group recording sheet examples and Summary of Responses

Focus Group Recording Sheet – Student Example

Date: April 9, 2002
Completed by: Jacqlyn & Raul (student researchers)
Organization: CART Website: www.cart.org
Group: Environmental Lab Number in group: 9
Location: Clovis, CA Phone: (559) 248-7400

School Group Members	Grade
Buchanan	senior (1)
Bullard	junior (1) senior (1)
Clovis High	senior (1)
Clovis West	seniors (2)
Hoover	senior (1)
McLane	senior (1)
Roosevelt	senior (1)

X - DESIGNATES MOST FREQUENT RESPONSES

1. What types of applications/components are on the Internet today or in the future that should be incorporated into an online course?

   X - Audio files
   X - Online Reference Tools
   X - Web Searches
   Chat Room
   E-mail
   Threaded Discussion
   Online game/student icon
   Virtual Room
   Video/video streaming
   Web sites
   Links to help

2. What ideas do you have regarding how a virtual school program might be financed?

   Digital High School - DHS
   Digital California Project – DCP
   Technology Staff Development Grants
   Library of California
   People who use it should pay
   School funded
   State taxes
   Combination of public and private funding
   Financial aid
   Fund raisers

3. What kind of laws or legal issues need to be considered as we move forward in creating a virtual high school?

   X - Filtering/censorship
   X - Plagiarism (copying or cheating)
   X - Safety (login/protection)
   ADA/FTE – Seat time
   Copyright
   CA state standards
   Teacher contracts
   Log in password protections
   Hacking

4. If you were to design a structure for a California virtual high school, how would it look? How can it best serve the needs of students, teachers, and school districts in California? Should the structure be a collaborative, competitive, school-based or stand alone entity? Should the state virtual school be scalable for school districts, should it be self-contained and self-funded?

   List of contacts
   E-mail list
   Study groups
   Directories of information
   Instant access
   Web cams
   Weekly contact between teachers and students
   Student files kept on line
   Well informed
   Advertised
   Hyper links for assignments

5. What type of support is needed for students to be successful in an online course (e.g. human or online)? (Put the number of when each item, if mentioned, is discussed. If not mentioned, leave blank.)

   X - Tech Support 24X7
   X - Human Mentor
   X - Online tutorials
   X - Online Library Resources
   Turnitin.com

Appendix L: Focus group recording sheet examples and Summary of Responses

Focus Group Data Sheet – Adult Example

Date: April 11, 2002
Completed by: Rob
Organization: San Benito High School
Group: Teachers Location: Hollister
Number in Group: 10

Group Members were teachers representing the following subject areas:

Math
English
Social Science
Foreign Language
Yearbook
Library Media Center
Technology Resource Teacher
Psychology
Drafting

X - DESIGNATES MOST FREQUENT RESPONSES

1. What types of applications/components that are on the Internet should be incorporated into teaching and learning in an online course?

   X - Chat Room
   X - E-mail
   X - Threaded Discussion
   Audio files
   Online game/student icon
   Online Reference Tools
   Virtual Room
   Video/video streaming
   Web Searches
   Web sites
   Other items mentioned:
   Online texts with search i.e. Shakespeare
   Animations (such as how to visualize a geometric shape)
   Online databases (Magazines and newspaper databases, Professional journals)
   Synchronous or asynchronous (e-mail listservs, tech support lines)
   Self practice, interactive, self checking
   Guides for learning
   Online simulation
   Tools for teacher created online practice, such as vocabulary review, etc.
   Multimedia

2. What state projects/initiatives are you aware of in California that could support/facilitate a virtual high school program?
   (Not asked)

3. What ideas do you have regarding how a virtual school program might be financed?
   (Not asked)

4. What kind of laws or legal issues need to be considered as we move forward in creating a virtual high school?

   X - Copyright
   X - Plagiarism (copying or cheating)
   X - Safety (login/protection)
   X - Intellectual Property
   ADA/FTE - Seat time
   Filtering/censorship
   CA state standards
   Teacher contracts

   Be careful that parents don't decide to keep a child home with the online courses so that kid can work at home to help support the family, while doing their course at night.

5. If you were to design a structure for a California virtual high school, how would it look?

   ADMINISTRATIVE STRUCTURE

   Central services – library reference, software access, career guidance, tutoring for students and teaching – core classes based on state standards, training and selection of online instructors. Some central faculty to teach and train others.

   Regional services – different regions might have different offerings – customizable – technical support, face to face meetings, hardware, textbooks to check out, supplemental offerings, counselors, multilingual support. Local human support. Local online teachers.

   Set up a type of course database that would update all the courses in the state.

   Courses would range from whole course to individual lessons to individual student practice.

   Consider online centers in various areas of state (especially for migrant students).

   Available to students who move – students working at a variety of places.

   Equal access for all students.

   Parent component very important. Many parents are not computer literate and need training to support online students.

   Should be a way for computers to be checked out for parents and students to use in their homes.

   Regional courses should be developed that would be interdisciplinary and include information about the geography of area to learn about local community and help tie students to the community.

   Access for students at various levels – should be security of student work to protect the work. Need protection from hackers.

   Create a small, focused "intranet" – to guide student learning.

6. What type of support is needed for students to be successful in an online course (e.g. human or online)?

   X - Tech Support 24 X 7
   Human Mentor
   Online tutorials
   Online Library Resources
   Consistent and timely feedback from teacher
   Immediate feedback for many assessments.
   Assessments should explain to students why they missed different problems.
   Higher order thinking skills – create scaffolding approach to concepts.
   Library support
   Feedback via e-mail, phone, in person, etc.

7. What type of student would benefit most from online courses?

   X - AP Students
   X - Honors
   X - Remedial
   X - All students
   X - Alternative Ed students
   Self motivated
   Home study
   Kids who move
   Migrant students
   Student access to laptops for trips for independent study work
   Home school students

   OTHER IDEAS/SUGGESTIONS
   Look at model of Technology High in Napa – some kids go all day, some go part day. Some are in other high school to be in activities such as sports or band. (Tech High doesn't have sports team or band, etc.). Other high schools are Napa High and Vintage High.

Legal requirements

Two Federal laws, the Americans with Disabilities Act and the Rehabilitation Act, govern accessibility issues in online education at the federal level. Within these two laws, two sections of the Rehabilitation Act are key for educational institutions. The Rehabilitation Act states that individuals with disabilities shall not be "excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance," and in Section 504 specifically lists educational entities as being subject to the act. Section 508 of the Act mandates specifications for Internet technologies "based on access guidelines developed by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium."

The WAI (**www.w3.org/WAI/**) "pursues accessibility of the Web through…technology, guidelines, tools, education and outreach, and research and development." The Initiative provides guidelines and suggestions that within online learning are applicable to courses as well as web-based services such as course registration, online support, and similar services. Guidelines include:

- Provide equivalent alternatives to auditory and visual content.
- Don't rely on color alone.
- Properly use markup and style sheets.
- Ensure that pages featuring new technologies transform gracefully.
- Design for device-independence.

The WAI also suggests the following "Quick Tips":

- **Images & animations.** Use the **alt** attribute to describe the function of each visual.
- **Image maps.** Use the client-side **map** and text for hotspots.
- **Multimedia.** Provide captioning and transcripts of audio, and descriptions of video.
- **Hypertext links.** Use text that makes sense when read out of context. For example, avoid "click here."
- **Page organization.** Use headings, lists, and consistent structure. Use **CSS** for layout and style where possible.
- **Scripts, applets, & plug-ins.** Provide alternative content in case active features are inaccessible or unsupported.
- **Frames.** Use the **noframes** element and meaningful titles.
- **Tables.** Make line-by-line reading sensible.

These guidelines and tips are a sample of much more extensive suggestions provided by the WAI.

Components of accessibility for online courses

There are four components to accessibility within online courses:

1. The Course Management System
2. Course content
3. Assessments
4. Teaching (teacher-student and student-student interactions)

- **Course management systems:** CMSs include a variety of tools that are used by teachers, some of which may present difficulties to disabled students. For example, whiteboards are typically not accessible to blind or visually impaired students, so content within the whiteboard must be described separately. Most of the commercial course management systems are addressing accessibility issues at some level, and all have policy statements on accessibility, so these issues can be assessed when choosing a CMS.
- **Content:** Taking accessibility into account with creation of course content is a key issue. Content that is heavily based on graphics, animations, or video should have an alternative delivery mechanism for visually impaired students. For learning disabled students, courses should contain single page layouts, use straightforward writing, and maintain consistency.
- **Assessment:** Because the largest disabled population is learning disabled students, addressing accessibility within assessments is an important consideration. In face-to-face classes, learning disabled students may, for example, be given extra time to complete an exam, or otherwise be given other assistance. This type of accommodation can be difficult within an online course, because most CMSs don't, for instance, have the ability to easily set allowable time for an exam by student instead of for the course. There are ways for a teacher to manipulate some CMSs to be able to accommodate learning disabled students, but these require additional training, experience, or knowledge of the CMS which most teachers will likely not have without extra guidance.
- **Teaching:** Many disability issues in a face-to-face classroom are addressed by the teacher, and similarly good teaching is a key component to addressing disability issues in an online class. In addition to the assessment issue addressed above, students may generally be given more time to complete assignments, or if on the same schedule may be given less content than other students.

Appendix N: Central Entity and District Responsibilities

The following lists identify the responsibilities of the state virtual school central entity and the responsibilities of a school district that would choose to be part of the state virtual school system. School districts ultimately have the responsibility for educating students, which is why this is the institution identified in this model. Within the eTrust, courses could be developed by institutions other than a school district (e.g. university or third party). The central entity would guide the course development and approval process whether from a university, from a school district or from a company. The central entity would also arrange any contractual issues with institutions other than school districts so that the content would be available to member school districts.

Central Entity Responsibilities

- Central office administration (Executive Director, Director of Online Resources, etc.).
- Application process for districts to participate, including monetary incentives for developing online courses, or for providing a teacher .
- Establish standards for course development, teaching, and administration of online courses.
- Establish approval process of online courses for school districts, higher education institutions, or third party (company) courses.
- Approval of online courses based on state criteria that would include state content standards (similar to state textbook adoption).
- Approval of online courses based on state technology standards (such as SIF or SCORM).
- Repository/clearinghouse of online courses (including an index of courses and similar to CLRN) .
- Data collection clearinghouse (integrated with current state data collection processes such as CBEDS or Dataquest).
- Facilitate the sharing of resources and collaboration between participants .
- Teacher Training: Create a "train the trainers" process for districts who choose to participate.
- Online school portal, which would include the repository, what courses are available and library reference material for use by participating districts and students.
- Develop standards and a framework for quality online teaching and learning (e.g., standard interfaces that all districts would use, processes and procedures for teacher/student communication).

District Responsibilities

- District virtual school coordinator
- Course development
- Teacher training
- Provide teachers
- Registration and recruitment of students
- Local support services for students (e.g. counseling, pre-screening students, grades, transcripts, etc.)
- Local facilitators, mentors or coaches
- Publicity and recruitment of students
- Collection of data
- Finance one teacher and one student to attend yearly CAVHS three-day meeting

Appendix O: Governing Board, Bylaws and Central Entity Staff

California Virtual High School Program Governing Board, Bylaws and Central Entity Staff

The CAVHS governing board should include consultants, administrators and teachers appointed from various educational entities such as the California State Department of Education, Office of the Secretary for Education, University of California, California State University, Community Colleges, and other affected groups such as the California Teachers Association, California County Superintendents Educational Services Association, Association for California School Administrators and the California School Library Association. The governing board will establish bylaws and policies that will be submitted to the State Board of Education for approval. Board duties will include:

- Hiring and evaluating the executive director
- Establishing CAVHS bylaws and policies
- Monitoring and promoting the vision of the eTrust
- Approving yearly budget

The governing board may consist of individuals appointed from the following institutions/organizations:

- 2 people appointed by the State Senate
- 2 people appointed State Assembly
- 1 representative OSE
- 1 representative CDE
- 4 online teachers selected from member districts
- 2 online students selected from member districts
- 1 UC
- 1 CSU
- 1 Community College
- 1 CTA
- 1 California School Library Association
- 1 Library of California
- 1 CUE Organization
- (ex officio) Chief Executive Director

Appendix P: Virtual School Program Responsibilities and Operational Issues

In this collaborative model, it is important to define the responsible entity prior to implementation. The following chart recommends which entity - the state entity or the local school district - is responsible for each operational issue.	
Responsibility -Central Office -District -Combination	**Operational Issues**
Combination	**Curriculum** Central office establishes criteria and approval process for online courses, develops repository, mechanism for communication to member districts. Central office decides how to contract with commercial content providers. District develops course content and target audiences.
Combination	**Content development** Central office establishes course development criteria. Central office facilitates training. Central office facilitates the approval of online courses to meet the University of California criteria. District creates the content aligned with curriculum standards.
Combination	**Review and quality assurance process for course creation** Central office establishes review process, establishing. Evaluation rubric and evaluators (may include CDE and higher education individuals). The CAVHS may want to consider a modified state textbook adoption process for online courses. Districts provide evaluators for courses outside their own district.
Combination	**Program evaluation** Central office establishes quality indicators/evaluation criteria in collaboration with governing board. District collects, analyzes, and submits evaluation data to central office. Central office collects and analyzes data from districts and reports findings to governing board and back to districts.
District	**Course delivery** Establish local policies regarding materials needed to take online courses, when students will access online courses, technology needed for online courses, etc. Teachers should be employed by the local district and have a California teaching credential. Contractual issues would be consistent with local district policies and union guidelines.
District	**Course pacing**
Combination	**Technology decisions/development** **Central office develops** Course creation standards (e.g. technical standards such as file naming, file organization, etc.). Recommended course platform standard.s **District** Chooses online platform to house courses . *continued from following page*

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Combination	**Support for students and teachers** Central office provides initial training and support for districts; creates online learning community for teachers. District provides training and support for students.
Combination	**Assessment** Central office establishes data to be collected. Each student should be entered into statewide system and tracked. Districts collect data and submit to central office.
Combination	**Student services** Central office establishes and maintains the online portal. Districts establish the local support system.
District	**Access and equity**
District	**Transcript and Credit Issues** Completed by district of residence.

Appendix Q: Suggested Funding Structure for Collaborative Model

In the collaborative structure, every district is contributing into the system in some way. This can be by way of teachers, course creation, or fees for students taking the online courses. Districts may choose to participate at a variety of levels. The state virtual school program would provide incentive money for district participation as well. Districts would need to show matching funds for the program. The matching funds could be in the form of teacher benefits, a local virtual school contact person, and other similar items. Once a district develops a state approved online course, they may choose to allow students from outside their district to take an online course. The central office would set the fees, while the local districts would decide on any other issues. The chart on the following page suggests a possible sliding fee schedule that may be considered.

Definitions

Course Creation: Putting the content of a course online that meets the state standards of quality for an online course. One teacher or a team of teachers from one district could accomplish this. (In the "suggested fee schedule" chart below, "yes" means that the district has contributed an online course. The district may be creating or may have already created an online course to be added into the state clearinghouse).

State Virtual School Teacher: This would be the teacher actually teaching the online course. The teacher would be employed full time by a local school district. Initially, the virtual school teacher would probably be teaching some face-to-face courses in the local district and some online courses for the state virtual school. More teachers would be needed for the same course if there were a strong student need. (In the "suggested fee schedule" chart below, "yes" means that the district has contributed a teacher to teach at least one section of one online course).

Teacher and Student Resource Use: Districts could buy into the online course repository and use the content as a resource for teachers to use with face-to-face classrooms (every student using a computer) or students could use the content as another resource for learning at school or from home. (In the "suggested fee schedule" chart below, "yes" means that the district is paying a fee to the state virtual school program for this access).

Students Taking Online Course: These are students who register to take one of the state approved online courses. (In the "suggested fee schedule" chart below, "yes" means that the district is paying a fee to the state virtual school program for students to take the online courses. If a district contributes an online course or an online teacher, the fee would be modified).

District/Student Fee: The district or student fee would be a sliding scale based on what the district contributes to the state virtual school program. This money would be paid to the state virtual school program.

State Incentive: This money would be paid to a district by the state virtual school program. Districts would be paid one time for creating an approved online course. Districts would receive ongoing funding for contributing a virtual school teacher. The chart shows the amount of state incentive money that would be paid to a district depending upon the level of participation.

Appendix Q: Suggested Funding Structure for Collaborative Model

Suggested Fee Schedule and Incentives for Participating School Districts						
Level	**Course Creation**	**State Virtual School Teacher**	**Teacher and Student Resource Use**	**Students Taking Online Course**	**District/Student Fee (Tuititon**	**State Incentive**
1	Yes	Yes	Yes	Yes	$500 per teacher per year for teacher/ student resource (maximum $5,000 per school). No charge for students in participating districts. Other districts may purchase online seats from another district at $1,000 per student per course, per year.	$5,000 per online teacher per year for each group of 30 online students. $10,000 per online course created and approved by central office.
2	No	No	No	Yes	$1,000 per student, per course, per year.	0
3	No	Yes	Yes	Yes	$500 per teacher, per year for teacher resource (up to $5,000 per school). $500 per student, per course, per year.	$5,000 per online teacher for each group of 30 online students.
4	No	Yes	Yes	Yes	0	$5,000 per online teacher for each group of 30 online students.
5	Yes	Yes	No	No	0	$5,000 per online teacher for each group of 30 online students. $10,000 per online course created meeting state criteria.
6	No	No	Yes	No	$500 per teacher per year up to $5,000 per school.	0
7	Yes	Yes	No	Yes	Same fees as Level 1.	Sames fees as Level 1.
8	Yes	No	No	No	Not an option.	

Appendix Q: Suggested Funding Structure for Collaborative Model

Possible Financing

In the initial years of financing the eTrust, there would need to be an infusion of money from the state or through company grants or partnerships. Eventually, school districts would be assessed a fee to belong to the eTrust and this money would off set future state funding. The following chart illustrates how this could occur.

There must be some type of incentive monies for districts to participate in a collaborative venture such as this. Funding for this may come from the state, from companies, or from various grants or foundations. The collaborative model, along with the eTrust concept is written as a starting point for the State of California. It is expected that these models will be modified as this concept moves forward in the state to best meet the educational needs of the teachers and students in the state.

Year	Central Office Funding From State	State Incentive Monies Paid to Districts	District Fees	Total Costs from State
1 (planning)	$100,000	0	0	$100,000
2 (implmentation)	$1,903,100	$70,000	0	$1,973,100
3	$1,928,100	$175,000	$150,000	$1,953,100

Appendix R: Marketing, Communication, Public Relations

Statewide online programs must market to school administrators, teachers, counselors, and different learner populations in order to increase awareness of the program throughout the state and ensure that educators support the program. While the end goal is to attract students, most students will find out about the program through their teachers, counselors, and schools. In order to reach students who are not currently part of the educational system, the program should also market to other support agencies. Major on-going marketing efforts will be through:

- Various state technology initiatives already in place such as the DCP and CTAP.
- Various CDE departments such as curriculum frameworks, alternative education, educational technology, and school library.
- Various educational organizations such as the California Teachers Association, Association of School Administrators, California School Library Association and Computer Using Educators.
- The program's website, which will include course listings, registration information, etc; and serve as the online "brochure" for the program.
- Presentations at conferences.
- Announcements on and links from other California educational websites.
- Flyers in schools.
- E-mail listserves to educators.
- Networks of educators throughout the state.
- Press releases and other news coverage.

While on-going marketing efforts will provide a constant flow of messages to create general awareness, a new program in the state could have its own public relations campaign and branding to create a new level of awareness and perception of value linked to VHS activities.

Appendix S: A suggested five-year implementation timeline

Year	Tasks	Costs
1 (Planning)	Planning committee selected Vision of eTrust Establish eTrust collaborative roles and relationships Planning Secure funding Establish content, technology and pedagogical standards for online courses Establish infrastructure, course repository, etc. Establish application process for member districts Establish process for course approval (for districts, universities, companies, etc.)	Travel for planning committee Secretarial support
2 (Implementation)	Governing Board selected Governing Board hires executive director Hire centralized administration (Executive Director, Assistant Executive Director/Trainer, Online Resources Director/Trainer, Portal Administrator/Trainer, Web master, Administrative Assistant) Select first participating school districts Develop portal Develop online course repository Determine first courses to be developed Evaluation of program Goals: 5 districts participating 10 teachers participating in first year pilot 100 students participating in first year pilot 5 core courses developed	Travel for governing board Clerical support for governing board Central Office established Staff salaries First five districts join
3	Participating districts increased through application process Maintain portal Maintain course depository Refine online courses Evaluation of program Additional courses developed Goals: 25 districts participating 100 teachers participating 500 students participating 10 core courses developed	Office Equipment Staff salaries 10 districts paid 15 districts pay into system *continued on following page*

Appendix S: A suggested five-year implementation timeline

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Year	Tasks	Costs
4	Participating districts increased Maintain portal Maintain course depository Evaluation of program Additional courses developed Goals: 100 school districts participating 400 teachers participating 1,000 students participating 20 courses developed	Office equipment Staff salaries 25 districts paid 75 districts pay into system
5	Participating districts increased Maintain portal Maintain course depository Refine online courses Additional courses developed Goals: 125 school districts participating 500 teachers participating 2,000 students participating 30 courses developed	Office equipment Staff salaries 50 districts paid 75 districts pay into system
Following years	Participating districts increased Maintain portal Maintain course depository Refine online courses Evaluation of program Additional courses developed Goals: Increase district participation by 25% Increase teacher participation by 50% Increase student participation by 100% Increase developed courses by 10 courses per year	Office equipment Staff salaries 50 districts paid 75 districts pay into system

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