Final Report
Colorado Online Education Programs Study Committee

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The Online Education Programs Study Committee studied elementary and secondary online education programs in Colorado. This report presents the findings and recommendations of the committee.

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Report prepared for the Colorado General Assembly
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The Colorado Department of Education dedicates itself to increasing achievement levels for all students through comprehensive programs of education reform involving three interlocking elements:
- High Standards for what students must know and be able to do;
- Tough Assessments that honestly measure whether students meet standards and tell citizens the truth about how well our schools serve children; and
- Rigorous Accountability Measures that tie the accreditation of school districts to high student achievement.

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Introduction and Summary of Findings

Online education is an increasingly common means for educators and parents in Colorado and across the country to meet the needs of diverse students, helping to overcome geographic isolation and lack of local resources. The National Association of State Boards of Education notes, "Evidence to date convincingly demonstrates that, when used appropriately, …elearning can improve how students learn, can improve what students learn, and can deliver high-quality learning opportunities to all [students]."[1]

Online education, however, also presents challenges to established educational norms, procedures, and measures. For this reason, the Web-based Education Commission to the President and Congress of the United States said, "The power of the Internet to transform the education experience is awe-inspiring, but it is also fraught with risk."[2]

The Colorado General Assembly, recognizing the need to address the promise and challenge of online education in K-12 schooling, established the Colorado Online Education Programs Study Committee (Study Committee) and charged it with responding to a set of inquiries set forth in the authorizing legislation. (22-2-122 (46), C.R.S.) This report documents the findings and recommendations of the Study Committee.

Following this introduction, the report is divided into three sections:
- Section I (pp. 8-20)—Findings Responding to Legislative Inquiry: Presents information relating to the inquiries posed in the committee's authorizing legislation;
- Section II (pp. 21-31)—Findings Responding to Study Committee Inquiry: Presents information relating to the inquiries posed in the committee's initial meeting;
- Section III (pp. 28-33)—Recommendations: Presents the Study Committee's recommendations for state-level policy action regarding K-12 online learning.

A. Online education in Colorado

In Colorado, a small but rapidly growing number of students are taking courses through supplemental online programs or are enrolled part-time or full-time in credit-granting cyberschools.[3] The October pupil count in 2002 recorded 1,969 students enrolled in cyberschools

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[1] *Any Time, Any Place, Any Path, Any Pace: Taking the Lead on e-Learning Policy*, October, 2001; http://www.nasbe.org/Organization_Information/e_learning.pdf; p. 7.

[2] *The Power of the Internet for Learning: Moving from Promise to Practice*, Report to the President and Congress of the United States, December, 2000; http://www.ed.gov/offices/AC/WBEC/FinalReport; p. i.

[3] An online learning program is an educational organization that offers an extensive and coordinated curriculum of online instruction and content. There are two types of online programs:
- **Cyberschools** (often referred to as a "virtual schools")—Online learning programs in which students enroll and earn credit towards academic advancement (or graduation) based on successful completion of the courses (or other designated learning opportunities) provided by the school in which they are enrolled.
- **Supplemental online programs**—Online learning programs that offer learning opportunities to students who are enrolled in physical schools or cyberschools; credit for successful completion of these learning opportunities is awarded by the physical school or cyberschool in which each student is enrolled.

across the state. Of these students, 1,680 were full-time and 249 half-time. Twenty-five online programs identified themselves in the October count as cyberschools, and their enrollments ranged from two students to almost 1,000. One of the cyberschools is a charter school, while the others are associated with physical schools or district offices. Seventy-five percent of the cyberstudents[4] in 2002-03 attended one of the two largest cyberschools, the Colorado Virtual Academy (COVA) and Branson Alternative School.

In addition to cyberschool enrollments, there are more than 1,000 students registrations[5] during 2002-03 in courses provided by Colorado Online Learning (COL), the statewide supplemental online program. Because it is a supplemental program rather than a cyberschool, COL does not enroll full-time students, and does not grant diplomas. COL, like almost all supplemental online programs (both in Colorado and nationally), provides only secondary-level curricula. By contrast the state's two largest cyberschools draw almost all of their enrollments from elementary-aged students, although both are expanding "upwards" to comprehensive K-12 programs.

The distinction between cyberschools, which primarily have full-time students and grant credit, and supplemental online programs, which serve part-time students who are enrolled in another school, is key. While the two types of programs have some elements in common (e.g., issues related to course design and student support), there are a number of significant differences between the two (e.g., PPR funding and CSAP requirements). Accordingly, the committee's findings and recommendations may apply to one and not the other; this report specifies the applicability of the findings and recommendations.

The number of students taking online courses has been increasing rapidly, as shown below.

School Year	Number of Registrations in Colorado Supplemental Online Programs	Number of Students in Colorado Cyberschools
2000-01	200	150
2001-02	450	750
2002-03	1100	2500
2003-04 (projected)	1500	3500

B. Recommendations of the Study Committee

The Study Committee's recommendations (pp. 28-33) fall into three general areas:

⇒ **Quality and accountability:** The committee recommends that accreditation requirements applied to physical schools should also apply to cyberschools to the extent appropriate and feasible. This means, for example, that online courses should follow Colorado content standards, and that all cyberstudents should take the CSAP. The committee further recommends that cyberschools should be individually and directly subject to accreditation requirements, rather than indirectly accredited through their respective districts (as is done

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[4] Cyberstudent—In this report the word means a student enrolled in a cyberschool.

[5] A registration is defined in this document as one student taking one course for one semester. One student taking two courses is counted as two registrations; one student taking a two-semester course is two registrations.

for physical schools) because some quality and accountability issues (e.g., course design and student support) are unique to online programs. (One example of this is the need to establish ways in which students can be identified and verified as doing the work for which they are credited.) For such issues online programs would propose some of the accountability indicators and benchmarks to be used. The accreditation system would be similar to the Quality Index System (QIS) used to allocate merit-based financing for Colorado's postsecondary institutions.[6]

⇒ **Access and equity:** Online education can increase equity of opportunity and fill gaps in education across Colorado, but it can also add to inequities by exacerbating the effects of the digital divide. The Study Committee's recommendations pertaining to access and equity address these issues in a variety of way. For example, the committee recommends that each program should set goals and strategies for serving geographically and socio-economically diverse populations of students as well as students with identified special needs, within the program's mission. In addition, the committee observes that all online learning programs must comply with the provisions of Section 508 of the federal Americans with Disabilities Act. The committee also recommends that efforts to ensure diversity and equity should come from the state level. For example, the state should purchase online library resources for use by all students in Colorado. In addition, CDE should work with online programs to improve understanding of (a) which populations can be best served through online learning and (b) what the best strategies are for serving those populations. Nonetheless, in the absence of state-provided resources, it is the responsibility of each cyberschool to meet the learning and resource needs of all of their students.

⇒ **Funding:** Reports from online programs across the country as well as those within Colorado consistently indicate that the cost per student of a high-quality online learning program is the same as or greater than the per student cost of physical school education. In light of these reports and the state's fiscal crisis, the committee recommends that PPR[7] funding should be continued at the state minimum. The committee also recommends that the state should continue to use the October pupil count to determine student enrollments for purposes of allocating PPR. But the committee recommends that student presence in an online course should be measured differently than it is measured in physical school courses, using course equivalent ("Carnegie Units") registrations rather than seat time. Finally, the committee recommends that the state fund a statewide entity to provide supplemental online courses and serve as a brokering and coordinating body for cyberschools.

All of the Study Committee's recommendations are presented in Section III of this report, and recommendations related to particular findings are referenced at the end of those findings.

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[6] For more information on using an indicator/benchmark system similar to QIS, see Appendix B, Briefing Paper 9: Benchmarking and Quality Indicators for Online Programs.

[7] PPR—Per Pupil Revenue—includes per pupil allocations for capital reserve spending (approximately $262 per pupil). The minimum PPR for 2002-03 is $5,435. PPOR—Per Pupil Operating Revenue—is the per pupil allocation *without* the capital reserve portion; for 2002-03 the PPOR minimum is $5,173. While educators generally refer to per pupil allocations as "PPOR", they almost always mean "PPR". Legislators distinguish between the two types of funds; this report uses the more precise, legislative label.

I. Findings Responding to Legislative Inquiry

The sections that follow provide answers to the inquiries raised in the legislation authorizing the Study Committee, presenting the findings of the committee related to each question. In some cases, where a single inquiry covers multiple subjects, the answer/finding is subdivided in order to respond directly to the discreet elements of the question. The findings reference specific recommendations of the Study Committee; all the recommendations are presented in Section III.

A. Appropriate grade levels and subject areas
"Identification of the grade levels and subject matter areas that are most appropriate for on-line education programs and for which on-line education programs are most effective."[8]

Online education programs are being used at all levels of K-12 education in Colorado, and for a wide variety of subjects across all major subject areas (e.g., math, science, language arts, world languages). Students have successfully completed courses[9] in all these grade levels and subject areas. The only subject areas that seem inappropriate, or less appropriate, for online learning are those that require collective or directly supervised physical activity. One obvious example is physical education. In other cases a component of a course, such as the lab section of a science course, may present problems when delivered online. As technology changes, the subject areas that are appropriate for online courses expand. Already, animations, simulations, and applets[10] are available that mimic manipulations previously conducted in physical labs; and broadband connectivity may soon support more extensive interactivity, such as real-time audio-visual meeting rooms that enable foreign language conversation or musical ensemble rehearsals.

While almost all subjects are appropriate for online learning, it is not clear that all ages of students should be learning online. Although the bulk of Colorado cyberschool students are in elementary grades, few online learning practitioners suggest that young children (ages up to approximately 10) can, or should, participate in online learning on their own. Learning for students in grades K through 4 or later requires substantial involvement by a parent or other significant adult, and many of these elementary level programs are used by parents who were previously home-schooling their children. The actual instruction is typically provided by the students' parents; the online curricula are really lesson plans for the adults, who transmit the lessons to the children or guide the children through exercises available via the online course. Thus, although supported by an online program, the actual instruction really occurs through the home. At the high school level, while student support is still essential, this support usually comes primarily from the staff of the online program, not the parent.

Many observers question whether any computer-assisted learning is appropriate for young children. Although the Study Committee did not specifically address this concern, a presentation

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[8] Italicized statements after each section heading repeat the inquiry language used in the authorizing legislation.

[9] "Successfully completed course" means, in this document, a course that a student completes with a passing grade.

[10] An applet is a small program used to create webpage effects (e.g., interactive animations); applets may be downloaded through the Internet and run directly on a remote computer.

to the committee by Dr. Jane Healy[11] argued that substantial exposure of children under 10 to computer-assisted instruction can have significant negative effects—including reading deficiencies and health risks (e.g., carpal tunnel syndrome, myopia, and spinal damage).

B. Benefits and detriments of online education for students

"Identification of the significant benefits and detriments that may be experienced by students who receive their education through on-line education programs."

Online education benefits students primarily by extending educational opportunities to those who face barriers of time or geography, or who for some other reason are unable or prefer not to attend a physical school. Online programs can be especially valuable in providing educational opportunities to students whose needs are not fully met by physical schools. Examples include at-risk students who are not performing well in physical schools, students in need of credit recovery, high-achieving students who are unable to take an Advanced Placement or honors course because it is not offered at their school, students who are home bound, adult adolescent students seeking a diploma, and incarcerated students. Online media and course structures may also appeal to students whose learning styles and socialization do not fit comfortably in the conventional classroom.

The chief disadvantages to online education lie in the challenges that, if not met successfully, will result in poor student outcomes. Accreditation and oversight of online programs that reflect the needs of physical schools are often inappropriate for online programs because online programs present circumstances, environments, and challenges that are quite distinct from physical schooling—such as the kind of pre-service preparation and in-service professional development that online educators need, student support requirements and strategies, supplemental resources, and communication with parents. These challenges are not inherent detriments of online learning, but may be disadvantages if they are not successfully addressed.

C. Availability of quality online curricula

"Whether on-line education program curricula are available that are academically rigorous, research-based, and sequential, and methods of assisting school districts and charter schools that operate on-line education programs in developing, obtaining, and accessing such curricula."

1. Availability of online education program curricula.
There are three levels of "availability":

- Existing (i.e., created by a curriculum developer) but not necessarily offered by a Colorado online learning program;
- Offered by an existing Colorado online learning program;
- Accessible by all Colorado K-12 students.

The paragraphs that follow deal with each level of availability.

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[11] Dr. Healy has a national reputation for her concerns about the use of computers by younger children. Her arguments are captured in the book, *Failure to Connect: How Computers Affect Our Children's Minds -- and What We Can Do about It (1999).*

Existing because created by a curriculum developer: Online education curricula are developed by the staff of online programs or purchased/leased from commercial or non-commercial developers. (The non-commercial developers are typically large online learning programs in other states.) Whether developed internally or acquired through other means, the available curricula range substantially in terms of quality. Several issues of instructional design influence the rigor of the courses, including the breadth and depth of the content, how material is presented, the nature and rigor of evaluations, the methods used to engage students in the learning experience, and the kind of work that students are asked to do. Moreover, the cost of online curricula also varies considerably (with reported curriculum development costs ranging from as low as $13,000 per course to $500,000 per course and more); and, at least at the lower end of this range, the quality of the curriculum is significantly affected by the amount invested in its development.

Offered by Colorado online learning programs: In all cases curricula offered by Colorado online learning programs are expected to meet Colorado content standards, an expectation affirmed by the Study Committee's Recommendation Quality/Accountability #1 (p. 28); and all of the state's online programs claim to meet this expectation. Curricula that have been developed in other states or by vendors at the national level typically adhere to national content standards and may need to be adapted to Colorado standards. School districts evaluate the rigor of the curricula, as they do for physical school curricula; and, except for content standards, no statewide system has been created to guide that process. Districts have very little experience in examining the online elements of a course, and the differences between online and conventional courses can—and should— be substantial. The Study Committee's Recommendation Quality/Accountability #4 (p. 29), which calls for a system of accreditation specific to cyberschools, proposes that such a system would consider, among other indicators, the rigor of each cyberschool's curriculum.

Accessible to all Colorado K-12 students: The Study Committee also recommends that online curricula should be created for use by all Colorado school districts and online learning programs. (See Study Committee Recommendation Access/Equity #3b, p. 31.) Districts or cyberschools would not be required to use the curricula, but courses would be available to ensure that all programs (and all students) have access to rigorous coursework aligned to Colorado content standards. Colorado Online Learning (COL)—the state's single statewide online learning program—would create the courses.

2. Methods of assisting online education programs in developing or obtaining such curricula.
Two methods exist for assisting online education programs in developing or obtaining curricula: (1) guidance regarding the quality of curricula, and (2) financial assistance in the development or purchasing/leasing of such curricula. To deal with the first method, the Study Committee recommends that an accreditation system be established for all online education programs in Colorado (see Study Committee Recommendation Quality/Accountability 4, p. 29). Such a system would include review of the quality of each online learning program's curricula. CDE has initiated a process to establish quality guidelines, which would frame programmatic and curricular reviews as well as public reports based on those reviews. For additional information on quality assurance procedures and protocols, see Section II-C (p. 22). To deal with the second method for assisting online education programs, the Study Committee recommends that

Colorado Online Learning be supported by the state in providing curricula for use (on an optional basis) by any Colorado school district or online learning program. (See Study Committee Recommendation Access/Equity #3, p. 31.)

D. Student engagement and accountability

"Identification of strategies that can effectively ensure student engagement and facilitate student accountability."

Successful student engagement is largely based on substantial teacher involvement and constant communication with each student. For students in lower grade levels, this communication may occur via the parent. In either case (younger or older students), communication between teacher and students, and sometimes among students, is critical. High-quality online education is not analogous to a correspondence course in which a student receives material through a computer instead of through an audiotape or book. The online content may be supplemented by high-end graphics, animations, and interactive applets that go beyond what is available through a book or tape. Even beyond these, however, the key to successful online education lies in the planning and communication that enable online teachers to be highly focused on each individual student.

This communication may take place online, via email, discussion boards, or chat rooms, and it may also take place by phone. In some cases these methods of communication at a distance are supplemented by single or periodic face-to-face meetings. Most online programs have specific requirements for teachers to be in touch with their students regularly, and also to respond to student inquiries within a specified short time.

Student accountability issues are addressed in Sections I-I (p. 15) and I-J (p. 16).

E. Significance of geographic location of students

"The significance, if any, of the geographic location of the students participating in an on-line education program in relation to the school district or charter school operating the program."

While online programs exist in part to overcome barriers of geography and time, the geographic distribution of students may significantly affect the operation and, in some cases, outcomes of online programs. In general, it is easier for online programs to work with students who live in or near the district in which the program operates; sometimes that means students are more likely to get the support they need to be successful online learners. Geography-related issues include:

- Administration of CSAP may be easier for cyberschools whose students are not geographically dispersed. Cyberschools with students dispersed across the state must provide alternative arrangements for CSAP and/or require students to travel, sometimes long distances, to take CSAP. (Note: This issue applies to cyberschools only, not to supplemental online programs. Supplemental programs do not administer CSAP because their students take the tests through the physical schools in which they are enrolled.)
- Online programs whose students are not geographically dispersed can more easily arrange face-to-face meetings between students (or parents) and teachers, or among students; such meetings can strengthen the online instruction.

- Cyberschools whose students are not geographically dispersed can contract with local area physical schools to provide supplemental services for online students, while a statewide cyberschool may have to contract with many dispersed schools and districts for such services. (Note: As with CSAP, this issue applies only to cyberschools.)

F. Students best served by online education

"Identification of those students who are most effectively served by or who benefit most from participation in on-line education programs based on significant characteristics, including but not limited to age, at-risk factors, geographic location, and physical or emotional disabilities."

The fundamental advantage of online learning is that it increases educational opportunities by making a broad range of study available to all students across the state. Online learning can significantly increase the opportunities available to students in isolated schools or in small schools with limited teaching staffs, students whose schedules exclude them from important learning opportunities, disabled students and students receiving special education services, students seeking alternative learning environments, institutionalized students, home-schooled students, and expelled students. (For more information on online learning opportunities, see the Findings and Recommendations of CDE's E-Learning Task Force.[12])

Different types of students may be better served by cyberschools or by supplemental online programs. Cyberschools primarily enroll full-time students who don't wish to attend a physical school for any of a variety of reasons. Examples include students whose learning styles or social needs do not fit comfortably within the conventional classroom, at-risk students who are not performing well in physical schools, students whose parents prefer to be heavily involved in their education on a daily basis, students who are home-bound for an extended period, and students who travel extensively. While supplemental online programs may also draw many of these students, they operate as complements to, rather than replacements for, students' physical schools or cyberschools. Accordingly, they most effectively serve students whose basic educational needs are being met in a physical school (or cyberschool) but who have particular needs—such as credit recovery, advanced coursework, specialized studies (potentially including individual tutorials or learning modules as well as full courses), or other opportunities not available through their "home" school.

Numerous factors beyond a specific curriculum or teaching methodology—including self-motivation; internal discipline, cognitive processing, learning styles, parent involvement, and other external support—play substantial roles in how well students engage in online educational experiences. Thus, determining who is best served and how to provide that educational service entails more than identifying particular populations. Online learning programs must adapt to individual students' needs; and equity issues in online educations involve much more than access to courses. (See Recommendations Access/Equity #1 through 3, pp. 30-31.)

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[12] The E-Learning Task Force (ELTF), which was created by the CDE and included 40 members from educational organizations throughout the state, met from November 2001 through June 2002 to consider the feasibility and potential benefits of creating a statewide online learning program. The ELTF's Findings and Recommendations report is available at http://www.cde.state.co.us/cdetech/et_distance-colorado.htm.

For both cyberschools and supplemental online programs, serving diverse needs effectively requires the programs to provide diverse curricula—including not only core and remedial courses, but advanced or honors courses, postsecondary options, basic skills and literacy, and even tutorials or learning modules. Creating such a range of courses requires a substantial investment. Serving diverse needs also means that online learning programs must adapt to the students they serve, shaping both course design and student support to respond to highly individualized student needs.

Nationwide, the students drawn to online learning tend to fall into a bimodal distribution (in terms of prior academic success). The two largest populations commonly served by existing online programs are "high-achieving" students (seeking courses unavailable at their local schools or a more independent learning environment) and "low-achieving" or "at-risk" students (seeking credit recovery, remedial work, or a more independent learning environment).

The bimodal distribution of students underscores the need for individualized approaches to learning—including the nature and timing of counseling in course selection, mentoring during courses, design of lessons, teacher-student interactions, and contact with students or the adults who are facilitating the students' learning. Online programs increasingly recognize and adapt to these varying needs, as demonstrated by the emphasis most programs place on regular and frequent contact with students. A comprehensive set of guidelines or principles (see Study Committee Recommendation Quality/Accountability #2, p. 28) would strengthen all programs.

Information on populations that could be best served by online education is largely anecdotal. Study Committee Recommendation Access/Equity #1 (p. 30) states "Research should be conducted to determine and recommend strategies and policies that should be implemented to ensure that online learning serves diverse student populations throughout the state."

G. Minimum requirements for an effective online education program

"The minimum requirements for an effective on-line education program, including but not limited to the necessary level of technical support and the necessary level of student enrollment to maintain the educational feasibility and integrity of the program."

To be effective, online education requires many elements that mirror those in physical classrooms, such as quality teaching, quality content developed to state standards, and ongoing student engagement. Online education also requires elements not common to the classroom, such as effective technical support and frequent communication between teachers and students.

The Study Committee determined that methods for achieving high-quality education online are numerous and varied, and cannot be effectively legislated in a top-down manner. Instead, the Study Committee recommended that quality measures and accountability for online programs should emulate those applied to physical schools. In particular, the committee recommended that CDE implement an accreditation process for in-state online learning programs, with particular attention to cyberschools (Study Committee Recommendation Quality/Accountability #4, p. 29).

For supplemental online programs student enrollment (in the supplemental context, more accurately referred to as "registration") at a certain level (e.g., half-time or full-time) is not

necessary because supplemental programs draw their revenue from course-related fees rather than PPR allocations. One of the advantages of supplemental online programs is that they may meet the needs of a single student, or small numbers of students in a given physical school—aggregating the individual needs of students in geographically dispersed schools. Because the individual student can be served by a teacher who is simultaneously teaching other students elsewhere, supplemental online education can provide the student with an excellent learning experience that would otherwise be unavailable or prohibitively expensive.

For cyberschools, however, a certain level of enrollment may be required for the programs to operate successfully. Because the students enroll in the cyberschool rather than a physical school and because the cyberschool's funding comes through PPR revenues, each cyberschool must establish a sustaining number of enrollments. Most Colorado cyberschools are reporting that in order to provide the range of services public schools are expected to make available to students they need to draw full-time PPR revenue. Increasingly, therefore, cyberschools are requiring full-time enrollment.

H. Minimum computer hardware and software requirements

"Identification of the minimum computer hardware and software requirements for an effective on-line education program and consideration of the issues surrounding provision and ownership of such hardware and software."

1. Regarding identification of minimum hardware and software requirements for an effective online education program.

In order to take an online course, a student must have access to a computer that has basic software (at a minimum, a contemporary version of a web browser, the plug-ins that play the interactive elements used to present course material, e-mail, and a word processing program), a reliable connection to the Internet, and the capacity to handle an online program's course management system (CMS). (The student must also have access to a telephone because a large, and growing, amount of communication between online teachers and students uses that more mundane technology.) Online programs and CMS providers typically set hardware and software requirements at a level that does not require high-end computers or broadband Internet connectivity. Even so, the hardware, software, and connectivity requirements can preclude students from participating in online learning, because either the equipment or connectivity is not available or is too expensive for a given student.

Students in supplemental online programs typically have access to their courses through their local physical schools. Supported by federal E-rate telecommunication discounts, almost all Colorado schools have hardware and connectivity sufficient for online courses. Federal Title I funds may support improved access, especially for students in high-poverty/high-need schools. But students in supplemental online programs also usually need access to the online courses when they are *not* at school; and students enrolled in cyberschools *always* need such access.

Home (or community) access, therefore, is critical, especially for cyberschools serving learners who are not enrolled in schools. Cyberschools often purchase or provide reimbursement for computer or Internet access. (Branson Online and the Colorado Virtual Academy purchase computers for all of their students.) Other access options exist, such as public libraries and some

workforce centers. At least one organization in the state, the Colorado Online School Consortium Foundation, is dedicated to finding ways to address access issues throughout the state and ensuring that online education is available to the neediest schools and students.

Despite such strategies and options, however, a substantial percentage of potential students do not have access to online learning outside of school; and these "non-cyberstudents" may have the greatest need for such access. The data on home connectivity to the Internet provide some indication. In February 2002 the National Telecommunications and Information Administration reported that two-thirds of people in households with incomes between $15,000 and $35,000, and three-fourths of those in households where income is less than $15,000, do not have Internet access. More than 60% of blacks and almost 70% of Latinos have no Internet access at home. While the overall connectivity rate in Colorado is slightly higher than the national average, the rates for the income and racial groups mentioned is not.

Considering such issues, the Study Committee has made several recommendations regarding access to online learning (Recommendation Access/Equity #5, p. 32) and serving diverse student populations (Recommendation Access/Equity #1 and Recommendation Access/Equity #2, p. 30).

2. Regarding issues surrounding provision and ownership of hardware and software.
Online learning programs that provide hardware and software to their students (e.g., Colorado Virtual Academy, Branson, and V.I.L.A.S.) do not report any uncertainty regarding the ownership of the hardware and software. Issues arise only when a student leaves a program and the hardware/software must be returned. The rules on disposal of property purchased with public funds are cumbersome, and retrieving technology products from remote users can be difficult. Some online program administrators have asked that disposal procedures be streamlined so that hardware and software can be sold or given away to their users. These administrators argue that the economic value of the technology does not justify the effort required to retrieve it or to go through an elaborate process of property disposal.

I. Measuring student progress

"Identification of appropriate and effective methods of measuring student progress and success in on-line education programs and whether academic achievement and progress in an on-line education program may be measured through demonstrated learning based on completion of assignments and assessments, through requiring a specified number of on-line participation hours per day, through a combination of such methods, or through other methods of tracking and measuring student engagement."

In physical school classes, student progress is measured by a combination of time spent in the classroom, completion of assignments, and grades on tests or other evaluations. The latter two methods of measuring student progress also apply in online courses, but not the first method. While most course management systems record students' logged-on time, online learning practitioners generally believe that this information is not useful. Students frequently work on assignments that don't require them to be online, and students can easily be logged in but not working on the assignments. Either way, the specific amount of logged-on time means little. Accordingly, online learning practitioners prefer to determine student progress through projects, tests, discussions, and other demonstrations of learning rather than measuring the amount of time a student spends online. Credit for courses is determined by the amount of content mastered rather than amount of time on task (or time in the "cyberseat"). The criteria for mastery of

material are usually established by the online teacher, as is the case in most physical classrooms. In some instances, the online program has explicit requirements, such as a final exam that the student must pass in order to receive credit for the course. Cherry Creek School District, for example, plans to require that students achieve a 70% or better score on the final exam to receive credit for a course, no matter what the student's overall grade is for that course. Other programs assess students within each lesson; for example, the SMART Schools online program requires students to pass each lesson with an 80% score.

J. Monitoring student participation

"Methods for effectively monitoring and auditing student participation in on-line programs, including but not limited to ensuring it is actually the student participating in the program and completing assignments and assessments."

The methods for measuring student progress (see Section I-I, p. 15) along with strategies for providing student support (see Section II-C, p. 22) and effective instructional design (see Section II-A, p. 21) also facilitate monitoring student participation. Use of portfolio assessments and consistent communication between teachers and students by e-mail and telephone, and sometimes in person, allow verification of student participation throughout a course. Personal communication, particularly by telephone (an increasingly common and effective strategy for providing student support), is especially valuable for verifying that students are doing the work and participating in the courses. In many cases communication between teachers and parents is also used to verify student participation.

In some cases, online programs require students to pass a proctored final exam in order to receive credit for the course. These proctored exams are conducted in a physical location and may require that students provide photo identification. Such exams could be "proctored" through the use of webcams, and other technologies could be used to confirm students' identities.

Study Committee Recommendation Quality/Accountability #6 (p. 30) addresses these issues.

K. CSAP participation by online students

"The most effective manner in which students participating in on-line education programs may participate in the Colorado Student Assessment Program."

Supplemental online programs (e.g., Colorado Online Learning) do not participate in the Colorado Student Assessment Program (CSAP), because students in supplemental programs take CSAP through the physical school or cyberschool in which they are enrolled. For cyberschools, however, administration of CSAP is an issue, and approaches to it vary. Most Colorado cyberschools, such as the Hayden Cyber School, Monte Vista's Online Academy, and JeffcoNet Academy, have a physical site in the school district where they offer the test. (JeffcoNet uses McLain Community High School, where the online program operates.) This strategy works well for the cyberschools whose students reside in or near the district where the cyberschool is located. When the students are more widely distributed, a single test site is problematic.

In part because of difficulties in administering CSAP, and in part because of the student populations served, some cyberschools report low rates of CSAP participation. Branson, for

example, reports that 5% of its students took CSAP in 2002, and Monte Vista reports that 29% of its students took CSAP in 2002. In general, however, cyberschools are making changes in how they administer CSAP, and making it clear to students—as well as the students' parents—that CSAP participation is required.

For the March 2003 CSAP "window" cyberschools established a cooperative network of regional testing sites, in which the schools' or districts' educators supervised the test for any cyberstudents who reside near one of the testing sites. The cyberschools plan to expand this program in coming years. Cyberschools are also changing the message they communicate to students and parents. Although many cyberschools previously dismissed the CSAP requirement, almost all now tell current and potential students that taking CSAP tests is a condition of continued enrollment. Such efforts will substantially increase student participation in the test. In addition, cyberschools and CDE are exploring the possibility of offering an online CSAP. Kentucky is now offering its statewide test online to some students, in large part to address access for disabled students.

Study Committee Recommendation Quality/Accountability #2 (p. 28) addresses CSAP concerns.

L. Creating a statewide curriculum and online education entity

"The feasibility, desirability, and estimated cost of developing a statewide curricula for both full-time and course-specific on-line education programs, of creating a statewide entity with representation from school districts and charter schools for the implementation of both full-time and course-specific on-line education programs, and of creating a resource bank of full-time and course-specific on-line education program materials available to school districts and charter schools."

1. Feasibility, desirability, and estimated cost of developing a statewide curricula.
Development of a curriculum[13] that could be used by all online programs in the state, as well as creation of a statewide online education entity that would offer courses to supplement those in physical schools and cyberschools, would yield numerous advantages. These advantages include:

- Saving money for both the state and school districts;
- Reducing duplicative efforts (e.g., curriculum development) by online programs;
- Ensuring that state content standards are effectively addressed.
- Increasing equity of opportunity among all Colorado K-12 students;
- Supporting physical schools and districts by complementing their educational services rather than reducing their student populations;
- Advancing online learning as a tool for educational opportunity rather than educational privilege;
- Encouraging collaboration among the state's online programs;
- Strengthening the quality of online learning curricula;

Since Colorado online programs are creating multiple courses in the same subject (for example, multiple versions of online algebra), a statewide curriculum would reduce overall costs by developing one set of courses for use by all online programs. A statewide program would also

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[13] In this section "curriculum" means a specific collection of courses that fulfills state content standards.

operate in partnership, rather than competition, with districts. Access to the online courses would enable districts to allocate their own staff and resources more efficiently—saving money, for instance, by not staffing courses that draw low numbers of students. Consequently, districts could spend less yet still make more learning opportunities available to their students.

Requiring that all online programs use a statewide online curriculum, however, would contradict the tradition of local education control and would encounter strong opposition. Nonetheless, the advantages of a statewide curriculum can be obtained by developing courses that online programs in the state may use *at their option*.

The core of a statewide curriculum has already been created by Colorado Online Learning (COL), supported through grant funds administered by CDE; and additional components are being created by COL as districts request them. The Study Committee did not attempt to estimate the cost of creating a statewide curriculum because the state's current financial situation precludes serious consideration of such a proposal for some time. However, information from other states indicates that an investment of approximately $500,000 per year over five years would substantially complete the task of building a statewide curriculum. Such an investment would be consistent with the recommendations of national policy analysts. (See, for example, *Who Should Fund Virtual Schools*[14] and *Funding Web-based Courses for K-12 Students to Meet State Educational Goals.*[15])

2. Feasibility, desirability, and estimated cost of creating a statewide entity.
A statewide entity would serve two general functions. First, it would provide supplemental online courses to schools throughout Colorado. Second, it would serve a brokering and coordinating role among online programs in the state. Specific activities could include developing online curricula, providing courses that supplement the offerings of physical schools and cyberschools, purchasing and providing library resources, assisting in setting standards for online educator licensure and the operation of online learning programs, helping to improve online access for students, assisting in supervision and accreditation of online programs, acting as a clearinghouse for possible state innovations/ideas, acting as a liaison and/or broker for districts seeking to use commercial vendors, and researching and disseminating online learning information statewide.

A statewide entity that can serve these functions already exists—Colorado Online Learning (COL). Created in fall 2002, COL implements the recommendations of the E-Learning Task Force. It represents districts and charter schools, rather than a single local education agency. It provides supplemental online curricula, drawing revenue through course fees and grant funds rather than PPR. It is based on three principles:

- Complement, not compete with, physical schools;
- Promote collaboration among all of the state's online learning programs;
- Serve the diverse needs of all Colorado K-12 students.

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[14] Published by The Appalachian Technology in Education Consortium (2001), http://www.The-ATEC.org.

[15] Published by the Southern Regional Education Board (2002), http://www.sreb.org.

The Study Committee did not explore the feasibility of funding such an entity, both because of the state's current fiscal condition and because COL needs to determine how to constitute itself as an official agent of the state. But the committee supported formalizing COL's role and status as the statewide online learning entity (Study Committee Recommendation Access/Equity #3, p. 31).

M. Ownership and use of a statewide curricula
"Issues regarding ownership and use of a statewide on-line education program curricula."

Copyright and ownership issues in online education have been addressed extensively by postsecondary institutions, and the legal issues have largely been settled. Online programs can address copyright and ownership of course content by stipulating in employment/consultant contracts that course development is done as "work for hire" and the online program owns all rights to courses and content. By incorporating such language into employment contracts, whether with full-time employees or work done under contract, online programs can ensure that they have full rights to their courses and content. This declaration has not been used consistently by online programs in Colorado to this point.

In some cases, online programs may wish to allow instructors to retain rights to the course materials they develop—for example, when a subject matter expert develops course materials independently of (usually prior to) the employment contract. Such arrangements can be stipulated in the contract.

N. Costs of online education
"Identification of any additional costs incurred and savings recognized in operating on-line education programs, as compared to traditional education programs, including but not limited to the appropriateness of funding students enrolled in on-line education programs at a lower level than other students and the appropriateness of requiring school districts to allocate a certain amount per on-line student to capital reserve and insurance reserve accounts."

1. Costs and savings in operating online education programs.
Reports from established online learning programs across North America indicate that the costs associated with online education are equivalent to or greater than the costs of physical schooling on a per-student basis. Cost of curriculum is a major variable in total funding needs. The only cyberschools that reported costs which were less than those of a physical school were not amortizing their course development costs over the number of years the courses would be used, and thus were not accounting for course development costs in the current year.

Although many aspects of online education cost less than physical schools (e.g., buildings, bussing, and physical security), other costs are significantly higher (e.g., hardware, software, and course development). Because the bulk of all education budgets (generally about 85%) go to staffing, the savings to online programs from reduced physical facilities apply to a small percentage of total costs. In addition, course development for online programs (see Section I-L, p. 17) may equal or exceed the per-pupil cost of buildings and other physical infrastructure. Physical schools do not pay for course development except through the purchase of textbooks and other commercially generated course materials; these purchases do not represent a

substantial cost on a per pupil basis. Since cyberschools often purchase computers for every student (see Section I-H, p. 14), hardware costs are also substantial.

Online programs can make adjustments in course design or instructional strategies that will reduce their costs. For example, significant savings can be obtained by increasing the ratio of students per teacher, reducing the individual contact and support for students, and simplifying the design of curricula. Such cost-reduction strategies are not in keeping with best practice for achieving successful student learning (see Section II-A, p. 21).

However, as discussed in Section I-L (p. 17), a statewide online program can save money for both the state and individual school districts by enabling the districts to allocate their staff and curricular resources more efficiently.

More details on financial issues are available in the report entitled *Funding Online Education*, prepared for the Study Committee. The report is summarized in Appendix B-8 (p. 61) and available in full at http://www.cde.state.co.us/cdetech/download/pdf/et_osc-fundingonline.pdf.

2. Allocation of a certain amount per online student to capital reserve.
The state could require that online programs allocate per pupil capital reserve ($262 per student) to course development and/or the support of a statewide online entity. (See Section I-L, p. 17.) The committee did not address whether such an allocation would be an effective funding device. In 2002-03 slightly more than 2,000 students were PPR-supported for enrollment in Colorado online programs. The capital reserve portion of these enrollments totaled approximately $500,000.

II. Findings Responding to Committee Inquiry

In its initial meeting, the Study Committee added research questions to those raised in the authorizing legislation. The sections that follow provide information that answer these inquiries. The findings reference specific committee recommendations in Section III (pp. 28-33).

A. Instructional design components

"Determination of instructional content design components that are effective in contributing to successful presentation of information and concepts in an online environment, including but not limited to implementation of content standards, sources of curricula, use of interactive elements, scope and sequence considerations, pacing, and types and timing of assessments."

Well-designed online courses incorporate effective teaching strategies—developing content through, among other methods, careful sequencing, guided interactions with course materials, exercises and review, a combination of learning experiences, and a variety of media. Over many years the practices of many different content developers, both in K-12 and postsecondary education, have demonstrated the value of an identified set of course design principles:

- Emphasis on context and application in focusing and deepening the learning experience;
- Use of multiple media (e.g., text, animations, and interactive applications) to present content;
- Use of physical resources (e.g., lab kits, math manipulatives, and books) to complement virtual study;
- Mix of collaborative and individual work to enhance the sense of community among online students and develop lifelong skills;
- Frequent assessment and/or check-in points to help students maintain a consistent pace and to help teachers identify each student's specific learning needs; and
- Product- and portfolio-based assessments to elicit more reliable and valid determination of what students are learning.

All of these course design principles, it should be noted, add to the cost of online learning.

B. Development of high quality content and instruction

"Determination of processes and types of participants that are effective in developing high-quality content and instruction for online learning, including but not limited to composition of design teams, design and development models, and appropriate uses of media."

The most effective designs are almost always created by teams whose members bring divergent expertise and experience to the project. For example, Colorado Online Learning courses are developed by teams that include a teacher (usually the teacher who will conduct the course online), a content area expert, and an instructional design specialist. The teacher generally drafts the course, and the others review the draft to suggest revisions. JeffcoNet Academy courses are created by teams comprising members of their full-time staff. Colorado Virtual Academy (COVA) courses come from the curriculum vendor K12.com; but COVA teachers can update the vendor-based content during the course, bringing in new content to reflect current events or specific needs they identify in periodic student assessments.

C. Teaching and support strategies

"Determination of teaching and support strategies that are effective in contributing to successful student engagement and learning in an online environment, including but not limited to types and timing of teacher-student interactions (online and face-to-face), types and timing of assignments or learning activities, interpretation and use of assessments, communication with parents, and limits on student-teacher ratios."

No matter how well crafted, content development is like writing a textbook; at best it sets a foundation on which the skilled teacher builds. The teacher-student process—including, for example, feedback on assignments, discussions, and various kinds of individualized student support—ultimately matters more to the success of the course. Teachers guide students through individual check-ins, leadership in discussions, responses to individual questions, comments on assignments, and assessments throughout the course, using these strategies to focus and motivate the students. Colorado Online Learning (COL) and V.I.L.A.S., for example, require that their teachers respond to students' notes or work within 24 hours. (V.I.L.A.S. requires its students to contact their teachers at least three times a week, either by e-mail or telephone.) COL reports that its teachers spend about ten hours per week per section in online interactions. JeffcoNet does not have a specific time-frame requirement but reports that its teachers communicate "continually" with their students. Internet-based tools (e.g., e-mail, chatrooms, white boards, and message boards) enable synchronous and asynchronous communication between teachers and students, or among the students. Despite these tools, the telephone provides the primary mode of contact in all three online programs. (COL teachers all have phone cards to make such contact easier.)

The number of students for whom a teacher is responsible directly affects the capacity of the teacher to work with and support the students. Online practitioners consistently report that teaching online is more demanding than teaching in a classroom because of the individualization that effective online teaching requires. No evidence has been found to suggest that a teacher can support more students in an online environment than can be supported in a classroom. Recognizing this, many online programs keep class sizes relatively small. COL, for example, limits class size to 20 students. JeffcoNet has classes of 20 to 25 students. (The director of JeffcoNet argues that overall student-teacher ratio, rather than the size of individual classes, may more accurately measure the responsive capacity of online teachers. JeffcoNet's full-time staff each work with 110-120 students. The net effect of the two measures is generally the same.) Commercial providers and some cyberschools, by contrast, often keep teaching costs down by increasing class size. The issue of student-teacher ratio is addressed in more detail in Appendix B, Briefing Paper 2: Quality—Class Size and Student-Teacher Ratio (p. 40).

Direct and continuous student support is a clear key to student success in online learning. Effective online programs actively support their students in a number of ways, with teachers generally serving as the main source of this support. In addition to consistent teacher-student interaction, other types of support include:

- Mentors, either online or, more effectively, on-site (in the student's local physical school), provide learning support (not necessarily subject-specific) to the student.
- Pre-course assessment of student knowledge and skills may be used to place students or adapt courses to their needs.

- Initial orientation of students, through an online tutorial and/or a face-to-face meeting with instructors or local mentors, helps students to understand both the processes and requirements of online learning.
- Communication with parents about students' progress or concerns helps parents to support their children's online learning as readily as they might their physical learning.
- Online learning communities, using the Web-based communication tools, can afford students significant social connection within a course. Although enthusiastically supported in theory by online educators, such communities are rarely extended in practice beyond the threaded discussions embedded in many courses.
- Technical support enables teachers as well as students to solve problems they encounter in using the online platforms.

D. Online teacher qualifications, preparation, and supervision
"Determination of minimum requirements for online teachers' qualifications, preparation, and supervision."

Online learning programs typically use teachers who are licensed by the state (though many programs will seek content expertise and experience over licensure); and most online teachers have classroom teaching experience. But online teaching is not just classroom teaching in a virtual form. The two environments involve different teaching strategies and modes of student contact; even giving instructions on projects or assignments changes substantially. It follows that success in classroom teaching does not imply success as an online teacher. Many programs are considering development of an online teaching endorsement; no state as yet has a program for online teacher licensure.

Because online learning is a relatively new field in K-12 education, formal instruction in online teaching has not yet matured within pre-service or professional development programs. For this reason, online learning programs usually prepare the teachers themselves instead of expecting to find previously experienced and qualified online teachers. V.I.L.A.S., for example, runs a three-day session for all of its teachers prior to the beginning of the school year, then conducts staff development through the course of the year. JeffcoNet conducts staff development sessions every two weeks. COL applies a four-step development program for all of its teachers: (1) an online course (conducted by Connected University, not COL) on standards-based instruction; (2) COL-based staff development; (3) teachers' involvement in the development of new courses; and (4) teachers' involvement in the Quality Assurance Program, as both reviewers and reviewees.

The Study Committee recommends that teachers in online programs should meet the same licensure requirements as teachers in physical schools (Recommendation Quality/Accountability #3, p. 28), and that teacher qualification and preparation should be covered in accreditation procedures (Recommendation Quality/Accountability #4b, p. 29).

E. Processes to promote high-quality online learning programs
"Identification of processes, guidelines, and rules most likely to promote high-quality online learning programs, including quality assurance programs within and among programs, and collaborative standards implemented by and among provider and recipient organizations."

A combination of processes, guidelines, and rules adopted internally by online education programs and applied externally by the state are most likely to promote high-quality online learning programs. Processes, guidelines, and rules that programs can adopt internally—and which most programs already use—apply to developing and maintaining high standards of quality in teaching, course development or selection, and student support. These three areas are considered by practitioners and analysts to be the essential areas of program quality because they have the most direct and substantial impact on student achievement. The best example of internally developed processes is provided by COL's Quality Assurance Program.[16] External processes, guidelines, and rules that can be applied by the state can either supplement the "inputs"-based mechanisms used by the online programs themselves or can be based on the measurement of "outcomes" (e.g., state-sponsored tests).

The Study Committee has determined that the most effective way to promote high-quality online learning programs is to implement accreditation and report card processes that are comparable to those now applied by CDE to school districts and physical schools but adapted and applied specifically to the individual online programs. The accreditation process would consider both inputs and outcomes in order to ensure that genuine quality is achieved for all programs (Study Committee Recommendation Quality/Accountability #4b, p. 29).

F. Partnerships to enhance online learning

"Whether and how partnerships between K-12 online learning programs and other educational and community organizations (e.g., postsecondary educational institutions, libraries, museums, businesses, and civic organizations) can enhance learning opportunities for Coloradoans."

Online learning presents opportunities for organizations with an educational mission (e.g., museums and libraries) to reach learners in a new way. Colorado Online Learning, for example, has several such partnerships in place or in development, with the Colorado Council on the Arts (CCA), Denver Public Library (DPL), Denver Center for the Performing Arts (DCPA), Denver Museum of Nature and Science, and Colorado's MathStar project. COL's partnership with CCA brings the council's Poet in Residence program online and offers an online poetry project to teachers and students throughout the state. The COL-DCPA partnership delivers filmed biographies online, and the COL-DPL partnership delivers digitized photographs online. COL and MathStar will pilot three online advanced math courses for Colorado middle school students.

These partnerships tap into the educational missions of the partnering organizations so they can bring additional resources to educators and students with little additional cost to either the organization or the online program. Through the partnerships COL brings online resources to classroom teachers as well as students, increasing the reach of these resources far beyond the physical limitations of the partnering organizations and beyond merely making the resources part of online courses. COL is also developing partnerships with postsecondary institutions and corporations in order to increase students' options (e.g., dual-credit K-12/postsecondary courses).

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[16] For a description and documentation of COL's Quality Assurance Program, go to http://www.col.k12.co.us/teachers_sitecoordinators/qualityassurance.htm.

The COL partnership arrangements have particular promise because a statewide organization offers economies of scale for partnering organizations, but such partnerships can also be put in place by cyberschools and district-level supplemental online programs.

G. Online resources to support learners

"Whether and how online resources and support (e.g., information databases and reference/research support) should be available for online learners."

As with learning in physical schools, online learning requires more resources than textbooks and the materials typically available to teachers. Both online teachers and students need access to extensive reference and other information sources in order to prepare course materials, conduct research, extend class-based learning, and explore ideas or subjects of individual interest. These needs are served by libraries; but not all students and teachers in Colorado—whether in physical schools or online programs—have sufficient access to adequate library resources. For example, rural schools and libraries often cannot provide access to information available to those residing in major metropolitan areas due to funding limitations that affect these libraries' ability to subscribe to resources. Staffing limitations often force school media centers in all parts of the state to be closed during many hours that their schools are in session; thus, any print materials they contain are not fully accessible for student use. A similar situation exists in public libraries, which are frequently open as few as 20 hours a week, resulting in limited access to materials for students. Equitable access to these resources is especially critical for low socio-economic status students. Studies have shown that access to well-provisioned library resources contributes to higher CSAP reading scores and could help close the learning gap.[17]

School and public libraries can purchase subscriptions to online library databases to supplement physical resources. Currently, schools and libraries purchase individual subscriptions to online database packages or buy into group subscriptions. But many schools and libraries cannot afford these subscriptions. If the state were to pay the entire subscription cost, access would be available through any school or public library to any Colorado resident or student with a library card; and the overall cost of these subscriptions would be greatly reduced. Comparable programs are already in place in most other states.

The State Library has prepared a program request totaling $479,000 (approximately 10 cents per Colorado resident), which includes the cost of an annual subscription to an extensive collection of online resources for every school media center and public library in the state, as well as one State Library position to administer the contract and to coordinate marketing and staff development efforts throughout the state. The proposed statewide online library database would complement, but not duplicate, other State Library projects (e.g., the Colorado Virtual Library). Details regarding the proposal and the resources that would be made available online are provided in Appendix B, Briefing Paper 7 (p. 59).

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[17] See "How School Librarians Help Kids Achieve Standards: The Second Colorado Study", 2000, by Keith Curry Lance and Marcia J. Rodney, and Christine Hamilton-Pennell, available at http://www.lrs.org/html/about/school_studies.html.

The committee recommends that the state "make an annual appropriation to pay for statewide purchase (and staff support) of online library resources." (Study Committee Recommendation Access/Equity #4, p. 31.)

H. Online professional development for educators

"Whether and how online learning opportunities should be made available to Colorado educators in the development of their professional practice."

The opportunities and issues that prompt consideration of online education programs for K-12 students apply equally to professional development for K-12 educators. Constraints of geographic isolation, schedule conflicts, or limited resources reduce the professional development opportunities available to many educators across the state and hinder the state's efforts to increase student achievement. The Study Committee has not addressed online professional development directly, focusing on the more immediate issues of education programs for K-12 students; and creating an online professional development program does not involve a simply adding more courses to an existing online program. The committee recommends further study in this area.

I. Possible modifications to PPR funding for online students

"Whether and how modifications to current mechanisms for distribution of PPR funds to support K-12 education would more efficiently, effectively, and equitably reflect student enrollment and schools' educational services."

1. Continuation of minimum PPR funding for cyberschools.
The Study Committee recommends that the minimum PPR allocation for cyberschools be continued. This recommendation balances the funding needs of cyberschools (see Section I-N, p. 19) with the state's fiscal crisis.

2. Gradual elimination of the cap on cyberstudent PPR.
The Study Committee recommends the gradual elimination of the PPR funding cap on cyberstudents who were not previously enrolled in Colorado public schools. This recommendation balances the equity of paying for the public education of all K-12 Colorado students with the state's fiscal crisis.

3. Improved accounting for cyberstudent enrollment.
The Study Committee recommends that the October pupil count process and count date should be maintained, but the way in which the "presence" of cyberstudents is determined should be changed to accommodate the differences between a cybereducation and physical school education. In physical schools each student's presence is determined by the number of scheduled hours of instruction in which the student participates. This method works in a physical classroom, where students sit for a certain number of hours per day or week. But a student census based on "seat time" does not apply well to online instruction, most of which is asynchronous and self-paced. (For additional detail, see Appendix B, Briefing Paper 6, Section 2,

p. 55.) Accordingly, the Study Committee recommends that PPR for cyberstudents should be calculated based on "Carnegie Units"[18] and their middle and elementary school equivalents.

4. Public school in the home.
State policy provides public funding for public K-12 education. In keeping with that policy, it is essential to determine whether the education provided by a cyberschool is, in fact, a public education provided online or, instead, a form of online home-schooling. To uphold state policy the Study Committee recommends that accreditation of cyberschools should include determination of whether each cyberschool is operating as a "public school in the home" or as an online provider for home-schooling. PPR funding would be tied to the determination that the cyberschool is operating as a public school (Study Committee Recommendation Quality/Accountability #5, p. 29).

J. Non-PPR funding for online learning
"Development of mechanisms for funding online learning, including but not limited to line-item supplement to K-12 educational funding, per-pupil allocations, and financial support for a statewide online learning organization."

PPR-based funding for cyberschools is consistent with existing funding for physical schools and seems appropriate to the operation of cyberschools. Supplemental online programs, however, require non-PPR-based funding because students do not enroll in such programs in the way they do in physical schools or cyberschools. The students register with the supplemental programs for individual classes. This enrollment-registration distinction is important because it contributes to the intention that the supplemental online programs complement physical schools rather than compete with them. Indeed, many districts are moving toward a "hybrid" model of schooling, in which the mixture of online courses with conventional classroom courses provides more opportunities for students and more efficiencies for the districts.

While individual districts can, and often do, allocate funds to district-based supplemental online programs, a statewide supplemental program (see Section I-L, p. 17, and Study Committee Recommendation Access/Equity #3, p. 31) will require some other form of funding. The Study Committee postponed recommendations on the nature of such funding, recommending instead that Colorado Online Learning undertake the steps needed to establish itself as a viable statewide organization and that funding options be considered as that process bears fruit.

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[18] A Carnegie Unit is the standard measure for credit used by K-12 and postsecondary educational organizations. It represents approximately 120 hours of instructional time in a physical school setting. Online Carnegie "equivalents" can be calculated by comparing the content covered.

III. Recommendations of the Colorado Online Education Programs Study Committee

The recommendations are divided into three issue clusters:
- Quality and Accountability;
- Equity and Access; and
- Funding.

All timelines mentioned in these recommendations are advisory and subject to change based on conditions and new information.

Language used in each recommendation indicates whether the recommendation refers to all Colorado online learning programs or specifically to the subset of those programs identified as cyberschools.

Quality and Accountability

1. **Content standards:** The Study Committee affirms that online programs must comply with state laws and regulations regarding content standards.

2. **CSAP requirements for cyberschools:** The Study Committee affirms that CSAP requirements apply to cyberschools.
   a. The Colorado Department of Education (CDE), in collaboration with cyberschool representatives, will determine the appropriate procedure for CSAP testing. *Timeline: Appropriate testing procedure implemented for the 2003-04 school year.*
   b. The Study Committee endorses exploration by CDE of the viability of conducting CSAP testing online.

3. **Licensure of online educators:** The Study Committee affirms that online programs must comply with federal and state educator licensure and endorsement regulations, including new licensure provisions of the federal Elementary and Secondary Education Act of 2001. CDE should determine appropriate alternatives to licensure requirements that would apply to online learning programs.

4. **Accreditation of online programs:** Accreditation should be required for all Colorado online learning programs.

   a. Accreditation would follow the principles, policies, guidelines, and procedures of district-based accreditation conducted by CDE but incorporate criteria specifically related to the quality and accountability of online learning programs.

   b. Quality indicators[19] based on program inputs and student outcomes would be established to provide the basis for evaluating each online learning program's accreditation status. Quality indicators could include (without limitation): elements of the School Accountability Report (adapted as appropriate for online learning programs); student retention and course completion[20] rates; strategies for dealing with diverse student populations; student-teacher ratio; student support mechanisms; qualifications and professional development of educators for guiding successful learning in an online environment; and educator supervision.

   c. Online learning programs would provide a body of evidence to demonstrate fulfillment of standards set for quality indicators and other criteria of accreditation.[21]

   Timeline: Quality indicators established by December 2003; accreditation review completed for all cyberschools by June 30, 2004.

   See also the recommendations listed below for additional elements of the proposed accreditation system:

   - Quality/Accountability #5 (Determination of "public school in the home");
   - Quality/Accountability #6 (Verification of student work);
   - Quality/Accountability #7 (Online educator professional development);
   - Access/Equity #2 (Serving diverse student populations); and
   - Access/Equity #5 (Access to online learning).

5. **Determination of "public school in the home":** Accreditation of cyberschools should include determination of whether each cyberschool is operating as a "public school in the home" or as an online provider for home-schooling. PPR funding should be tied to the determination that the cyberschool is operating as a public school.

   Timeline: Public school designation criteria established by December 2003; accreditation review completed for all cyberschools by June 30, 2004.

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[19] Quality indicators delineate the areas of evaluation and rubrics for evaluating the areas. For additional information, see the Study Committee's Meeting Notes, 2/3/03, p. 6, and Benchmarking and Quality Indicators for Online Programs, at http://www.cde.state.co.us/cdetech/et_onlinecommittee.htm.

[20] "Course completion", in this document, means completing an online learning program's credit-earning course with a passing grade.

[21] CDE examines a "body of evidence" for each district to determine fulfillment of accreditation criteria. Accreditation is based on the preponderance of the evidence considered. Examples may be found in Accreditation Indicators B (CSAP Goals), C (Closing the Achievement Gap), D (Value Added Growth), E (Achievement in Other Curriculum Standards Areas), and F (School Accountability Report). See *Colorado Accreditation Program: Implementation Guidelines*, August 2002, available at http://www.cde.state.co.us/index_accredit.htm.

6. **Verification of student work:** All Colorado online learning programs should implement mechanisms for verifying that students are doing their own work in online learning courses.

   a. The mechanisms could include proctored exams, identity confirmations, portfolio-based assessments, teacher-student interaction, and teacher-parent interaction.

   b. Accreditation review for online learning programs would include examination of each program's mechanisms for verifying that students are doing their own work.

   Timeline: Online programs propose mechanisms by October 2003; after review and revision, mechanisms included in quality indicators for accreditation by December 2003.

7. **Online educator professional development:** All Colorado online learning programs should provide professional development to ensure that all of their educators are proficient in the skills and processes required to provide high-quality learning experiences in an online environment. Accreditation review for online learning programs would include examination of the quality of the professional development that each program provides its educators.

   Timeline: Online programs provide professional development plans by June 2003; professional development included in accreditation quality indicators by December 2003.

Access and Equity

1. **Determining strategies for serving diverse student populations:** Research should be conducted to determine and recommend strategies and policies that should be implemented to ensure that online learning serves diverse student populations throughout the state.

   Timeline: Research initiated by August 2003, concluded by January 2004. Recommendations for policy to the Legislature and State Board of Education in January 2004.

2. **Serving diverse student populations:** All Colorado online learning programs should set goals and strategies for serving geographically and socio-economically diverse populations of students.

   a. Accreditation review for online learning programs would include examination of each program's goals and strategies for serving diverse populations of students.

   b. Each online learning program's goals and strategies would be set in the context of that program's identified mission. Programs intended to focus on specific student populations (e.g., students residing within the district operating the program, or at-risk students) would not be required by this provision to expand that intent.

   c. The goals and strategies would address providing effective access to the courses and services of the online learning program. Issues to be considered would include providing Internet connectivity, hardware, and software for students with financial need, restricting the use of course design elements in order to reduce bandwidth requirements, providing technical support, and ensuring accessibility for students with disabilities.

   d. The goals and strategies would address methods for supporting the academic success of a diverse mix of students.

   Timeline: Online programs propose goals and strategies by October 2003; after review and revision, goals and strategies included in quality indicators for accreditation by March 2004.

3. **Establishment of a statewide online learning organization:** Colorado Online Learning (COL) should be established as the organization primarily responsible for providing statewide online learning services for Colorado school districts.

   a. The goals of COL would include:
      o Ensure meaningful and appropriate access to high-quality online learning opportunities for K-12 students in Colorado;
      o Promote economies of scale in providing online learning services;
      o Encourage cooperation among the state's online learning programs;
      o Obtain and disseminate information relating to online learning issues and opportunities in order to guide policy and activity within the state.

   b. Statewide online learning services provided by COL would include:
      o Offering online courses and other online learning experiences to Colorado K-12 students that supplement the educational opportunities available through Colorado schools;
      o Making courses and learning "objects" (modules or units of study) available at a minimal cost to all Colorado school districts and online learning programs in order to supplement curricula;[22]
      o Aggregating and brokering purchases by online learning programs;
      o Assisting in setting and implementing standards for online educator licensure and the operation of online learning programs;
      o Helping to improve access for online learners;
      o Providing support to enhance the online academic success of diverse student populations;
      o Conducting or reporting on research pertaining to online learning.

   c. Appropriate authorization and organizational structure would be created to enable COL to fulfill its designated role and mission. Areas of particular attention include:
      o Constituting COL as a Local Educational Agency (LEA);
      o Establishing appropriate governance and structure (e.g., a form of Type One state agency status) for COL.

   d. Appropriate funding would be provided to enable COL to fulfill its designated role and mission.

   Timeline: COL authorized and established as the statewide supplemental online learning organization by June 2003.

4. **Statewide access to online library resources:** The state should make annual appropriations to pay contractual fees for (and staff support of) statewide access[23] to online library resources.

   Timeline: Initial year appropriations made by August 2004.

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[22] Whether and how to use the courses and learning objects would be determined by each district and/or online learning program.

[23] "Contractual fees" means purchasing licenses that permit users to access the resources. "Statewide access" means available for the use of all Colorado residents at any time from any Internet connection.

5. **Access to online learning:** The state should support effective access to online learning for all Colorado K-12 students.

    a. The state should encourage bringing all K-12 programs onto the Multi-Use Network.[24]

    b. The state should encourage Internet service providers to make high-bandwidth Internet connectivity available to K-12 students who cannot afford such connectivity or live in areas where the connectivity is not currently available.

    c. The state should encourage online learning programs to implement goals and strategies that provide effective access to their courses and services, with particular attention to financial or technological needs.

    Timeline: Access policies and strategies implemented over a three-year period beginning in July 2004.

6. **Accessibility for people with disabilities:** The Study Committee affirms that all Colorado online learning programs must comply with Section 508 of the federal Americans with Disabilities Act in providing accessibility to courses for people with disabilities.

    Timeline: Online programs demonstrate compliance with Section 508 by September 2003.

Funding

1. **PPR funding for cyberschools:** PPR funding for cyberschools should continue at the state minimum for the 2003-04 school year.

2. **Cap on PPR funding for cyberstudents new to public schools:** Over the next four years, the state should eliminate the cap on PPR funding for cyberstudents not enrolled in Colorado public schools during the preceding year.

    Timeline: Gradual lifting of the funding cap begins in FY 2004-05, continuing over each of the succeeding three years, with complete elimination of the cap by August 2007.

3. **Discouraging strategies to avoid limits on PPR:** The Study Committee disapproves of efforts by families and school districts to exploit loopholes in rules relating to the PPR census in order to circumvent the PPR limitations that apply to students enrolled in cyberschools.

    a. Efforts of particular concern involve enrollment of students in physical schools in order to circumvent the minimum PPR funding for cyberschools or the cap on PPR funding for cyberstudents not enrolled in Colorado public schools during the preceding year.

    b. CDE should clarify rules and procedures for determining student presence for purposes of allocating PPR, and implement mechanisms to discourage efforts to circumvent the PPR limitations that apply to students enrolled in cyberschools.

    c. Additional resources should be provided to CDE to enforce the rules.

    Timeline: Mechanisms and rules established by July 2003.

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[24] The Multi-Use Network (MNT) project is a partnership between the State of Colorado and Qwest to build a high-speed fiber-optic network linking rural and urban Colorado. See http://www.colorado.gov/dpa/doit/mnt/.

4. **Retaining the October Count.** The current "October Count" date should continue to be the sole census period for determining PPR.

5. **Determining student "presence" for purposes of PPR distribution:** The basis on which students' "presence" is determined for purposes of PPR should be changed for cyberschools.

    a. The presence of each student would be determined by the number of "Carnegie Units"[25]—or comparable units, as appropriate, in grades K-8—that the student is taking.

    b. The Carnegie Units, or comparable units, of online educational offerings would be determined by the district in which the cyberschool making the offerings is located.

    c. Districts would provide verification, as of the October census date, that each student is actually participating in each educational offering for which PPR credit is applied.

    d. When a student enrolls in both a physical school and cyberschool, or participates in learning experiences offered through a physical school and a cyberschool, agreements between the respective schools to determine distribution of money based on the student's enrollment or participation should be guided by calculating the number of hours of instruction provided the student during the school year by each of the respective schools.

    Timeline: CDE writes new rules, as needed, for determining presence by May 2003. Rules take effect for the 2003-04 school year.

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[25] A Carnegie Unit is the standard measure for credit used by secondary and postsecondary educational organizations. It represents approximately 120 hours of instructional time in a physical school setting. Online Carnegie "equivalents" can be calculated by comparing the content covered.

Appendix A: Glossary of Online Learning Terms

Asynchronous communications:
> Communication in which the participants interact over time and not at the same time (e.g., e-mail, threaded discussions, homework, message boards).

Brick-and-mortar school (Physical school):
> An educational organization that enrolls students primarily in classroom-based courses.

Course management system (CMS):
> The technology platform through which online courses are offered. A CMS includes software for the creation and editing of course content, communication tools, assessment tools, as well as other features designed to enhance access and ease of use.

Colorado Online Learning (COL):
> The statewide organization created to sponsor online learning for K-12 students and educators. Collaboratively managed by school districts and online learning programs, COL began operation in November 2002—taking over the COSC educational program.

Cyberschool (also referred to as a virtual school):
> An online learning program in which students enroll and earn credit towards academic advancement (or graduation) based on successful completion of the courses (or other designated learning opportunities) provided by the school. (See Online learning program; see Supplemental online program.)

Cyberstudent:
> A person enrolled in a cyberschool. Sometimes used to characterize all online students.

Distance learning:
> Educational activity in which the participants are separated by space (e.g., correspondence courses, online learning, videoconferencing).

E-learning:
> Instruction and content delivered via digital technologies, such as online, CD-ROM, or learning experiences that involve the use of computers. E-learning is often (incorrectly) used as another term for online learning.

E-Learning Task Force (ELTF):
> A group convened by CDE to analyze the development of K-12 online learning in Colorado. The group, whose forty members represented a rough geographic and programmatic cross-section of the state's educators, met monthly from November 2001 through June 2002 and issued a "Findings and Recommendations" report.

Online learning:
    Instruction and content delivered primarily via the Internet. Online learning is a form of distance learning. (See Distance learning.)

Online learning program:
    An educational organization that offers an extensive and coordinated curriculum of online instruction and content. An online learning program may be a cyberschool or a supplemental online program—or it may be a hybrid of both. (See Cyberschool; see Supplemental online program.)

Relationship of online learning programs, cyberschools, and supplemental online programs:

Cyberschools	Supplemental Online Programs

Online learning programs are either cyberschools or supplemental online programs—or hybrids of the two.
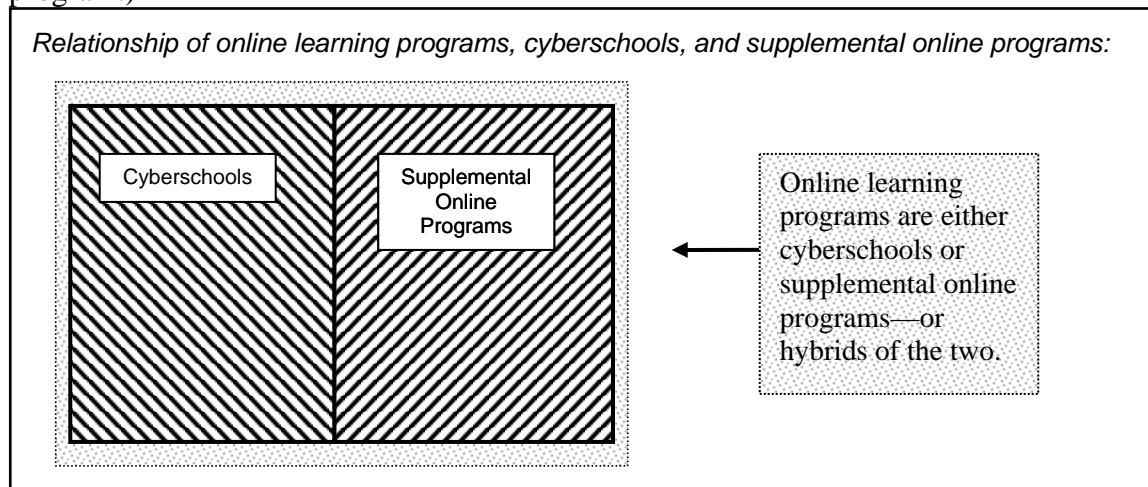
Online student:
    A person taking one or more courses from an online learning program.

Physical school (Brick-and-mortar school):
    An educational organization that enrolls students primarily in classroom-based courses.

"Portal" website:
    The website surrounding the online courses, which serves as a brochure for the online program, provides course listings and/or schedules, and may support registration and other student services.

Supplemental online program:
    An online learning program that offers courses or other learning opportunities to students who are enrolled in physical schools or cyberschools; credit for successful completion of these learning opportunities is awarded by the physical school or cyberschool in which each student is enrolled. (See Online learning program; see Cyberschool.)

Synchronous communications:
    Communication in which the participants interact at the same time (e.g., telephone calls, face-to-face meetings, physical classrooms, chatrooms, videoconferencing).

Virtual school (also referred to as a cyberschool):
    See Cyberschool.

Appendix B: Briefing Papers

Briefing Paper 1: Quality
Colorado Online Education Programs Study Committee—December 2, 2002

Quality lies at the core of almost all the issues in online learning. The concerns related to quality and the strategies for obtaining it inform the analysis of accountability, focus the search for equity, and guide the determination of appropriate funding. This paper summarizes the issues of quality in the following areas:

- Content standards
- Content development
- Teaching strategies and teacher-student interaction
- Student support
- Student-teacher ratio
- Course and teacher evaluation
- Teacher qualifications and preparation

Content standards

Online learning programs in Colorado, like physical schools in the state, must implement state content standards with grade-level expectations. The Colorado cyberschools and supplemental online programs[26] that use teacher-developed curricula (e.g., Colorado Online Learning [COL] and JeffcoNet Academy[27]) report that all of their courses are standards-based. COL and JeffcoNet both design their courses to align with the standards and conduct standards-based annual course reviews. Vendor-based curricula (e.g., used by Branson School Online! and Colorado Virtual Academy [COVA]) are usually written to national standards rather than those of a specific state. In some cases this content can be adapted to state standards. Sometimes the vendor-based curricula are "modular" (e.g., curricula from bigchalk and eCollege)—covering specific concepts within the course. The online learning program's content developers and teachers can organize and supplement these modules to match the scope and sequence of Colorado content standards.

Content development

Content—presentation of information and concepts—is the focus of any course. Well-written online courses incorporate effective teaching strategies—developing the content through, among other methods, sequencing, guided interactions with course materials, exercises and review, and the nature and timing of assessments. Effective content development not only mixes learning experiences but also media (including text, animations, interactive applications, and physical

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[26] Supplemental online programs offer part-time online learning opportunities to students who are enrolled in physical schools or cyberschools. Supplemental programs do not offer diplomas and do not receive per-pupil operating revenue; either the students or their local schools pay course fees.

[27] Examples of particular Colorado online learning programs are offered to illustrate typical or striking practices, not to highlight or characterize the programs. The examples are based primarily on telephone interviews conducted on November 21, 2002, by John Watson with the directors of the programs mentioned.

resources [e.g., lab kits, math manipulatives, and books]). COL courses are developed by a team that includes a teacher (usually the teacher who will conduct the course online), a content area specialist, and an instructional design specialist. The teacher generally drafts the course, and the others review the draft to suggest revisions. JeffcoNet courses are created by core teams comprising members of their full-time staff. COVA courses come from K12.com; but COVA teachers can update the vendor-based content during the course, bringing in new content to reflect current events or specific needs they identify in periodic students assessments. COVA reports that its teachers can adapt their courses to the learning needs of special education or gifted students, among others.

Teaching strategies and teacher-student interaction

No matter how well-crafted, content development is like writing a textbook; at best it sets a foundation on which the skilled teacher builds. The teacher-student process—including, for example, feedback on assignments, discussions, and various kinds of individualized student support—ultimately matters more to the success of the course. One COL teacher has commented that teaching a course online is like preparing twenty individualized lesson plans. Teachers guide students through leadership in discussions, responses to individual questions, comments on assignments, and assessments throughout the course, using these strategies to focus and motivate the students. Internet-based tools (e.g., e-mail, chatrooms, white boards, and message boards) allow extensive synchronous and asynchronous communication between teachers and students, as well as among the students. COL and V.I.L.A.S., for example, require that their teachers respond to students' notes or work within 24 hours. (V.I.L.A.S. requires its students to contact their teachers at least three times a week, either by e-mail or telephone.) COL reports that its teachers spend about ten hours per week per section in online interactions. JeffcoNet does not have a specific time-frame requirement but reports that its teachers communicate "continually" with their students. Despite the Web-based tools, however, the telephone provides the primary mode of contact in all three programs. (COL teachers all have phone cards to make such contact easier.)

Student support

Successful online programs actively support their students in a number of ways, with teachers generally serving as the main source of this support. In addition to the interactions described above, teachers may also check in with students on progress or concerns. The online time reported by COL, JeffcoNet, and V.I.L.A.S., includes support contact as well as instructional interaction. JeffcoNet and COL teachers also telephone students frequently. JeffcoNet reports that the phone contact is especially important for their students, who are more "at risk" than the typical population. Other types of support include:

   o   Mentors in the "local school"[28] provide learning support (not necessarily subject-specific) to the student. Almost all supplemental online programs use some form of this system. COL requires participating districts to have at least one coordinator in every local school attended by COL enrollees. The coordinator, who is familiar with COL, enrolls and monitors each student. The coordinators in turn are supervised and facilitated by COL's student services director, who independently monitors students' progress and needs.

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[28] "Local school" is defined, in this document, as the diploma-granting educational organization in which a student is enrolled, probably for half or more of the student's courses.

VHS, Inc., which provides supplemental online courses to schools around the country (Littleton High School among them), requires a mentor in each local school. Students enrolled in JeffcoNet and Lester B. Arnold also attend the physical alternative schools that house these cyberschools; as a result, each cyberschool's teaching staff can provide on-site mentorship.

o Pre-course assessment of student knowledge and skills may be used to place students or adapt courses to their needs. Based on pre-assessments, for instance, some V.I.L.A.S. high school students are taking 6th grade math. As they master the middle-school-level material, they can advance to high school material.

o Initial orientation of students, through an online tutorial and/or a face-to-face meeting with instructors or local mentors, helps students to understand both the processes and requirements of online learning. Many students enroll in online courses because they believe the courses will be easier than those in physical school. The orientation often serves as these students' first reality check. JeffcoNet conducts an initial orientation for parents.

o Communication with parents about students' progress or concerns is a common, though widely varied, practice. Teacher availability by phone and e-mail supports the communication. Sometimes the initial contact comes through the site coordinator or mentor. V.I.L.A.S. teachers report that they have more parental contact in the online program than they did in physical classroom settings; most of that contact is by phone.

o Online learning communities, using the Web-based communication tools, can afford students significant social connection within a course. Examples of online learning communities include discussion groups, study groups, online mentoring and tutoring; project groups, competitions, and exchanges with distant classes, experts, and researchers. Although enthusiastically supported in theory by online educators, such communities are rarely extended in practice beyond the threaded discussions embedded in many courses.

o Technical support enables teachers as well as students to solve problems they encounter in using the online platforms. Since online teaching and learning may occur at any time, technical support should ideally be available 24x7. COL provides such support through its commercially managed course management system (Jones Knowledge); eCollege offers the same service to its clients.

Student-Teacher Ratio

The number of students for whom a teacher is responsible directly affects the capacity of the teacher to work with and support the students. Teachers consistently report that teaching online is more demanding than teaching in a classroom because of the individual attention needed for students. No evidence can be found to suggest that an online teacher can support more students in an online environment than can be supported in a classroom. Recognizing this, many online programs keep class sizes relatively small. COL, for example, limits class size to 20 students. JeffcoNet has classes of 20 to 25 students. Commercial providers often keep teaching costs down by increasing class size. The director of JeffcoNet argues that overall student-teacher ratio, rather than the size of individual classes, may more accurately measure the responsive capacity of online teachers. JeffcoNet's full-time staff each work with 110-120 students.

Course and teacher evaluations

Almost all online learning programs conduct evaluations of their courses and teachers, but the rigor of these evaluations varies substantially. COL's Quality Assurance Program[29] is probably the most thorough and effective effort in Colorado. The program includes student reviews, self-assessment by the teachers, external review, feedback from parents and local physical school teachers; COL administrators can also "peek" into courses to follow progress. JeffcoNet also uses an extensive review protocol, modeled in large part on a template developed by the National Education Association.[30]

Teacher qualifications and preparation

Online learning programs typically use teachers who are licensed in the state (though many programs will seek content expertise and experience over licensure); and most online teachers have classroom teaching experience. But online teaching is not just classroom teaching in a virtual form. The two environments require different modes of student contact and teaching strategies; even giving instructions on projects or assignments changes substantially. It follows, therefore, that success in classroom teaching does not imply success as an online teacher. Many programs are considering development of an online teaching endorsement; no state as yet has online teacher licensure.

Because online learning is a relatively new field, formal instruction in online teaching has not yet matured within pre-service programs or professional development courses. For this reason, online learning programs usually prepare the teachers themselves instead of expecting to find previously experienced and qualified online teachers. V.I.L.A.S., for example, runs a three-day session for all of its teachers prior to the beginning of the school year, then conducts staff development through the course of the year. JeffcoNet conducts staff development sessions every two weeks. COL applies a four-step development program for all of its teachers: (1) an online course (conducted by Connected University, not COL) on standards-based instruction; (2) COL-based staff development; (3) teachers' involvement in the development of new courses; and (4) teachers' involvement in the Quality Assurance program, as both reviewers and reviewees.

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[29] Details available at http://www.col.k12.co.us/teachers_sitecoordinators/qualityassurance.htm.

[30] *Guide to Online High School Courses*, available at http://www.nea.org/technology/onlinecourseguide.html.

Briefing Paper 2: Class Size and Student-Teacher Ratio
Colorado Online Education Programs Study Committee—December 16, 2002

Class size limits exist in physical schools because of the need to limit number of students per teacher at any one time in order to promote (1) better classroom management, (2) more frequent and effective teacher-student interaction, and (3) more individualized teaching strategies. Studies in physical schools indicate the benefits of smaller class size, and most people infer that these benefits apply to online learning as well. We have been unable to find any studies that address class size in online learning or the issues raised here.

This paper addresses key questions concerning class size and teacher-student ratios:

1. Does a "class" exist in online programs the way we think of a class in physical schools?
2. Is teacher load (i.e., total number of students per teacher) a better measure than class size in online programs?
3. How do subject matter and student populations influence the issues related to student-teacher ratios?
4. Could requirements or guidelines for teacher-student interaction provide a useful alternative to limits on class size or teacher load?

1. Does a "class" exist in online programs the way we think of a class in physical schools?
Many online programs adhere to concepts of "classes" that are carried over from physical schools. COL, for example, limits the number of students in any one class to 20; if the demand for a particular course exceeds 20 students, the program opens another "section" of the course by creating another course shell. As with physical schools, students in one section of a course do not interact with students in another section of the same course. Programs with class size limits also typically have teacher load limits. (More on this subject in question 2.)

However, the concerns that class size restrictions address (classroom management, teacher-student interaction, and individualized instruction) are addressed differently in an online setting. The very concept of a "class" may be questioned in a typical online setting because the asynchronous communication between teacher and students tends to make the class a collection of individual learners rather than an assembled group.[31] Moreover, even in a large class the teacher can divide the students into groups to facilitate interaction via discussion boards, group assignments, and other exercises.

2. Is teacher load (i.e., total number of students per teacher) a better measure than class size in online programs?
The term "class" and the concept of class size are well understood by educators, parents, and the general public as they apply to physical classrooms. But that understanding is not so clear in the

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[31] Most online learning programs use asynchronous communication. In other words, the teacher and students are not necessarily online at the same time. Asynchronous tools (e.g., e-mail, discussion boards, posted assignments that are available to students at any time) tend to make the learning experience more of an individual exchange between the student and the teacher—as opposed to synchronous tools (e.g., chatrooms or whiteboards), which tend to bring the students together as a group.

context of online learning, and many online practitioners contend that a new terminology should be created to describe the collection of students who work with a teacher. Some educators argue that a more relevant measure is "teacher load", meaning the total number of students for whom a teacher is responsible. JeffcoNet Academy, for example, keeps teacher load to about 120 students.

The question of teacher load versus class size is influenced by whether the online program has full-time or part-time teachers. JeffcoNet Academy can manage its full-time teachers' workload more easily than it could a dispersed staff of part-time teachers, because all of the teachers' responsibilities can be ascertained. By contrast, programs with part-time teachers only deal with a portion of their teachers' time and responsibilities; in such cases class size may provide a better measure of the teachers' online workload.

3. How do subject matter and student population influence the issues related to student-teacher ratios?
Different subjects require different types of teaching. For example, many educators believe that the content of math and science courses is more sequential than the content of social studies and language arts, therefore requiring that students master specific content to a greater degree before they can move on. Others believe that some subjects require more intensive teacher review of student work (e.g., essay-writing). Likewise, some students may need more individual support in order to succeed as learners. These differences suggest that questions of class size and teacher load may vary by subject, and a one-size-fits-all guideline or regulation may not be appropriate.

4. Could requirements or guidelines for teacher-student interaction provide a useful alternative to limits on class size or teacher load?
Class size is in some ways a proxy for harder-to-measure elements of teaching and learning. Class size limits assume that individual teacher-student interactions will occur more frequently and more effectively in smaller classes. But many elements of student-teacher interaction can be tracked; indeed, many online programs are already tracking them. E-mails, discussion board notes, chatroom entries, and completed assignments are tracked by most course management systems. Phone calls can be logged. Some online practitioners argue that since the quantity and quality of teacher-student interactions is the goal, then guidelines which relate directly to these interactions would be more likely to assure high-quality learning experiences than limits on class size or teacher load.

Briefing Paper 3: Accountability

Colorado Online Education Programs Study Committee—December 16, 2002

Because online learning is a new endeavor, issues of accountability are critical to its acceptance and development. In some cases accountability issues mirror those of physical schools, while in other cases the unique aspects of online learning create new accountability concerns. This paper summarizes issues of accountability in the following areas:

- Evidence of quality—accreditation and school report cards;
- CSAP administration;
- Measuring and monitoring student progress in online courses;
- Rates of successful course completion;
- Determining that online students are doing the work attributed to them.

Evidence of quality—accreditation and school report cards:
State oversight of K-12 education in Colorado relies on two mechanisms for ascertaining the quality of schools and districts—accreditation of districts by CDE and school report cards issued by the Governor's office. Although accreditation involves several factors, the key element in both mechanisms is schools' performance on CSAP tests.

This system for physical school accountability encompasses the state's public school online learning programs. A physical school's report card will incorporate the CSAP scores of a supplemental online program operating within the school; a district determines how a cyberschool operating under its jurisdiction fits within the district's accreditation framework. Colorado Online Learning, as a supplemental online program working with many districts, is accountable to every district that uses the program. Schools or districts with students who take COL courses certify the courses by accepting credit for them towards a student's diploma. Thus, the state already has an accountability system for online learning programs. However, while this system of accountability is accepted for physical schools, several concerns are raised with respect to online programs. Districts may not know what accountability criteria apply to online learning programs. They may not have—or may not believe they have—the knowledge and experience to evaluate these programs. Consequently, districts may need support (e.g., guidelines or benchmarks) in accrediting online programs, or the state may need to establish and operate a separate accountability system for online learning programs.

CSAP administration
Because school report cards and district accreditation rely on CSAP scores, an important question is how online programs address CSAP: How many of their students take CSAP, and how is the test administered to these students. In the case of supplemental online programs[32], students take CSAP through the physical school or cyberschool in which they are enrolled, so the supplemental programs do not administer CSAP. This is true of Colorado Online Learning, for example, and for the Poudre School District Virtual High School. For cyberschools, however,

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[32] Supplemental online programs offer part-time online learning opportunities to students who are enrolled in physical schools or cyberschools. Supplemental programs do not offer diplomas and do not receive per-pupil operating revenue; either the students or their local schools pay course fees.

administration of CSAP is an issue, and approaches to it vary. Most of the cyberschools, such as the Hayden Cyber School, Monte Vista's Online Academy, and JeffcoNet Academy, have a physical site in the school district where they offer the test. (JeffcoNet uses McLain Community HS, where the online program operates.) This strategy works well for the cyberschools whose students reside in the district where the cyberschool is located. When the students are more widely distributed, a single location is problematic.

In part because of difficulties in administering CSAP, and in part because of the student populations served, some cyberschools report low rates of CSAP participation. Branson, for example, reports that 5% of its students took CSAP last year, and Monte Vista reports that in 2002 29% of its students took CSAP. In general, however, cyberschools are making changes in the ways they offer CSAP, and making it clear to students that they are required to take the test.

Measuring and monitoring student progress
In most online programs, student progress is measured through demonstrated learning based on completion of assignments and assessments. Student time online is not considered an important measure of student progress. Most course management systems include software that records students' logged-on time; but most online learning programs believe that the logged-on information is not useful. The Program Administrator for JeffcoNet Academy, for example, contends that measuring time online is difficult and inaccurate because a "student with modem access on a single phone line for the family might download assignments, disconnect, and then work all day independent of an Internet connection…[while a] student with a cable connection might connect and then go to the mall, leaving the illusion of a constant connection." In addition, logged-on time doesn't account for other time the student may spend on coursework, such as doing a project or conducting research on the Internet. Online learning practitioners prefer projects, tests, discussions, and other assignments to measuring the time a student spends online for determining student credit. As the Superintendent of Branson says, "We are looking for mastery of material, not 'seat time'." In some cases, establishing the criteria for mastery of material is left to the teacher, as is the case in most physical classrooms. In other instances, the online program has explicit requirements for a final exam that the student must pass in order to get credit for the course. Cherry Creek, which will have its first online students in spring '03, will require that students achieve a 70% or better score on the final exam to pass the class, no matter what the student's overall grade is. Other programs assess students within each lesson; for example, SMART Schools requires students to pass each lesson with an 80% score.

Rates of successful course completion
Reported course completion rates in Colorado's online learning programs range from about 50% to 75%, with most programs reporting somewhere between 60% and 70%. These rates are comparable to those reported in other states. No study has been done to date that compares cyberstudent "success rates" with physical students. But questions exist about how to measure course completion rates, and whether such comparisons are meaningful across programs. Online programs, like physical schools, permit students to drop a course with no penalty. But different programs may permit the no-penalty drop at different times in the course term. (The variation occurs, in part, because online programs often allow students to set their own pace, which is not compatible with a set drop date.) In addition, some programs don't keep track of the no-penalty drops, while others measure course completion rates against the number of students who started

the course, regardless of the no-penalty drop date. Another cause for variation across programs is that some programs serve primarily at-risk students, while other programs tend to serve high-achievement students who tend to complete courses at higher rates. Most observers believe that the higher proportion of at-risk students in online learning programs as a whole (compared to physical schools) is a major factor in the generally lower completion rates for those programs.

Determining that the student getting credit for a course is the person doing the work and taking the exams
Online programs address this issue in two general ways. The first is requiring one or more proctored exams. Cherry Creek, for example, will require that a final exam be taken in person, and that the student pass the final test in order to pass the class. Other programs are implementing or considering a similar approach, either with a final exam or regular exams throughout the course. JeffcoNet Academy is an example of the latter.
The second method of addressing this issue is through a combination of teacher-student interaction and a portfolio assessment approach. Many programs feel that the high level of teacher-student interaction, combined with the number and variety of assignments that the student must complete, require the student to demonstrate mastery of the subject throughout the course, not just once or twice. This reduces the likelihood that a student will cheat. Teacher communication with the student by phone, which many programs require, can reveal a discrepancy between the student's work and what the student knows about a subject, and it also gives teachers a clear sense of who the student is and how the student works. The Monte Vista Online Academy, for example, reports "Our teachers invest a great deal of time in one-on-one communications with our online students. We get to know each student's abilities and styles thoroughly and are very aware of what each student's work looks like. Any work from a student that doesn't fit is investigated."

Briefing Paper 4: Equity and Access

Colorado Online Education Programs Study Committee—January 6, 2003

The equity and access concerns related to online learning involve both issues created by the medium (e.g., computer availability, connectivity) and challenges that can be addressed by the online medium (e.g., geographic isolation). This paper examines issues of equity and access in the areas listed below. Each of the areas aligns with a committee study question.

1. Identification of populations that could benefit from access to online education;
2. The feasibility and desirability of developing a statewide curriculum for online programs;
3. Whether and how a statewide organization can help to provide high-quality online learning opportunities to Coloradoans;
4. Access to essential hardware, software, and Internet connectivity;
5. Whether and how online resources should be available for online learners;
6. Significance of geographic distribution of students;
7. Identification of partnerships that may benefit online learners;
8. Whether and how online professional development should be available to educators;
9. Copyright and ownership of course content.

1. Identification of populations that could benefit from access to online education

A variety of unmet educational needs that could be addressed through an online program were identified by CDE's E-Learning Task Force (ELTF)[33], including the needs of students in isolated schools, students in small high schools with limited teaching staffs, students whose schedules exclude them from important learning opportunities, students seeking alternative learning environments, home-schooled students, and expelled students. Weighing immediacy of student needs with programmatic feasibility, the ELTF identified the following courses and learner populations as initial priorities for a statewide online program:

- Core and remedial courses that students may need to complete scholastic requirements or basic educational needs but may not be able to obtain in their local schools;
- Advanced Placement, honors courses, and other advanced academic courses for students attending schools that do not offer these courses or whose schedules prohibit them from taking these courses;
- General high school curricula for learners who otherwise would not be able to obtain them, including (1) students who are homebound due to prolonged illness, disability, or other factors; (2) home-schooled students; and (3) adult adolescent learners who are acquiring basic skills or working towards a high school degree.

In addition to those listed above, populations that are served or could be served by online programs include special education, at-risk, and incarcerated students. Nationwide, online

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[33] The report of the E-Learning Task Force (ELTF), issued in August 2002, provides some of the information and analysis presented in this briefing paper. The ELTF, which was created by the CDE and included 40 members from educational organizations throughout the state, met from November 2001 through June 2002 to consider the feasibility and potential benefits of creating a statewide online learning program. The ELTF's Findings and Recommendations report is available at http://www.cde.state.co.us/cdetech/et_distance-colorado.htm.

student populations tend to fall into a bimodal distribution in terms of student success. The two largest populations commonly served by existing online program are "high-achieving" students (seeking courses unavailable at their local schools or a more independent learning environment) and "low-achieving" or "at-risk" students (seeking credit recovery, remedial work, or a more independent learning environment).

This bimodal distribution of students has ramifications for online programs that go beyond course offerings. It underscores the need for individualized approaches to learning—including counseling in course selection, mentoring during courses, design of lessons, teacher-student interactions, and nature and timing of contact with students or responsible adults. Online programs increasingly recognize and adapt to these varying needs, as demonstrated by the emphasis most programs place on regular and frequent contact with students. A comprehensive set of guidelines or principles might provide useful guidance for all programs.

2. The feasibility and desirability of developing a statewide curriculum for online programs
Development of a statewide online curriculum could save money and enhance quality control. Since Colorado online programs are creating multiple courses in the same subject (for example multiple versions of online algebra), a statewide curriculum could reduce overall costs by developing one course for use by all online programs.[34] In addition, statewide course development could help to ensure quality and adherence to state content standards.

Requiring that all online programs use a statewide online curriculum, however, would contradict the tradition of local education control, including course creation and quality assurance processes at the school or district level. Significantly, despite similar potential advantages and a push towards increasing accountability, no statewide curriculum exists for physical schools. It is likely that requiring use of a statewide curriculum would encounter strong opposition from online learning programs, which seem unified in the belief that uniqueness is essential to their individual success as well as the dynamic development of the overall enterprise.

But the advantages of a statewide curriculum might be obtained without threatening local control if a statewide organization were to develop courses that online programs in the state could use at their option. The statewide program might have as a mandate development of high-quality courses that are tied to state standards and are available at low cost to programs around the state. The statewide supplemental online program, Colorado Online Learning, has 33 courses in place as of fall 2002. If state funding supported the goal of creating a central source of course content, COL could put a greater proportion of its resources into content development and offer a broad range of options to online programs throughout the state.

3. Whether and how a statewide organization can help to provide high-quality online learning opportunities to Coloradoans

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[34] The cost savings are potentially significant. COL estimates its course development costs at $13,000 per course, which is on the very low end of course development costs nationwide. The director of the Colorado Virtual Academy has said that the cost of developing his curriculum may exceed one million dollars per course. Course development costs vary according to a number of variables, chief among them the extent to which high end, expensive technology is used to create animations, applets, and similar content objects. A course that uses such objects extensively typically costs between $250,000 and $1,000,000 to develop.

A key recommendation of the ELTF was that a statewide supplemental online learning program would be best positioned to increase equity of opportunity for all Colorado learners. The recommendation was based on the two general roles that a statewide organization can play—first, in providing supplemental courses to a variety of learner populations throughout the state, and second, in being a centralized service organization for other in-state online programs in areas such as course development, quality assurance, and acquiring and sharing resources. Other states, such as Florida, Kentucky, Michigan, and Illinois, have created statewide organizations to provide online learning benefits across the state, and the growing national trend is to create these statewide organizations as supplemental online programs (rather than state-level cyberschools).

Statewide online programs in other states often charge course registration fees, which are usually paid by schools or districts, and sometimes by parents. (Some schools require the student to pay for an online course when a comparable course is available at the physical school.) This creates an inequitable situation because even a low registration fee can inhibit students' taking online courses. In Colorado, the ELTF concluded that equity of access should be a guiding principle for a statewide online program. But the task force also observed that programmatic feasibility should be protected and that an registration fee causes people to take the online learning opportunity more seriously. Balancing these factors, the ELTF recommended a minimal registration fee.[35] Applying this principle means that a statewide online program cannot pay for itself through registration fees; consequently, other stable revenue sources must be available to sustain a statewide program (an issue to be addressed in the discussion of funding).

4. Access to essential hardware, software, and Internet connectivity

In order to take an online course, a student must have access to a computer that has basic software (at a minimum a recent version of a web browser, the plug-ins that play the interactive elements used to present course material, and a word processing program), reliable connection to the Internet, and the capacity to handle an online program's course management system (CMS). Online programs and CMS vendors typically set hardware and software requirements at a level that does not require high-end computers or broadband connectivity. Even so, the hardware, software, and connectivity requirements can preclude students from participating in online learning, either because the equipment or connectivity is not available or is too expensive for a given student. The Executive Director of Colorado Online Learning reports anecdotally that the concerns he hears from educators and parents are usually about cost and not about access.

Students in supplemental online programs have access to their courses through their local physical schools. Supported by E-rate funding, almost all schools have the hardware and connectivity required for online courses. In many cases, because the online course replaces a local school course, a student has a free period available to take the online course at the school. Title I funds from the federal government may support improved access, especially for students in high-poverty/high-need schools.

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[35] In response to the ELTF recommendation, COL has set course registration fees at $100 per student per course per semester. This tuition does not cover the full cost of offering online courses (which includes development, evaluation, and administrative structure), although it may cover the marginal cost of offering the course (teacher contract, technology, and support costs).

But home access is the key, especially as online programs attempt to serve increasing numbers of learners who are not enrolled in schools (e.g., adult adolescent learners). Programs sometimes purchase or provide reimbursement for computer or Internet access costs. (Branson Online and the Colorado Virtual Academy purchase computers for all of their students.) Other options for access also exist. For example, public libraries have computers and Internet access, as do many workforce centers. At least one Colorado organization, the Colorado Online School Consortium Foundation, is dedicated to finding ways to address access issues throughout the state and ensuring that online education is available to the neediest schools and students. Despite such strategies and options, a substantial percentage of potential students will not have access to online learning outside of school; and these "non-cyberstudents" are likely to be the least successful in physical schools. The data on home connectivity to the Internet provide some indication. In February 2002 the National Telecommunications and Information Administration reported that two-thirds of people in households with incomes between $15,000 and $35,000 do not have Internet access, and three-fourths of those in households where income is less than $15,000. More than 60% of blacks and almost 70% of Latinos have no Internet access at home.

5. Whether and how online resources should be available for online learners

Access to online courses does not complete the opportunity equation. For the access to be meaningful, students must have genuine and well-supported opportunities to use the online courses well. Information resources that students can use to support their learning are one of several essentials for meaningful access. Currently, individual schools and libraries buy into a group online package for online resources. But not every school or library can afford the online package; and not every student has access to schools or libraries when the students need to use the online materials. Last spring the State Library proposed that the state pay the entire subscription cost, then make the materials available to any Colorado resident with a library card. The proposed statewide subscription would cost $479,000 per year (including the cost of the materials and state library support for users); the online resources would include full-text articles from 450 periodicals, 120 reference books, full texts of 60,000 primary source documents, and a Spanish-language interface, with an automatic Spanish translator for English language materials. These resources would complement the resources provided by the Colorado Virtual Library and would be available to all citizens of the state from school, home, business, or any library. Comparable programs are already in place in most other states. More details on this proposal are provided in the Appendix attached to this briefing.

6. Significance of geographic distribution of students

Many online programs (e.g., Douglas County, Littleton, and Poudre school districts, and Lester B. Arnold alternative school) operate as adjunct programs of a local physical school or district, so the cyberstudents in these programs are not widely dispersed geographically. In some cases (e.g., Douglas County and Poudre), students access the online courses while sitting in a physical classroom of the school in which they are enrolled. This arrangement reduces many challenges of funding, administration, and student support.

Programs that serve geographically dispersed students (e.g., Branson, Colorado Online Learning, Colorado Virtual Academy, Monte Vista Online, and Vilas Online) are truly approaching one of the central visions of online education, but face additional challenges in doing so. Little or no contact between students and the program is face-to-face, meaning that many logistical functions

(e.g., course registration) and student support (e.g., mentoring and supervision) must occur online or by telephone.

The largest challenge for dispersed programs is providing support for student success. Support is provided in a variety of ways, including coordinators and mentors at students' local schools. These elements of student support are described in the Quality Briefing, p. 2.

7. Identification of partnerships that may benefit online learners
Online learning presents opportunities for organizations with an educational mission (e.g., museums, libraries) to reach learners in a new way. COL has several such partnerships in place or in development, with the Colorado Council of Arts, Denver Public Library (DPL), Denver Center for the Performing Arts (DCPA), and Denver Museum of Nature and Science. The Colorado Council of Arts partnership, for example, entails bringing the Poet in Residence program online and offering an online poetry project to teachers and learners throughout the state. Other partnerships are similar, seeking to deliver filmed biographies (DCPA) and digitized photographs (DPL) to learners via the Internet.

These partnerships tap into the educational missions of partnering organizations so they can bring additional resources to educators and students with little additional cost to the online program. Also, these partnerships often seek to use the statewide online program as a conduit to bring online resources to classroom teachers, increasing the reach of these resources far beyond the teachers and students taking part in fully online courses.

Other partnerships are in place or in discussion with post-secondary institutions and corporations. Post-secondary institutions that seek to reach high school students, such as CU Succeed, are using online programs as a mechanism for doing so.

While we have used COL partnership examples throughout this section, and a statewide organization offers economies of scale for partnering organizations, these types of partnerships can also be put in place by cyberschools and district-level online learning programs.

8. Whether and how online professional development should be available to educators
Many of the same challenges that exist for students (e.g., geographic isolation, time constraints) also exist for teachers seeking professional development. Teachers in rural schools do not have the same professional development opportunities as teachers close to the Front Range population centers of the state. Time constraints are exacerbated for rural teachers because of the driving time to professional development opportunities. Online learning can fill the same gaps in professional development for teachers that it does for students across the state by relieving geographic and time limitations. Creating a comprehensive professional development online program, however, entails some issues that are different from those faced by existing online programs, and it should not be assumed that professional development can be a simple add-on to an existing online program.

9. Copyright and ownership of course content
Online programs can address copyright and ownership of course content by stipulating in employment contracts that course development is done as "work for hire" and the online

program owns all rights to courses and content. This has not been done consistently by online programs in Colorado to this point, but copyright and ownership issues in online education have been addressed in post-secondary institutions. By incorporating such language into employment contracts, whether with full-time employees or work done under contract, online programs can ensure that they own and have full rights to their courses and content.

Briefing Paper 5: Equity and Access

Colorado Online Education Programs Study Committee—January 6, 2003

1. Identification of populations that are enrolled in online programs

Several online programs are disproportionately serving low-performing or at-risk students. Examples include:

- Poudre Virtual HS considers all its students high-risk. 75% have a GPA of less than 2.0, and 25% are making up a failed class.
- Branson estimates that 80% of its students fall into one of these categories, or have been suspended from another school.
- JeffcoNet estimates its number of these students at 97%
- SMART Schools estimates that 33% of its students have been expelled or suspended

Other online programs serve these student populations at percentages similar to or below the percentage in physical schools.

- DPS and Pueblo both estimate roughly 30% of their students fall into one of these categories, with most being considered at risk for one of a variety of reasons (skill deficit, behind grade level, others).
- COL serves about 20% of students that it considers at-risk.
- Colorado Virtual Academy estimates that 7% of its students are special education, and they serve few or no students in the other categories.

Few programs are disproportionately serving students that they have identified as high achievers (gifted and talented, students taking advanced-level courses, and others). Branson estimates its total at 4%, Jeffco 2%, DPS 10%, Pueblo 1%, COVA 3%. Two exceptions are COL, reporting 30% of students in this category, and Littleton. Littleton has three distinct online programs, and about 80% of its students taking courses through VHS, Inc. are high achievers.

2. Access to essential hardware, software, and Internet connectivity

Student access to online courses is not reported as a major problem. In part, this is because many students access courses at their physical schools, which have adequate connectivity. At Poudre all students access their courses at school, and other programs have a significant percentage of students using a school for access.

In some cases where the student does not have access to a school, the online program provides a computer and in some cases pays for connectivity. Branson provides students with a computer, and virtually all of its students log in from home. SMART Schools provides computers to students in some cases, and in other cases students access courses from an existing home computer. Connections Academy pays for connectivity for DPS online students.

Access issues are tied to geographic distribution of students in some cases. When all students in an online program are from within a single school of district, it is easier to provide access from a school. However, even COL, with students dispersed around the state, estimates that 70% of its students access courses from a school.

Briefing Paper 6: Funding

Colorado Online Education Programs Study Committee—January 27, 2003

Funding online programs raises numerous complex issues, ranging from how to count the students to how to pay for them. Funding is also tied to policy issues, like quality, equity, and accountability. Given the scarcity of public funds and the rapid growth of online learning, funding choices in this area will have significant influence on all of public education.

Specific issues and questions addressed in this brief fall into four categories:

1. PPOR policy: Whether and how PPOR should be used to fund students in online programs;
2. PPOR accounting: How PPOR funding should be calculated;
3. Non-PPOR funding sources: Whether new funding sources for online learning should be considered;
4. Funding priorities: Identifying funding needs and developing a process to determine priorities.

Context: PPOR and cyberstudents

The bulk of K-12 public education funding in Colorado is derived from state sales and income taxes and allocated via PPOR (per pupil operating revenue) amounts. Schools are also funded by local taxes, but state-allocated PPOR accounts for about 60% of total funding for public schools. PPOR funding is set at a minimum level of $5,435 per student, with various other elements factored in for each district that can raise per-pupil funding as high as $12,512. PPOR allocations go to districts, which distribute the money to individual schools. Districts often fund individual schools at different per-student levels, with elementary schools generally receiving 85% of the PPOR allotted for each student, middle schools receiving 100%, and high schools receiving 115%.

Most online programs and cyberschools are funded directly or indirectly through PPOR. Direct PPOR goes via district budgeting to cyberschools that enroll students half- or full-time; indirect PPOR goes to supplemental online programs supported by district money. Cyberschools enrolling students full- or part-time in most cases receive the minimum level of PPOR, with two exceptions:

1. Students who were taking online courses during to 2001-02 continue to be funded at the district's regular PPOR level.
2. Students who were not enrolled in a Colorado public school in the previous year are not funded through PPOR for their online education in the current year. (New legislation permits districts to count 135 of these cyberstudents at the minimum PPOR level, and CDE has created rules to distributing the 135 slots among applicant cyberschools.)

Students are counted through a census conducted in every school on October 1st. Some allowances for students absent on Oct. 1 exist, but all students who will be counted for PPOR purposes must be enrolled in the school and in class on Oct. 1 (or a day soon before or after). The census counts scheduled class time for each student and determines whether the student is full-time (at least 360 hours of scheduled instruction per semester) or part-time (90 hours per

semester). Schools receive half the PPOR allotment for part-time students. PPOR funding mechanisms do not take into account course completion rates, student transfers between schools, expulsions, or dropouts.

1. PPOR policy: Whether and how PPOR should be used to fund students in online programs

Should students enrolled in online education programs be funded at a different level than other students?
PPOR funding for full-time cyberstudents is set at the minimum PPOR level, except for approximately 300 students who were online students and PPOR-covered prior to the current school year. These students continue to be funded at their districts' PPOR level.

The argument for allocating less money for online students is based on the premise that online programs do not face some of the major expenses of physical schools, such as building, bussing, and physical security. An alternative view is that online programs entail different expenses, such as technology, course development, and more frequent individual contact with students, which make the cost of online education similar to that of physical schools.

There are no studies that show conclusively the costs for online education. At least two factors make estimating cost difficult. First, because most online education programs are new, they are still growing and have not yet achieved full economies of scale. Start-up costs, course development, some software and hardware, and other costs are fixed; as the number of students grows, these costs can be distributed more broadly, lowering the per-student cost. Florida Virtual School, the largest virtual school program in the country, provides illustrative numbers. In 2003, FVS is funded at $5.8 million for the school year[36], and will have 12,000 course registrations. (Between 1998 and 2002, FLVS received approximately $20 million total funding; its total enrollment for the entire five-year period was roughly the same as it this year.) Second, course delivery and technology costs vary as the technology market changes, and these changes are difficult to predict. While over time technology costs have generally been decreasing, new, and frequently expensive, technologies tend to drive out the less expensive but less powerful older technologies. Therefore, the cost of delivery at any one time represents a snapshot that may change significantly in either direction in the future.

The absence of conclusive information suggests that the state should attempt to determine the actual costs of online learning. A study that examines the cost of online programs, aided by new account coding by CDE to track the online program budgets more precisely, would help to resolve the cost debate.

Should funding reflect cyberschool mission or populations served?
Costs for online programs and cyberschools may vary according to the student populations being served by the program. Therefore, consideration could be given to adjusting funding based on a program's mission or population served. For physical schools, PPOR is adjusted in some cases for at-risk students—for example taking into account a factor for how many students in a school

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[36] The budget and number of registrations do not include funding and registrations for Florida Virtual School's summer program, because it is in early development.

are taking CSAP in a language other than English. These considerations are not, in most cases, applied to in cyberschools because their students receive the minimum PPOR. Another way to vary funding of cyberschools would be by the grade levels of students in the cyberschool, following the common practice applied to physical schools.

Should restrictions on PPOR funding of students in cyberschools be changed or eliminated? The Colorado legislature, concerned about the cost implications if large numbers of new students were attracted to online public schools, capped the number of "new" cyberstudents who could be funded through PPOR at 135. "New" cyberstudents are defined as those who were not enrolled in a public school by the October count date of the prior year and are currently enrolled in public school through an online program.

The cap on funding "new" cyberstudents may limit the money available to cyberschools with large numbers of at-risk students who were not in school the year before. Its clearest application, however, is to home-schooled students who do not want to attend a physical school but may be interested in a cyberschool. If the cap were removed, large numbers of home-school students might be attracted into public cyberschools. Indeed, cyber charter schools might be started to attract these home-school students. This raises a question of whether the state wants to pay for the education of home-school students in cyberschools.

Several options for dealing with this cap exist. One is to leave the cap in place, ensuring that no additional PPOR revenue is allocated to new online students. This will limit the growth of online programs because they will attract fewer students who were previously not in public school (particularly students who were home-schooled). A second option is to eliminate the cap, which some people have argued is the appropriate approach because the state should support access to new forms of quality education and should seek to increase educational opportunities. This argument extends the principle that public education should reach as many students as possible. Eliminating the cap, however, could raise the cost of public education substantially and, at least in the first few years, somewhat unpredictably. As a rough estimate, there were about 10,000 home-school students in the state in 1999. If 10% of these students were to enroll in a public cyberschool, and if they drew the minimum PPOR, the annual cost would be roughly $5.5 million. These are of course estimates, and meant to show the potential cost over time, not in the first year after the restriction is lifted. The director of one cyberschool estimates that 200 additional students would have attended cyberschools this year if the cap had not been in place.

An option between these two is to increase the cap, enabling a larger number of new cyberstudents to qualify. This action would increase the number of cyberstudents and the state's budget for education, but in a more controlled way. Negotiations in the close of the 2002 legislative session suggest that a gradual increase in the cap over several years is the plan most favored by legislators.

PPOR shuffling

Both the cap and the differential funding raise an additional issue that may require closer attention, which is that they encourage schools and families to manipulate attendance in order to qualify students for PPOR funding or higher levels of PPOR. There have been numerous reports, for example, of home-school students enrolling in local physical schools in order to qualify for

the next year's PPOR in a cyberschool. Similarly, some districts with cyberschools enroll students (including many who do not live in the district) in a physical school until the October census has concluded, then transfer the enrollments to the cyberschool. Furthermore, if a district's students are enrolled part-time in both a district cyberschool and a physical school, then the district benefits by calling the cyberschool a supplemental online program and claiming the student full-time for the larger "physical" PPOR. None of these actions violate state law or CDE regulations, and it could be difficult to craft regulations that controlled such activity without unduly restricting students' choices.

2. PPOR accounting: How PPOR funding should be calculated

As noted earlier, the existing methods for counting students to determine PPOR allocations are based on physical school attendance. Online programs may require some new math.

When should students be counted?

The single count date in early October has worked largely because, within a district, the migration of students has a modest impact on the overall student population. For an individual school, whether physical or cyber, the impact can be much more significant. Applying a district-based measure to individual schools, therefore, raises concerns. Several cyberschools have reported substantial changes in their enrollments (mostly increases) after the October date. Significantly, the cyberschools with large percentages of at-risk students tend to have the greatest variation in student count (again, mostly increases). Adding a second count date, possibly only for cyberschools, would respond to these concerns. Some educators, both in physical schools and cyberschools, argue that a second count date would also encourage schools to work harder at retaining students.

But a second count would also increase the cost and complexity of both the census and the follow-up distribution of revenue to schools and/or districts. In addition, a second count (and second distribution of revenue) would make budgeting more difficult, since school and/or district revenues would not be as predictable—nor available over the entire school year.

How should students be counted?

Full-time and part-time students are determined by the number of scheduled hours of instruction in a semester. This method works in a traditional class, in which students are scheduled to sit for a certain number of hours per day or week; but taking a student census that incorporates scheduled "seat time" does not apply well to online classes, most of which are asynchronous and self paced throughout the week (with some students working more quickly or more slowly than the "norm").

Because online learning is still new, many states are still attempting to force the square peg of online learning into the round hole of traditional measures. Kentucky law, for example, assumes that the student accesses the course from a physical school, during a time set aside for the online class, and states "A student in attendance in the class immediately preceding or following (if applicable) the designated virtual class or block shall be counted in attendance for the virtual high school class."

A common model in other states (e.g., Oregon, Michigan, and Utah) is to use "course equivalents," in which a determination is made as to whether the online course is the equivalent of an in-class course. Draft legislation in Oregon, for example, requires student involvement in an online course to be counted as the equivalent of one hour of instruction per day, as long as evidence of "continuing involvement" exists. In these states, if the online course is considered the equivalent of a physical school course, funding follows in the same way it would for a physical course. Colorado's school districts often apply this measure in determining what credit to give for particular online courses. Districts make this determination, for example, in giving credit to courses provided by Colorado Online Learning.

In some other states, per-pupil funding for online courses operates outside the usual channels for traditional courses. In California and Minnesota, for example, online courses are considered independent study, and processes are in place for funding of independent study.

Many people contend that cyberstudents should be counted through an outcomes-based approach, such as demonstrated learning or successfully completed courses, using *learning metrics* instead of *proxy measures* (e.g., attendance and seat time). This approach circumvents the issue of how to count student "presence" in an online class. An outcomes-based approach, however, would cause a fundamental change in education funding, including not only how students were counted but when and how funds were allocated. Such a method would force changes in districts' accounting, disbursement of funds, budget planning, and employment practices; and it would create a disincentive for schools to serve at-risk students. It would represent a significant policy shift rather than a change in accounting practices. In addition, no comparable method—or requirement—applies to physical schools. Although cybercounting needs to be different from physical counting, it probably should be analogous.

A more manageable alternative may be to create an online parallel to the census/seat-time method used to count students in physical schools. Recently enacted legislation in California, for instance, amended the state's definition of a "class" to include:

> *"...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."*

A similar definition in Colorado statutes or regulations could help to clarify the counting of online students for funding purposes. This definition helps to clarify the degree of access students should have to their teachers and encourages discussion regarding the types and quality of student-teacher interactivity.

Should the definitions of full- and part-time pupil be changed?
For PPOR purposes all students are either full- or half-time; there is no smaller allocation. But many cyberstudents are involved in activities of both online programs and physical schools, or are taking several courses from a cyberschool and the rest in their home-school program. Students enrolled in cyberschools may take part in classes or extracurricular activities at physical schools (e.g., sports, band, and world language conversation). Students enrolled in a physical school may take one or more classes from a supplemental online program. Vody Herrmann, Director of CDE's Finance Unit, has suggested breaking down student PPOR allocations to

quarter-time. This would enable finer levels of distinction in funding students who split their educational experiences between online and physical schools or online and home schooling. Counting "quarters" of a student's presence would more precisely allocate PPOR revenues, but it also might be cumbersome for the state and districts to administer.

An alternative strategy would be to encourage PPOR distribution agreements—or other contractual arrangements—between physical schools and online programs. Some other states' laws explicitly allow for such agreements between schools and districts without state involvement. California's law, for example, states:

> "A school district offering an online course may contract with 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."

These arrangements put the distribution burden on the local schools, but also give them more flexibility. Some cyberschools argue, however, that the broad geographic distribution of their students would make entering into contracts with a large number of school districts prohibitive.

3. Non-PPOR funding sources: Whether new funding sources for online learning should be considered

Several states have created or tapped into funding sources for online education that are distinct from PPOR/ADA or local tax revenues. Colorado may consider some of these as well, including:

Line item support for online education

Some states have created a distinct line item in their budgets to support online education. Two examples of ideas come from the Southern Regional Education Board's report entitled *Funding Web-based Courses for K-12 Students to Meet State Educational Goals*:

> *"State legislatures may want to create a 'Virtual Access Fund.' For example in Texas, the Telecommunications Infrastructure Fund was created in 1994 to finance state technology networks in schools, libraries, and hospitals. This was a tax on telephone services that provided funding and resources through an application process. A similar fund could be created by a state to support the use of Web-based courses. Another example is in West Virginia, where the state matches federal funds with state funds to provide financial aid to students and schools across the state taking Web-based courses."*

Line item support for a statewide online learning organization

Several states make specific budget allocations for statewide online learning organizations. Examples of statewide organizations include programs in Florida, Kentucky, Michigan, Illinois, and California. Although differences exist among the statewide organizations, they are generally supplemental online programs—providing courses to meet gaps in education across the state—rather than diploma-granting cyberschools. Their states often allocate funds to these organizations in lieu of paying for students' enrollment in other online programs. In addition, the statewide organizations may charge district membership fees, whereby school districts pay an

annual charge that buys a specified number of registrations in online courses. The membership fees may vary by size of the district, district demographics, or other factors.

The size of these statewide programs differs substantially. Florida Virtual School (12,000 students and a budget of $5.6 million in 2003) is the largest in the country, and was one of the first online programs to be created. Other states' programs operate on budgets that range from as low as several hundred thousand dollars to several million dollars per year. Most of these programs are still in development, are growing, and serve somewhere in the range of several hundred to several thousand online students.

Colorado Online Learning is funded through course registration fees (paid by districts) and grant funds available through the federal Elementary and Secondary Education Act; with a budget of approximately $870,000, COL will have roughly 1100 registrations this year in its supplemental online courses. State funding would enable COL to improve equity of access, develop a greater number of courses per year, expand services to high-poverty/high-risk students, and grow in number of registrations more quickly.

4. Funding priorities: Identifying funding needs and developing a process to determine priorities

Policy discussions from previous meetings often have funding implications. Proposals for assuring equity, conducting research, or other activities at the state level require funding if they are to be implemented. Specific proposals that have been raised that would require associated funding include:

- Tracking of students' point of entry in online programs to determine whether online students were previously home-schooled, in a physical school in or out of Colorado, or not in school;
- Research to provide a comparative analysis over an extended period of student performance in online education versus physical schools;
- Research to better understand the student populations who are served by online programs and the most effective strategies for supporting their success as learners;
- Programs to address equity issues in online education;
- Development of high-quality courses that would be made available to K-12 online learning programs around the state;
- Mechanisms to ensure that online learning serves geographically and socio-economically diverse populations of students.

A process needs to be established for determining priorities for funding these proposals, both in the near-term and over the next several years. The process needs to include methods for determining how much to appropriate for particular proposals and the order in which proposals should be funded. Factors to be considered include urgency of the issue, impact of the issue on the state, importance of the underlying values, and the sequence of steps in implementing a long-term vision for online learning.

Briefing Paper 7: Statewide Purchase of Online Library Database Resources
Proposal by State Library—April, 2002
Brenda Bailey-Hainer; Nancy Bolt

Currently, individual schools and libraries buy into an online package by paying for a portion of the total cost. Instead, the state should pay the entire subscription cost because not every library/school can afford to buy into the group online package (particularly since the money for State Grants to Libraries was zeroed out May 31 by the Governor). Access would be available through any school or public library to any resident or student with a library card. Comparable programs are already in place in almost every state.

Funding Request: Total request of $479,000
This program request includes the cost for an annual subscription to a base collection of online resources for every school media center and public library in the state, as well as one Senior Consultant position to administer the contract and to coordinate marketing and training efforts throughout the state.

$400,000	Annual subscription cost
$ 59,000	Senior Consultant ($50,000 salary + 18% benefits) to manage the program
$ 20,000	Travel, videoconferencing, training, printing, etc., expenses
$479,000	**Total annual cost to make online library resources available to every Colorado resident (approximately 10 cents per person)**

Program Summary
Online Library Databases is a new program request from the Colorado State Library for state-funded subscriptions to online resources that will be available over the Internet to all Colorado school media centers and public libraries, at no charge to them. These resources and the information contained in them are not available for free over the Internet, and are complementary to, but not duplicative of other projects going on in the state (e.g., the Colorado Virtual Library).

Problem or Opportunity Definition
Students who live outside of the major metropolitan areas do not have equal access to information needed to support student achievement. Rural schools and libraries are unable to provide access to this information—in either print or online form—due to funding limitations that affect their ability to subscribe to resources. Staffing limitations result in school media centers not being open every hour that school is in session, meaning any print materials they own are accessible just a few hours per week for student use. A similar situation exists in public libraries, which are frequently open as few as 20 hours a week, resulting in limited access to materials for students. Equitable access to these resources is especially critical for low socio-economic status students. Studies have shown that access to licensed databases contributes to higher CSAP Reading scores and could help close the learning gap.

State-funded online resources for all school and public libraries would provide the following benefits:

- Equal access to information for all K-12 students throughout the state—whether they are in public schools, private schools, charter schools, or home-schooled;
- Equal access for all students to the same base level of resources, no matter the geographic location or the economic climate locally;
- Equal access for all students to the same base level of resources regardless of socio-economic status;
- Access to research materials in languages other than English (with the English language equivalent available), to assist students who are learning English as a second language;
- Equal access to the most current information, since online resources are updated weekly;
- Extended access to information (24X7) instead of limiting students' access to school media center or public library hours;
- Significant cost savings for schools and libraries by aggregating subscriptions to online resources into a single contract;
- Improved efficiency and effectiveness of delivering information to students by utilizing Web-based delivery methods.

Online Resource Collection

The proposed statewide online resources, while not completely comprehensive, would provide a strong base level of materials needed to support student achievement. These resources would include the following:

- Separate resources appropriate for elementary, middle and high school students;
- Online full text articles from over 450 magazines and journals, appropriate for K-12 students;
- Teacher resources, including full text articles from 400 professional journals and access to ERIC;
- Complete text from 120 reference books;
- Full text from 60,000 primary source documents (e.g. the Gettysburg Address);
- Articles from selected newspapers, including some from Colorado;
- Spanish language interface, with an automatic Spanish language translator for English language materials (other languages will be available within the coming year);
- Separate current events database with over 48,000 articles.

Briefing Paper 8: Funding Online Education—A Report to the Online Education Programs Study Committee, February 21, 2003

Summary of Full Report

(Full report at http://www.cde.state.co.us/cdetech/download/pdf/et_osc-summary.pdf)

The purpose of this report is to identify the actual costs associated with operating a cyberschool in Colorado. This report examines national research on the topic, data from Colorado schools, and data from established cyberschools outside of Colorado.

It is difficult to make a precise determination of the costs of cyberschools because of the large number of variables associated with program purpose and delivery. This report focuses only on those programs whose students receive their education primarily online from locations remote from the educator. Variables of delivery include curriculum source and design, platform and Internet service, instruction, administration, student support, and other factors that affect funding needs. Variables of curriculum, instruction, and student support have an especially significant impact upon funding. This report examines only those programs that have an interactive curriculum; a student/teacher ratio similar to the traditional classroom; systemic student support, including special education when appropriate; and licensed instruction in all classes.

A review of literature shows that there is almost nothing published on the costs of K-12 online education. Studies of college level online education programs have all shown that online education is more expensive than traditional education; no known study has shown otherwise. The difference could be even greater than research shows because low costs for curriculum development in these studies indicate that the college online courses examined were not designed to make use of the technology but instead to replicate lecture courses. Other studies emphasize the need for extensive student support and mentoring to improve course completion rates.

Reports from established cyberschools across North America indicate that the costs associated with online education are *different* from the costs associated with traditional education, but they are equivalent or greater in amount. Cost of curriculum is a major variable in total funding needs. In the only cases in which cyberschools reported total costs that were less than those of a regular school, these cyberschools had in past years invested so thoroughly in curriculum development that they now had total control of their curricular content at virtually no current cost.

Data from Colorado cyberschools is consistent with the results obtained from schools across the country. With the exception of Monte Vista, though, Colorado schools are much younger than the schools that were surveyed outside of Colorado.

An analysis of the funding requirements for each of the components of online education indicates that the total costs are comparable to or higher than the costs of traditional education. Although many aspects of online education cost less than traditional schools, other costs are significantly higher. Schools can make adjustments in design that deviate from the model established for this report. These adjustments can lower the costs of education, but they are not in keeping with best practice for student learning. Students choose cyberschools because a regular school does not meet their needs; when a funding model for online education is determined, it must include all

the funding necessary to provide an adequate educational system that will not leave these children behind.

Funding Profile   *(Introduction and Methodology — Report p. 4)*

Because online education is such a new and evolving concept, many different delivery models are used. The report examined variables in program purpose and delivery, then identified a model profile for its funding analysis.

Program profile

- A curriculum that requires student/teacher interaction and makes full use of the instructional benefits associated with computer assisted instruction.
- A student/teacher ratio at least similar to the traditional classroom.
- Licensed instructor in all courses.
- Systemic student support, including special education when appropriate.

Funding requirements for the model program profile were broken down into their component parts. Although the cost of each component is heavily influenced by the variations in program delivery and by other factors, a cost range for each component was derived through information from national research, Colorado cyberschool data, data from schools outside Colorado, and information supplied by vendors. Component costs were totaled to estimate total program costs.

Summary of Findings from Literature   *(Report p. 5)*

Although published literature provides very little information about actual costs of K-12 cyberschools, it does provide strong evidence that online education at the collegiate level is more expensive than traditional education. It also demonstrates that successful schools must have curriculum and instruction that stress interaction among the participants. Skilled teachers who are knowledgeable in their subject matter are necessary. Successful schools also have support systems in place to improve student achievement. Schools that choose to skimp in these areas should not expect a high degree of student success. This research strongly supports the program profile identified for this report.

Data and Profiles from Cyberschools   *(Report p. 8)*

All schools reported program costs approximately the same as or somewhat higher than funding requirements for traditional schools, except in cases where schools had already completed curriculum development and no longer had costs in that area. Two such schools (SK Online and Florida Virtual School) had large grants and startup funds to allow them to create curriculum.

Funding Analysis   *(Report p. 15)*

All programs must have the same components, but the variations in the design of these components and their resulting costs are significant. They are also interrelated, meaning that one system might bring great cost savings in one component, but those savings would be offset by additional costs in another component. This analysis is summarized in the table on the next page.

Curriculum: Fully self-created curriculum and fully purchased curriculum require large investments up front, followed by significant savings. They also allow for total customization. Leased and outsourced curricula require no up-front costs, but costs remain constant and the school must accept the curriculum as it is, even if it is not totally suitable to district needs. Most established schools estimate curriculum costs at $2,000-$2,400 per FTE.

Instruction: Accepting an average of all factors, a cyberschool should expect to pay $2,000 to $2,500 per FTE for licensed instruction at a student/teacher ratio consistent with traditional instruction and demonstrated best practice in online education.

Course management system/Internet service: Course management system /Internet service costs can be either fixed costs that do not depend upon enrollment (in-house services) or variable expenses that are directly related to enrollment (full service or outsourced service). As fixed expenses, they can run from $15,00-$20,000. This makes per pupil costs range from $150 or more (in a cyberschool of 100 students) to $20 or less (in a cyberschool with 1,000 students). As variable expenses, they can run from $50-$120 per student. At the highest part of that range, course management system/Internet expenses can bring about savings in other components.

Student support: Students need support in both technical and in academic/affective areas. Online education programs are still learning the degree to which this is true and do not have enough consistent models to create a meaningful cost analysis. This report uses $600 per FTE to provide Mentoring, social work, and other forms of support, but that is a theoretical number based on preliminary and incomplete data.

School administrative support: These fixed costs that are highly dependent upon total enrollment figures to be determined on an FTE basis. This report assumes an average program will spend $400-800 per FTE.

District administrative support: The needs of online students in this area are the same as traditional students. A typical school spends $300-400 per student.

Factors affecting per pupil costs:
- Geographic dispersal
- Scale
- Experience/Completed curriculum
- At-risk student population

Summary of FTE Costs for Online Education		
Component	**Estimated Cost per FTE**	**Comments**
Curriculum	$2,000-$2,400	Depends upon source. Can be an up front purchase or an annual lease. With purchased/created curriculum, costs would be much higher than this in the first years, but costs then diminish over the life of the program.
Instruction	$2,000-$2,500	Depends upon student/teacher ratios
Platform/Internet	$20-$120	Depends upon the system. Higher costs can lead to savings in other areas. Higher priced systems assist in curriculum development/acquisition.
Student Support	$600	Earliest programs provided little support. There is no clear cost history.
School Administration	$400-$800	Fixed costs; depends upon enrollment
District Administration	$300-$400	Fixed cost; depends upon enrollment
Typical Total Cost Range	**$6,000-$6,400**	Excludes factors affecting per pupil costs.

The profile's cost range is consistent with findings from cyberschools outside of Colorado. Four of the schools surveyed said costs were the same or slightly higher than the costs of traditional schools. Florida High School reported FTE costs significantly higher than traditional schools when it was still designing curriculum, and it reports lower costs now that curriculum is completed. CSS Web School in North Carolina also reports costs that are less than traditional schools, and that can be attributed to the fact that they have completed all work on more than 100 courses, and thus have almost no curriculum costs. In Oregon, SK Online has also lowered costs by completing curriculum development.

Strategies that lower costs: Online programs can achieve substantial savings by departing from the program profile in the areas listed below. But all of these savings depart from best practice for instruction and student achievement.

- Curriculum
- Instruction
- Student support:

Conclusion: For cyberschools to meet the needs of students, they must have adequate funding. If schools do not have adequate funding, they will be forced to make adjustments to their programs that reduce their effectiveness with a largely at-risk population.

Briefing Paper 9: Benchmarking and Quality Indicators for Online Programs

Quality Indicators and Benchmarking

In establishing parameters for the quality and accountability of online learning programs, the Committee proposes criteria that lie between absolute standards and unenforced guidelines. Committee members have stressed the importance of flexibility—rules that offer diverse options for compliance in order to encourage programmatic innovation and diversity. But committee members also seek consistency and comparability across programs. There is support for sufficient firmness to provide assurance that online learning programs are evaluated at a level of rigor that is as high or higher than the evaluation of physical schooling.

The Committee's discussions have suggested the use of both benchmarks and quality indicators, and the distinction between the two is important.

A quality indicator is a criterion by which a program is evaluated (e.g., course completion rates, quality of course design, or student-teacher ratio). The quality indicator may be quantitative— involving measurement through a number or percentage (e.g., course completion rates)—or qualitative—involving measurement through relatively subjective judgments (e.g., quality of course design).

The term *benchmark* in most contexts means a fixed standard by which the success or quality of an activity or an organization is measured—a point of reference for measurement. Thus, a benchmark is the standard by which one determines whether the requirements of a quality indicator are fulfilled. For example, a benchmark for course completion could be that 90% of students successfully complete their online courses. The 90% benchmark might be used because, hypothetically, that's the rate for physical schools, or, still hypothetically, the national average for online programs. Whatever the rationale, it's the "fixed standard" by which one determines that a cyberschool has achieved success in the quality area of course completion. Setting a benchmark for the quality of course design is more complex because it's subjective. The subjectivity is mitigated through the use of rubrics, which specify the kinds of elements that should go into good course design and what varying levels of quality would look like in terms of those elements. But even this more subjective quality indicator would have a benchmark—a fixed standard that must be achieved in course design. A course design rubric could describe poor, fair, good, excellent, and superior levels of design; a benchmark could be that the overall rating for course design must be excellent, with no individual element rating below good.[37]

Accordingly, each quality indicator is demarcated by a benchmark that signifies how well the program being evaluated is doing. A key point here is that quality indicators are more general and may provide greater flexibility to programs in demonstrating success. For the course completion example, one program may use a 90% completion rate to demonstrate its excellence

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[37] Given that a goal would be capable performance on the CSAP or some other measurement tool, another criterion for success could be courses being designed which support improved performance on the test medium.

while another may show that the completion rate of its students is higher than the completion rate for those same students in physical schools. [38]

This distinction suggests that the committee intends to recommend that a set of quality indicators should be established for evaluating online learning programs, and that the programs should have some flexibility in demonstrating how they perform in each area evaluated. Rubrics would delineate the qualities expected within each indicator. The rubrics would include benchmarks within some or all quality indicators, but each online program would be able to present other types of evidence.

Elements of a Quality Indicator System

Several dimensions come into play in establishing a set of quality indicators, and these dimensions may combine in complex matrices. Some of these dimensions are described below.

- Inputs vs. Outcomes—A measure can be applied to what the online program does (e.g., the student-teacher ratio or the number of student-teacher contacts) or to the results (e.g., successful completion of courses or scores on CSAP tests).
- Standards of Evidence vs. Standards of Performance—The standard to meet may be qualitatively fixed (e.g., high rates of student success), and the flexibility comes in how a program demonstrates that it meets the criteria (e.g., a body of evidence rather than a single test to demonstrate the quality of a program), or the standard of performance may vary (e.g., high success and partial success).
- Reward vs. Sanction—The consequences linked to evaluation of the program can either be rewards for fulfilling the evaluation criteria in question (e.g., funding bonuses) or penalties for failing to fulfill the criteria in question (e.g., refusal to accredit).
- Assessment vs. Evaluation—The determination of a program's status can either be used to guide follow-up action (e.g., progress reports coupled with annual improvement plans) or to assign a designation (e.g., accredited or not).

QIS Example

The QIS (quality indicator system), developed by the Colorado Commission on Higher Education (CCHE) to guide CCHE's performance funding system, presents a comprehensive example of the use of quality indicators.[39] Indicators include graduation rates, freshmen retention and persistence rates, passing scores or rates on tests and licensure examinations, faculty teaching workload rates, undergraduate class size, institutional expenditures per student, support and access of minority students, graduation requirements, and two indicators selected by the schools themselves. Individualized benchmarks are identified for each postsecondary institution, with the measures based on the performance levels of national comparison groups (i.e., institutions across the country with similar roles and missions, enrollment size, program array, complexity, etc.).

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[38] Often times with benchmarking the organization that is performing at the highest levels is considered and acknowledged as best in class. Once that level is accomplished, then the bar is raised in order to promote continuous improvement for all organizations.

[39] The CCHE website provides an explanation of the QIS system at www.state.co.us/cche/qi/newprocess.html.

Institutional performance on each of the ten QIS indicators is determined by the points the institution earns for performance related to the benchmark assigned to each indicator. If insufficient data exist for any indicator for any institution, that indicator does not "count" in determining the total points earned by that institution.

Hypothetical Quality Indicator Matrix

The specific quality indicators, rubrics, and benchmarks to be used in evaluating online learning programs in Colorado should be determined over time and with the participation of online educators. Central to the selection of quality indicators and benchmarks should be some determination that the selected factors contribute significantly to educating students and their priority among numerous aspects of each program. Narrowing the lists of potential factors to the few that are critical and expending energy and money on addressing and attaining those would be wise and far more frugal.

Hypothetical elements are provided below as examples of what a quality indicator matrix could contain.

Hypothetical Quality Indicators	Hypothetical Benchmarks	Hypothetical Alternative Indicators
Course completion rates	Colorado average for course completion in physical schools	Online course completion rates comparable to physical schools with similar student populations
Test scores	Average CSAP scores of cyberstudents meet or exceed state average	Average CSAP scores of cyberstudents state average of similar student populations
Teacher response time to student queries	Response within two business days in 95% of cases	Variable response rates based on nature of courses and student populations
Teacher/student ratio	1-25, or same as statewide average for physical schools	Ratios vary by grade level, subject; or instructional design; or use total student "workload" per teacher
Overall student satisfaction	A specified percentage of students indicating they are satisfied with their online classes in a standard survey given to all cyberstudents	Individually designed and specifically adapted surveys by cyberschools, or retention rates used to indicate satisfaction