



# **A Needs Assessment of the Accessibility of Distance Education in the California Community College System**

## **Part II: Costs and Promising Practices Associated with Making Distance Education Courses Accessible**

**May 2009**



# **A Needs Assessment of the Accessibility of Distance Education in the California Community College System**

## **Part II: Costs and Promising Practices Associated with Making Distance Education Courses Accessible**

**May 2009**

Beverly Farr, Ph.D.  
Carol Studier, M.A.  
Laurel Sipes, M.P.P.  
Norman Coombs, Ph.D.

MPR Associates, Inc.



# Contents

	PAGE
List of Tables.....	iv
Introduction.....	1
Costs for Making Distance Education Courses Accessible to Students with Disabilities .....	2
Existing Research .....	3
Methods.....	4
Data and Discussion on Costs.....	8
Cost Per Item.....	8
Costs Beyond Those Listed in Table 1 .....	17
Cost Per Course .....	18
One System-Wide Recipe: Cost to Make Existing Courses Accessible .....	22
Recommendations.....	25
Use Ingredients to Determine Costs and Make Decisions .....	25
Use Funds Effectively.....	25
Clarify with Faculty What They Are Responsible For .....	26
Offer Incentives to Faculty .....	26
Promising Practices for Making Distance Education Courses Accessible to Students with Disabilities.....	27
Establishment and Use of <a href="#">Policies</a> and Guidance.....	28
Centralization, Coordination, and Communication.....	30
Development Procedures.....	32
Training and Support.....	34
Evaluation and Monitoring .....	36
Conclusion.....	37
References .....	38

## List of Tables

	PAGE
Table 1: Cost of ingredients to make distance education courses accessible .....	10
Table 2: Cost to make sample courses accessible using ingredient costs .....	20
Table 3: One system-wide recipe—cost to make existing courses accessible.....	24

# Introduction

As the number of online distance education (DE) courses mushrooms in the California community college system, the need to address the accessibility of these courses becomes more and more urgent. With this in mind, the California Community College System Office (CCCCO) retained MPR Associates, Inc. to complete a needs assessment to help determine the current status of DE courses system wide, examine promising practices for making online DE courses accessible, and determine the costs to make them accessible. In an effort to release data and results as soon as possible, it was agreed that the report would be released in two parts.

Part I, released in August 2008, revealed not only that there is room for improvement in the system, but also that there are some promising approaches that the system could explore to improve the status of DE courses for all students. The System Office is already responding to some of the recommendations made within. Part I provided results from exploratory interviews and three surveys administered to Distance Education and Disabled Students Programs and Services (DSPS) coordinators, faculty that develop or teach DE courses, and students with disabilities who may or may not have taken DE courses.

Part II of the study included data gathered from:

- Site visits to five college campuses at which MPR conducted interviews and focus groups with administrators, faculty, and students (as possible) to obtain more in-depth information on the local procedures for developing accessible online courses.
- Structured interviews with key respondents to obtain detailed information regarding issues that surfaced in the survey results as ones that needed additional contextualization or explanation and to gain a deeper understanding of the variation in procedures being used to make courses accessible as well as the associated challenges.
- Cost analyses through both review of available literature and the collection of additional data both through in-depth interviews on costs associated with making courses accessible throughout the system and exercises completed by alternate media specialists in the field.

The results of this work conducted for Part I of the needs assessment are provided in the following two sections: one on our cost analyses and one on promising practices.

## Costs for Making Distance Education Courses Accessible to Students with Disabilities

The bottom line in many important decisions often relates to cost—how much will it cost to initiate, implement, or maintain a certain proposal? However, in some situations, such as a legal decision, cost is less a determinant; instead of asking “is this financially feasible,” the decision is based on “is this right.” In the case of *Title II of the Americans with Disabilities Act* and section 504 of the federal *Rehabilitation Act*, the federal government determined that giving people with disabilities equal access to education was the right thing to do. Making distance education courses accessible is part of meeting these mandates. With that in mind, California has attempted to make DE equally accessible to all students. However, in a large state with many students enrolled in different institutions, it can be difficult to monitor whether those best intentions are being met. While in many cases they are, it is clear that some courses offered by the state’s 110 community colleges are not fully accessible. Even though awareness, understanding, personal motivation, and other factors influence the extent to which this is being accomplished on different campuses, the cost to make the needed changes to courses also generally plays a role. Identifying the costs required to make courses accessible can help the CCCSO and the state determine how best to apply funds to meet the moral and legal obligation to make all online courses accessible.

This report begins to outline the cost of making online courses accessible to all students. Part I of the needs assessment, released in August 2008, reported administrator and faculty views on the accessibility of distance education and specifically on the costs of making online courses accessible. Part II of the report, detailed here, estimates the specific costs of (1) addressing each 508 standard and other accessibility and navigability issues; and (2) providing training and support for alternate media personnel, faculty, and students to ensure courses are being made accessible. During these difficult economic times, it may not be possible for the state to provide the ideal level of funding, but the state can use the cost estimates to determine how it will address the issue—reallocating funds to where they are most needed, streamlining certain services to take advantage of economies of scale, or



implementing very low-cost strategies such as building awareness among faculty about the importance both of attending trainings and making at least basic features of courses accessible. Some have pointed out that making a course accessible during development is less expensive than returning to fix it later, and the state could help contain costs by directing attention to that as well.

## Existing Research

A review of the literature reveals surprisingly little information on the topic of the costs required to make online courses accessible. While some reports attempt to outline the costs of developing an online course (Boettcher, 2006; Rumble, 1997; Sterns et al., 2005), they do not extract the particular costs associated with making the courses accessible. As we interviewed many for this study, it became clear that the field is eager to learn what these costs are.

Part I of this needs assessment provides some information on administrator and faculty views regarding the costs of making distance education courses accessible. Responses from 111 administrators (DE and DSPS coordinators) and 647 distance education faculty to two separate surveys revealed information on whether funding provided is sufficient to make courses accessible, what contributes most to costs, where funding comes from, and whether determining which department offers funding is an issue. In summary, of those who responded to particular questions about costs, we found the following:

- About a third of administrators and faculty think that there is insufficient funding for developing DE courses, and slightly more thought that there is insufficient funding for making them accessible. About half didn't know if the cost of making DE courses accessible compromised the quality of the courses they could otherwise offer.
- In an open-ended question, both administrators and faculty were asked which features of DE courses seem to add the most to the cost of making them accessible.
  - The 44 coordinators most commonly said closed-captioning (25). The next most frequent response (5) was staff to provide assistance, and the remaining responses were fairly evenly divided among simulations and more elaborate interactive components, videos, and training.
  - Of the 230 faculty who detailed which features of distance education seem to add the most to the cost, the most frequent response was “release

time to develop the course.” The remaining responses were fairly evenly divided among the need to do closed-captioning, create transcripts of videos, create text equivalents for visual images, multimedia in general, and hardware/software. Forty-five respondents indicated they did not know.

- No one department is required to fund DE accessibility, and campuses determine how their general funds are spent, which may lead to discussion on campuses as to which campus budget those funds come from.
  - While a third of administrators and more than half of faculty did not know whether determining which department will pay to make DE courses accessible was a barrier to development, a third of administrators and a quarter of faculty thought that it was.
  - It appears that on most campuses much of the funding provided to make DE courses accessible comes from categorical or general funds.
  - It appears that those saying more funding came from the general fund to make DE courses accessible were more likely to say determining which department will pay for accessibility is not a barrier. Likewise, those saying less or no funding was coming from the general fund were more likely to say that it is a barrier.

## Methods

To determine the costs of making online distance education courses accessible, we first interviewed 13 experts in the field including individuals at the High Tech Center Training Unit, California Virtual Campus (CVC), alternate media specialists, and DSPS staff on six different campuses, as well as those at institutions outside the California community college (CCC) system knowledgeable about distance education and its costs. Input from these interviews helped us to develop and refine our approach for determining costs in a way that fit within the scope and timeline of this project. From the information gained in these conversations, we concluded that identifying the cost of each “ingredient” required to make courses accessible would provide the state with the most useful information and flexibility in using the data later to make decisions. An “ingredient” was either a 508 standard, other feature required for navigability or accessibility, or trainings and support for various populations.

A specialist in the economics of education has outlined this approach to cost analysis. “Levin (1983) has described the standard economic approach to cost analysis as an ‘ingredients model.’ The first step in the use of this model is to develop a list of all the ingredients and the amounts of each that are needed by the program. One can think of this as a recipe for producing the program. The second step is to determine the cost of each ingredient. When the cost of each ingredient has been established, these costs can be summed to produce a measure of the total cost of the intervention.”<sup>1</sup>

Before deciding to adopt this approach, we considered others. Initially, we investigated using an entire DE course as the unit for cost but soon learned that courses have such wide variation in online features offered that costs could vary dramatically. To explain further, in exploring this idea, we attempted to locate criteria for what constituted a quality distance education course, talking with the CVC about their awards program for quality courses and other organizations doing similar work. These “quality” criteria would help outline the elements of an exemplary course (sharing of ideas, interaction with the instructor, multiple forms of media used, etc.)<sup>2</sup> to help us assemble the critical elements in a course that an external vendor as well as an on-campus alternate media specialist could use to provide costs of making a course accessible.

In searching for criteria, we discovered that we could gain access to the award-winning courses. After accessing them, we discovered that a high-quality DE course may, indeed, include very few multimedia features. In fact, since multiple forms of media were just one element of the CVC’s quality criteria, it turns out the award-winning courses contained very little. Some in the system estimated that as many as 60% of DE courses are of a “simple” format with mostly text-based pages and images; 20% are “light multimedia” with perhaps a few complex features such as videos, podcasts, or PowerPoint presentations, which are more expensive to make accessible; and 20% are “heavy multimedia” and include many more of those complex features. While not all interviewees agreed with this breakdown, the discussion alerted us to the fact that courses vary considerably. (While it would be useful to have data on how many simple or complex courses exist in the system, it was beyond the timeline and budget for this project to determine that breakdown. Even then, “simple” and “complex” are categories that could only take us so far.)

---

<sup>1</sup> Shonkoff, J.P. and Meisels, S.J. (May 15, 2000). *Handbook of Early Childhood Intervention. Second Edition*. Cambridge, MA: Cambridge University Press citing Levin, H.M. (1983). *Cost-Effectiveness A Primer*. Beverly Hills, CA: Sage Publications, Inc.

<sup>2</sup> See California Virtual Campus award selection criteria at <http://www.cvc.edu/faculty/selection-criteria>.

With this information in mind, we determined that obtaining access to a range of quality courses with varying degrees of multimedia features was wise. We also decided that using an external vendor to cost sample courses was too expensive for the scope of the project and likely inaccurate since on-campus costs would be significantly less.

For the costs to be useful in a wide range of situations, we determined with interviewee input, that having various reviewers determine the costs for features in different course formats could give us information on each 508 standard, which could then be used by many to determine the costs of various courses. Gaining input from various reviewers also helped ensure that we were taking into account different approaches for making features accessible.

Identifying the cost of each ingredient required multiple steps. First, from experts' opinions and awards in the field, we identified six quality DE courses with varying degrees of complexity. Some consisted of mostly text-based pages with images; others provided complex multimedia presentations, videos, audio podcasts, or other features. We asked nine individuals familiar with making online courses accessible to serve as "reviewers." Six of the nine agreed to help us, and four submitted completed worksheets outlining costs. Each reviewer was given passwords to access two of the six DE courses and a worksheet on which they recorded the quantity of the ingredient or feature they found in the course reviewed, the time needed to make each ingredient or feature accessible, the person best suited to make the feature accessible (faculty, alternate media specialist, DE and DSPS personnel, or others), and any comments relevant to the task. The four returning worksheets reviewed five courses in math, science, English, history, and psychology. Of these four reviewers, three were alternate media specialists and one was an instructional technology support specialist.

Once these data were gathered, we looked for patterns and trends in the reviewer responses to gain a general consensus around who would likely be responsible for making certain items accessible and how long it might take to make those items accessible. In some cases, there was variation in what reviewers cited, and we have noted this in the comments column of Table 1 along with any other pertinent details they provided on making a feature accessible. With the general consensus of the reviewers' opinions summarized, we then took the time needed to make a feature accessible, determined an hourly rate for the various personnel cited as best suited to address each 508 standard or navigability feature and determined the cost for that feature.

To determine the hourly rate for each personnel cited, with help from the CCCSO, we requested the salary scales and salary ranges for particular positions on California community college campuses. We received information from seven campuses in rural, suburban, and urban areas and averaged the hourly rates and/or salaries to determine a rate for each position identified by the reviewers as the best person to make a certain feature accessible. To determine training and support costs for services offered by the High Tech Center Training Unit, the Center reviewed agency budgets and enrollment logs to determine how many campuses take advantage of their services each year for administrator trainings, one-on-one support such as troubleshooting phone calls, electronic assistance such as listservs, and other supports and what percentage of the agency budget applies to the accessibility of distance education courses.

This approach to costing has limitations to consider. Certain 508 standards<sup>3</sup> or other features being examined will have a range of possible costs. For example, a complex table might take 45 minutes to make accessible. One that is slightly less complex might take less time to address, but for simplification our data only estimates for the 45 minute table. The costs provided are simply an amalgam of the data offered by reviewers from the five courses reviewed and their own estimations of how long it would take to make an item accessible if that particular feature was not included in the courses they reviewed. Another limitation is that it is unknown whether the reviewers are “typical” reviewers or whether others might take longer to make course features accessible or have better methods that might take less time. We are providing averages that may vary on different campuses. In addition, MPR Associates’ estimates made from the data the four reviewers provided is largely subjective. We took into account reviewer comments and estimates and made our own determination of how many minutes per unit might seem most accurate to make a feature accessible.

Even so, this approach of costing each ingredient rather than complete courses offers many benefits that we feel outweigh the limitations of the approach. Flexibility for future costing queries is key. As technology progresses, ingredients and their costs can be added or adjusted to the Cost Table to make the existing data more timeless. In addition, campuses or the system office can determine the cost of any course—simple or complex. And costs can be estimated at the course, campus, and system office level. While a system-level estimate might be used for leverage to gain more funding

---

<sup>3</sup> Section 508 of the Rehabilitation Act is the legislation that is most relevant to accessible online learning. It should be noted that there has been ongoing work to update the Web accessibility standards, but nothing new has yet been issued. The Web Accessibility Initiative’s Web Content Accessibility Guidelines were updated in December 2008. They are only guidelines, but they still carry weight for determining accessibility.

from the legislature, a campus-level estimate might help make the case that more of the general fund should be dedicated to meeting these needs. Estimates can also be made to help determine whether offering faculty incentives to make courses accessible during development would outweigh the amount of funding required to make courses accessible after they are fully developed. Finally, costing each feature of a course may be more accurate than costing a “model” course that may not be representative of courses offered throughout the community college system.

## Data and Discussion on Costs

### *Cost Per Item*

The data collected and analyzed are presented in Table 1, which lists the personnel and associated costs required to address 508 standards, navigability issues, and training elements. The table also includes comments gathered from reviewers and other research to highlight certain caveats or information for particular items.

- The first column lists the 508 standards, other features required for navigability or accessibility, or trainings required to make a DE course accessible.
- The second column provides a description of those items.
- The third column lists the personnel needed to complete this task.
- The fourth column offers the cost to make the feature accessible as determined from reviewer data. The cost was calculated by taking the minutes estimated to make a particular feature accessible and multiplying it by the hourly rate of the campus personnel responsible for making that item accessible.
- The fifth column provides comments from reviewers about other issues to take into account or even disagreements on estimating the number of minutes required to complete an item.

**Benefits** for personnel are not included in the costs listed in the table. Those costs can vary dramatically, from no benefits for contract employees, partial benefits for part-time employees, to full benefits for full-time employees.<sup>4</sup> The cost of benefits is relevant though and must be considered.

**Faculty rates** are not currently listed for two main reasons. First, interviewees and reviewers of DE courses reported that as part of developing a DE course, faculty are responsible for certain aspects of making them accessible, such as writing descriptions

---

<sup>4</sup> Benefits/retirement rates offered from one college were 12.710% of salary + 12,100 for full-time faculty; and 11.99% for part-time faculty; 19.966% + 12,100 for all classified staff.

for images or organizing documents so they do not require an associated style sheet. Because this is generally expected of faculty, costs for their time are not seen as “additional” costs for making a course accessible because they are accounted for in general faculty salaries. While we considered listing faculty costs just as a point of information, it also appeared that salaries and wages varied quite widely depending on whether personnel are new or veteran, adjunct or tenured, and hourly or salaried. As a result of these factors, we list only the time required to address each course feature.

**TABLE 1: Cost of ingredients to make distance education courses accessible**

Feature	Description	Personnel needed for task	Cost per unit to make accessible*	Reviewer comments
<b>508 Standards for Accessibility</b>				
Images	Providing information for Images or non-text elements (using alt, longdesc, or other methods)	Faculty Member**	Faculty Responsibility—3 minutes to address each image	
Multimedia presentations	Synchronizing alternatives for multimedia presentations	Alternate Media Specialist***	\$40.50 for the 90 minutes it takes to caption 15 mins of video (or \$90 for 15 minutes of video captioned by an external vendor)	This cost is if an intern or faculty have already provided a transcript. The cost listed is for alternate media personnel to develop the captioned video.
Use of Color in Webpages	Conveying alternative ways to view web page information provided in color (from context or markup)	Faculty Member	Faculty Responsibility—1.5 minutes per instance of color used on webpage	
Documents without Style Sheets	Organizing documents so readable without requiring an associated style sheet	Faculty Member	Faculty Responsibility—10 minutes	One reviewer reported that if the text is organized in a simple way, including basic headers and bullets, no style sheet should be necessary. Another suggested creating the document in HTML without fancy formatting so the document would be easily readable without style sheets. Another commented that this is a Moodle or other course management system issue and normally is not a problem.
Server-Side Image Maps	Providing redundant text links for each active region of a server-side image map	Alternate Media Specialist	\$13.50 for 30 minutes to address each server side image map	Reviewers wrote that this is an uncommon issue and outdated standard.
Client-Side Image Maps	Providing client-side image maps instead of server-side image maps except where the regions cannot be defined with an available geometric shape	Alternate Media Specialist	\$13.50 for 30 minutes to address each client side image map	One reviewer reported that this is an uncommon issue and reported that an alternate media specialist could address it. Another reviewer said this should be straightforward for a web designer. The other two reviewers did not estimate time or make comments.
Data Tables— Headers Identified	Organizing data tables so that row and column headers are identified	Faculty Member	Faculty Responsibility—15 minutes	This is a normal part of course development. It would take longer to develop complex data tables than simple ones. One reviewer suggested that this just involves adding some bits of HTML code, which does not take very long.
Data Tables— Complex	Making data tables that have two or more logical levels of row or column headers clear (through markup used to associate data cells and header cells)	Alternate Media Specialist	\$20.25 for 45 minutes to fix one complex data table	Less for simple data tables
Frame Titles	Titling frames with text that facilitates frame identification and navigation	Faculty Member	Faculty Responsibility—5 minutes each	One reviewer wrote that this is a Moodle or other course management system issue. As long as the faculty member has been properly trained and the school has provided well constructed templates, this should not be an issue.
Flicker Frequency	Changing webpages so that they do not flicker with a frequency greater than 2 Hz and lower than 55 Hz	Faculty Member	Faculty Responsibility—5 minutes to run a GIF flicker test in Internet Explorer	One reviewer wrote: uncommon issue that can be completely avoided by training faculty not to use such features.

\* Benefits, incentives, and ongoing support are not included in chart but should be considered.

\*\* Faculty responsibilities include only time and not cost to make accessible since salary ranges are so broad and presumably faculty are required to these feature as part of course development.

\*\*\* Hourly rate used for alternate media specialists was \$27 or approximately \$52,000 annual salary. Hourly rate used for DSPS computer lab staff was \$30 or approximately \$57,600 annual salary. Hourly rate used for a student intern was \$12.

Source: Data gathered from CCC campus personnel and analyzed by MPR Associates.



**TABLE 1: Cost of ingredients to make distance education courses accessible—Continued**

<b>Feature</b>	<b>Description</b>	<b>Personnel needed for task</b>	<b>Cost per unit to make accessible*</b>	<b>Reviewer comments</b>
Text Only Pages	Providing text-only pages with equivalent information or functionality that makes a web site comply when compliance can not be accomplished in any other way. The content of the text-only page shall be updated whenever the primary page changes.	Faculty Member	Faculty Responsibility—time varies depending on size and element; reviewers cited up to 1 hour for PPT presentation; 30 minutes for external website	One reviewer reported that modern development standards have rendered the text-only page obsolete. Another reviewer of a course he/she reviewed reported that in place of an external website that was not fully accessible, an instructor could spend 30 minutes writing a short lecture for the site and post it.
Scripting Language	Changing pages using scripting languages to display content, or create interface elements, so that the information provided by the script is identified with functional text that can be read by assistive technology	Faculty Member	Faculty Responsibility—4 minutes to revise it if not accessible or switch to an accessible format	One reviewer commented that this is an uncommon issue, but said he/she would tell faculty to go back and revise this feature if they had developed such a complex approach initially. The example he/she gave for "scripting language" is that if you move the mouse over a header and menu pops up beneath it, that it also be accessible by using the keyboard to tab over and access it so someone with fine motor skills can obtain the proper information. Another reviewer reported that he/she would train the instructor so he/she could incorporate the correct coding when building the course.
Plugin or Applets	Providing a link to a plug-in or applet that complies with standards when a web page requires it to interpret page content	Alternate Media Specialist	\$4.50 for 10 minutes to address one feature	One reviewer commented that the course should have links to Quicktime plug-in, and also PowerPoint plug-ins for students who do not have PowerPoint installed. Another reported that this checkpoint has become substantially more complicated to evaluate since it was written. There are two problems here. The first, "applets," can be thought of as true computer applications running within a browser; for example, Java or ActiveX controls—these will have to meet the separate Section 508 standards for all computer software. The second, "plug-ins," could mean anything from Flash to Quick-time to PDF or even Word. Most browsers now provide built-in rendering for many of these formats, but many assistive technologies probably won't. Equivalent content will have to be provided for a large range of disabilities; for example, closed captioning of video and transcripts of audio—and formats such as PDF will have to be coded with current accessibility techniques.
Online Forms	Changing any information, field elements, and functionality required for completion and submission of on-line forms, including all directions and cues so that they are accessible by those using assistive technologies	Faculty Member	Faculty Responsibility—varies according to length of form; estimate average of 2.5 hours per form	One reviewer commented that this could take a long time, depending on how large the form is and how well it is created.
Repetitive Links	Changing webpages so a user can skip repetitive links.	Faculty Member	Faculty Responsibility—Varies according to number of pages to address; 5 minutes to add "skip link" to one page or to switch within a template to change for all pages	One reviewer reported that you can add a link that allows a blind person to skip the screenreader going through a full menu of choices each time it is listed. This must be done on each page that had long list of links, but if the course used a template, then it is possible to switch it once for all pages.

**TABLE 1: Cost of ingredients to make distance education courses accessible—Continued**

Feature	Description	Personnel needed for task	Cost per unit to make accessible*	Reviewer comments
Timed Response Feature	Adding a feature so that when a timed response is required, the user shall be alerted and given sufficient time to indicate more time is required.	Faculty Member	Faculty responsibility—20 minutes to create second version of test that has no timer or a different timer with password protection	One reviewer wrote: users may have a variety of difficulties when a timed response is required from a Web form. In education, one possible reason requiring such a response would be in an examination, where it would be impractical to allow all students to request more time, as called for in the checkpoint. Other accommodations, such as a customized version of the test or a special testing center, may have to be provided in this case. Or a special login to the quiz with additional time for one or more students may be required. Another reviewer questioned whether all course management systems offer timed exams.
<b>Other Accessibility and Navigability Issues</b>				
Alternate Format for Materials Needed	Developing a plan to offer materials to students in the appropriate alternate format for any course features when it is deemed necessary for making material accessible	Alternate Media Specialist	\$27 for 1 hour to develop the plan	Cost estimate is based on two reviewer's time estimates since two did not list estimates. One of them commented that developing the plan is fairly easy but actually collecting and converting the materials would take quite a bit more time. The other suggested developing HTML content outside of the course management system to assist in an efficient accessibility review process in not having to find content code within the course management system's code. Another reviewer reported that this is a policy/procedure question that needs to be determined at the administrative level of each district/college. The fourth reviewer reported that it would require a consultation involving the faculty member, disabilities services counselor, and perhaps the student.
Activation with desired input device	Ensuring that users may enable activation of page elements with their preferred input (or output) device—mouse, keyboard, voice, head wand, or other.	Alternate Media Specialist	\$4.50 for 10 minutes to address one page	One reviewer commented that for this item an orientation to the course by a trained alt media/adaptive technology trainer may be necessary. It is often the case that students using assistive technology already know how to use their tools pretty well. An orientation to the course with a sighted assistant can be helpful sometimes. Another reviewer reported that addressing this issue is normally not a problem. If the faculty member has created applications that are not keyboard accessible (for example in Macromedia Flash) they would be asked to revise them for keyboard accessibility. Headwand, voice, etc is usually not considered.
Audio Podcasts	Transcribing Podcasts	Student Intern**	\$12 for the 1 hour required by a student to transcribe 15 minutes of audio podcast; or \$30 for an external vendor to transcribe 15 mins at a rate of \$2/minute of podcast	
Clear navigation mechanism exists	Ensuring that clear navigation mechanism (orientation information, navigation bars, a site map) exists so users can find what they are looking for	Faculty Member	Faculty Responsibility—3 minutes per page	One reviewer commented that this is a normal part of course development; course management systems have built in navigation features. Another reviewer suggested use current "jump to" coding to provide site map for most of required fixes. A third reviewer wrote that this can exist in many ways. It is up to the faculty as to how complicated they want it to be.

**TABLE 1: Cost of ingredients to make distance education courses accessible—Continued**

<b>Feature</b>	<b>Description</b>	<b>Personnel needed for task</b>	<b>Cost per unit to make accessible*</b>	<b>Reviewer comments</b>
Course Management Systems (chat, whiteboards, and similar features)	Providing access in the course management system or in another format for features such as chat or a whiteboard if they are not accessible. (e.g., a "tree" or thread of entries may be incomprehensible to a blind person using a screen reader)	Student Intern	\$24 per week of course or \$408 per semester for a student intern providing 2 hours of assistance per week in a 17 week course	One reviewer suggested that someone assisting the blind student could help the student to navigate the bulletin board. For a semester long class, the student might need one or two hours of help for each week of the class (usually 17 weeks). This cost is more similar to an accommodation though.
External Websites	Determining whether an alternative or plan is in place for students who cannot access external websites that the course links to or requires for access to lectures or assignments (e.g., alternative assignment might be offered)	Alternate Media Specialist	\$4.50 for 10 mins to identify one website, make link clear, and notify instructor that they need to provide an alternative if it is an inaccessible site	One reviewer reported that usually what works best in these situations is for the instructor to pull only the information needed from a particular page or site. Going a step further, they could place the information (if it is limited) on the instructor's pages while giving credit to the author of the external site or the appropriate person cited there. Another reviewer offered four pieces of information: 1. Determining a plan for students who may not have access to the materials in external sites is necessary, and should be determined at the school's administrative levels. 2. All external links should open in a separate window. 3. Students should be notified when they are about to access an external link and should be encouraged to contact the instructor when they find materials in external links to be inaccessible. This way the instructor can look for alternative accessible content that is equivalent to the inaccessible content. 4. Hyperlinks on these pages should use plain English text rather than the actual URL as the hyperlinked text. This hyperlinked text will be confusing to students using screenreaders.
External Videos—captioning; obtaining permission	Captioning External Videos; Can only make accessible if you have the copyright. Otherwise you need to obtain permission to make the video accessible.	Alternate Media Specialist	\$13.50 for 30 minutes to contact external source and obtain copyright or permission to make accessible; Additional \$40.50 per 15 mins of video captioning needed	One reviewer commented that it may require several phone calls or emails to track someone who can give permission and could take up to 1 hour per video. Another reported that in one course he/she reviewed the external videos were displayed as part of a multimedia presentation interface for which the ability to display captions may or may not exist. Even with permission granted, the best the school could do is provide an unsynchronized text transcript of the audio. The best solution is for the publisher to make this content accessible. Another reviewer pointed out that even though you must ask for permission, you do not pay anything to make the video accessible.
Navigation Between Pages	Providing tools and orientation information that help students navigate within and between pages	Alternate Media Specialist	\$3.60 for 8 minutes to address one page	One reviewer commented that this might be done outside of the specific course, in a general online learning orientation. Another reported that faculty should explain how to navigate the course during the in-person or online orientation. In some cases a student with disabilities will need additional help from DSP&S. A third commented that the course he/she reviewed included WebCT tutorials which explained course navigation.
Pause and Stop	Ensuring that moving, blinking, scrolling, or auto-updating objects or pages can be paused or stopped.	Alternate Media Specialist	\$20.25 for 45 minutes to provide the same information in another linked format such as text file or PDF so that it is more easily readable by assistive technology.	One reviewer pointed out that this probably would be done by the person who created the pages. For example, if the faculty member with this type of expertise created such pages, then they would be asked to revise them to avoid these problems.

**TABLE 1: Cost of ingredients to make distance education courses accessible—Continued**

<b>Feature</b>	<b>Description</b>	<b>Personnel needed for task</b>	<b>Cost per unit to make accessible*</b>	<b>Reviewer comments</b>
PDFs	Making PDF documents accessible—required if images or other features in the PDF were not made accessible prior to making the document a PDF	Alternate Media Specialist	\$4.50 for 10 minutes to make the PDF accessible (getting the document in pre-PDF format, making all features accessible, and then putting back in PDF format)	One reviewer reported that this is a normal part of course development if a faculty member is properly trained. Another reviewer reported that there is a setting in Acrobat that allows you to enable accessibility. It basically makes the document easily readable by a screen reader. The setting only needs to be enabled once. Once that is set the only thing left to do is to convert the original to PDF, which can take up to a minute.
Power Point Files	Making PowerPoint documents accessible	Faculty Member	Faculty Responsibility—5 minutes per image, graph, chart or other visual image	One reviewer reported that graphs, charts, images and other items would need to be described to conveyed the information to a blind person. He/she reviewed one course that contained images that were mainly decorative but commented that even those should be described to avoid confusion. The files would have to be downloaded, edited, resaved, and reposted. A simple chart might take 1-2 minutes and a complex one 10 minutes. Another reviewer suggested recreating the course's PowerPoint files using the appropriate style templates to ensure accessibility.
Publisher-Developed Content	Determining whether the publisher's content used in a course is accessible, whether it can be altered, and if not, and whether the publisher would allow it to be altered.	Alternate Media Specialist	\$81 for 3 hours to assess and determine whether content can be altered	One reviewer explained that the alt media specialist would need to review the course then attempt to contact the publisher via emails and phone calls. The time required to take these steps will vary from course to course. Again, the ideal situation is to purchase products that are already accessible, but currently that is usually not possible.
Software Used	Determining whether other software packages (such as statistics packages) that are included in the course, whether on the student's computer or through the college system, is accessible and finding an alternative to it if it is not.	Alternate Media Specialist	\$54 for 2 hours required to determine if accessible and find alternative	One reviewer reported that this is a complicated issue that would require close consultation with the faculty member, student's counselor, and perhaps experts in the field. If features are included, such as multimedia movies, it would be up to the instructor of record to supply an equivalent accessible means for the student to access it. Another reviewer commented that telling the students that the multimedia materials are optional and the only requirement is to "read the chapters" is not an adequate response.
Time to assess entire course to identify what needs to be changed	Alternate media specialists will need to review each lesson, quiz, bulletin board in a course and click on all external links, assess all videos, audio podcasts and other features.	Alternate Media Specialist	\$81 for 3 hours to click through all features and links to see if accessible	
Videos—Describing Contents	Describing video contents so a blind person will understand what is showing on the screen	Faculty Member	Faculty Responsibility—12 hours to write a script describing features of the video, have someone record it, and then added to the existing video in the correct locations so as not to overlap with existing audio	One reviewer reported that this is almost never done but would be very expensive. A script would need to be developed, voice talent would need to read the script, and all on the screen would need to be described accurately. As an alternative, the instructor or college staff could provide additional written information for the blind student.

**TABLE 1: Cost of ingredients to make distance education courses accessible—Continued**

<b>Feature</b>	<b>Description</b>	<b>Personnel needed for task</b>	<b>Cost per unit to make accessible*</b>	<b>Reviewer comments</b>
Videos—Captioning	Captioning Videos	Alternate Media Specialist	\$40.50 for the 90 minutes it takes to caption 15 mins of video (or \$90 for 15 minutes of video captioned by an external vendor)	One reviewer reported that external vendor costs can vary: roll up video costs less than pop up video.
<b>Training and Support</b>				
Trainings for alternate media specialists and other campus personnel supporting the accessibility of distance education	To keep veteran and new alternate media personnel up to date on the latest technology and how to make web features accessible	High Technology Center Training Unit	\$147,647 annually—with 50 campuses taking advantage of the services in a year	To calculate the cost of administrator trainings per campus, more information would be needed, including whether the trainings offered are at capacity, how many attendees could be accommodated in one training, and other factors. If the trainings currently offered are filled to capacity, then the cost per campus would be \$2,953.
1:1 Assistance	1:1 assistance such as trouble shooting phone calls	High Technology Center Training Unit	\$73,823 annually—with approximately 30 campuses per year taking advantage of the service (\$2461/campus)	
Electronic Assistance	Electronic assistance such as providing assistance through listserves or developing online tutorials	High Technology Center Training Unit	\$110,735 annually—with all 109 community college campuses taking advantage of the service. (\$1016/campus)	
Other Support	Other support might include addressing issues with site licenses, research projects and other factors	High Technology Center Training Unit	\$36,911 annually—benefiting all 109 community college campuses (\$339/campus)	
Faculty Training for Those Developing and Offering On-line Courses—Delivered by Campuses	Training to help faculty better understand what needs to be made accessible and how to make it so	Alternate Media Specialist	\$324 annually for one campus to administer six 90-minute trainings per year with 90 minutes preparation time prior to each one	There may be many more faculty who need to be trained so this is not the full cost of training. One reviewer commented that his sessions could accommodate up to 20 people but usually 8 to 14 attend.
Student Training for DSP&S Students—Delivered by Campuses	Training on taking DE courses to ensure they know how to access features with adaptive technologies	Alternate Media Specialist or DSPS Staff	\$243 annually for Alt Media or \$270 annually for DSPS computer lab staff to provide 3 trainings at 90 minutes per session with 90 minutes preparation time prior to each one	

We recommend that state and/or local administration make clear to faculty which features they are expected to complete on their own and for which they can expect to receive assistance. For example, reviewers reported faculty clearly are responsible for writing descriptions of images posted and providing text only materials. Other areas are less clear. If a video needs to be captioned, is that a faculty responsibility and cost, or that of DSPS, DE, or other offices? What is reasonable to expect an instructor to address and to account for out of their department's budget? It should be noted that the Distance Education Captioning and Transcription grant can assist campuses in their efforts to provide live and asynchronous captioning and transcription for videos that they own. More information on how to access these funds is available at <http://www.canyons.edu/captioning>.

**Training and support** listed in the ingredients chart are an integral part of the process of making online courses accessible. It is imperative that faculty understand what features need to be made accessible and how to make them so. However, in Part I of this report, the faculty survey results revealed that only 49% knew that their college offered “workshops, seminars, or courses on designing accessible courses” and only half knew of the state's document *Distance Education: Access Guidelines for Students with Disabilities* published in 1999. Perhaps even more telling, while 92% of faculty respondents knew that DE courses must be accessible to all students, when they were asked whose responsibility that was, 31% were not sure, and 13% reported that it is not the faculty's responsibility. It is clear that training could play a key role in educating faculty about the accessibility requirements and their role in meeting them. Even this simple step could significantly reduce the costs of making courses accessible since training is not expensive and can reach many personnel.

Additional faculty trainings that cover issues besides accessibility could focus on helping faculty learn to incorporate features into their courses that make learning the content easier and more interesting for students. In Part I of this report, 28% of students found DE courses less interesting than on-campus courses and 29% thought DE courses make it harder to understand material than their on-campus classes. At least one reviewer commented on the need for this type of training.

Accessibility and navigability would likely improve for students by also providing them with training on taking DE courses. Even if the course material is accessible, students need to understand the features provided in a DE course such as bulletin boards or chat rooms and how to access the material, or when to ask for assistance. Ensuring that they know how to use adaptive technologies is also an important piece of their navigating the courses.

Administrators also need ongoing training on how to make courses accessible using the most recent tools and techniques and on how to train and support faculty to make features accessible. These trainings might include assistance for alternate media personnel or others in the DSPS and DE offices that work on making web-based courses accessible. Those new to the job need training and veterans need updates on new technologies and processes for making courses accessible. In addition to formal training sessions, the High Tech Center Training Unit and other organizations offer one-on-one troubleshooting and support, electronic assistance such as listservs and online tutorials, and other support services.

Trainings may not be reaching all who need to attend and consequently costs for those may be significantly higher than currently budgeted given personnel time required to run trainings and increased travel costs. As mentioned previously, many faculty are unaware of trainings being offered. Those interviewed for this report said that faculty trainings draw only a handful of people and would likely be better attended if incentives were offered. It's also possible that some campuses currently are not offering any faculty trainings. As for administrator trainings, the High Tech Center Training Unit, which provides much of the relevant administrator training, estimates that only 50–60% of campuses send personnel to trainings each year. They recommend that administrators attend annually to stay current with new technology developments.

### ***Costs Beyond Those Listed in Table 1***

Various factors are not included in the Table 1 costs that may require funds and should be considered.

Building awareness of trainings and providing incentives to attend them would likely get more personnel to attend. Interviews revealed strategies that might encourage more individuals to attend. Strong encouragement or gentle pressure from administration that it expects faculty and administrators to attend trainings could help. Encouragement from the Academic Senate that making courses accessible is a core component important to the campus's work may also help with recruitment.

Three other ideas would entail varying costs:

- Offering flexible credits such as continuing education credits or credit hours for attending training sessions;

- Developing online tutorials or activities for a select group who could most benefit from this approach. (In Part I, 22% of faculty reported that their college offered such supports.); and
- Providing “social engineering” such as warm brownies and cold milk to entice some to attend training sessions.

Services provided by external vendors can also help campuses with insufficient capacity to address all the DE courses needing attention. As already explained, to determine the costs in Table 1, we used campus personnel costs instead of vendor costs since we thought it might provide more accurate information since interviewees reported that vendors are used less frequently and are more expensive. While we did not survey vendors to determine costs, reviewers reported on a few course features that might be handled by vendors: video captioning would cost approximately \$90 for 15 minutes of video, and audio podcast transcription would cost \$30 for 15 minutes. Reviewers also commented that vendors charge less for roll-up videos than pop-up videos. Obviously, costs would vary by vendor.

### **Cost Per Course**

In addition to examining the costs per item, we also looked at the costs for two specific courses that were reviewed. An English course offered a fairly simple format with mostly text and images; and a history course offered a more complex format with various multimedia features that can require more time to make accessible. We chose to compare two humanities courses so the simple and complex formats would be comparable given that the format for content in these courses might be more similar than say a math class, which requires that formulas be translated. The cost to make each course accessible (not including faculty’s role) was \$477 for the simple course and \$2,016 for the complex course. Table 2 offers a format similar to the Table 1 ingredients chart but includes the specific quantity of the features included in each course and total costs for each course.

It is important to note that these costs are for only two sample courses. Within the California community colleges more than 6,000 online courses are being offered—each providing a different combination of features. Using the “ingredients” we have provided, the cost for each of these individual and different courses can be determined, but clearly costs will vary depending on the features included. (If many of the features included are those that reviewers indicated faculty are responsible for, the total cost for even a complex course may be lower than one might expect.) While it was beyond the scope of this study to determine how many of the existing and developing online courses offer simple or complex formats, as mentioned above,



some interviewees estimated that the majority of courses are offered in a simple format. It should be noted that a simple course can be an excellent one if it includes extensive instructor input for students and rich online discussions.

For the purposes of this study we define a “simple” course as one that, technologically, has features that take less time and expertise to make accessible, which ultimately may require less funding to address. For example, “simple” courses provide text and images but not videos, podcasts, or other multimedia features. The course may have a significant amount of text and number of images, but we would still define it as simple. We define a “complex” course as one including features that take more time and expertise to make accessible such as videos, podcasts, or other multimedia features. Courses may have a limited number of features, but can be considered “complex” due to the type and amount of work necessary to ensure accessibility.

**TABLE 2: Cost to make sample courses accessible using ingredient costs**

Feature	Description	Personnel needed for task	Cost per unit to make accessible*	Quantity of feature as cited by reviewers	Total cost for feature	Quantity of feature as cited by reviewers	Total cost for feature
<b>508 Standards for Accessibility</b>				<b>Simple Course: English</b>		<b>Complex Course: History</b>	
Images	Providing information for Images or non-text elements (using alt, longdesc, or other methods)	Faculty Member**	Faculty Responsibility—3 minutes to address each image	17	0.00	1	0.00
Multimedia presentations	Synchronizing alternatives for multimedia presentations	Alternate Media Specialist***	\$40.50 for the 90 minutes it takes to caption 15 mins of video (or \$90 for 15 minutes of video captioned by an external vendor)			42 Multimedia presentations at approx 15 minutes each	1,701.00
Documents without Style Sheets	Organizing documents so readable without requiring an associated style sheet	Faculty Member	Faculty Responsibility—10 minutes			yes	0.00
Data Tables—Headers Identified	Organizing data tables so that row and column headers are identified	Faculty Member	Faculty Responsibility—15 minutes	1	0.00		
Scripting Language	Changing pages using scripting languages to display content, or create interface elements, so that the information provided by the script is identified with functional text that can be read by assistive technology	Faculty Member	Faculty Responsibility—4 minutes to revise it if not accessible or switch to an accessible format			All 42 Multimedia presentations previously discussed	0.00
Plugin or Applets	Providing a link to a plug-in or applet that complies with standards when a web page requires it to interpret page content	Alternate Media Specialist	\$4.50 for 10 minutes to address one feature			1	4.50
Online Forms	Changing any information, field elements, and functionality required for completion and submission of on-line forms, including all directions and cues so that they are accessible by those using assistive technologies	Faculty Member	Faculty Responsibility—varies according to length of form; estimate average of 2.5 hours per form			Form fields are present in various pages throughout the moodle shell	0.00
Repetitive Links	Changing webpages so a user can skip repetitive links.	Faculty Member	Faculty Responsibility—Varies according to number of pages to address; 5 minutes to add "skip link" to one page or to switch within a template to change for all pages			Skip to Main Content' link	0.00
Timed Response Feature	Adding a feature so that when a timed response is required, the user shall be alerted and given sufficient time to indicate more time is required.	Faculty Member	Faculty responsibility—20 minutes to create second version of test that has no timer or a different timer with password protection			8	0.00

\* Benefits, incentives, and ongoing support are not included in chart but should be considered.

\*\* This cost is not included in the total even though it might be necessary because the solution for making this accessible is more of an accommodation. These costs might be incurred if a blind student enrolls and needs assistance with this feature though.

**TABLE 2: Cost to make sample courses accessible using ingredient costs—Continued**

Feature	Description	Personnel needed for task	Cost per unit to make accessible*	Quantity of feature as cited by reviewers	Total cost for feature	Quantity of feature as cited by reviewers	Total cost for feature
<b>Other Accessibility and Navigability Issues</b>				<b>Simple Course: English</b>		<b>Complex Course: History</b>	
Activation with desired input device	Ensuring that users may enable activation of page elements with their preferred input (or output) device—mouse, keyboard, voice, head wand, or other.	Alternate Media Specialist	\$4.50 for 10 minutes to address one page	10 pages	45.00		
Clear navigation mechanism exists	Ensuring that clear navigation mechanism (orientation information, navigation bars, a site map) exists so users can find what they are looking for	Faculty Member	Faculty Responsibility—3 minutes per page	10 pages	0.00	All pages	0.00
Course Management Systems (chat, whiteboards, and similar features)	Providing access in the course management system or in another format for features such as chat or a whiteboard if they are not accessible. (e.g., a "tree" or thread of entries may be incomprehensible to a blind person using a screen reader)	Student Intern	\$24 per week of course or \$408 per semester for a student intern providing 2 hours of assistance per week in a 17 week course	(**)		(**)	
External Websites	Determining whether an alternative or plan is in place for students who cannot access external websites that the course links to or requires for access to lectures or assignments (e.g., alternative assignment might be offered)	Alternate Media Specialist	\$4.50 for 10 mins to identify one website, make link clear, and notify instructor that they need to provide an alternative if it is an inaccessible site	Approximately 70 external websites mostly located under the Resources Page	315.00	51	229.50
Navigation Between Pages	Providing tools and orientation information that help students navigate within and between pages	Alternate Media Specialist	\$3.60 for 8 minutes to address one page	10 pages	36.00		
Time to assess entire course to identify what needs to be changed	Alternate media specialists will need to review each lesson, quiz, bulletin board in a course and click on all external links, assess all videos, audio podcasts and other features.	Alternate Media Specialist	\$81 for 3 hours to click through all features and links to see if accessible		81.00		81.00
Videos—Describing Contents	Describing video contents so a blind person will understand what is showing on the screen	Faculty Member	Faculty Responsibility—12 hours to write a script describing features of the video, have someone record it, and then added to the existing video in the correct locations so as not to overlap with existing audio			See Multimedia Entry	0.00
Videos—Captioning	Captioning Videos	Alternate Media Specialist	\$40.50 for the 90 minutes it takes to caption 15 mins of video (or \$90 for 15 minutes of video captioned by an external vendor)			See Multimedia Entry	0.00
<b>Total cost for course:</b>					<b>477.00</b>		<b>2,016.00</b>

The costs for training and support are not included in Table 2 because it is difficult to disaggregate the costs to train one faculty member designing a course or to train and support one alternate media specialist and/or other administrators in making one course accessible. For example, if trainings are not at capacity it may not be accurate to include the full cost of the training for one person.

### ***One System-Wide Recipe: Cost to Make Existing Courses Accessible***

As mentioned previously, the ingredients can be used to determine costs at the course, campus, or system level. Various recipes might be mixed at the system level. We offer one here: determining the costs to make *existing* courses accessible. This is a complicated task because many factors must be taken into account: the number of courses that are currently inaccessible, the level of complexity of those courses, supports beyond the “ingredients” that are needed to make current and future courses accessible, and other factors.

### **Complexities of Determining System Costs**

One of the complexities of determining the cost for the system is estimating how many existing courses are currently fully accessible. While survey data from Part I of this needs assessment provides some information, it represents only a sample of faculty and administrators on CCC campuses. Those results found that faculty responding to the survey believed that 87% of their courses taught over the last 5 years were accessible. Of administrators responding, 50% believed that 76–100% of existing DE courses on their campuses were accessible for courses offered from summer 2007 to spring 2008. Two-thirds of students with disabilities responding to the survey reported that DE courses they took in the last year were “almost always” accessible. For the recipe outlined in Table 3, we took an amalgam of these survey data and estimated that 33% of online courses are not accessible.

Another difficulty, as mentioned previously in this report, is that each course varies in format and features, and no concrete data exist on how many of the system’s courses might be termed simple or complex. And the capacity of each campus to make the courses accessible may differ as well, depending on how well faculty follow through with their responsibilities to make course features accessible, how overloaded alternate media specialists currently are, and other factors. It is also difficult to project how many courses developed in the future will offer more involved formats given technological advances. While it might seem reasonable to assume that courses would become increasingly complex as technology advances, interviewees reported that most instructors are not exceptionally skilled at developing web-based courses that incorporate advanced features because, after all, their expertise is in teaching and

research. As a result, if there was a push to offer more complex formats, there would likely be a steep learning curve for instructors, or additional supports needed from staff more skilled in this type of web-based work. In addition, technological advances could make it easier to make some features accessible, thus lowering costs. For the recipe outlined in Table 3, we used an estimate cited by some experts interviewed during this study that perhaps 60% of online courses are of a simple format and 40% are of a complex format. As previously mentioned, some disagreed with this estimate. We also estimated that a course in a simple format would cost \$477 (from the English course in Table 2), and a course in a complex format would cost \$2,016 (from the history course in Table 2).

Further complicating matters in estimating system costs is that no data exist on how frequently existing online courses are updated and require ongoing assistance to maintain their accessibility. According to survey results from Part I of this report, the number of courses being maintained far outweighs the number being developed. Two-thirds of administrators reported that 1–10 DE courses were being developed on their campuses, with the other third indicating that 11–50 are being developed. The costs listed in Table 1 above can be used to estimate the cost of maintaining courses. For if each of the 6,335 existing online courses added just one 15-minute video that was not accessible, it could cost more than \$250,000 to update the courses for accessibility.

On the other hand, if faculty are well trained and motivated to make courses accessible during development, costs might diminish. Many interviewed reported that it would be much less expensive to make a course accessible up front than to return to fix it later. For example, if the instructor wants to include animation in the course and knows not to embed choices, it can save hours of work later on because it minimizes the inaccessible part that needs fixing. Or if an instructor has a choice between videos and knows to select the one that is already captioned and builds his or her lessons around that, costs are saved on captioning or on changing the video later and having to adapt the lessons to it.

### **One Recipe for System Costs**

With these caveats in mind, we offer one sample “recipe” for combining the ingredients outlined in Table 1 to determine the costs to make all *existing* online courses in the system accessible.

CCCSO data from 2008 reported that 6,335 DE courses in the system were Internet based. Using the survey data from Part I of this report, which is just a sample of responses of those in the field, we might estimate that 33% of online courses or 2,091 are not accessible. (This figure was determined by taking the average of the

administrator, faculty, and student survey responses mentioned earlier in this section.) Of those 2,091 courses, 60% might be presented in a simple format offering mostly text and images. The other 40% might be presented in a complex format with far more multimedia components, as estimated by certain interviewees. The cost of one simple format course as estimated in Table 2 is \$477 and the cost of a complex one is \$2,016.

With these figures in mind, 60% of 2,091 inaccessible courses results in 1,254 simple courses that need to be made accessible. If it takes \$477 to address them, using the “simple” course in Table 2 as an estimate, that would cost \$598,315. For the 40% of complex courses, or 836 courses that need to be made accessible, if it costs \$2,016, using the “complex” course estimate in Table 2, then the total to address them would be \$1,685,820. Adding these two costs provides a total of \$2,284,135 in costs to make existing DE courses in the system accessible.

**TABLE 3: One system-wide recipe—cost to make existing courses accessible**

<b>Course features</b>	<b>Number of online courses offered</b>	<b>Sample course cost taken from ingredients chart in Table 2****</b>	<b>Total cost</b>
Total number of online courses offered in CCC*	6,335		
33% of online courses inaccessible**	2,091		
Assuming 60%*** of the 33% above are offered in simple format	1,254	\$477	\$598,315
Assuming 40%*** of the 33% above are offered in complex format	836	\$2,016	\$1,685,820
<b>Total Cost:****</b>			<b>\$2,284,135</b>

\* MIS data from CCC System Office received on July 15, 2008; Data from 2006-07.

\*\* Estimate taken from amalgam of administrator, faculty, and student responses in Part I survey.

\*\*\* Estimate from several experts interviewed for study.

\*\*\*\* Benefits, incentives, and various ongoing supports including training are not included in these costs but should be considered.

Other factors such as trainings, incentives, maintenance of courses, new courses, and capacity building needs are not included in this recipe and would need to be taken into account. Although we have data on training costs, these are ongoing costs that would be required each year—so providing those costs in this particular recipe might be incongruous. Incentives for campuses to make existing courses accessible might be offered to encourage getting this work done. These might be incentives to attend trainings or to submit a revised course that has been identified as being inaccessible. Other factors, such as maintenance and capacity building needs are also not included in this estimate. As instructors continue to update these courses from semester to semester, the features they add may need attention to make them accessible.

## Recommendations

Much can be done at the system and campus level to improve the percentage of DE courses that are accessible to all students. Many recommendations have been mentioned throughout this report, but we summarize them here.

### ***Use Ingredients to Determine Costs and Make Decisions***

The ingredients list that offers the costs to make certain features of DE courses accessible or costs to offer trainings and supports to campuses should be used for further estimates at the course, campus, and system level. Some examples include determining costs to make courses *being developed* or *existing* courses accessible on each campus and for the system; provide sufficient trainings for all campuses if all personnel who could benefit were attending; *make* courses in a particular discipline accessible so more funding can be provided for more disciplines that often require more complex formats; or make particular courses accessible to determine whether offering incentives to faculty would outweigh the costs to fix courses later if faculty do not address them up front.

At the system level, the CCCSO might use an estimate to leverage more funding from the legislature to address these needs. Similarly, at the campus level, administrators might use these data to request more general funds from the campus to meet these needs. Campus deans or curriculum review committees might use these data to explain to faculty how much it will cost to fix courses that were not made accessible in the first place. As was suggested previously, the features in the ingredients list should be updated as new technologies affecting DE courses emerge, and the costs should be updated as new approaches make it easier to address those features.

### ***Use Funds Effectively***

While determining costs may reveal that more funding is needed to make all DE courses accessible, some changes can be made by reallocating funds, using existing funds more effectively, or containing costs in other areas. For example, building awareness among faculty as to what they need to do would cost little but could have a significant effect on the number of courses made accessible.

In addition, there were strategies that we noted in Part 1 of this report that bear repeating because they relate to the effective use of funds. We mentioned that there may be important reasons to purchase more than one CMS depending on what features each system contains, but it would seem reasonable that the CCCSO should oversee which systems are purchased and use its potential bargaining power to its

advantage. Limiting the number of products will also cut the costs of support staff. Besides considering the cost for a CMS system, key decision makers can give priority to the accessibility features provided by each CMS.

Basic courses are a significant part of the total number of online courses in the CCC system. These courses could be adapted to state-of-the-art, media-rich online presentations including video, while also permitting individual students to interact in some way with that media. This media-rich content could be created by a CCC team of developers or the courses might be developed by an outside provider. The format would probably involve less personal interaction with a teacher, but it should continue to permit some form of personal contact. In cases where campus sections of large courses are limited by room size, providing rich media online can be delivered to an audience of any size. The beginner courses could control costs because of the size of classes.

### ***Clarify with Faculty What They Are Responsible For***

It is important for the CCCSO and each campus to make it clear to faculty what they are solely responsible for in making a course accessible and what they can expect to get help with (e.g., image descriptions vs. captioning). Updating the state guidelines can help with this, but generally building awareness among faculty, many of whom may not read the guidelines is also important. Getting academic senates on individual campuses to understand the importance of this is key to having faculty take on this work.

### ***Offer Incentives to Faculty***

While some balk at offering faculty incentives for something they are seen as required to do, offering funds, credits, or other elements may be less expensive than trying to fix their courses later. Incentives might be offered to get them to attend trainings. As one reviewer put it, “if they left feeling confident and aware about their responsibility to fix just certain (not all) elements in their DE courses, it would still save the system money.” And better-attended trainings would take advantage of the time and effort already put into preparing and administering the trainings; training for 5 may have the same cost as for 15. Incentives could also be offered to encourage faculty to make their courses accessible and the program could include checks of their courses when finished to assure that they accomplished this.



# Promising Practices for Making Distance Education Courses Accessible to Students with Disabilities

As part of the work for Part II of this study, we gathered information about practices that seemed promising or have good potential for facilitating the process of making distance education courses consistently accessible. These ideas were gathered from literature we reviewed, from open-ended responses on the surveys administered during Part I of the study, and from interviews conducted by phone with a range of informants or during site visits to a sample of community colleges in California. While we did not use any formal vetting process for identifying practices as “promising,” we gave consideration to the reactions that others had to them and to the measure of success they seemed to be having in sites where they were being implemented, and to whether they addressed needs identified in the survey results of Part I of this report

We begin this section with a set of overarching indicators developed by a group of experts that provides a framework for addressing accessibility of distance education for students with disabilities. Scholars at the University of Washington collaborated with 16 other institutions of higher education to create a set of common indicators of distance learning program accessibility. Each indicator is associated with a targeted audience: students, distance education course designers, distance education instructors, or program evaluators. Many of the indicators relate to the establishment of policies or to publicizing the school’s commitment to making courses accessible. While these indicators do not constitute an exhaustive list, they could provide helpful guideposts for distance education programs as they work towards accessibility. The indicators are as follows:

For Students and Potential Students:

- *DLP Accessibility Indicator 1.* The distance learning home page is accessible to individuals with disabilities (e.g., it adheres to Section 508, W3C, or institutional accessible-design guidelines/standards).
- *DLP Accessibility Indicator 2.* A statement about the distance learning program’s commitment to accessible design for all potential students, including those with disabilities, is included prominently in appropriate publications and

websites along with contact information for reporting inaccessible design features.

- *DLP Accessibility Indicator 3.* A statement about how distance learning students with disabilities can request accommodations is included in appropriate publications and web pages.
- *DLP Accessibility Indicator 4.* A statement about how people can obtain alternate formats of printed materials is included in publications.
- *DLP Accessibility Indicator 5.* The online and other course materials of distance learning courses are accessible to individuals with disabilities.

For Distance Learning Designers:

- *DLP Accessibility Indicator 6.* Publications and web pages for distance learning course designers include: a statement of the program's commitment to accessibility, guidelines/standards regarding accessibility, and resources.
- *DLP Accessibility Indicator 7.* Accessibility issues are covered in regular course designer training.

For Distance Learning Instructors:

- *DLP Accessibility Indicator 8.* Publications and web pages for distance learning instructors include: a statement of the distance learning program's commitment to accessibility, guidelines/standards regarding accessibility, and resources.
- *DLP Accessibility Indicator 9.* Accessibility issues are covered in training sessions for instructors.

For Program Evaluators:

- *DLP Accessibility Indicator 10.* A system is in place to monitor the accessibility of courses, and, on the basis of this evaluation, the program takes actions to improve the accessibility of specific courses as well as update information and training given to potential students, current students, course designers, and instructors (Burgstahler, 2008).

### ***Establishment and Use of Policies and Guidance***

The prevailing wisdom in the literature and in the field is that every campus should have a local accessibility policy pertaining to web sites and online distance learning courses (Burgstahler et al., 2008; AccessIT Pub #7, 2004; Burgstahler, 2002). These policies should be couched in an understanding of what the law requires, though like many other compliance issues, what constitutes legal compliance is somewhat open

to interpretation and strict adherence to a legal mandate does not always translate into effective practice.

### **Legal Compliance**

Determining what constitutes legal compliance with laws governing the accessibility of distance education is a challenge. Section 508 of the federal Rehabilitation Act only applies directly to federal agencies. However, many other entities use these guidelines as guidance for their own efforts around web accessibility. In an informal, non-binding review of the issues surrounding the accessibility of distance education, the federal Office of Civil Rights (OCR) at the United States Department of Education provides some helpful discussion around what constitutes compliance. First, they explain that “live” online courses ought to be designed to be easily adaptable so that instructors can quickly address the needs of students with a range of disabilities. In an example, the OCR publication explains that there is probably not a need to provide real-time captioning if a course does not have a student with hearing impairment enrolled. But the authors go on to say that instructors should be ready and the course should be built in such a way that real-time captioning can be readily added—as close to immediately as possible—if a student with such an impairment enrolls in the course. It follows then that campuses must have systems in place to respond quickly to this and faculty must be fully aware of their obligation and of how to request and receive assistance promptly to meet student needs.

However, in the case of archived courses that are available online, the OCR documentation suggests that captioning should be included in the course before it is posted, or at least that the instructor responsible for the course is ready to provide an effective alternative for those with impairments. This example underscores the fundamental message of the OCR document—to meet an acceptable degree of compliance, educational institutions must either ensure that all learning opportunities are accessible or that an alternative and equally effective approach to providing the same information and interaction is available (OCR, “Web Accessibility,” n.d.). In addition, the Office of Civil Rights, as well as quite a few others, recommends that institutions provide a simple way for those with disabilities to report problems with accessibility and request alternative means to access the online information (OCR, “Web Accessibility,” n.d.).

### **Policies and Guidelines**

Evidence from MPR Associates’ survey of California community colleges in 2008 suggests that the creation and implementation of policies at the local level varies from site to site. Only 40% of administrators reported that their colleges or districts had an accessibility policy that guides administrators and faculty in developing and maintaining courses that are accessible to all students. Of administrators who

reported that their campus or district had an accessibility policy, 46% said that the policy did not include accessibility checklists for DE course development. Some advice about the process of developing such a policy and its contents has emerged from our evaluation. First, campus leaders should ensure that all stakeholders are represented in the process of forming local accessibility policies. Some initial steps towards developing a policy may include reviewing other sites' accessibility policies for promising approaches and consulting with legal experts for clarity regarding mandates relating to web and distance education accessibility under the Americans with Disabilities Act (ADA) and other statutes. It should also be based on an assessment of local needs (see section on Evaluation as well).

Next, those developing the policy should explore existing barriers to providing fully accessible DE courses, including the specific challenges experienced by students with disabilities who take online courses. Then, developing a policy statement that expresses the institution's commitment to accessibility, standards for the accessibility of all web content and tools, and time for stakeholders to revise such statements and guidelines is critical. The policy should include language pertaining to timelines for compliance, approaches to ensuring the accessibility of legacy pages that predate the policy, processes for requesting exemptions from compliance, protocols for considering accessibility when procuring new technological tools, and expectations around training faculty and staff on how to ensure accessible web-based content. Finally, stakeholders and leaders should identify a process for evaluating progress towards full compliance (Burgstahler et al., 2008; Access IT Pub #7, 2004).

Once a campus has developed a local accessibility policy and guidelines, it is incumbent upon leaders to widely distribute information about that policy to a range of campus audiences. Campus leaders should inform faculty and staff about where and with whom the responsibility lies to ensure online content is accessible to all students. Students must be informed about their rights under the law and under the local policy regarding accessibility of course content and other web-based information. Information technology staff must be trained to know what their role will be in ensuring accessibility, including supporting academic departments and procuring new technology.

### ***Centralization, Coordination, and Communication***

A number of practices that were recommended or seemed promising involved the centralization of procedures. Our survey in Part I revealed that almost 50% of DSPS and DE coordinators do not think responsibilities are clearly designated, and a similar percent of faculty either did not think responsibilities were clearly designated or did not know. Procedures for ensuring accessibility of DE sources should be

coordinated among the various offices that have an interest or responsibility. Roles and responsibilities should be clarified as should the procedures for developing and making courses accessible. In places where we saw higher levels of coordination, courses were more consistently accessible.

Coordination and communication can also be important when it comes to establishing system-wide procedures. A number of interviewees had success and thought it would be useful if there were more joint advocacy among the community college campuses to prompt vendors and publishers to make their materials accessible or to refuse to purchase materials that are not accessible. Another suggestion was that an advisory/working group be established that would review software packages or other tools and procedures and make recommendations for the system as a whole.

Colleges can learn a lot from each other. While there are a number of listservs among DSPS and DE staff across colleges that function quite well in highlighting issues and raising particular questions, many thought that a higher level of cross-campus communication through other means could facilitate the sharing of useful ideas, techniques, and procedures. Others mentioned Internet and other resources that can be tapped and are useful: <http://www.merlot.org> and <http://www.cew.wisc.edu/accessibility/default.asp> are examples. The latter focuses on “accessibility for all.” Other useful information is available through the Web Accessibility Initiative of the W3C web site: <http://www.w3.org/WAI/>. Tapping such resources allows people to broaden the conversation and share resources and ideas that are useful to many who are striving to make education accessible to all.

Everyone needs to know what resources are available as they work towards accessibility. A variety of approaches have been suggested for achieving such far-reaching publicity. Centrally publishing students’ rights and services relating to accessibility on the web is a common approach. Regularly collaborating with campus-based and community media outlets to raise awareness about disability-related events and services, especially if students with disabilities are playing an active role in the planning and execution of events, helps raise the profile of disability-related issues on campus. Recruiting students with disabilities to be speakers at campus events also increases visibility for accessibility issues (Burgstahler, 2005). As is evident throughout these suggested approaches, it is commonly recommended that dissemination occur using a variety of formats, including mailings, in-person presentations, web-based presentations, and others (AccessIT Pub #7, 2004; Brown and Keegan, n.d.).

The University of Texas at Austin serves as an example of creative publicity for web accessibility. Each year, as part of a larger event focused on accessibility issues, the

campus hosts the Accessibility Internet Rally University challenge. There, teams of web developers partner with local nonprofits to build the most accessible websites they can in the span of one day. The best sites are given recognition and awards, the nonprofits benefit from new, accessible websites, and the message of online accessibility reaches a broader campus and community audience (Burgstahler, 2008). In California, the California Virtual College has established a set of criteria for high-quality distance education courses and identifies excellent examples from around the state. In addition to these state-level examples, it might be valuable to create local or regional awards or recognition programs for distance education courses that excel in the realm of accessibility. This might be an effective incentive as well as a means of raising awareness.

### ***Development Procedures***

Building on the first section about the establishment of policies and guidelines and the second that focuses in part on coordination, the best procedures for development seem to be those that are well-developed sequences. One interviewee described the ideal sequence as follows: an instructor goes to the curriculum committee and makes a proposal. If accepted, the instructor is then assigned an instructional designer who helps him or her storyboard the course—describes the flow of the course-specific content. They then figure out together the construction and intellectual property issues, video segments, and issues of accessibility. They address all those issues before committing to a single line of code. They also determine the budget and sources.

### ***Approval and Review Forms***

As part of the development sequence—or to initiate it—many colleges have forms or checklists that faculty are asked to complete or that are completed by reviewers as part of the review of their plans for course development or subsequent to development as part of the review process. These reflect varying levels of compliance—from acknowledgement that accessibility standards must be met to something closer to a “gatekeeper,” i.e., a course won’t be approved if it does not pass an accessibility review. These are examples of tools that could be shared or used to develop a common form to be used across campuses. The WebAIM (Web Accessibility in Mind) web site also provides a useful checklist for assessing whether elements in the course meet each of the 508 standards.

### ***Collaboration***

A number of interviewees described the ideal development process as one that would involve a team of collaborators that would bring their expertise together in developing a course. A survey respondent described such a practice as one that involves a collaborative team including an instructional designer, faculty member,

DE specialist, etc. This individual valued this new model because s/he felt that an “artisan” approach had been used for too long, resulting in courses that “look like correspondence courses of 60 years ago.” Another promising practice that was mentioned by a high tech specialist also focused on a collaborative approach—this time across the whole system. Noting that about 20 courses make up 50% of the curriculum in community colleges, s/he thought that a representative, collaborative team could develop a set of commonly-taught, high-quality courses that would be available to colleges throughout the system. A complementary recommendation to this one was that a faculty member developing a course could identify a “critical path” of information that was absolutely essential to obtaining course content and that attention could be focused on making this information accessible. Other auxiliary material might not need such focused attention.

### **Controlling Costs**

While the first half of this report addressed the cost of making courses accessible much more extensively, a few key points from the literature and our conversations in the field merit review. Many of the experts interviewed expressed a common perception that it costs less to build an accessible distance education course, or any web-based object, from the ground up than it does to retrofit it for accessibility later (Edmonds, 2003; Access-IT, n.d.). This point reinforces the importance and urgency of faculty awareness of accessibility issues and training in how to create accessible online instruction. New online distance education courses are created and introduced every semester. Working to ensure that these courses are built to be accessible—and easily modified later if necessary—will undoubtedly save resources locally and system wide.

It is important to note, however, that the cost of making courses “accessible” depends heavily on two factors: the features included in the courses and the definition of “accessible.” To the first point, our cost analysis, detailed in the previous section, demonstrates that different components of distance education courses require differing investments of time and resources to ensure their accessibility. To the second point, our evaluation has assumed “accessible” to mean Section 508 compliance. We are aware, however, that compliance with these federal guidelines does not mean perfect accessibility and navigability in every situation. As one expert asserts, meeting the standard of equivalence, that students with disabilities and students without have equivalent educational experiences, is a higher standard than compliance with relevant statutes concerning accessibility. He goes on to explain that meeting the standard of equivalence costs more (Carnevale, 1999).

## ***Training and Support***

When exploring the literature and speaking to practitioners and experts in the field about how best to promote the accessibility of distance education, perhaps the most frequently mentioned practices were those pertaining to support for faculty and administrators in designing and maintaining accessible DE courses. Administrators responding to our survey cited common barriers to the development of accessible DE courses, including (1) lack of awareness that courses should be accessible, (2) lack of incentives to develop DE courses, and (3) difficulties with the approval process. Faculty most often cited (1) lack of proper tools, (2) lack of time to update previously developed DE courses or accessibility, and (3) lack of technical support or guidance in making courses accessible. When asked what supports were needed, administrators most commonly reported that their campuses needed the following: online self-paced tutorials on designing accessible courses, a manual on designing accessible courses, and release time for developing accessible courses. Faculty members were clear about the support they needed that would encourage them to develop accessible courses: technical assistance, funding, workshops and training, and release time.

One approach to providing this type of support is offering, and perhaps requiring, faculty and administrator training around accessibility issues. Many believe that all teaching and administrative staff should participate in some form of training that includes the accessibility of websites and online distance education courses. It follows that engaging such a diversity of staff in accessibility training would require tailoring those trainings for different audiences (Burgstahler, 2005). For instance, a brief orientation to the legal requirements around accessibility and strategies to achieve compliance might be appropriate for departmental meetings, while more in-depth, hands-on trainings in the technical aspects of making the components of DE courses accessible would be appropriate for faculty interested in participating in distance education (Burgstahler, 2005, 2007). Additionally, offering trainings in a variety of formats is an important consideration. From in-person presentations, to online tutorials, to printed publications, several different modes of communication should be employed to educate faculty and staff about the need to work towards accessible distance education (Burgstahler, 2005, 2007; Kalivoda and Totty, 2003).

Our review of the literature and interviews yielded a number of additional approaches to supporting instructors who are designing and maintaining accessible distance education courses. One alternative media specialist at a California community college noted that he gives faculty templates for uploading common course content such as syllabi and schedules to save faculty the time and trouble of ensuring that these elements of their online courses are accessible. Taking a similar



approach, the University of Wisconsin at Madison has created a web-based multimedia presentation tool called eTEACH, which allows educators to add PowerPoint slides, video, and audio course elements to a standard course template. This tool also includes a table of contents and space for uploading assessments and links to outside resources, all while ensuring that the course is contained within an accessible shell (Burgstahler, et al., 2008). San Jose State University assigns every faculty member designing a DE course an instructional designer who helps faculty prioritize when to add multimedia features such as photographs and video that can be challenging from an accessibility perspective. The instructional designer also supports the faculty member by helping to ensure that the features that are included in the course are made accessible at the time of the course's creation. Another interviewee suggested that faculty members should be encouraged to try a "hybrid course" before a full-fledged DE course—that such a sequence serves as "training wheels." Another district pays for 18–36 hours of support from mentors that are assigned to support a faculty member developing a course.

Much like faculty and staff, students with disabilities must also have appropriate support if they enroll in DE courses. As with faculty and staff, one of the most commonly cited approaches to providing such support is to ensure that students are trained to successfully engage in the online course format. From our Part I survey, faculty who provided 250 open-ended responses when asked what would make it easier for students with disabilities to succeed in DE courses most commonly suggested (1) providing an orientation session to help students accommodate the online environment; (2) providing assistance that is readily available through a help desk or other means; and (3) either encouraging students to self-identify early or facilitating the identification of students who will be in online courses as early as possible. Assessing students' readiness or preparedness for taking an online course is accomplished effectively on one campus where they have a system in place that involves searching a database when a student enrolls to see if s/he has taken a DE course before. If not, the system takes the student through an online tutorial that assesses what s/he knows and provides an orientation for taking such courses.

As one accrediting agency for institutions for higher education stated, "Any distance learning programs offered by an institution must provide students with reasonable technical support and full disclosure of all program requirements, including any that cannot be completed via distance learning" (Council for Higher Education Accreditation, 2002). Several experts cautioned that facility with technology varies greatly among students, and that training and support must be available to those who need to learn how to use the associated tools. Experts also warn that students who encounter barriers or technical difficulties during their distance learning experiences

are often easily discouraged and are quick to search for other opportunities that might better suit their needs (Brown and Keegan, n.d.; Zirkle, 2001).

Students with disabilities also ought to be active participants in creating more accessible distance education experiences; they should be involved in every stage of distance education course development—from the selection of technology, to designing technical assistance, to testing DE courses through use. By involving students throughout the process, faculty and staff learn what works and what does not, and students learn how to advocate for their own need for accessible course material (Kelly, 2008). Giving students easy protocols for providing feedback is also a direct and effective approach to supporting students with disabilities. One expert suggests creating a standard reporting tool that allows students to inform school staff of non-compliance with Section 508 accessibility standards (Murray, 2004). Another suggests making it simple for students to request alternatives when the standard presentation of course material does not work for them (OCR, “Web Accessibility,” n.d.). A few students noted that student networking or study groups helped facilitate their progress in DE courses—much as it does with on-campus courses. In the case of DE courses, it can be helpful for them to use any of the social networking tools available now through the Internet.

Finally, encouraging a culture that allows students with disabilities to find what works best for them is another positive step. For instance, students with disabilities often find it easier to e-mail with their instructors using their regular email providers (such as a campus email account or commercial providers such as Gmail) rather than the email feature built into the online course interface (Kelly, 2008).

### ***Evaluation and Monitoring***

While we did hear of some campuses that have started using a “gatekeeper” model where courses are not made “live” until someone has approved that they are accessible, we did not find many specific examples of campuses that have clear evaluation and monitoring procedures in place. However we believe that many of the problems or challenges could be identified and solved more readily if attention were paid to an assessment of needs, progress, and attainment of goals. For example, each campus or district should conduct a needs assessment to determine what is needed at their site, i.e., the number of students with disabilities, number and capacity of the support staff, number of DE courses being developed/offered, number of courses that are accessible, and so on. This should lead to the development of clear policies and procedures. Then a system should be put in place to monitor progress in implementation as well as progress toward goals set as part of the needs assessment/planning process.

# Conclusion

Ensuring that all students have access to educational opportunities is not always easy to do, but it is clearly the right thing to do. Through this study, we learned that determining the costs associated with making distance education courses accessible to students with disabilities is a complicated matter. Distance education courses are rapidly increasing in the California community college system and, indeed, in the nation and the world. As the number of DE courses escalates, technology advances, faculty become more skilled at development, the complexity of these courses becomes greater and, concomitantly, the cost of both developing them and making them accessible increases. That is one reason we strongly suggest that the CCCSO find economies in the procedures used to develop such courses. Coordinating, centralizing, and communicating about cost-effective and efficient procedures should become the master guidelines of development.

Estimating the costs of making courses accessible was a thorny process. While we relied on consultations with a number of accessibility experts, the variation in course formats and in procedures that various individuals use raised limitations at every turn. Nevertheless, we feel that the data we gathered—using an ingredients approach—provide a solid starting point for estimating these costs—either for developing individual courses or for upgrading courses in general. Even so, there are many considerations to take into account when using these data, starting with the specific purpose for using them. For example, if the goal is to estimate the cost of updating current courses, that does not take into account the quality of existing courses or the rapid changes occurring in technology. The process for costing out each “ingredient” (e.g., captioning video) depends on the individual or vendor doing it. If changes in policy resulted in a requirement that all video used in courses be pre-captioned, that cost would decrease significantly. Our general suggestion is that the data be used and applied according to the particular purpose of the process and with consideration to questions related to format and components requiring accessibility attention.

The second section of this part of our report focused on promising practices because we believe there is much to be learned from strategies that are already being used by experts both outside and inside the college system. While those presented are by no means exhaustive—and it would have been outside the scope of this project to do so—we believe many of the strategies prompt one’s thinking about the general approach to take in making courses accessible. We commend the Community College Systems Office for taking on the important task of ensuring accessibility to educational opportunities for all students.

## References

- Access-IT. "Dr. Doe's Internet Course: A Case Study on Accessible Distance Learning." The National Center on Accessible Information Technology in Education, University of Washington. n.d. Retrieved December 9, 2008. <<http://www.washington.edu/accessit/articles?157>>.
- Accessibility in Distance Education. "Basic Principals of Web Accessibility." University of Maryland. Retrieved December 8, 2008. <<http://www.umuc.edu/ade/wia/basic.html>>.
- Boettcher, Judith. "How Much Does It Cost to Develop a Distance Learning Course? It All Depends..." 2006. Retrieved December 8, 2008. <<http://www.designingforlearning.info/services/writing/dlmay.htm>>.
- Brown, Carl, and Sean Keegan. "Container, Content, and Capability: The Three C's of Accessibility and Distance Education." High Tech Center Training Unit. n.d. Retrieved December 8, 2008. <[http://www.htctu.fhda.edu/publications/articles/three\\_cs\\_111804.pdf](http://www.htctu.fhda.edu/publications/articles/three_cs_111804.pdf)>.
- Burgstahler, Sheryl. "Bridging the Digital Divide in Postsecondary Education: Technology Access for Youth with Disabilities." National Center on Secondary Education and Transition. December 2002. Retrieved December 8, 2008. <<http://www.ncset.org/publications/viewdesc.asp?id=718>>.
- Burgstahler, Sheryl (ed.). "Students with Disabilities and Campus Services: Building the Team." DO-IT, University of Washington. 2005. Retrieved December 9, 2008. <<http://www.washington.edu/doi/AdminN/>>.
- Burgstahler, Sheryl. "Accessibility Training for Distance Learning Personnel." *ATHEN E-Journal* Issue #2. 2007. Retrieved December 8, 2008. <<http://athenpro.org/node/56>>.
- Burgstahler, Sheryl, Alice Anderson, John Slatin, and Kay Lewis. "Accessible IT: Lessons Learned from Three Universities." *Information Technology and Disabilities*, XII(1). June 2008. Retrieved December 9, 2008. <<http://people.rit.edu/easi/itd/itdv12n1/burgstahler.htm>>.

- Carnevale, Dan. "Colleges Strive to Give Disabled Students Access to On-Line Courses." *The Chronicle of Higher Education*. October 29, 1999. Retrieved December 8, 2008. <<http://chronicle.com>>
- CHEA Institute for Research and Study of Accreditation and Quality Assurance. "Accreditation and Assuring Quality in Distance Learning." CHEA Monograph Series 2002, Number 1. Council for Higher Education Accreditation. 2002. Retrieved December 8, 2008. <[http://www.chea.org/pdf/mono\\_1\\_accred\\_distance\\_02.pdf](http://www.chea.org/pdf/mono_1_accred_distance_02.pdf)>.
- Edmonds, Curtis. "Providing Access to Students with Disabilities in Online Distance Education: Legal, Technical, and Practical Considerations." ILRU. February 19, 2003. Retrieved December 9, 2008. <[http://www.ilru.org/html/training/webcasts/handouts/2003/02-19-CE/AM\\_paper.txt](http://www.ilru.org/html/training/webcasts/handouts/2003/02-19-CE/AM_paper.txt)>.
- Edmonds, Curtis, Marsha Allen, Robert Todd, and Shelley Kaplan. "Closing the Circuit: Accessibility from the Ground Up." *Information Technology and Disabilities*, XI(1). August, 2005. Retrieved December 8, 2008. <<http://people.rit.edu/easi/itd/itdv11n1/edmonds.htm>>.
- Hetherington, Thomas. Personal interview. October 31, 2008.
- Jarrow, Jane, and Lucinda Aborn. "Accommodations in Online Learning: Everything Old Is New Again." Presentation at CAPED conference. October, 2008.
- Kalivoda, Karen S., and Margaret C. Totty. "Disability Services as a Resource: Advancing Universal Design." In J. Higbee (Ed.), *Curriculum Transformation and Disability: Implementing Universal Design in Higher Education*. University of Minnesota. 2003. Retrieved December 9, 2008. <<http://cehd.umn.edu/CRDEUL/books-ctad.html>>.
- Kelly, Stacy. "Distance Learning: How Accessible Are Online Educational Tools?" American Foundation for the Blind. November 2008. Retrieved December 8, 2008. <<http://www.afb.org/Section.asp?SectionID=3&TopicID=138&DocumentID=4492>>
- Murray, Corey (ed.). "Accessibility Goal: Tear Down Barriers to Virtual Schooling." *eSchool News*. May 26, 2004. Retrieved December 8, 2008. <<http://www.eschoolnews.com/news/top-news/index.cfm?i=35778&CFID=18176830&CFTOKEN=54791643>>.

- National Center on Disability and Access to Education. "Assuring that IT in Distance Learning Courses Is Accessible." *Accessible Information Technology Series: Publication #7*. November 2004. Retrieved December 8, 2008. <<http://ncdae.org/activities/atia06/burgstahler.cfm?template=print>>.
- Nussbaum, Debra. "For the Disabled, Barriers to Online Study." *The New York Times*. April 9, 2000. Retrieved December 8, 2008. <<http://query.nytimes.com/gst/fullpage.html?res=9802E7D81F3CF93AA35757C0A9669C8B63&sec=&spon=&pagewanted=print>>.
- Office for Civil Rights, U.S. Department of Education. "Web Accessibility and Distance Learning for People with Disabilities." Retrieved via Freedom of Information Act, December 2, 2008.
- Rumble, Greville. *The Costs and Economics of Open and Distance Learning*. London: RoutledgeFalmer. 1997.
- Schmetzke, Axel. "Online Distance Education: 'Anytime, Anywhere' but not for Everyone." *Information Technology and Disabilities*. VII(1). August, 2001. Retrieved December 9, 2008. <<http://people.rit.edu/easi/itd/itdv07n2/axel.htm>>.
- Sterns, James, Allen Wysocki, Dorothy Comer, Gary Fairchild, and Suzanne Thornsbury. "The Cost of Delivering Courses via Distance Education." June 1, 2005. *NACTA Journal*. June 1, 2005.
- Zirkle, Chris. "Access Barriers to Distance Education Perceived by Inservice and Preservice Career and Technical Education Majors." Presented at the annual meeting of American Vocational Education Research Association, New Orleans. December 13, 2001. Retrieved December 9, 2008. <[http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content\\_storage\\_01/0000019b/80/1a/d3/02.pdf](http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/1a/d3/02.pdf)>.