A new form of distance learning, online learning is education in which instruction and content comprising a formal course of study are delivered primarily via the Internet. K–12 enrollments in online courses continue to grow, and while there is great potential in the virtual schools movement, there are many challenges inherent in this relatively new method of education delivery. *What Works in K–12 Online Learning* provides a comprehensive overview of effective online teaching and learning practices. Based on extensive experience and research, chapters cover a full spectrum of topics including virtual course development, online learning in elementary classrooms, instructional assessment and differentiating online instruction, professional development for teachers of virtual courses, and the challenges that virtual schools will face in the future.

**Chapter 8:**

**Exceptional Learners: Differentiated Instruction Online**  
Christy G. Keeler, Ph.D., University of Nevada, Las Vegas  
Jonathon Richter, Ed.D., Lynne Anderson-Inman, Ph.D., Mark Horney, Ph.D.,  
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**Chapter 10:**

**Professional Development for Online Teachers**  
Susan Lowes, Teachers College, Columbia University
CHAPTER 8

Exceptional Learners: Differentiated Instruction Online

Christy G. Keeler, University of Nevada, Las Vegas
Jonathon Richter, Lynne Anderson-Inman, Mark A. Horney, Mary Ditson, University of Oregon

ONLINE LEARNING IS AN INCREASINGLY POPULAR approach to providing educational options for our nation’s students (National Center for Educational Statistics, 2005). Unfortunately, these options are not available to all students equally. Many students bring characteristics to the teaching and learning process that are exceptional, characteristics that can inhibit access to information presented via the Web and prevent success in courses provided over the Internet. Students with disabilities (including those with cognitive, physical, or sensory limitations), English language learners (ELL), and gifted learners can all benefit from online learning environments. Their individual differences, however, influence the extent to which these environments are effective vehicles for learning.

Students who are blind or have limited reading skills will need an alternate means of accessing and interacting with text. They would benefit from having the text read out loud and the images described. Students who are still learning to speak English may need unfamiliar words defined, translated, or illustrated. Students who are easily distracted may benefit from an interface that is highly structured and keeps stimulating detail to a minimum. Federal legislation such as the Individuals with Disabilities Education Act (1990) mandates that exceptional learners with disabilities have access to curricular and learning opportunities equivalent to those available to students who are not disabled. This includes environments and courses for online learning. For other learners with exceptionalities, there may not be a federal mandate, but access to online environments is still the right thing to do (French, 2002).
In addition to issues of equity, there can be instructional advantages to learning in online environments. Online learning can provide alternative ways to accomplish academic tasks. For example, a student with cerebral palsy may have trouble speaking intelligibly but can engage in a class "discussion" through online chat or instant messaging. A student in hospital isolation can use videoconferencing to practice French with a classmate. Online environments can also reduce the visibility of students’ exceptionalities. For example, Michael Pugliese, a 10-year-old gifted student who took high school courses online through Oregon’s CyberSchool, said, “I used to go to school, and the kids were always making fun of me…. But when I’m talking to older kids on the Internet, it doesn’t matter how old or big I am. In CyberSchool, I’m just the same as the older kids” (Keating, 1998).

The purpose of this chapter is to provide an overview of factors relevant to online learning for exceptional learners, with an emphasis on research-based ideas and practice. Our perspective is threefold:

- First, we concur with federal mandates and social justice proponents that exceptional learners should have access to the same curriculum and learning opportunities as all students, and that this extends to electronic learning environments (Banks, Lazzaro, & Noble, 2003; Edmonds, 2004; U.S. Department of Justice, 2002).
- Second, since online learning is increasingly a part of the curricula provided by schools nationwide, we advocate for ensuring that all online learning environments and courses be both accessible to and supportive of the full range of learners. This means that resources for online learning must be designed so that all students can use them with equal effectiveness.
- Third, we suggest that online learning is improved for everyone when it is made accessible to and supportive of those who have exceptional learning needs.

Background

The term exceptional learners is a generic one and means different things to different people. One population of exceptional learners is students with disabilities. As defined by the Americans with Disabilities Act (ADA), an individual with a disability is

...a person who has a physical or mental impairment that substantially limits one or more major life activities, a person who has a history or record of such an impairment, or a person who is perceived by others as having such an impairment (U.S. Department of Justice, 2002).

The U.S. Department of Education recognizes several types of disabilities:

- specific learning disabilities,
- speech and language impairments,
- mental retardation (also referred to as developmentally delayed),
- emotional disturbance (also called behavior disorders),
- orthopedic impairments,
- visual impairments, and
- hearing impairments (U.S. Department of Justice, 2002).
Together, the number of students receiving special education services under the Individuals with Disabilities Education Act or Section 504 of the Vocational Rehabilitation Act is 13.8% of the total student population. The largest subset of this population is students with learning disabilities, who make up 42.7% of the total (National Center for Education Statistics, 2004a). Clearly, this is a substantial segment of the nation’s student body.

For the purpose of this chapter, however, we take an even more inclusive approach to the term **exceptional learner**. In addition to students with disabilities, we use the term to refer to students with other special academic needs. This includes the 6.3% of the U.S. student population who are academically gifted (National Center for Education Statistics, 2004a), the increasingly large number of students with limited English proficiency (National Center for Education Statistics, 2004b), and students who are struggling in school due to nontraditional learning styles or poor preparation for learning. Obviously, the needs of such diverse learners are different, whether receiving instruction in the classroom or through online courses.

Differentiated instruction has become a popular approach to teaching and learning that takes into consideration the diversity of students in school today. Tomlinson and Allan (2000) describe differentiation as “simply attending to the learning needs of a particular student or small group of students rather than the more typical pattern of teaching the class as though all individuals in it were basically alike” (p. 4). They further state that “the goal of a differentiated classroom is maximum student growth and individual success” (p. 4), as measured by personal, not age- or class-based, benchmarks. This is accomplished through instructional and management strategies that allow for varying levels of student mastery. Examples include strategies for teaching to multiple intelligences, individualized questioning strategies, alternative grouping methods, and supplemental materials based on each learner’s specific needs and interests. When implemented well, differentiated instruction results in appealing and effective educational experiences for a broad range of learners. The concept of differentiated instruction can also guide the adoption and integration of online learning opportunities for exceptional learners.

One way to make differentiated instruction operational is to adopt the principles of Universal Design for Learning (UDL), a concept introduced by CAST (Center for Applied Special Technology) (www.cast.org). In their description of UDL, Rose and Meyer (2002) recommend educators design learning environments characterized by three types of “flexibility” or alternatives:

- multiple ways in which content is presented,
- multiple modes for student expression, and
- multiple means for engaging student interest.

The goal of UDL is to create learning opportunities that provide the greatest possible accommodation to the greatest number of students, without a focus on the learning needs of any specific population. Students receive instructional and assessment options and are permitted to choose from those options. A benefit of the UDL approach is that these principles can be applied to the design and selection of courses. For example, the option to use assistive devices such as text-to-speech can be made available to students in an online course, but it is the student’s or teacher’s choice whether or not to access this option (Northwest Americans with Disabilities Act and Information Technology Center, 2005).
Designing and Selecting Online Courses for Exceptional Learners

To meet the needs of exceptional learners, online courses should be both accessible and supportive. In the following sections, we present three major approaches to developing online courses so that they address the needs of exceptional learners.

The first approach is to ensure that the course is accessible, which means that exceptional learners can physically access the information and learning resources as effectively as students not identified as exceptional (Allan & Slatin, 2005). The second and third approaches are alternative ways to make an online course supportive, which means that exceptional learners find supports built into the course design, materials, and learning activities that minimize the negative impact of their learning weaknesses and maximize the use of their learning strengths.

Although not mutually exclusive, the three approaches can lead to very different instructional environments. Online course designers, as well as online school administrators, teachers, and parents, should be aware of all three approaches and consider their implications for the courses they are designing, evaluating, or selecting for students.

Making Online Learning Accessible

The first approach is to design online courses in ways that make the content and navigation accessible to exceptional learners. A Web site is accessible when all potential users can navigate between and among its pages successfully and benefit from the information contained in its text, images, tables, forms, and various sorts of multimedia. Over the last several years, federal legislation and Web development experts have been working to specify criteria and standards for accessible Web sites. To a much lesser extent, they have worked to provide guidelines for accessible online courses.

For example, international efforts to improve the accessibility of Web sites have been led by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C), an industry group committed to full accessibility for individuals with disabilities. Since 1999, they have been working to develop a set of guidelines and protocols for Web developers that improve accessibility of Web page content and Web navigation (www.w3.org/WAI/). On the government side, the Architectural and Transportation Barriers Compliance Board (Access Board) has established standards that ensure accessibility of Web sites in compliance with Section 508 of the Rehabilitation Act Amendments of 1998. Known as Section 508 Standards, they apply directly to the Web sites of all federal agencies and are increasingly being adopted by other organizations, including schools and universities (Allan & Slatin, 2005).

Recommendations by both groups are very specific and technical. Overall, they ensure that Web sites are accessible by providing

- recommendations for what to avoid (for example, presenting data in tables that cannot be read by screen readers, screen flicker rates that might induce seizures in individuals with photosensitive epilepsy),
- recommendations for alternative approaches to presenting content (for example, text descriptions to accompany visual cues and content such as images and videos), and
- recommendations for presenting information in its most readable form (for example, brightness contrast ratio between text and background of at least 5:1).
Online courses, however, are not just Web sites. Although distributed to students via the Web, they are electronic learning environments comprising materials to read, videos to watch, activities to do, assignments to complete, discussions to join, tests to take, and so forth. For an online course to be accessible requires that these and other online learning activities also be accessible. A variety of projects and organizations focus on accessibility issues related to specific aspects of electronic learning environments. For example, in 2005 the National Center for Accessible Media (NCAM) unveiled its Access for All standard, “an international technical standard designed to increase access to online learning tools and content for all learners, particularly those with disabilities” (National Center for Accessible Media, 2005). Unique to the Access for All standard is the creation of learner profiles that enable teachers and students to tailor their interface with the Web and locate materials specific to each student’s needs.

Another initiative is development of the National Instructional Materials Accessibility Standards (NIMAS), coordinated by CAST (http://nimas.cast.org). This federally funded initiative is working to develop standards for electronic versions of all published reading materials so that they are accessible to students with disabilities. The NIMAS standards provide textbook publishers with the guidelines they need to meet federal mandates for providing reading materials in electronic formats that can be read out loud by screen readers or turned into braille. These accessible reading materials can then be integrated into online courses to improve the accessibility of the course’s reading materials.

It is relatively easy to determine whether a Web site is accessible to individuals with disabilities but more difficult for online courses. Web site developers who have complied with W3C or Section 508 Standards will post a statement or symbol which signifies that the Web pages have been designed and tested for accessibility. Developers may also provide a description of what has been done to make the Web site accessible, or they may post instructions informing users with disabilities how best to navigate within the Web site. For examples, visit the Web sites of CAST (www.cast.org/site/accessibility.html) or NCAM (http://ncam.wgbh.org/accessncam.html). It is also possible to test any Web page for accessibility by inserting its URL into online tools such as WebXACT (http://Webxact.watchfire.com) (formerly called Bobby) and WAVE (www.wave.webaim.org).

The accessibility of online courses is more difficult to determine in part because courses are more complex, in part because they are more interactive, and in part because they are often hidden until one registers for credit. Burgstahler (2006) and the DO-IT Project at the University of Washington propose indicators of accessible online courses including, but not limited to,

- an accessible home page,
- a statement indicating a commitment to accessibility,
- a statement informing potential students how they can request accommodations,
- a statement about how to obtain print materials in alternate formats, and
- the use of accessible materials online.
The other two approaches to designing online learning environments appropriate for exceptional learners focus on support, as opposed to access. The first of these approaches involves designing online courses with attention to the learning needs of a specific population (for example, migrant students from Mexico). The second approach is to design a course that can be customized to meet the needs of all learners, in alignment with the principles of UDL. It would be both accessible to any learner and supportive of any learner.

### Online Courses for Specific Student Populations

Most existing online courses are designed for students who are competent readers and proficient at working independently (Lary, 2002), but many learners fall outside competency and proficiency levels. One way to support exceptional learners is to design online courses that match their specific learning profiles. If adopting this approach, an online course developer asks: “What would a course look like if it were designed to support a specific population of exceptional learners?” To answer this question requires using what we know from research about the specific learning needs of the target population and then designing a course that minimizes the negative impact of their learning difficulties and maximizes their opportunities for success.

This was the approach taken by researchers and online course developers at the University of Oregon’s Center for Electronic Studying (CES) when they decided to develop an online course to teach Computer-Based Study Strategies (CBSS) to high school students with learning disabilities (known as CBSS4U). After a thorough review of the research literature, they synthesized recommendations for teaching individuals with learning disabilities and wove the recommendations into the design and delivery of their course.

### Making Online Learning Supportive

<table>
<thead>
<tr>
<th>Table 8.1 Sites for understanding accessibility criteria</th>
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<tr>
<td><strong>Organization or Tool</strong></td>
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<tr>
<td>U.S. Architectural and Transportation Barriers Compliance Board</td>
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<tr>
<td>Web Accessibility Initiative (WAI)</td>
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<tr>
<td>Steps for Ensuring Accessibility</td>
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<td>IMS Guidelines for Developing Accessible Learning Applications</td>
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<td>National Center for Accessible Media (NCAM)</td>
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For example, research has found that students with learning disabilities perform well when explicit instructions are given about what is to be done (Gersten, 1998; Gersten, Fuchs, Williams, & Baker, 2001), complex learning activities are broken down into carefully sequenced small steps (Swanson, Hoskyn, & Lee, 1999; Vaughn, Gersten, & Chard, 2000), and prompts, facilitators, or “think sheets” are used to make expectations visible and remind students of critical steps in a process (Englert, Raphael, Anderson, Anthony, & Stevens, 1991). Reflecting these recommendations, the CBSS4U online course was designed by chunking lessons into small, bite-sized components, carefully sequencing these components, and providing explicit information about what is to be learned in each lesson and why. One-page handouts, such as the one shown in Figure 8.1, are available to remind students of the steps for implementing each study strategy taught in the course.

In addition to course structure, recommendations from the research literature also informed the course’s instructional content, practice activities, and teacher-student interactions. For example, the literature suggests that students with learning disabilities should be taught specific cognitive strategies for complex activities and that instruction should enable them to “own” the strategies so that they can transfer them across settings, making modifications as needed (Anderson-Inman, Horney, & Knox-Quinn, 1996; Deshler & Schumaker, 1993; Gersten, Fuchs, Williams, & Baker, 2001; Harris & Pressley, 1991; Vaughn, Gersten, & Chard, 2000). It also suggests that instruction be anchored in authentic tasks and that applications to students’ personal lives be explicit (Ferretti & Okolo, 1996; Kinzer, Gabella, & Rieth, 1991). The CBSS4U online course teaches a repertoire of specific cognitive and meta-cognitive strategies for using the computer as a study tool, provides

Table 8.2 Resources for understanding needs of specific exceptional learners

<table>
<thead>
<tr>
<th>Organization or Tool</th>
<th>Description and Source</th>
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</thead>
<tbody>
<tr>
<td>Web Accessibility in Mind</td>
<td>Provides “knowledge, technical skills, tools, organizational leadership strategies, and vision” for organizations creating accessible content (<a href="http://www.Webaim.org">www.Webaim.org</a>).</td>
</tr>
<tr>
<td>DO-IT: Disabilities, Opportunities, Internetworking, and Technology</td>
<td>Incites students with disabilities to excel by promoting “the use of computer and networking technologies to increase independence, productivity, and participation in education and employment” (<a href="http://www.washington.edu/doit/">www.washington.edu/doit/</a>).</td>
</tr>
<tr>
<td>Challenges and Solutions by Disability Type</td>
<td>Provides a listing of challenges and solutions by disability type including blindness, color blindness, low vision, deafness, motor disabilities, and cognitive disabilities (<a href="http://www.Webaim.org/techniques/userperspective/">www.Webaim.org/techniques/userperspective/</a>).</td>
</tr>
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Figure 8.1 One-page handout for textbook notetaking lesson

students with opportunities to practice each strategy using simulated school tasks, and supports students as they apply the strategies to real world school assignments in multiple settings. Examples of methods used to deliver this content appear in the vignette below.

Finally, the literature suggests that students with learning disabilities need learning options that are not dependent on reading skill (Anderson-Inman & Horney, 1998; Kinzer, Gabella, & Rieth, 1991). To make the CBSS4U course accessible to students who do not read well, audio files are included with digitized readings of all text contained on each page. In addition, short narrated video clips provide overviews of each lesson, illustrate steps for each study strategy, and remind students how to perform required computer skills. All audio and video files for any given page are available to students as options, to be accessed, paused, replayed, enlarged, and otherwise controlled by the learner, as needed.

A Vignette: Computer-Based Study Strategies for You (CBSS4U)

Jessica Watson is a sophomore with learning disabilities who attends Lincoln High School. Although she is intelligent and has excellent language skills, she is disorganized and has difficulty paying attention in her courses. Her resource teacher recommends she take CBSS4U as a way to improve her study skills and meet one of her Individualized Education Plan (IEP) goals, the need to increase homework completion.

Each morning Jessica goes to the computer lab and logs into the CBSS4U online course. Today, about 2 weeks into the semester, she checks the timeline provided by her online teacher and finds she is ahead of schedule. This gives her confidence she will finish the course by the end of the term. She puts on her headphones and goes to the second lesson in Module 2. From the top of the Web page Jessica selects, listen to This page, which links to a warm welcoming voice reading the text that provides an overview of the lesson. The voice places emphasis on important points and sometimes repeats critical items. To receive more detail about the lesson, Jessica clicks on a link leading to a brief video demonstrating the study strategy to be learned and the use of technology in that lesson. She decides to repeat the video to clarify some steps and then prints the lesson handout that provides her with a one-page reference sheet, illustrated with screenshots.

Ready to proceed with her lesson, Jessica looks at the carefully sequenced and cleanly formatted Web page and sees that she is supposed to download an electronic study tool for the *Oregon Driver’s Manual*. The tool was created by her online teacher. When she opens the tool, she finds an electronic outline of some facts to be learned about rules of the road in Oregon. Following the lesson’s online instructions, she practices the Self-Questioning Strategy using the hide and show feature available in most outlining software. Since Jessica hasn’t yet taken her driving test, she is motivated to learn the material. After working with this relevant and timely example, Jessica learns to create similar electronic study tools, guided by the straightforward text that methodically guides her through each of the activities, and supported by the digitized voice-over of the course narrator.

After working partway through the tutorial, Jessica decides she understands the process well enough to skip the remaining directions and clicks on the link Go Straight to the Assignment. She knows she can go back and get the step-by-step help if needed. For her assignment, Jessica takes a mock driver’s test, enabling her to see how it feels to have prepared for a test using the Self-Questioning Strategy. She then completes a checkout (online survey) requiring her to reflect on her own learning process and how CBSS can help her prepare for future tests. Jessica’s work receives a timely, personal response from her online instructor.
While the learning is fresh, Jessica is asked to apply what she has learned to one of her high school classes. She decides that this electronic study tool might help her learn the material in her biology class, and she spends the remainder of her time constructing an electronic study tool from her biology teacher’s study guide for this week’s chapter. She then uses the Self-Questioning Strategy to study the information for an upcoming test. When finished, Jessica completes a lesson survey, giving feedback to her online teacher about aspects of the lesson that worked well for her and those that were problematic.

**Lessons Learned from Research on CBSS4U**

During the 2005–06 academic year, researchers at the Center for Electronic Studying (CES) gathered data on the usability and efficacy of the CBSS4U online course. Below is a brief overview of some of the principles found to work for high school students with learning disabilities. The principles are organized under two topics: course design and course interactions.

With respect to course design, many of the CBSS4U features that work for students with learning disabilities would work for anyone. These include clarity, simplicity, concreteness, choices, self-pacing, explicit expectations, multi-modal presentations, showing (rather than telling), and a consistent structure for every lesson. In addition, researchers found that students responded well to the inviting, colorful design (interesting, but not overstimulating), generous use of graphic elements to provide structure, ample white space, attention to line length, and careful attention to headings. Students also appreciated the various supportive features such as sound files that read printed text out loud, graphics and videos illustrating every expectation, fonts recommended by the Dyslexia Association (Verdana and Comic Sans), easily available sample files and software tools, clear guidelines for file management, and options for retaking online assessments. See an illustration of these design features in Figure 8.2.

**Figure 8.2 Computer-based study strategies lesson**

With respect to course interactions, CES researchers found that students generally responded well to the high activity level (for example, read this, make that, send it in) as well as the frequent and varied student-teacher contacts. The course encouraged student-teacher communications by having the online teacher respond quickly and eagerly to all e-mails and assignments. Observations also suggested that students responded well to constant invitations to reflect on their actions and apply their learning to their personal lives. In this way, the content is personalized and the skill development is connected to their personal well being as well as their academic achievement.

Online Courses and Universal Design for Learning

The second major approach to designing an online course that is supportive of exceptional learners is quite different from that described above. Instead of designing for a specific student population, course developers use principles of Universal Design for Learning. The goal of a UDL online course is to be proactive in accommodating the learning needs of all students who might take the course. Thus, the ideal UDL online course would be maximally accessible to, and maximally supportive of, all learners. Its design would meet the needs of a wide range of student abilities, instructional preferences, and learning styles. Multiple features would be presented as options from which students, or their teachers, may choose. This allows a UDL online course to be customized for an individual learner or for a group of learners with the same learning profile.

Although the literature is suggestive of features that might appear in online courses that follow the principles of UDL, most of the discussion still focuses on increasing accessibility (Burgstahler, 2005, 2006), with only a few online educators focusing on increasing support through flexibility and options (Bohman, 2004; Engleman, 2005). To be consistent with Rose & Meyer’s three dimensions of flexibility (2002), a UDL online course should provide

1. multiple means of representation so that learners have various options for acquiring information,
2. multiple means of expression so that learners have alternative ways to show that learning has occurred, and
3. multiple means of engagement to increase motivation and tap into students’ interests.

The following list provides a sample of possible alternatives for each of these three dimensions, most of which go beyond making the course accessible.

Multiple Means of Representation

- Content presented in video, audio, slide show
- Reading materials at multiple difficulty levels
- Reading materials with supportive resources
- Presentations at variable complexity levels
- On-demand translation for nonnative speakers
- Graphic representations such as concept maps and graphic organizers
- Illustrative representations such as diagrams and simulations
Multiple Means of Expression

- Alternative forms of text input: text, speech-to-text, switches, touch pads
- Media-based assignments: drawings, maps, diagrams, videos, slideshows, Web pages
- Reduced text assignments: outlines, concept maps, tables, graphs, hands-on activities
- Supportive tools: spelling and grammar checkers, drawing programs, outliners
- Social networking options: blogs, wikis, online chat, instant messaging
- Shared writing and peer editing

Multiple Means of Engagement

- Interviewing experts
- Role-playing
- Threaded discussions
- Brainstorming activities
- Team inquiry projects
- Online experiments
- Game playing
- Community activism

A Vignette: A Customized UDL Online Course

Ms. Jones is a science teacher for OnlineSchool. She is responsible for three classes of middle school students covering the basics of physical and life sciences. Students from all over the country work with Ms. Jones, so there are wide ranges of background knowledge, academic proficiencies, and abilities.

Fortunately for these students, their online courses have been designed with diversity in mind. All Web pages in the course have been developed in compliance with Section 508 Standards. In addition, the course has adopted NCAM's Access for All standard enabling the creation of individual learner profiles for accessibility needs and requirements. Short videos are integrated into each lesson, illustrating key concepts and illustrative experiments. The videos are closed-captioned and have companion audio files describing the action to help students with vision impairments. All reading materials have linked supports that help define unfamiliar technical terms and illustrate unfamiliar concepts. To support students with inadequate preparation for learning the content, there are links to an archive of videos and short readings on key concepts.

Beyond these features, each lesson has multiple assignment options that engage students in alternative ways. For example, in one lesson, students can choose to conduct an e-mail interview with a scientist, conduct an inquiry project using data on the Web, or interact with an online learning object that simulates the scientific process under study. For accountability, the students can communicate what they have learned through writing, drawing, graphing, or a multimedia slideshow, and they can do so independently or in collaboration with other online students. Software and online tools are available to support production of these assignments.
In the design of her science course and her interactions with students, Ms. Jones makes an effort to meet the individual needs of all students based on the assumption that each has unique learning styles, skills, and preferences. Many of the options described above are available to all students, and each individual student chooses which options to access. However, to reduce student confusion, it is possible to customize the course in advance, using assessment information obtained prior to instruction. Ms. Jones uses the UDL Profile Template developed by CAST to gather information useful in planning instruction for specific learners. She then adjusts how the course looks and operates and what content is available and when, tailoring it to match each learner’s preferences and strengths. As students proceed through the course, their learning profiles are continuously monitored, and adjustments are made based on student interaction with the course content and interface as well as their level of engagement. Where appropriate, control over these learning options is turned over to the students, who can then make their own adjustments and choices. Giving students control over their learning environment empowers, motivates, and gives them ownership and responsibility for their own learning.

CAST has designed several online courses illustrating some of the UDL features listed above. For example, the graduate-level lesson pages appearing in Figures 8.3 and 8.4 were prepared for inservice teachers, parents, and service providers on behalf of the Massachusetts Department of Education. In the first figure, students may self-select their page display mode. In the second example, students choose the format in which they will receive their content (text, visuals, audio). Few contemporary online courses offer this level of flexibility and accessibility (Keeler & Horney, in press).
What We Need to Know from Research about UDL

Adopting UDL concepts and integrating them into online learning environments is still new. There is little empirical information to support their use, and there are many questions about how to best offer options and flexibility for diverse learners. Although multiple representations of content may help one population of learners, they could hinder others (Bohman, 2003; Burgstahler, 2005). For example, adding supporting graphics to a Web page may assist a student with a reading problem but be distracting for a student with vision impairment or overstimulating for a student with attention deficit disorder. Nonetheless, some initial research suggests that students taking courses designed using UDL principles appreciate having multiple options available and choose those that match their learning preferences (Engleman, 2005). This research also suggests there are recognizable relationships between students’ learning styles and choices they make in online courses with respect to assignments (Engleman, 2005) and motivational activities (Ingram & Watson, 2005). The fact that these relationships sometimes run contrary to what we might intuitively predict suggests that online course developers and teachers need to be very careful when selecting or controlling the alternatives available to students.

Listed below are some questions worth pursuing in an effort to develop a research base for online courses aligned with UDL principles:

- What types of alternative representations are most useful to which types of learners?
- What emerging technologies can best support alternative forms of expression?
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- How can educators present optional features that minimize confusion and maximize appropriate choices?
- Who should control and manage a course’s customizable features?
- What is the right balance between structure and choice?
- Can all learners choose wisely between available options?
- What kinds of off-line support are best supplied to students?

Tools

As previously described, standards, guidelines, checklists, policies, and legislation designed to increase access to, improve participation in, and ensure success of online environments exist for exceptional learners. Nonetheless, most Web sites and online courses still present barriers to millions of learners (Burgstahler, 2004; Edmonds, 2004; Keeler & Horney, in press). Most Web sites do not meet Section 508 Standards for accessibility, and most online courses do not provide differentiated instruction to assist in meeting the needs of diverse student populations. Providing equal access to online learning for exceptional learners is an ethically correct, legally mandated, and educationally appropriate endeavor. It is also in accordance with the International Society for Technology in Education’s National Educational Technology Standards for students, teachers, and administrators. All levels of the standards note the critical importance of addressing “social, ethical, and human issues” by ensuring equitable access and promoting positive attitudes toward technology for all learners (International Society for Technology in Education, 2004).

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<thead>
<tr>
<th>Organization or Tool</th>
<th>Description and Source</th>
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<tbody>
<tr>
<td>WebXACT</td>
<td>Formerly called Bobby, this tool allows users to evaluate accessibility of Web pages in terms of W3C compliance (<a href="http://Webxact.watchfire.com">http://Webxact.watchfire.com</a>).</td>
</tr>
<tr>
<td>Design Considerations for Individuals with Cognitive Disabilities</td>
<td>Provides “design considerations that present common problems for individuals with cognitive disabilities” (Rowland, 2004). (<a href="http://www.Webaim.org/techniques/articles/conceptualize/">www.Webaim.org/techniques/articles/conceptualize/</a>).</td>
</tr>
<tr>
<td>Instrument of Instructional Design Elements of High School Online Courses</td>
<td>Provides a broad overview of UDL and other design variables in online courses (<a href="http://cateWeb.uoregon.edu/ckeeler/dissertation.pdf">http://cateWeb.uoregon.edu/ckeeler/dissertation.pdf</a>) including a section on accessibility (Keeler, 2003).</td>
</tr>
<tr>
<td>Software Evaluation Tool</td>
<td>Designed for evaluating software as it relates to accessibility, many of the design elements translate to online environments (Higgins, Boone, &amp; Williams, 2000).</td>
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</table>
Future Trends
The future of online differentiated instruction for exceptional learners will be influenced by at least three major trends.

- First, the concept of Universal Design for Learning will continue to impact the field of education and the legal mandates provided to ensure equal access to educational opportunities. This will influence the design and availability of online courses appropriate for exceptional learners.

- Second, national mandates for electronic books and media to be both accessible and supportive will result in more options for online learners with poor reading skills. The federal government has invested millions of dollars in the development of accessibility standards for electronic books and other types of media. In addition, it has invested in research on how to make these information sources effective for exceptional learners. In the not-too-distant future all major textbook publishers will offer electronic versions of their text materials, with features embedded to increase access and support.

- Third, social networking (for example, blogs, wikis) and virtual design tools will become more powerful and more available, transforming online educational opportunities and the variety of ways in which individuals, groups, and communities interact.

Together, these trends will help transform the look and feel of online courses for exceptional learners. More important, they will help ensure that exceptional learners have equitable access to online learning opportunities designed to meet their individual learning needs.

Conclusion
This chapter has explored the concepts of accessibility, differentiated instruction, and Universal Design for Learning in relationship to online learning for exceptional learners. Implemented equitably and effectively by ensuring accessibility and supports, online differentiated instruction can lead to success for all types of exceptional learners. Without access to information, students cannot learn. Without support, students may not be able to overcome the challenges they experience due to their individual needs, styles, and preferences.

Fortunately, as technological supports and customizable interfaces become available, discovering ways to help exceptional learners participate in and benefit from online learning is becoming appreciably easier. National mandates and federally funded initiatives have led the way to increased accessibility of Web sites and improved online learning for diverse learners. Nonetheless, more research is needed to ensure alternative models for providing differentiated instruction online lead to instructional effectiveness and large-scale efficacy. Educators, parents, and students can anticipate a day when exceptional learners will have access to a full array of online courses designed for differentiation and customizable in ways that support their specific learning needs and preferences.
References


Professional Development for Online Teachers

Susan Lowes, Teachers College, Columbia University

The number of students who take online courses has expanded rapidly over the past few years. The need for teachers to teach them has expanded as well. As a result, professional development, which has always been an important aspect of virtual schooling, has not only taken on added urgency, but has also changed in form and content.

First, the necessary early focus on conquering less-than-transparent technologies has decreased, replaced by an emphasis on support and pedagogy. Second, as initial start-up funds have ended, issues of cost-effectiveness and management, including supervision, have become increasingly important. Third, as the body of experienced online teachers has developed, it has become both necessary and possible to introduce ongoing professional development and to begin to build communities of practice. Fourth, although there are, as we shall see, major differences in virtual schooling models and in the professional development programs that support them, there are some convergences as schools develop ways to adapt to similar challenges.

Before looking at these developments, we need to make three important distinctions concerning the structure of the virtual school experience. These distinctions will help us understand the differences in the professional development that is being offered by each school.

Distinction #1: Virtual Schools versus Virtual Schooling

The term virtual schools is used to refer to two very different types of experiences. Fully developed virtual schools offer students the opportunity to take an entire diploma online. Students do not attend any site-based school, although the diploma itself may be offered through an affiliated school district. There are relatively few full-fledged virtual schools. Most are charter schools that have attracted homeschoolers, such as those affiliated with K–12, Inc., and a few are virtual schools for students whose schedules make it difficult for them to attend site-based schools, for instance, athletes and actors.
Virtual schooling, on the other hand, is what students experience when they take one or more courses online while also attending their site-based schools. Institutions that call themselves virtual schools (for example, Michigan Virtual School and Louisiana Virtual School) may offer virtual schooling, but they do not have a full array of courses and do not offer diplomas. The teacher and student experience in a virtual school is entirely different from the experience with virtual schooling. Virtual schooling, first developed to deliver courses to small schools in rural areas in a synchronous manner (for example, radio, TV, satellite), has a long history in the United States, but the development of the Internet has allowed it to move from synchronous to asynchronous modes of delivery. It is virtual schooling that is growing so rapidly in public K–12 schools across the United States, and virtual schooling will be the focus of this chapter. For convenience, however, we will use the common terminology and refer to the provider as a virtual school.

By 2005, virtual schooling opportunities were offered by 21 state-level virtual schools (Watson, 2005) as well as by the not-for-profit Virtual High School in Maynard, Massachusetts, which attracts students from across the country. We will use four schools as our examples: Florida Virtual School (FLVS), Michigan Virtual School (MVS), Louisiana Virtual School (LVS), and Virtual High School (VHS). The first three are state schools, while VHS is national in reach.

The common feature of the state schools is that they offer courses to students across their particular states. However, although they are state-level schools—that is, open to students from across the state—and state-sanctioned, they may not be state-led (see Clark [2001] for this distinction), and there are many different governance and funding models. For instance, MVS is a not-for-profit, while LVS is jointly run with the state’s Department of Education. Clark (2001) and Watson (2005) provide detailed state-by-state comparisons of state-level schools. Cavalluzzo (2005) provides a discussion of funding models, which also vary widely.

VHS and FLVS are among the oldest and most established of the virtual schools in the United States, founded in 1996 and 1997 respectively, and FLVS is one of the largest. MVS and LVS are newer, founded in 2000, but are in states with a long prior history of K–12 distance learning.

Distinction #2: Virtual Resources versus Virtual Courses versus Virtual Classrooms

The second distinction is central to understanding the structure of the virtual schooling experience, which in turn affects the structure and content of professional development.

Virtual resources, which range from small Web-based simulations, to large document archives, to elaborate virtual textbooks, are increasing in sophistication and availability. Although delivered over the Internet, these resources are as likely to be used in face-to-face classrooms as they are in virtual classrooms. Indeed, the use of virtual resources originally developed for virtual courses in the face-to-face classroom is a growing trend that we will return to in this chapter.
Virtual courses, which almost always include virtual resources, are delivered over the Internet and generally come in two forms:

- self-paced, with minimal teacher involvement (the classic correspondence course), and
- self-paced (within an overall time frame), with ongoing, one-on-one teacher-student interaction, generally by phone, e-mail, chat, or other digital means.

Virtual courses with ongoing, one-on-one teacher-student interaction are offered by most of the state virtual schools.

Virtual classrooms include virtual resources and virtual courses with teacher-student interaction, but they also incorporate extensive student-student interaction, generally through the use of a course management system's discussion forums. This is not a return to the synchronous virtual classroom of the 1980s and 90s; today's virtual classrooms are, like today's virtual courses, Internet-based and asynchronous, but they are not self-paced. Virtual classrooms have a "classroom" of students (generally around 25), follow a course calendar (regardless of the calendar for the individual students' site-based schools), and use a set of discussion forums as the main sites of student-student and teacher-student interaction (although e-mail between teachers and students is common as well). Although virtual classrooms are very common in higher education, there are only a few examples at the K–12 level.

Florida Virtual School and Michigan Virtual School are examples of schools that offer virtual courses, while Virtual High School and Louisiana Virtual School are examples of schools that are built around virtual classrooms. At present, schools offering virtual courses are far more prevalent than schools built around virtual classrooms, although, as we shall see later, schools that offer virtual courses are increasingly trying to build aspects of the virtual classroom into their model.

Distinction #3: Professionally Developed Virtual Courses versus Teacher-Adapted Virtual Courses

The final distinction that has an impact on the kind of professional development that is offered is between schools that offer courses that are developed by professional course developers and schools that offer courses that are developed or adapted, or both, by the teachers who will teach them. In the first case, the professionals may be teachers or instructional designers, or a combination of the two. Sometimes teachers or teams of teachers take the lead; in other cases, instructional designers take the lead, with teachers as content advisers.

Once a course is finalized by the course designers, those who teach it are not allowed to alter the structure or content, although they may be allowed to personalize it by adding announcements, topical material, and in some cases even assignments. What they cannot do is remove approved content. As virtual schooling grows and course developers invest heavily in designing courses that meet state standards, the pressure to make virtual courses “teacher-proof” (to quote one commercial course developer) is strong. The challenge is to create courses that meet standards but still allow for the imprint of the individual teacher.
In the second case, the course developers are the teachers who actually teach the courses. This is not only a very different approach to curriculum development but to teachers and teaching: although these courses are also developed to state (or national) standards, teachers are not only encouraged but also required to adapt them to include their own materials, activities, and assessments—core aspects of the course. The challenge here is to maintain the formal structure underlying the course design while allowing the teacher to take ownership of the course in order to teach it effectively.

Clearly, the professional development experience for teachers who develop (or adapt) their own courses is fundamentally different from the experience for teachers who teach courses that have been professionally developed.

Professional Development for Virtual Schooling

When discussing professional development for online teachers, it should be remembered that while these teachers may be new to online teaching, they are not new to teaching as such. In fact, virtual schools generally have more stringent requirements for their teachers than do many site-based schools: in almost all cases, teachers must be state-certified in their subject area and have several years of face-to-face teaching experience. For example, Bill Thomas of Southern Regional Education Board (SREB) reports that none of the 11 SREB states that have state virtual schools has any first-, second-, or even third-year teachers teaching online.

In addition, classroom management, which takes up a large amount of time in face-to-face classrooms, takes a very different form in a virtual classroom: less time is spent on formal discipline, for instance, and more on engaging students. Those who teach virtual courses have few classroom management issues but instead need to learn how to work with individual students. Furthermore, since most online teachers teach courses that have already been created and reviewed, they do not have to develop lessons, write tests, choose age-appropriate readings, and so forth. This is true even in schools where teachers alter courses, such as Virtual High School, because there is now such a large catalog of existing courses that teachers are much more likely to adapt than create from scratch.

On the other hand, online teaching necessitates learning a new technology called the course management system (CMS), generally Blackboard, but also e-Classroom, a proprietary system, or an open-source alternative such as Moodle. Since CMS is not particularly intuitive, a large number of professional development hours have in the past been spent on learning to negotiate these systems. Although this time has been reduced as CMSs have become more prevalent and somewhat more user-friendly, time saved there has been co-opted by the need to learn the raft of other technologies that are now being integrated into virtual learning, from videoconferencing, to chats, to wikis, to blogs. As a result, a substantial amount of professional development time is still spent on learning the technology.

Professional development for virtual teachers is therefore significantly different, in focus and content, from professional development for teaching in face-to-face classrooms. This does not mean, however, that there is a clear consensus as to what professional development for online teaching should include. Although some states have regulations regarding such issues as class size, student-teacher ratios, and the amount of teacher contact with students, only two (Kansas and Alabama) require professional development specific to online teaching (Watson, 2005). The kind...
of professional development to offer, and to what standard, is currently left up to the individual schools, although this is changing.

For instance, the Southern Regional Education Board has developed a set of Standards for Quality Online Teaching that covers such areas as academic preparation, content knowledge, and teaching/learning methodology. It has been adopted by all SREB member states (see www.sreb.org). In addition, there are at this point few clear-cut indicators of who will make a good online teacher, so in general, administrators look for teachers who have a good track record in terms of student success in the face-to-face classroom and who have good time-management and written communication skills. This is changing too, however: the National Education Association recently published a *Guide to Teaching Online Courses*, which has a long section on preparing and supporting online teachers, including defining credentials and skills, evaluation, and assessment (see www.nea.org).

Despite considerable differences, however, there are some commonalities:

- **First**, all schools require that their teachers participate in one or more professional development activities before they teach online, although the extent of this preparation varies considerably. To date, most schools have developed and offered their own professional development courses, geared to the expected needs of their own teachers and generally focusing on the specific course these teachers will be teaching.
- **Second**, in almost all cases an important part of the professional development requirement is an online course, on the theory that by modeling the model, teachers will apply the experience of being a student in a well-run online course to their own teaching.
- **Third**, most schools have some form of mentorship as part of their professional development, and they increasingly include some form of supervision as well.
- **Fourth**, many schools build in some face-to-face meetings (although, as we will see, they use this time in different ways).
- **Finally**, none of the teachers-in-training is paid to participate in the professional development that makes them eligible to teach online courses; in fact, some have to pay for the course themselves, although they may receive graduate or other credits. This situation is likely to continue only as long as teaching an online course is primarily a part-time (contracted) activity, and as long as there are more teachers who want to teach such courses than there are courses for them to teach.

Although the form or structure of these professional development activities may be similar, their content differs. Here, the distinction between virtual courses and virtual classrooms, and between professionally created and teacher-created courses, becomes important. Instructors who teach virtual courses through one-on-one instruction, as at FLVS and MVS, are able to adapt to the learning styles and academic levels of their students. While such individualized instruction is routinely discussed in professional development for face-to-face classrooms, it is generally in terms of having materials and activities available that appeal to students at different levels or with different learning styles, not adapting them to each student separately. However, it is no small matter to determine how to teach to specific learning styles, much less different learning disabilities, even when you are interacting one-on-one with your students; and the virtual schools are only just beginning to think about how to capitalize on this opportunity while managing large student loads.
Schools with virtual classrooms, such as VHS and LVS, have a different set of challenges. These center on issues of communication and facilitation. Teachers in virtual classrooms communicate entirely through the course management system (for example, through Blackboard) or by e-mail, not by telephone; so they have to scaffold their courses very carefully and make their instructions very clear and explicit. In addition, since student-student interactions are a core component of the weekly assignments in virtual classrooms, these online teachers have to find ways to engage students without relying on force of personality (except as it can be realized in written form), and they also have to find ways to create community among their students. To do this, they have to learn how to generate, and sustain, meaningful discussions, and to organize and manage group projects. Although individual attention is possible, individualized instruction is much more difficult, and allowing for different learning styles becomes a matter of curriculum development rather than teaching as such. Schools with the virtual classroom model are increasingly focusing on how to fine-tune the two key components—the discussion forums and the group projects—to encourage deeper learning.

**Cases**

In this section, we will briefly describe how the distinctions outlined earlier—between virtual courses and virtual classrooms, and between professionally developed and teacher-adapted courses—play out in specific schools that offer virtual schooling. Florida Virtual School and Virtual High School are the oldest and most highly developed examples of schools that rely on virtual courses (FLVS) and virtual classrooms (VHS), with the more recent Michigan Virtual School closer to the virtual course model and Louisiana Virtual School closer to the virtual classroom model. FLVS is also the mostly highly developed example of professionalized course development, while VHS is the most highly developed example of teacher-led course development. The professional development experiences at each school differ in structure, length, and content, depending in part (but only in part) on whether the schooling takes place through virtual courses or in virtual classrooms.

Thus, VHS and LVS teachers, who work in virtual classrooms and adapt courses, go through long pre-teaching processes that focus on learning the course content and developing strategies for course facilitation. FLVS teachers, on the other hand, handle many students one-on-one in virtual courses, spending less time beforehand on the course content. MVS falls in between. The descriptions, although highly condensed, are designed to give a sense of the variety and complexity of the schools and of their approaches to professional development.

**Schools Offering Virtual Courses**

**Florida Virtual School** was founded in 1997 and is the second largest virtual school in the United States. Utah’s Electronic High School is the largest, with about 35,000 students in 2005, but its courses are more like traditional correspondence courses.

In discussing virtual schooling, where one student may take one or more courses online, there is a distinction between course registrations and number of students. Course registrations seem the more comparable number, and FLVS had just over 33,000 course registrations from summer 2004 through spring 2005 (Watson, 2005), see www.flvs.net/educators/fact_sheet.php). It offers more than 80 courses taught by 174 full-time and 106 adjunct faculty, a larger proportion of full time to part time than most virtual schools.
FLVS was founded in order to offer a virtual alternative to students in Orange County and Alachua County, Florida, school districts, where the student population was expanding faster than buildings could be built (Clark, 2001). However, it quickly attracted homeschoolers, migrant workers, and students from other districts. FLVS emphasizes one-on-one teacher–student communication as being at the heart of its educational experience, with communication mostly by telephone and e-mail (Friend & Johnston, 2005).

A full-time FLVS teacher will handle approximately 200 students to course completion, and all of them may be on different schedules, either because of rolling enrollments or because students can set their own pace as they go through a course. To manage this variation, FLVS has developed “pace charts,” which allow students to choose one of three paces: traditional, extended, or accelerated. Teachers can further adapt these to students’ needs. Not surprisingly, to manage such a large number of teachers and rapidly changing roster of students, FLVS has developed comprehensive management and tracking systems.

When FLVS started, teachers created its courses, but they are now developed by multi-role teams that include subject matter experts, curriculum specialists, instructional designers, and project managers, with separate teams for creating, modifying, and totally revising courses. Teachers cannot change the course content, but they can individualize in small ways, for instance, by adding chats, topical discussions, announcements, and so forth.

Professional development at FLVS was originally entirely face-to-face at FLVS headquarters. This in-person element has been maintained, although in an abbreviated form, while an online component has been added. FLVS has recently begun to chunk the material to be covered, delivering it on an as-needed basis rather than all at once. For example, teachers learn how to register students early on but do not learn how to submit grades until later. Before they begin teaching, new teachers take a quick walk-through of the course with the help of a content specialist.
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Not surprisingly, given the number of students that FLVS teachers work with, considerable professional development time is spent on course management and administrative systems, in addition to strategies for effective teaching.

FLVS also has a mentoring system that lasts an entire year. The mentor teacher—a veteran instructor who has proved to be highly successful teaching online—both supervises and advises (by telephone and e-mail), frequently at first and then at longer intervals. In addition, mentors meet together weekly as a team. FLVS has a highly developed system for monitoring teachers, including "observations" of online activities, reviews of teacher progress reports, and checks of phone logs (Watson, 2005).

Michigan Virtual School has its roots in a long tradition of distance education in the state. In its current manifestation, MVS first offered courses in fall 2000 (Clark, 2001) and has since expanded rapidly, to approximately 6,000 semester course registrations from summer 2004 through spring 2005 (Watson, 2005). Most of the approximately 80 MVS teachers teach only one course and also teach either full or part time in site-based schools. Like FLVS, MVS’s approximately 100 courses (plus another 100 exam-review courses) are mostly self-paced and instructor-guided, with teachers interacting with students one-on-one. MVS originally bought its courses from outside vendors but is now developing its own, using teams that include the department chair, an instructional manager, and an instructional designer.

MVS’s training for teachers originated in an online course for higher education faculty, in this case a 7-week course developed to train faculty to teach online. Like FLVS, MVS has a face-to-face component to its professional development: a year-end meeting that is part professional development, part planning, and part building communities of practice. MVS has a mentoring system that originally relied on experienced teachers acting as mentors to new teachers, “sitting

Figure 10.2 Michigan Virtual School Web site

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in” on their courses and being available for consultation. These have recently been replaced by department chairs.

**Schools Built around Virtual Classrooms**

**Virtual High School** is the oldest of the four schools discussed here and is unique in that it is the only virtual school that is not state-focused, drawing its teachers and students from across the nation as well as from other countries. VHS was founded in 1996 as the result of a 5-year U.S. Department of Education Technology Innovation Challenge Grant. The grant was awarded to the Hudson, Massachusetts, Public Schools in partnership with the Concord Consortium, an educational research and development organization. In 2001, after the grant ended, it became a nonprofit organization, headquartered in Maynard, Massachusetts.

VHS had approximately 6,000 course registrations from summer 2004 through spring 2005, with 260 teachers offering 140 courses (Watson, 2005). This increased to 237 courses and 7,500 enrollments in 2005–06, largely as the result of a Department of Education grant to develop an Online AP Academy (Virtual High School Network, 2006). VHS has a unique cooperative structure: a school that releases a teacher to teach a VHS course is allocated 25 seats for its students in other VHS courses. Because of this arrangement, almost all VHS teachers teach virtual and face-to-face classrooms concurrently.

![Virtual High School Web site](image)

All VHS courses are developed by the teachers who teach them. Those who teach a previously developed course are required to adapt it. They can change the readings, the assignments, and the assessments, although the course must still meet the applicable national standards. VHS teachers teach in virtual classrooms. In other words, although the courses are asynchronous and accessible 24/7, students who enroll in a class follow a weekly schedule of readings, activities, and assignments, and they are expected to collaborate and communicate with each other frequently throughout the week.
When Concord Consortium received the Technology Innovation Challenge Grant to create a virtual high school, it had been offering K–12 classroom teachers, through an earlier grant, online professional development courses on developing inquiry-based instruction in math, science, and technology. The experience gained in developing and facilitating these courses, which relied heavily on the exchange of ideas in discussion forums, provided the basis for VHS’s virtual classroom model, as well as for its first professional development course, titled Teachers Learning Conference (TLC).

In addition, because VHS teachers come from, and work for, many different districts and schools, VHS had to develop a teacher preparation process which would ensure that all its courses and teachers met the same high standards. TLC is a 22-week (shortened from 26 weeks) online course in which teachers learn about and experience online pedagogy as they build courses they will teach. They can receive up to 12 graduate credits for completing the course. A shorter (10 weeks, shortened from 12 weeks) course, Netcourse Instructional Methodologies (NIM), was developed for teachers to learn online pedagogy as they adapt existing courses. During TLC, NIM, and their first semester teaching, new VHS teachers are carefully mentored and supervised by experienced VHS teachers.

VHS is the most explicit of the four schools discussed here in terms of its focus on transferring a student-centered, constructivist pedagogy from face-to-face instruction to the virtual classroom, introducing teachers to the principles of “backwards design” (Wiggins & McTighe, 1998) and emphasizing problem-based learning, peer review, and the use of rubrics. For many VHS teachers, this is their first exposure to this approach to curriculum development (Lowes, 2005).

**Louisiana Virtual School**, like Michigan Virtual School, has its roots in earlier incarnations of distance education, at first by satellite and then via tele-learning through the state’s Distance Learning Network. LVs first offered courses through a private boarding school, the Louisiana School for Mathematics, Science, and the Arts, whose teachers developed and taught a series of synchronous distance-learning courses.

In 2000, the format was converted to online, although there are still courses offered through a satellite link. LVs’s origins are thus in virtual classrooms, and these continue today. As with VHS, LVs students are required to interact with each other. Since 2000, enrollment has grown rapidly, and LVs had approximately 2,500 course registrations, in 32 courses, in the 2004–05 academic year (Watson, 2005). Most of LVs’s approximately 40 teachers teach online part time. Teams develop LVs courses in-house, and teachers are allowed to add to, but not subtract from, the courses as they teach them.

To deal with its rapid expansion, LVs developed a structured five-phase professional development program. LVs decided not to develop its own professional development course for new teachers but instead enrolled prospective instructors in an existing 6-week course offered through Concord Consortium and tailored to LVs needs. After taking the course, the prospective teacher spends a semester as a teaching assistant for an experienced instructor, who plays the role of mentor. This is followed by an induction year, during which the new teacher is allowed to teach one course. LVs also requires all its teachers to participate in online workshops throughout the school year and attend a year-end, face-to-face workshop—3 days in the past, reduced to 1 in 2005 when students displaced by Hurricane Katrina needed the space for summer school.
### Figure 10.4 Louisiana Virtual School Web site

![Louisiana Virtual School Web site](image)

Reprinted with permission of the Louisiana Department of Education.

### Figure 10.5 Louisiana Virtual School’s teacher training and professional development model

<table>
<thead>
<tr>
<th>Phase</th>
<th>Purpose</th>
<th>Requirements</th>
<th>Additional Resources/Support</th>
<th>Topics Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Prospective Instructor</td>
<td>Trains a pool of teachers for future growth</td>
<td>6-week online course (LVS codevelops with a provider)</td>
<td>Instructor-led Blackboard (Bb) moderated courses</td>
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<td>• Developing a course syllabi</td>
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<td>• Moderation techniques</td>
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<td>• Creating online teacher resources</td>
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<td></td>
<td>• Collaborating in an online environment</td>
</tr>
<tr>
<td>II</td>
<td>Teacher Assistant (TA)</td>
<td>Plays the role of an online student teacher, serving in a mentee teacher assistant role</td>
<td>One-semester enrollment in an LVS course while being paired with an experienced instructor/mentor</td>
<td>Bb TA community shell; F2F and online support via a mentor</td>
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<tr>
<td></td>
<td></td>
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<td>• Online teaching pedagogy</td>
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<td>• Collaborating in an online environment</td>
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<td>• Grade-level expectations</td>
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<td>• Proficiency with the CMS</td>
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<tr>
<td>III</td>
<td>Induction Year</td>
<td>Delivers one online course for LVS</td>
<td>Online workshops throughout the school year; end-of-year F2F workshop</td>
<td>Bb teacher community shell; F2F workshop</td>
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<td>• Grade-level expectations</td>
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<td>• Visualizing concepts: increasing understanding and memory</td>
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<tr>
<td>IV</td>
<td>Experienced Instructor</td>
<td>May deliver more than one online course for LVS</td>
<td>Online workshops throughout the school year; end-of-year F2F workshop</td>
<td>Bb teacher community shell; F2F workshop</td>
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<td></td>
<td>• Visualizing concepts: increasing understanding and memory</td>
</tr>
<tr>
<td>V</td>
<td>Mentor Program</td>
<td>Mentors a new TA for LVS</td>
<td>One semester mentoring of a TA in an LVS course; submission of monthly progress reports</td>
<td>Bb teacher community shell; F2F workshop</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>• Mentoring in an F2F and online environment</td>
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Challenges

Rapid growth has created many challenges for virtual schooling, and these affect the professional development component as well. In the face of constant pressure to reduce costs, all schools face the problem of remaining true to the core principles of their model while adapting to new technologies and changing constituencies. One of the most common pressures is the need to reduce the length of the initial professional development course—to make it shorter, more directed, and more efficient. FLVS has addressed this in part by breaking its professional development into chunks. VHS reduced its TLC and NIM courses by several weeks. MVS and LVS both reduced the length of their face-to-face workshops. A trend toward developing more just-in-time professional development opportunities (see Trends section) is also a response to this challenge, enabling schools not only to shorten the initial professional development activities, but also to deliver professional development when it is most needed.

The second challenge that relates to professional development is the changing student population. Course enrollment in the first online courses was primarily made up of highly motivated, high-achieving students. Today, enrollment also includes students in low-performing schools who are taking courses online because they have not done well in the face-to-face classroom. This change, often the result of state or federal pressure to offer such higher level coursework as AP courses to students who have not had such opportunities, or to offer students the opportunity to retake classes they have failed so that they can graduate (credit recovery), requires not only that the schools learn how to support these students but that teachers also learn how to reach and retain them.

In fact, retention, a major issue in virtual schooling in general, is a particular concern with regard to many of these students, although it may be of lesser concern regarding credit-recovery students, for whom the online course offers the last chance to graduate. Since virtual courses still tend to be heavily text-based and these students are less likely to be good readers, schools are searching for ways to address this challenge. For example, FLVS has hired full-time reading and literacy coaches to help its teachers with underachieving students. VHS, with the help of a Department of Education grant, has developed a series of pre-AP courses to prepare middle and high school students for AP-level work. This has also led VHS to introduce virtual vertical teaming, to make sure the skills and content needed for AP are included in the pre-AP courses.

A third related challenge is to create courses that are accessible to a wider variety of students, which often means being less text-based, more multimedia, and more interactive. FLVS has recently announced an alliance with Academic ADL Co-Lab to introduce, into existing courses, sharable content in the form of virtual labs, simulations, podcasts, and other interactive media. Several schools, as well as the Southern Regional Education Board, are talking about developing libraries of SCORM-compliant learning objects that can be used in many different courses. However, teachers are only now learning how to use such objects in face-to-face classrooms, and learning how to use them in virtual environments will involve additional professional development for current online teachers.
Trends

Outsourcing Professional Development

As noted above, until recently each school developed its own professional development courses for its teachers. This is changing, however: schools are buying seats for their teachers in courses offered by other institutions, and schools are developing courses for teachers from other institutions. An example of the first is Louisiana Virtual School’s contract with Concord Consortium to train its teachers in online facilitation. Although the Concord course already existed, it was adapted to meet the specific needs of LVS.

In addition, as more and more schools and districts put their own courses online, there will be a growing need for professional development for these teachers. To address this need, VHS is in the process of developing a 6-week online course that will prepare any teacher anywhere to take a course online, regardless of the platform (Fig. 10.7). FLVS, the only school discussed here that licenses its courses to schools in other states (through Florida Virtual Global Services), has always included training for that state’s teachers in its licensing package.
Once there is a core of teachers who teach online again and again, year after year, it becomes both possible and necessary to offer ongoing professional development. As noted earlier, learning the technology is a major hurdle for most virtual schools’ beginning teachers. Many professional development hours are expended on mastering course management systems, student tracking systems, and other administrative structures. Much ongoing professional development continues to focus on using the existing technology effectively, as well as on learning new technology systems or innovations as providers introduce them.

In addition, the most established virtual schools, including VHS and FLVS, have now developed formal multiyear professional growth models, adapted from site-based schools to fit the virtual environment. FLVS expects both teachers and staff to set annual goals and engage in a variety of professional development activities to meet those goals. VHS has a 3-year professional growth model that takes teachers through a process of self-evaluation, peer mentoring, and formal evaluation (Pape, Adams, & Ribiero, 2005).

Schools are also developing more just-in-time professional development opportunities. VHS created the Community of Virtual Educators (COVE), a centralized virtual space that is facilitated by experienced teachers and is explicitly designed not only for professional development but also to foster a community of learners (see Fig. 10.8).

Originally used for immediate problem solving and timely information, COVE now brings a number of activities into one place, including department-type discussions (by subject area), self-paced minicourses that address recurring problems, and discussions around topical issues. FLVS has developed single-topic, monthly, open forums, some delivered as webcasts through
Elluminate. Topics range from those of particular interest to teachers—for example, communicating with students—to those that are of interest to administrators anywhere, for example, managing your teachers or managing a virtual school budget. There are also opportunities to focus on particularly pressing problems, as in recent literacy and leadership series.

As experience is gained and more research is published, attention is increasingly focusing on how to take positive advantage of the online environment rather than how to overcome its hurdles. Some of this focuses on pedagogy. For instance, in COVE, VHS has courses that focus on the pedagogy that teachers struggle to implement in their virtual classrooms, including how to organize group work effectively and how to generate a deeper discussion. FLVS has recently begun to look at such issues as effective questioning techniques, and LVS has developed an online session called Visualizing Concepts: Increasing Understanding and Memory. In addition, those schools that have rolling enrollments or offer “flex-90” courses, such as FLVS and MVS, have begun to recognize the importance of student-to-student communication and are working to find ways to introduce this into their courses while preserving the student-to-teacher one-on-one format (see section below titled Convergences). This has led them to add professional development around building effective group projects and discussions. These student activities may or may not be online. For instance, FLVS teachers can use conference calls, while MVS is using discussion forums.

Most professional development has been offered online, but until recently it was entirely asynchronous. This is changing as a result of wider access to such platforms as Breeze, WIMBA, and Elluminate. FLVS uses Elluminate for interactive discussions, while MVS has used PictureTalk for both group discussions and one-on-one Web conferences. LVS has recently acquired a WIMBA Live license and expects to deploy it in all its courses in the near future.

**Mentorship and Supervision**

In the early days of virtual schooling, there were no role models, and teachers helped each other as best they could. But as the field has developed and expanded, mentoring programs have been
developed and institutionalized. Mentoring has become a formal position in all the virtual schools discussed here, and mentor teachers are almost always paid a stipend for their work. In addition, although in the early days this was generally peer mentoring, the position has become more professionalized, with mentoring and supervision increasingly wrapped up in the same person.

FLVS, for instance, combines mentorship during a new teacher’s first year with extensive supervision and monitoring. VHS has a system whereby experienced teachers mentor new teachers through every step of the TLC or NIM course and then during the first semester of teaching online; after that, teachers are monitored, while mentoring shifts to the community-building COVE area. Rapid growth has led MVS, which originally had experienced teachers acting as mentors, to create departments (by subject) and have the department chairs act as intermediaries between teachers and MVS staff. Being a chair is not a full-time position, however, and chairs still teach courses, thus remaining practitioners. LVS builds mentoring into its five-stage professional development program; not only are new teachers required to spend a semester as a teaching assistant, but lead instructors in particular subject areas also help both new and experienced teachers learn new tools.

**Building Communities of Practice**

Just as the growing number of online teachers requires ongoing professional development, so, too, a growing number of experienced teachers can benefit from communities of practice. In the past, many teachers in virtual schools had existing communities to relate to. For instance, those who teach in both site-based and online schools have their site-based schools as communities; their need for a community among online teachers is more focused than the needs of those teachers who teach only online. This distinction is evident in the ways in which the different schools develop community.

FLVS, with more teachers whose community of practice is not the site-based school, has recently introduced a number of community-building activities. They range from cross-team discussion forums, including a great books series that meets weekly online, to study circles on different topics. VHS explicitly attempts to develop a community of practice during its TLC and NIM courses and then has a set of discussion forums inside COVE. Both MVS and LVS use their end-of-year, face-to-face meetings to develop community, as the title of MVS’s first meeting—Collaboration of the Minds—indicates.

**Convergences**

At the beginning of this chapter, we distinguished virtual resources, virtual courses, and virtual classrooms. Although these distinctions are useful for understanding the differences among the virtual schooling experiences, they have recently begun to blur around the edges in ways that hint that in the future virtual schooling may look somewhat different than it does today.

Virtual resources can range from Internet resources developed for other purposes (document archives, real-time data, videos, and so forth) to highly sophisticated virtual textbooks developed specifically for use in online courses. In the past year or so, there have been signs of a growing move to use virtual resources specifically developed for online courses in site-based classrooms. For instance, some schools are considering using the virtual textbooks developed for online classes, particularly material from online AP courses, in face-to-face classrooms. This is in part because they are very up-to-date, but also because they often contain interactive applets or large...
document libraries, or both, as well as quizzes and practice tests, which are particularly useful to
teachers who have not taught AP before. In addition, virtual schools are branching out by offering
to help face-to-face classroom teachers use the virtual resources that online teachers have been
using all along. For example, VHS is developing a 6-week online course for site-based teach-
ers who want to create what VHS is calling the “Web-extended” classroom, one that takes such
virtual resources as virtual tours, real-time information, maps, streaming video, audio clips, and
so forth, and integrates them into face-to-face classroom activities.

The distinction between virtual courses and virtual classrooms is also blurring somewhat, at
least for those who have traditionally offered virtual courses. This is partly in response to criti-
cism that virtual schooling is too isolating. Some, like MVS, are developing more courses that are
offered in virtual classrooms. Others, including FLVS and MVS, are not abandoning the model
of one-on-one teacher-student interaction but instead are trying to build more student-student
interaction into the course, generally by creating “natural” cohorts, a grouping of students who
enroll at the same time and work together on certain activities. (In site-based schools, on the
other hand, there is a growing move to create “blended” classrooms by adding discussion forums
as out-of-class activities. While this is common in higher education, until recently K–12 schools
were concerned that unequal access to technology made this impossible. That this is changing is
indicated by another, new VHS course which focuses on building a classroom that combines both
online and face-to-face instruction.)

Perhaps the greatest convergence, however, is the one between virtual schooling and site-based
schooling, or more precisely, between virtual teaching and face-to-face classroom teaching. All of the
trends discussed above, and more, are leading to this larger convergence. Here are some of them:

- The expectation is growing that all students will take an online course before they
  graduate.
- Site-based classroom teachers are using more virtual resources, including not only such
  virtual classroom features as the discussion forum but entire virtual courses as well.
- Virtual schools are offering courses for site-based classroom teachers, and site-based
  schools are offering courses for virtual teachers.
- More and more site-based teachers are also teaching a course or two online.
- Teachers are finding that professional development for online teaching is also useful for
  the site-based classroom.
- Standards for teaching online are being codified.
- Being an effective online teacher is becoming valued in the profession.
- Colleges of education are beginning (very slowly) to include learning to teach online in
  their coursework.

As all this happens, and happens fast, the distinctions between teaching in a virtual school and
teaching in a site-based school are beginning to look both artificial and, in terms of analysis, even
misleading. In this world, “trans-classroom” teachers will move back and forth between the two
environments, transferring ideas, strategies, and practices from one to the other. As we move
forward, we should perhaps think more about the interactions between the two environments
and less about how to distinguish them from each other, therefore constructing our professional
development opportunities with this in mind.
Acknowledgments

There is very little published research on virtual schooling, although there are a number of studies in the works. The schools discussed in this chapter were chosen because each was the site of one of the studies sponsored by the North Central Regional Educational Laboratory (NCREL) in 2005. Smith, Clark, and Blomeyer (2005) have written a synthesis of these studies.

The discussions in this chapter rely heavily on interviews with Felicia Ryerson, Florida Virtual School; Liz Pape, Ruth Adams, and Ray Rose, currently or formerly from Virtual High School; Ken Bradford, Louisiana Virtual School; Robert Currie, Michigan Virtual School; Matthew Wicks, Illinois Virtual School; and Bruce Thomas, Southern Region Education Board. In addition, Ruth Adams, Virtual High School; Liz Azukas, Florida Virtual School; and Bob Currie, Michigan Virtual School made visits (virtually) to a class on virtual schools and virtual schooling that I taught at Teachers College in spring 2006. Bob Blomeyer gave valuable input on the first draft of this chapter.

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Web sites for the Virtual Schools Discussed in this chapter:

Florida Virtual School
www.flvs.net

Louisiana Virtual School
www.louisianavirtualschool.net

Michigan Virtual School
http://mivhs.org

Virtual High School
www.goVHS.org

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What Works in K–12 Online Learning

Cathy Cavanaugh is an associate professor in the College of Education at the University of Florida and the editor of Development and Management of Virtual Schools.

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