THE PROMISE OF ACCESSIBLE TECHNOLOGY: CHALLENGES AND OPPORTUNITIES

HEARING

OF THE

COMMITTEE ON HEALTH, EDUCATION, LABOR, AND PENSIONS

UNITED STATES SENATE

ONE HUNDRED TWELFTH CONGRESS

SECOND SESSION

ON

EXAMINING ACCESSIBLE TECHNOLOGY, FOCUSING ON CHALLENGES AND OPPORTUNITIES

FEBRUARY 7, 2012

Printed for the use of the Committee on Health, Education, Labor, and Pensions

Available via the World Wide Web: http://www.gpo.gov/fdsys/

COMMITTEE ON HEALTH, EDUCATION, LABOR, AND PENSIONS

TOM HARKIN, Iowa, *Chairman*

BARBARA A. MIKULSKI, Maryland
JEFF BINGAMAN, New Mexico
PATTY MURRAY, Washington
BERNARD SANDERS (I), Vermont
ROBERT P. CASEY, JR., Pennsylvania
KAY R. HAGAN, North Carolina
JEFF MERKLEY, Oregon
AL FRANKEN, Minnesota
MICHAEL F. BENNET, Colorado
SHELDON WHITEHOUSE, Rhode Island
RICHARD BLUMENTHAL, Connecticut

MICHAEL B. ENZI, Wyoming
LAMAR ALEXANDER, Tennessee
RICHARD BURR, North Carolina
JOHNNY ISAKSON, Georgia
RAND PAUL, Kentucky
ORRIN G. HATCH, Utah
JOHN McCAIN, Arizona
PAT ROBERTS, Kansas
LISA MURKOWSKI, Alaska
MARK KIRK, IIllinois

DANIEL E. SMITH, *Staff Director, Chief Counsel*
PAMELA J. SMITH, *Deputy Staff Director*
FRANK MACCHIAROLA, *Republican Staff Director*

(II)

C O N T E N T S

STATEMENTS

TUESDAY, FEBRUARY 7, 2012

Page

(III)

THE PROMISE OF ACCESSIBLE TECHNOLOGY: CHALLENGES AND OPPORTUNITIES

TUESDAY, FEBRUARY 7, 2012

U.S. SENATE,
COMMITTEE ON HEALTH, EDUCATION, LABOR, AND PENSIONS,
Washington, DC.

The committee met, pursuant to notice, at 2:36 p.m., in Room SD–G50, Dirksen Senate Office Building, Hon. Tom Harkin, chairman of the committee, presiding.

Present: Senators Harkin and Enzi.

OPENING STATEMENT OF SENATOR HARKIN

The CHAIRMAN. The Senate Health, Education, Labor, and Pensions Committee will come to order.

This session of the Senate Committee on Health, Education, Labor, and Pensions will consider the topic of The Promise of Accessible Technology: Challenges and Opportunities. This is one of a series of hearings we have been holding since March 2011 to explore a range of issues that can impact the employment situation for Americans with disabilities with the overall goal of boosting labor force participation for this community.

Earlier hearings have focused on those with intellectual disabilities, how higher education can promote employment for people who are deaf and hard of hearing, transportation accessibility, and State and private strategies for employment of people with the most significant disabilities. This is also the first of the series of hearings that we will be holding this year on the use of education technology to improve student achievement.

Innovations in technology are already transforming instruction in some schools and have great potential for personalizing the learning experience for all students. The education technology hearings will examine topics such as blended learning, professional development, and open educational resources. Today's hearing focuses on education, accessible technology, and universal design.

We know without a strong education, the goals of the American Dream are difficult to attain for many Americans. In our modern classrooms, technology is playing an increasingly important role. For students who use technologies like screen readers to access text, a modern classroom can accelerate learning and level the playing field by allowing students to access digital content through screen reader technology.

In a classroom that enables computer monitors on each desk, students can change the size of print and the background colors so

they can see better what is on the screen. Those with learning disabilities and those with visual impairments can use audio books, and devices such as iPods can be set to aurally scan listings of books, music, and lectures.

These are all examples of accessibility built into the technology that we use every day. But for every example we can find of accessible technology and curricula, there are other examples that are not accessible or are only accessible through modifications that can cost hundreds of dollars.

In December, the U.S. Department of Education's Commission on Accessible Instructional Materials issued its report on Accessible Materials in Post-Secondary Education. The Commission, one of whose members is a witness today, stated,

> "Individuals with disabilities must have equal opportunity and discrimination-free access to full participation and success in post-secondary education."

The Commission is correct. Access to curriculum and instructional materials is a civil right, one that all students should be able to enjoy equally. Although technological advances make accessibility readily achievable in modern classrooms, the level of accessibility continues to be uneven.

The Commission itself states that even,

> "some digital materials that hold the most promise for equal access are often partially or completely inaccessible to students with disabilities."

We will hear from one of our witnesses about one of these digital resources that was inaccessible and how that barrier was overcome.

If a portion of our students, any students, are systematically excluded from accessing their curricula because of inaccessible technology and because we have not designed curricula in a manner that allows them equal access to knowledge and skills, then we are systematically denying a portion of our next generation an equal educational opportunity. As you will hear from our witnesses today, technology and education itself must be made accessible from the beginning, not just as an afterthought.

And it is not enough for us to ensure that the technology is accessible. We must then work to make the curricula we use in schools accessible to all students, designing the curricula from the ground up to be used by all students. This means ensuring that the ideas that are part of the curriculum are represented in multiple ways, through words, through graphics, through sound, through motion and movement.

Technology and universal design can make learning more effective and more engaging. Today's witnesses will help us explore these issues.

We have two panels before us. We will begin with Eve Hill, Senior Counselor to the Assistant Attorney General for Civil Rights at the Department of Justice. Our second panel is composed of Mark Riccobono, executive director of the Jernigan Institute of the National Federation for the Blind; Dr. John Quick, superintendent of the Bartholomew Consolidated School Corporation, a public school district in Columbus, IN; and Mr. Mark Turner, director of the Center for Accessible Media at California State University.

Before we begin, I want to welcome a very large number of members of the National Federation of the Blind from around the country. I see you all here. We welcome you to this hearing. And, of course, if I might, as a matter of pride, welcome Marc Maurer, your president. Where is Marc sitting? Right in front—from Boone, IA. I was in Boone last Saturday night. It is still there. Boone is still going strong.

Congratulations, Marc, on your being the president of this great organization.

Now I will yield to Senator Enzi for his opening statement.

OPENING STATEMENT OF SENATOR ENZI

Senator ENZI. Thank you, Mr. Chairman.

There is not a single aspect of daily life that hasn't been transformed or made easier through the use of technology. We only need to walk down the halls of this building to see how Blackberries and iPhones have made each of us more accessible to our colleagues as well as to our constituents. For me, personally, there is not a day that goes by that I do not use my Kindle to keep track of the volumes of messages I receive from the people of Wyoming and the memos my staff send.

Now, you may have some ideas for some technology that will improve your life and many others. I do an Inventors' Conference in Wyoming once a year to encourage people to invent something and to get it to the stage where they can market it and sell it. So if you've got one of those ideas, consider doing that. It could be a whole new business as well as solutions for a lot of people.

Now, in other professions and aspects of life, technology has been even more transformative. Last Thursday, the committee heard how technology is changing higher education, making it cheaper and more accessible to thousands of students. We heard how Virginia Tech is cutting costs by moving many of its introductory math courses online. MIT and Stanford are putting classes online for free, and Western Governors University is providing low-cost, high-quality degree programs completely online to thousands of non-traditional students. This is a welcome and necessary development if America is going to remain the world's economic leader.

For individuals with disabilities, technology has been a godsend. It has created countless opportunities for the disabled that were beyond anyone's imagination just 5 years ago. We take for granted how many technologies developed to assist individuals with disabilities have been adapted for use by the general population. For example, closed caption TV and films. Once it was only available through the use of a special transformer. Now, every TV has the built-in capacity for closed captioning. And you cannot go to a single gym facility where the TVs do not have the captioning for the members.

Now, just as we have benefited from technology developed to address specific disabilities, we must also take steps to assure that no one is left out of this technological revolution. We have seen how technology can create new barriers as well, as well-intentioned efforts to improve education through technology have simply turned out to be inaccessible to those with disabilities. That is what we need to know about.

Now, this is certainly not intentional. Many manufacturers in their excitement to get new products to market simply do not anticipate the needs of the disability community. In other cases, technology reaches the consumer only to be used in ways never imagined. Fortunately, the schools and colleges that are innovating through technology are beginning to work with manufacturers to ensure their products are accessible by all students regardless of disability.

Today we have on the panel two school systems that have found creative ways to increase access through technology and improve student outcomes. I look forward to hearing how they have enhanced their student educational opportunities as well as how they have been successfully working with manufacturers to benefit all of their students.

Mr. Chairman, I have to apologize because we are having a markup in the Finance Committee on how to fund highways and bridges in this country, and figuring how to pay for it around here is pretty tough. So I am going to have to leave after a little while to do that.

Mr. CHAIRMAN. I understand that.

Mr. ENZI. But thank you for holding the hearing, and I will get a complete report on all of the suggestions that we get.

The CHAIRMAN. Thank you, Senator Enzi, and thank you for your close working relationship on this. While we may have differences on some things that come before this committee, I can tell you this is one on which there is very close bipartisan agreement on the use of technology and making sure that technology is accessible and available and making sure curricula, as I said earlier, is designed. This is all intertwined.

So I want to thank you, Senator Enzi, and thank your staff for a very close working relationship. I understand we do have to build some new bridges and roads in this country. I understand that full well.

We will start with our first panel. Ms. Eve Hill joins us from the Civil Rights Division at the Department of Justice, where she serves as a Senior Counselor to the Assistant Attorney General. Over the course of her career, Ms. Hill has worked at the State and Federal level as well as private nonprofit organizations to ensure that education and job training meet the needs of people with disabilities.

She was the first director of the Office of Disability Rights in Washington, DC. Ms. Hill was also the executive director of the Disability Rights Legal Center of Los Angeles and a supervisory attorney with the Department of Justice's Disability Rights section.

Ms. Hill, welcome to the committee. Your statement will be made a part of the record in its entirety. I had the privilege of reading it last evening. It is very thorough, very comprehensive. I wish we had the time for you to read the whole thing. But if you could sum it up in several minutes, I'd sure appreciate it.

Ms. HILL. I will do my best.

The CHAIRMAN. Thank you.

STATEMENT OF EVE HILL, SENIOR COUNSELOR TO THE ASSISTANT ATTORNEY GENERAL, CIVIL RIGHTS DIVISION, DEPARTMENT OF JUSTICE, WASHINGTON, DC

Ms. HILL. Chairman Harkin, Ranking Member Enzi, thank you so much for having me here today. It is really an honor to appear before you to discuss the promise of assistive technology and the civil rights aspects of accessible technology.

The Civil Rights Division of the Department of Justice enforces the Americans with Disabilities Act and Section 504 of the Rehabilitation Act, and we have a substantial role in implementation of Section 508 of the Rehabilitation Act. These statutes require accessibility for persons with disabilities, and providing accessible technology is an integral part of these statutes' requirements.

In this fast-paced information age in which we live, this is a fundamental issue of civil rights for millions of Americans. But cutting-edge technological advances will leave people with disabilities behind if they are not accessible. The department's work is making significant difference in access to technology for our citizens with disabilities. While my written testimony covered a broad range of technology issues, I will focus today on educational technology, specifically.

In education, the current transition from print materials to digital materials creates an incredible opportunity for people with print disabilities to finally use the same products as their peers and to gain the same benefits as their peers who do not have disabilities. The emergence of electronic book readers holds great potential to place students with disabilities on an equal footing with other students. But that happy result will only occur if the e-book reader is equipped with text-to-speech capabilities and if the electronic texts themselves are coded with structural data and text descriptions of images.

Students who are blind or have low vision have long used a form of electronic text as an accommodation that enables them to access their peers' materials. But this traditional system for providing special electronic text disadvantages blind students, because it can take considerable time for a college or university to locate and convert text into a digital form.

Imagine as a student being unable to access the course materials for your class for the first 4 months of the semester. Some types of textbooks, such as high-level science, technology, engineering, and math texts, have not even been available in electronic format.

In early 2010, the Department of Justice reached settlement agreements with six colleges. The agreements require that the schools not purchase, require, or use in their curricula the Amazon Kindle DX e-book reader or any other e-book reader that is not accessible. The schools must ensure that a student who is blind or has low vision can acquire the same information, engage in the same interactions, and enjoy the same services as sighted students with substantially equivalent ease of use.

In June 2010, the Assistant Attorney General for Civil Rights and the Assistant Secretary for Civil Rights at the Department of Education wrote to college presidents jointly throughout the country explaining that the requirement to use inaccessible emerging technologies in their classrooms violates the ADA. In May 2011,

the Department of Education issued Frequently Asked Questions making clear that the concepts from the 2010 letter extended beyond e-book readers to all forms of technology and extended to all operations of schools, including elementary and secondary schools.

E-book readers are not the only technology coming into the educational context. Other new technologies are also making their way into classrooms. One example is the wireless student response devices, known as clickers or i-clickers, that allow professors to take attendance, ask questions or take polls, and allow students to respond, sometimes even anonymously, by pressing buttons on their clickers or making choices on their clickers. However, if the clickers continue to rely on LCD displays that are visual only, they will exclude students with print disabilities from that form of participation in class.

Accessible technology also encompasses access to information on Web sites, which is of critical importance to education. Many colleges offer degree programs online. Some schools exist only online. Most colleges today rely on the Internet and other technologies for course assignments and discussion groups and for a wide variety of administrative and logistical functions.

As schools offer online document sharing, Web conferencing, streaming video, social networks, and even virtual reality programs, accessibility of those technologies to students with disabilities becomes essential. The Department of Justice has long taken the position that both State and local government Web sites and the Web sites of private entities that are public accommodations are covered by the ADA and are required to be accessible. Therefore, both public and private colleges and universities are required to make their online offerings accessible.

On April 26, 2011, the Department of Justice announced two settlement agreements involving the accessibility of the Law School Admission Council's online application service, which is used by law schools across the country to allow students to apply for their colleges. Under these agreements, LSAC will make its online Web site accessible by the fall of 2012, and Atlanta's John Marshall Law School will modify its own Web site to provide an accessible application process.

In addition, the Department has issued an Advanced Notice of Proposed Rulemaking on the accessibility of information and services on the Web. The Department anticipates publishing separate NPRMs addressing Web site accessibility pursuant to Titles II and III of the ADA in calendar year 2012.

It is also important for individuals with disabilities to have an equal opportunity to use electronic and information technology, commonly referred to as EIT. And equipment that uses electronic information and technology is becoming very pervasive in our society, things like kiosks and point-of-sale devices. Just in the educational context, kiosks are used for information and way-finding, for class registration, and for library services.

Unfortunately, many of these technologies have been developed without accessibility in mind. Even though accessibility features like talking kiosks are available, as a result, persons who cannot see a touch screen must rely on other people to enter information, including personal identification numbers.

The department's 2010 Advance Notice of Proposed Rulemaking on equipment and furniture included accessibility of EIT equipment. And EIT equipment will be the subject of an NPRM that the department anticipates publishing in early fiscal year 2013.

We are at a critical juncture for people with disabilities and educational technology. Technology may prove to be both the catalyst and the conduit to full integration of people with disabilities into society, which is what is envisioned by the ADA, or it may serve as the ultimate barrier. Accessible technologies will increase and are already increasing the educational opportunities, employability, and the social and civic participation of individuals with disabilities.

History tells us that inaction and silence will result in business as usual, that is, technological innovations that do not consider accessibility for people with disabilities. But we can break that pattern. The department's work, along with that of other agencies, advocates, and the work of this committee, is making a difference in raising the profile of this important civil rights issue.

The Department of Justice looks forward to continuing to work toward a world where accessible technology is the norm and not the exception in full compliance with both the letter and the spirit of the ADA.

Thank you again for the opportunity to be here today, and I look forward to answering any questions.

[The prepared statement of Ms. Hill follows:]

PREPARED STATEMENT OF EVE HILL

Chairman Harkin, Ranking Member Enzi, and members of the committee, it is an honor to appear before you today to discuss the promise of accessible technology. The Civil Rights Division enforces the Americans with Disabilities Act of 1990 ("ADA") and Section 504 of the Rehabilitation Act of 1973 ("Section 504"), and we have a substantial role in implementing Section 508 of the Rehabilitation Act. These statutes ensure accessibility for persons with disabilities. Providing accessible technology is an integral part of these statutes' requirements, and in the fast-paced information age in which we live, this has become a fundamental issue of civil rights for millions of Americans.

We are at a critical juncture for people with disabilities and technology. As we come to realize anew each day, the pace of technological change is amazing; what appeared impossible just years or even months ago is now commonplace. Advancing technology can open doors for many people with disabilities and can provide the means for them to move closer to the goal of full, equal, and truly integrated access to American life. But cutting-edge technological advances will leave people with disabilities behind if the entities that develop, manufacture, and offer technology do not make their products and services accessible.

As public servants entrusted with the welfare of our citizens, we in the Federal Government must provide the leadership to make certain that individuals with disabilities are not excluded from the virtual world in the same way that they were historically excluded from "brick and mortar" facilities. Emerging technology promises to open up opportunities for people with disabilities throughout our society. But a digital divide exists between individuals with and without disabilities. If we are not careful, as technology becomes more sophisticated the gap will grow wider, and people with disabilities will have less access to our public life.

Congress passed the ADA, 42 U.S.C. §12101 *et seq*., in 1990. The statute is a comprehensive, broad-reaching mandate to eliminate discrimination on the basis of disability in all areas of American civic and economic life. The Department of Justice is responsible for enforcement and implementation of Titles II and III of the ADA, which cover State and local government entities and private businesses, respectively. We also enforce Title I of the ADA, which prohibits disability discrimination in employment, in cases involving State and local government employees. The Department also enforces the statute on which the ADA is based, Section 504 of the

Rehabilitation Act of 1973, 29 U.S.C. 794, which prohibits discrimination in federally assisted and federally conducted programs and activities.[1]

When Congress enacted the ADA and section 504, the Internet and electronic and information technologies as we know them today—the ubiquitous sources of information, commerce, services, and activities—did not exist. For that reason, although the ADA and section 504 guarantee the protection of the rights of individuals with disabilities in a broad array of activities, neither law expressly mentions the Internet or contains specific requirements regarding developing technologies. When Congress amended the Rehabilitation Act in 1998, it added what is now known as section 508. That provision specifically requires Federal Government agencies to ensure that their electronic and information technologies, including their Web sites, are accessible to individuals with disabilities. 29 U.S.C. §794(d). Within the Civil Rights Division, the Disability Rights section is responsible for enforcement of the ADA and the coordination of enforcement of section 504 as these two civil rights statutes apply to the accessibility of information technologies to individuals with disabilities.

Enforcement of these laws by the Department of Justice has resulted in public entities, public accommodations, and some technology developers and manufacturers taking new approaches to technology accessibility. The Department's work—along with the important work of the Department of Education—is making a significant difference in education for our Nation's students with disabilities.

My testimony will also address the importance of Internet access for people with disabilities in the education context and beyond, and will discuss the Department of Justice's rulemaking activities on accessibility of information on the Web, as well as rulemaking activities of the Access Board, the Department of Transportation, and the Federal Communications Commission. Finally, I will turn to a discussion of how the Department of Justice's enforcement efforts are helping to ensure that other types of technology enhancements continue to improve the lives of people with disabilities across a full spectrum of activities, as Congress intended in enacting the ADA over 20 years ago.

I. ACCESSIBLE TECHNOLOGY IN EDUCATION: CHALLENGES AND OPPORTUNITIES

We are at a critical juncture for people with "print disabilities"—that is, people who experience barriers to accessing print in nonspecialized formats because of a visual, physical, perceptual, developmental, cognitive or learning disability.[2] The current transition from printed materials to digital materials creates incredible opportunity for people with print disabilities to finally use the same products as their peers who do not have disabilities. It promises a truly revolutionary kind of change for students with disabilities, allowing them to integrate fully with their non-disabled peers in terms of access to materials and class participation.

But the transition to digital materials also creates real peril for people with print disabilities. Technology is transforming education in this country, and electronic book readers appear to be on the front lines. Electronic book readers are typically lightweight, hand-held devices with screens and operating controls. Texts in an electronic form appear on the screens of these devices to simulate the experience of reading a book. Experts say that e-book reader use is likely to become interwoven at all levels and forms of education.[3] These books are now starting to feature interactive graphics, built-in videos, and other aspects especially attractive to educators; Apple's new iPad textbook features built-in quizzes, note cards, custom glossaries, and thumbnail navigation. Inaccessible e-book readers that, unlike the iPad, cannot convert text to speech, either for operational controls or content, will leave people who are blind or have print disabilities far, far behind.

Students who are blind or have low vision have long used a form of electronic text as an accommodation that enables them to access the course materials their classmates use. These electronic texts, which are converted from standard print texts, are read on a computer, using a screen reader or a refreshable Braille display. In order for these electronic texts to be truly usable by someone who is blind or has low vision, however, the texts must be coded with structural data so that the assist-

---

[1] In addition, other agencies that provide Federal funding or that provide Federal programs are responsible for enforcement of section 504 for the programs they fund or conduct. The Department of Justice has also designated eight other agencies to share enforcement authority under Title 2 of the ADA for programs closely related to the types of programs they fund.

[2] See, e.g., Higher Education Opportunity Act, 20 U.S.C. 1140k.

[3] See, e.g., Nelson, M., "E-Books in Higher Education: Nearing the End of the Era of Hype?" 43 EDUCAUSE Review No. 2 (March/April 2008) (originally published by the EDUCAUSE Center for Applied Research (ECAR): Mark R. Nelson, "E-Books in Higher Education: Nearing the End of the Era of Hype?" *ECAR Research Bulletin*, vol..... 2008, issue 1 (January 8, 2008).

ive technology can properly identify where to begin reading or where a sentence or paragraph begins and ends.

This traditional system for providing "special" electronic texts disadvantages blind students as compared with sighted students, because it can take considerable time for a university to locate texts from publishers, and convert the text to a format usable by a screen reader or similar assistive technology. As noted in the December 2011 report of the Advisory Commission on Accessible Instructional Materials in Post-Secondary Education for Students with Disabilities ("AlM Commission"), disability student services offices at colleges and universities face a number of challenges and delays in obtaining accessible materials.[4] As a result, all too often course materials are not available to blind students until well after classes have begun.[5] Imagine as a student being unable—on a routine basis—to obtain your course materials for the first 4 months of the semester. As an alternative to obtaining converted texts from the publisher, universities may scan printed texts in order to provide them in electronic form. But this method can result in a "text dump," which lacks structural data to ensure proper reading by assistive technologies. Conversion errors, too, are common. So, the choice often available to blind students has been to receive accurate materials months into the semester or inaccurate materials in a more timely manner. Some types of textbooks and class materials, such as high-level science, technology, engineering, and mathematics texts, charts, and diagrams, have not even been available in electronic format, forcing blind students to ask their peers, sometimes at their own expense, to recreate the materials in tactile or other forms.

As schools increasingly use electronic texts for all students, the inaccessibility of some electronic book readers has become an important issue for people who are blind or have low vision. The development and deployment of e-book readers that are inaccessible to persons with disabilities runs counter to the core principles of the ADA: equal opportunity and equal treatment.

As the AIM Commission report notes, access to textbooks and other instructional materials has historically presented a great barrier to a truly equal education for blind students and others with print disabilities. Historically, the accessibility of new hardware in the education context has been addressed as follows: a new innovation comes out, but accessibility is not built in. Time passes, and accessibility issues are raised. Advocates file complaints, generally under civil rights laws and against educational institutions; and gradually some minimal access is included, primarily through assistive technology.[6] The delay in access resulting from this process, and the burden placed on people with disabilities to have to fight to receive what typically turns out to be minimal access, is not equal opportunity, is not equal treatment, and is not the world that the ADA envisions.

Electronic book readers and other educational technologies can be accessible if they provide text-to-speech or "read aloud" capability for menus, operational controls, and electronic text.[7] Appropriate coding would mean that the text, mathematical formulas, or even poetry in which line lengths vary, would be read aloud coherently. In this way, the user with the disability would gain access to all the information on the printed page.

a. Department of Justice Resolution of Complaints Against Universities Deploying Amazon Kindle Electronic Book Readers

In June 2009, the Department of Justice and Department of Education received several complaints from the National Federation of the Blind (NFB}, the American Council of the Blind (ACB}, and a coalition of disability rights groups collectively known as the Reading Rights Coalition. Each of these complaints alleged that colleges or universities were violating their obligations under the ADA and section 504

---

[4] AIM Commission Report at 77 (December 6, 2011), available at *http://www.ed.gov/news/ press-releases/aim-commission-releases-report-disparities-postsecondary-learning-material-stude*.

[5] See U.S. Government Accountability Office, Report GAO–10–33 Higher Education and Disability; Education Needs a Coordinated Approach to improve Its Assistance to Schools in Supporting Students, at 21 and 22 (October 2009), available at *http://www.gao.gov/products/GA0-10-33*; As the Disability Resource Center at Arizona State University informs blind students in its handbook, for example "Textbook/print conversion is a time-intensive process, especially for technical subject matter, and can require up to 4 months (e.g., mathematics, science, foreign language texts) to complete." *http://www.asu.edu/aad/manual s/ssm/ssm701–07.html*.

[6] Id. at 61–2.

[7] From the user perspective, an accessible electronic book reader might speak each option on a menu aloud, as the cursor moves over it, and then speak the selected choice aloud once made by the user. Special key strokes might be programmed specifically for blind users. For example, the user would press the alt–A key any time something related to accessibility is needed, at which point a menu with additional choices would come up, allowing the user to scroll over the menu as described above.

by deploying Amazon Kindle DX electronic book readers to students in the classroom setting. Among other things, the complaints alleged that the Amazon Kindle electronic readers did not have text-to-speech capacity for their menu or navigational controls, which prevented blind students from knowing which book they selected or how to access the search, note taking, or bookmark functions of the devices.

The Department of Justice investigated each complaint and, on January 13, 2010, the Department issued a press release announcing that it had reached settlement agreements with Case Western Reserve University, Reed College, and Pace University.[8] The Department of Justice, the NFB, and the ACB also jointly settled similar allegations against Arizona State University in an agreement signed on January 11, 2010. On March 29, 2010, the Department entered into a settlement agreement with Princeton University, and, on July 27, 2010, the Department of Justice and the Department of Education jointly entered into an agreement with the University of Virginia Darden School of Business regarding its use of the Kindle DX.

These settlement agreements provide that the universities will not purchase, require, or in any way incorporate into the curriculum the Amazon Kindle DX or any other dedicated electronic book reader unless it is accessible or they ensure that a student who is blind or has low vision can acquire the same information, engage in the same interactions, and enjoy the same services as sighted students with substantially equivalent ease of use.

The purpose behind these agreements is to make clear that requiring use of an emerging technology in the classroom that is inaccessible to an entire population of individuals with disabilities—individuals with visual disabilities—is discrimination that is prohibited by the ADA and section 504. The Department is currently investigating other claims that schools and libraries are using inaccessible technology and failing to provide accessible online materials.[9]

b. Department of Education and Department of Justice Guidance on Accessible Technology

In June 2010, the Assistant Attorney General for the Department of Justice's Civil Rights Division and the Assistant Secretary for Civil Rights of the Department of Education jointly issued a "Dear Colleague Letter" to college and university presidents throughout the country regarding the use of electronic book readers and other technology in higher education. The letter explained that requiring the use of emerging technologies, such as electronic book readers, in the classroom violates the ADA and section 504 if the educational benefits provided by the technology are not made accessible to students with disabilities in an equally effective and equally integrated manner. That is, an educational institution has the obligation to either provide accessible technology in the first instance or, if the technology is inaccessible, provide reasonable accommodations or modifications that permit students with disabilities to acquire the same information, engage in the same interactions, and enjoy the same services with substantially equivalent ease of use. The letter emphasized the need to ensure that students with disabilities are afforded an equal opportunity to participate in, or benefit from, college and university aids, benefits, and services, and it called on the institutions to refrain from requiring the use of any electronic book reader, or other similar technology, in a teaching or classroom environment as long as the device remains inaccessible to individuals who are blind or have low vision. The letter also provided information and resources to assist colleges and universities to achieve compliance with Federal law on this issue.

The Department of Education clarified this guidance in May 2011, when it issued a document entitled "Frequently Asked Questions About the June 29, 2010 Dear Colleague Letter." The FAQ made clear that the concepts explained in the 2010 letter extended to forms of emerging technology beyond electronic book readers and applied to all operations of schools, including elementary and secondary schools, covered by the ADA and section 504. The FAQ was sent to elementary and secondary schools, as well as colleges and universities.

The emergence of dedicated electronic book readers holds great potential to place students with disabilities on equal footing with other students. The accessibility of electronic text readers stands to improve dramatically the experience of students with visual disabilities. The instantaneous downloading of texts is obviously a "night

---

[8] Agreement between United States and Case Western Reserve University, Jan. 13, 2010; Agreement between United States and Pace University, Jan. 13, 2010; Agreement between United States and Reed College, Jan. 13, 2010.

[9] The Department's settlements do not prohibit students from buying e-book readers of their own choice for personal use or in connection with classes. Nor do the agreements bind e-book manufacturers.

and day" difference for blind students who are used to waiting for their materials until well into the semester or receiving inferior materials that are difficult to follow.

Moreover, if accessible electronic book readers are used in the classrooms of the future, students with and without disabilities will be able to use the same devices, albeit in different ways, resulting in an integrated experience for students with disabilities who will not have to rely on separate accommodations to gain access to course materials. Such integration is the core goal of the ADA and section 504. But that happy result will occur only if the electronic book reader is equipped with text-to-speech capabilities, so that it may read the electronic text aloud, and if the electronic texts are coded with structural data and text descriptions of images.

Other new technologies are also making their way into classrooms. For example, wireless student response devices, known as "clickers," are being assigned to students. The clickers allow professors to take attendance, pose questions, and get feedback from individual students or from the class as a whole, including anonymously. Students respond to questions and participate in class by choosing answers on their clickers. However, if the clickers continue to rely on visual LCD displays, they will exclude students with print disabilities from participating equally in class.

As the AIM Commission report notes, one way to ensure access for people with disabilities in compliance with Federal laws prohibiting discrimination on the basis of disability is to encourage publishers, developers, and manufacturers to develop mainstream educational products that are accessible to the maximum extent possible, allowing students with and without disabilities to obtain the same materials at the same time and at the same price.[10] It is up to the market—elementary and secondary schools, colleges and universities, libraries, government agencies, and public accommodations, who are covered by the ADA, to ask about, and insist on, accessible technology from their suppliers.

Section 508 of the Rehabilitation Act is an example of this "market model." Section 508 requires Federal Government agencies to ensure that all electronic and information technology they develop, procure, maintain, or use is accessible. Because the Federal Government is a large market for technology, its insistence on accessibility of its electronic and information technology can be expected to trickle down to products and services for general markets. In addition, since the enactment of section 508, at least 20 States have adopted their own versions of section 508, requiring State agencies to buy accessible technologies.

In 2011, the Department of Justice conducted a survey of Federal agencies regarding their compliance with section 508 and expects to issue a report on Federal Government implementation. In addition, in 2011, on the anniversary of the ADA, the President announced that the Administration will develop a comprehensive strategic plan to improve compliance with Section 508 of the Rehabilitation Act.

II. WEB SITE ACCESSIBILITY: CHALLENGES AND OPPORTUNITIES

I have devoted significant time to discussing the importance of accessible technology equipment in education. But accessible technology also encompasses access to information on Web sites and more generally on the Internet, which is also of critical importance in education. Schools at all levels are increasingly offering programs and classroom instruction through the Internet. Many colleges and universities offer degree programs online; some universities exist exclusively on the Internet. Even if they do not offer degree programs online, most colleges and universities today rely on the Internet and other electronic and information technologies in course assignments and discussion groups, and for a wide variety of administrative and logistical functions in which students and staff must participate. As schools offer online applications and course management, interactive online exercises and exams, document sharing, Web conferencing, streaming video, social networks, and even virtual-reality programs, accessibility of those technologies to students with disabilities becomes essential.

On April 26, 2011, the Department of Justice announced its participation in two related settlement agreements involving the accessibility of the Law School Admission Council's (LSAC) online application service, which is used by law schools nationwide for their application processes. The Department of Justice determined that LSAC's online application service was not accessible to persons with vision disabilities. Moreover, the Department found that applying through the LSAC Web site offers several convenient features to applicants, including the bundling of applications into the required LSAC Credential Assembly Service, which eliminates the need to

---

[10] AIM Commission Report at 22.

obtain multiple transcripts, letters of recommendation, and evaluations for applicants to more than one school.

Under the first settlement agreement, which resolved a lawsuit filed against LSAC by NFB and to which the Department was a signatory, LSAC is required to ensure that is online application Web site is fully accessible to individuals who use screen readers by the fall 2012 application cycle. The second settlement agreement, which was between the Department and Atlanta's John Marshall Law School, requires the law school to modify its own Web site to notify potential applicants with vision disabilities of a process they may use to apply to the law school until LSAC's online application process is made fully accessible. The law school also committed to stop using LSAC's online application process if it is not fully accessible by the fall 2012 application cycle under the terms reached in the first agreement.

Of course, limited access to information on the Internet does not just affect education. As more and more of our social and economic infrastructure is made available on the Internet—in some cases, exclusively online—access to information and electronic technologies is increasingly becoming the gateway civil rights issue for individuals with disabilities. Information technologies play a significant and ever-expanding role in everyday life in America. Electronic and information technologies are swiftly becoming a primary conduit to employment. Employment, recruiting, and hiring systems are often Web-based. In many cases, the only way to apply for a job or to sign up for an interview is on the Internet. Job applicants research employment opportunities online, and they use the Internet to most efficiently learn about potential employers' needs and policies.

The Internet has also become a doorway to the full range of activities, goods, and services that are available offline. Constituents of State and local government use the Internet to file tax forms, renew driver's licenses and library books, and to correspond with elected officials. Increasingly, businesses—even those with substantial physical sales facilities—use Web sites to sell goods and services to their customers. E-commerce is a rapidly expanding segment of the American economy. Ensuring nondiscriminatory access to the goods and services offered through the Internet is, therefore, essential to full societal participation by individuals with disabilities.

For many individuals with disabilities who are limited in their ability to travel outside their home, the Internet is one of the few available means of access to the goods and services in our society. The broad mandate of the ADA to provide an equal opportunity for individuals with disabilities to participate in and benefit from all aspects of American civic and economic life will be served in today's technologically advanced society only if it is clear to businesses, employers, and educators, among others, that their Web sites must be accessible.

Millions of people have disabilities that affect their use of the Web—including people with visual, auditory, physical, speech, cognitive, and neurological disabilities. People who have difficulty using a computer mouse because of mobility impairments, for example, may use an assistive technology that allows them to control software with verbal commands. But Web sites and other technologies are not always compatible with those assistive technologies. Captioning of streaming videos and Web conferences may also be necessary in order to make them accessible to individuals who are deaf or hard of hearing. And individuals with memory loss or cognitive impairments may be affected by complex Web sites. People who are blind or have low vision are often the most affected by inaccessible information and electronic technology.[11]

Ensuring that people with disabilities have a full and equal opportunity to access the benefits of emerging technologies is an essential part of our disability rights enforcement at the Department of Justice. Because the Internet was not in general public use when the ADA was enacted, nor when the then-Attorney General promul-

---

[11] Many individuals with visual impairments use an assistive technology known as a screen reader that enables them to access the information on computers or Internet sites. Screen readers read text aloud as it appears on the computer screen. Individuals who are blind may also use refreshable Braille displays, which convert the text of Web sites to Braille. Sometimes, those individuals will use keyboards in lieu of a mouse to move up and down on a screen or sort through a list and select an item. The most common barriers on Web sites are posed by images or photographs that do not provide identifying text. A screen reader or similar assistive technology cannot "read" an image. When images appear on Web sites without identifying text, therefore, there is no way for the individual who is blind or who has low vision to know what is on the screen. The simple addition of a tag or other description of the image or picture will keep an individual using a screen reader oriented and allow him or her to gain access to the information the image depicts. Similarly, complex Web sites often lack navigational headings or links that would make them easy to navigate using a screen reader. Web designers can easily add those headings. They may also add cues to ensure the proper functioning of keyboard commands: They can also set up their programs to respond to voice interface technology.

gated regulations to implement it in 1991, neither the statute nor the regulations expressly mention the Internet. But the statute and regulations create general rules designed to guarantee people with disabilities equal access to all of the important areas of American civic and economic life. And the Department made clear, in the preamble to the original 1992 ADA regulations, that the regulations should be interpreted to keep pace with developing technologies. 28 CFR pt. 36, App. B.

The Department of Justice has long taken the position that both State and local government Web sites *and* the Web sites of private entities that are public accommodations are covered by the ADA. In other words, the Web sites of entities covered by both title II and title III of the statute are required by law to ensure that their sites are fully accessible to individuals with disabilities. The Department of Justice has affirmed the application of these statutes to government Internet sites in a technical assistance publication, *Accessibility of State and Local Government Web Sites to People with Disabilities (http://www.usdoj.gov/crt/ada/websites2.htm)*, and in numerous agreements with State and local governments and recipients of Federal financial assistance. Our technical assistance publication also provides guidance with simple steps to ensure that government Web sites have accessible features for individuals with disabilities.[12] Further, the Department has included Web site accessibility requirements in a number of settlement agreements, such as its agreements with Wells Fargo, QuikTrip, and Hilton Hotels Worldwide.

The Department also recently became involved in a case involving access to Web-streamed content. In October 2011, the Department filed a Statement of Interest opposing the defendant's motion to dismiss in *National Association of the Deaf* v. *Netflix, Inc.* (D. Mass.). *NAD* is a private title III action challenging Netflix's failure to provide captioning for many of its "Watch Instantly" Internet-based streamed videos, as well as to ensure equal access to other Netflix member services (such as Netflix "recommendations" and genre-sorted movie listings). The Department took the position that Title III of the ADA applies to Netflix's "Watch Instantly" videos and that the court had subject-matter jurisdiction over the ADA claim.

In addition, the Department has issued an Advance Notice of Proposed Rulemaking ("ANPRM") on the accessibility of information and services on the Web, and has solicited public comment from the broad range of parties interested in this issue. The public comment period closed on January 24, 2011.

The Department received approximately 440 public comments and is reviewing them. The Department anticipates publishing separate NPRMs addressing Web site accessibility pursuant to Titles II and III of the ADA in calendar year 2012.

III. USING TECHNOLOGY TO FULFILL THE PROMISE OF THE ADA: TECHNOLOGY-BASED SOLUTIONS IN DOJ ENFORCEMENT AND REGULATORY ACTIONS

Of course, technology has long played an important role in advancing equal opportunity for people with disabilities, and the Department of Justice investigates, litigates, and resolves cases across the spectrum of disability that rely on technological solutions.

a. Technology and Testing Accommodations

Assistive technology is of particular importance for individuals with disabilities seeking to take examinations required for admission to secondary or post-secondary school and for professional certification. Under the ADA, these examinations must be administered in a manner that is accessible to individuals with disabilities. To ensure accessibility, entities offering these examinations are required to provide testing accommodations [13] so as to "best ensure" that the examination measures an individual with a disability's aptitude and achievement rather than the individual's disability. In many cases, technology is the key to ensuring accessibility. For example, a high school student with hypotonia that results in illegible handwriting may need a testing accommodation on the essay composition portion of a college entrance exam to allow him to draft an essay using a computer instead of having to write

---

[12] There are several sets of standards describing how to make Web sites accessible to individuals with disabilities. Government standards for Web site accessibility were developed pursuant to section 508. The U.S. Architectural and Transportation Barriers Compliance Board ("Access Board") is updating the section 508 Standards, as well as the Telecommunications Act Accessibility Guidelines. The Access Board issued an advance notice of proposed rulemaking on December 8, 2011 and is currently accepting comments. Many entities elect to use the standards that were developed and are maintained by the Web Accessibility Initiative, a subgroup of the World Wide Web Consortium ("W3C7").

[13] The term "'testing accommodations" used throughout this document encompasses both those "modifications" and "auxiliary aids" required by 28 CFR §36.309(b).

out his essay by hand. Some testing entities are reluctant to provide access to technology-based testing accommodations.

b. Technology and Access to Events (Ticket Sales)

Over the past 20 years, some public and private venues, ticket sellers, and distributors have not provided the same opportunity to purchase tickets for wheelchair-accessible seats and non-accessible seats. The general public has been able to directly and immediately purchase tickets for non-accessible seats, whether through a venue's Internet site or its box office, or through a third-party internet-based vendor. However, these direct-purchase options have sometimes been unavailable to individuals who use wheelchairs because transactions frequently could not be completed. Instead, the purchaser was directed to send an e-mail or to call a separate telephone number to request tickets and wait for a response. As of March 15, 2011, revised regulations issued by the Department require venues that sell tickets for assigned seats to implement policies to sell tickets for accessible seats in the same manner and under the same conditions as all other ticket sales. Specifically, tickets for accessible seats must be sold during the same hours; through the same methods of purchase (by telephone, onsite, through a Web site, or through third-party vendors); and during the same stages of sales (pre-sales, promotions, general sales, wait lists, or lotteries) as non-accessible seats.

c. Technology and Access to Transportation

The Department of Transportation (DOT) is also working to update its regulations to reflect the growing use of the Internet and electronic and information technology to access goods, services, and information. In September 2011, DOT published a Supplemental Notice of Proposed Rulemaking (SNPRM) that addresses the accessibility of air carrier Web sites and automated airport kiosks to ensure that travelers with disabilities can independently access the convenience and cost savings of booking the best airfares and check-in options (both online and through self-service kiosks) that travelers without disabilities widely enjoy. The public comment period recently closed and DOT is reviewing those comments and preparing for the next stage in its rulemaking.

d. Accessibility Issues in Electronic and Information Technology Equipment

The Department's experience in the 21 years since the ADA was enacted has given it a better understanding of the barriers posed by inaccessible electronic and information technology (EIT) equipment and the solutions provided by accessible EIT equipment. Accessible EIT equipment is often critical to an entity's ability to provide a person with a disability equal access to its goods and services. The Department believes that it is important for individuals with disabilities to have an equal opportunity to use EIT equipment, such as kiosks, interactive transaction machines (ITMs}, point-of-sale (POS) devices, and automated teller machines (ATMs). Individuals with disabilities who engage in financial or other transactions should be able to do so independently and not have to provide third parties with private information, such as a personal identification number (PIN).

Among the available equipment that uses EIT are kiosks, which provide a wide range of services, including information sharing, ticketing, hospital check-in, prescription dispensing, Internet access, vehicle registration, library services, movie ticket sales and DVD rentals, security screening, building permits, bill paying, and photo developing. POS devices, such as credit card payment terminals, retail store self-checkout stations, machines used for ordering food at quick service restaurants, and gas station pay-at-the-pump systems continue to grow and offer more services for both businesses and government entities.

Unfortunately, many of these emerging technologies have been developed without accessibility in mind, even though accessibility features like "talking" kiosks are available. Often, with the advent of touch-screen technology, customers are required to enter data using a flat screen while reading changing visual information and instructions. Persons who cannot see the flat screen must rely on other people to enter their information, including their personal identification numbers (PINs). At least one State (California) already requires all check-out locations with a flat screen POS device to have a permanently attached tactile keypad that is usable by individuals with vision disabilities.

The Department's 1991 ADA Accessible Design Standards contained requirements for physical accessibility for fixed (built-in) ATMs and also required that "[i]nstructions and all information for use shall be made accessible to and independently usable by persons with vision impairments." The recently revised 2010 Standards for Accessible Design provide more specific requirements for the accessible design of fixed ATMs and fare machines, but do not address non-fixed ATMs and fare machines and do not address other fixed and non-fixed EIT equipment, such as

ITMs. In March 2010, the Access Board published an ANPRM seeking public comment on its plans to amend the 2004 ADA/ABA Accessibility Guidelines to include technical guidelines for self-service transaction machines used for ticketing, check-in or check-out, seat selection, boarding passes, or ordering food in restaurants and cafeterias. In the ANPRM, the Access Board noted the proliferation of inaccessible POS machines, kiosks, and other self-service machines and referenced ADA litigation against various public accommodations over the past 10 years that has resulted in numerous settlement agreements and structured negotiations requiring the installation of tactile POS devices.[14] DOT's recent SNPRM also addresses the accessibility of automated kiosks at airports.

In its 2010 ANPRM on equipment and furniture, the Department focused on, among other issues, the accessibility of fixed and non-fixed EIT equipment. While some types of fixed equipment and furniture are explicitly covered by the 1991 and 2010 Standards, in its ANPRM, the Department emphasizes that whether a type of EIT equipment is fixed or not is generally not relevant from the perspective of the user. For example, an ATM or vending machine that is fixed is used for the same purpose and in the same manner as an equivalent ATM or vending machine that is not fixed. To the extent that ADA standards apply requirements for fixed equipment, the Department will look to those standards for guidance on accessibility standards for equipment that is not fixed.

In the ANPRM on equipment and furniture, the Department posed questions and sought public comments about the nature of accessibility issues and proposed solutions for making equipment and furniture, such as EIT equipment, accessible to persons with disabilities. The Department received more than 400 comments in response to its ANPRM and is reviewing these comments. Most of the categories of this ANPRM, including EIT equipment, will be the subject of an NPRM that the Department anticipates publishing in early fiscal year 2013. As we move forward, we will continue to collaborate with the Access Board and DOT to ensure consistency in our approaches to regulating EIT equipment within our respective jurisdictions.

e. 2151 Century Communications and Video Accessibility Act

In addition to the efforts by DOT, the Access Board, and the department on technology accessibility, the FCC is working to implement the provisions of the 21st Century Communications and Video Accessibility Act of 2010, 47 U.S.C. §601 *et seq.* ("CVAA"). Among other items, the CVAA addresses accessibility of communication equipment with respect to hearing aid compatibility, internet-based services and equipment, television and other video-programming devices, and closed captioning decoders and video description capability. For example, under the CVAA smart phones will be required to be usable by blind and visually impaired people, as well as people with hearing aids. The law aims to ensure that people with disabilities are not left behind as technology changes and the United States migrates to the next generation of internet-based and digital communication technologies. On August 25, 2011, the FCC released a report and order, pursuant to the CVAA, that will make television programming more accessible to children and adults who are blind or have a vision impairment. The new rules require each of the affiliates of the top four broadcast networks located in the top 25 television markets and each of the top five non-broadcast networks to provide 50 hours per calendar quarter of video-described children's and/or prime time television programming. On October 7, 2011, the FCC issued a report and order implementing the advanced communications accessibility provisions of the CVAA and released a Further Notice of Proposed Rulemaking on certain provisions. On January 12, 2012, the FCC adopted its final report and order that sets out the obligations and schedule for requiring programming shown on television with closed captions to be closed captioned when distributed using Internet protocol.

f. Next Generation 9–1–1

In the past decade there have been major changes in the types of communications technology used by the general public and by people with disabilities. Among the devices now commonly used by individuals with hearing or speech disabilities are both wired and mobile videophones, text messaging, wireless devices (including smart phones), as well as computers (including Web cams) and captioned telephones. Many individuals with disabilities now use the Internet and wireless text devices as their primary modes of telecommunications.

---

[14] Any final ADA Guidelines adopted by the Access Board will still have to be adopted by the Department of Justice in order to become enforceable standards under the ADA.

The original 9–1–1 system is based on traditional analog voice telephone technology, which cannot process text, data, images, and video sent from handheld devices and computers (*e.g.*, personal digital assistant [PDA], cellular phone, portable media player, video phone, or camera). Most Public Safety Answering Points (PSAPs) or emergency 9–1–1 call-taking centers are not yet equipped to directly receive video calls, photos or videos sent from mobile devices such as smartphones and cell phones, or text messages (except for text transmitted by a TTY). As a result, individuals with hearing or speech disabilities who have to call 9–1–1 using their Internet protocol (IP)-based videophone or a non-TTY text device must call through a Telecommunications Relay Services (TRS). TRS uses a relay operator called a communications assistant (CA) who relays the call between the caller using text or video and the PSAP. In most IP-based video or text-relay services, the CA receives the call from the person originating the call, places the call to the PSAP, and then relays the conversation between the caller and the PSAP. This process can result in harmful delays in reporting emergencies or in requesting emergency assistance for individuals with disabilities.

To address changing technology, State and local governments are working to improve their 9–1–1 emergency communications systems and are moving toward an IP-enabled network. The ultimate goal is to have an emergency network that will enable the general public to make a 9–1–1 call via voice, text, or video from wired and wireless devices and directly communicate with personnel at the PSAP.[15] Migration to IP-enabled 9–1–1 systems in general represents the critical path for meeting the needs of people with disabilities.

The Department's current title II regulation requires that PSAPs provide direct access to individuals with disabilities who use TTYs. Recognizing that many individuals with disabilities now rely on IP-based and digital wireless devices, rather than analog-based ITYs, as their primary modes of telecommunications, and that 9–1–1 call-taking centers are shifting from existing traditional telephone emergency services to new IP-enabled Next Generation ("NG") 9–1–1 services, the Department published an ANPRM in 2010 to begin to develop appropriate regulatory guidance for PSAPs that are making this transition. The Department is completing its review of the approximately 146 public comments it received in response to its NG 9–1–1 ANPRM and expects to publish an NPRM addressing accessibility of NG 9–1–1 in fiscal year 2012.

g. Movie Captioning and Video Description

Evolving technologies in movie production, including the increasing movement to digital cinema, as well as the development of systems that deliver digital audio description and display captions only to the person who needs it, are making going to the movies an accessible experience for people with a hearing or vision disability. Therefore, the Department issued an ANPRM in July 2010 on the issue of ADA requirements for movie captioning and audio description. The Department received approximately 1,171 public comments in response to its movie captioning and audio description ANPRM. The Department is in the process of completing its review of these comments and expects to publish an NPRM addressing captioning and video description in movie theaters in fiscal year 2012.

<div align="center">IV. CONCLUSION</div>

As I stated at the outset, we are at a critical juncture for people with disabilities and technology. Technology may prove to be both the catalyst and the conduit to full integration of people with disabilities into society as envisioned by the ADA— or it may serve as the ultimate barrier. As the population ages, more and more Americans will need access to emerging technologies to continue working and to access the healthcare system. Advances in the availability of accessible technologies will increase—and are already increasing—the educational opportunities, employability, and social and civic participation of individuals with disabilities.

History tells us that inaction and silence will result in business as usual; that is, technological innovations that do not consider accessibility for people with disabilities. But we can break the pattern. The Department's work—along with that of the Department of Education, the Department of Transportation, the Access Board and the Federal Communications Commission, and the work of this committee—is making a difference in raising the profile of this important issue. The Department of Justice looks forward to continuing to work toward a world where accessible tech-

---

[15] The FCC has recently undertaken a number of broadband initiatives. One initiative seeks to improve the Nation's current 9–1–1 system by establishing the foundation for the transmission of voice, data, or video to PSAPs during emergency calls.

nology is the norm, and not the exception, in full compliance with both the letter and the spirit of the ADA.

Thank you, once again, for the opportunity to appear before you today. I look forward to answering any questions.

The CHAIRMAN. Thank you very much, Ms. Hill, for a great statement, and thanks for a wonderful written statement, which I said I read last night.

Again, thank you. You covered a wide variety of things in your written statement. I noted that the Department of Justice and the Department of Education issued a letter in June 2010, as you mentioned, to college and university presidents regarding the use of electronic book readers and other technology in higher education and the need to ensure accessibility under the ADA and Section 504 of the Rehab Act.

I saw that the Department of Education issued a similar guidance to elementary and secondary schools in May 2011. You kind of mentioned those, also. What kind of feedback have you gotten on that? That is what I'd like to explore with you. What kind of feedback have you gotten on these guidance documents? Do you think colleges and universities and elementary and secondary schools are taking the issue seriously and are really addressing it?

Ms. HILL. I think it is a mix in terms of how schools are addressing it and to what extent they are addressing it. Some States and some schools have come up with guidance or regulations for either e-book technology, educational technology, or any government technology. Some schools have come up with procedures or standard contract language requiring accessibility, which really asks the question in each case about the accessibility of the product or service being purchased.

Some developers and providers of educational technology have paid attention to what this has said about the availability of that educational market and have incorporated accessibility as, of course, part of what they provide. Some publishers of electronic books have incorporated accessibility as central parts of what they provide.

But the level of commitment and the level of understanding varies. So some schools appear to assume that what they are buying is accessible without asking the question or without checking it themselves. Some entities developing technology for the general market do not think accessibility matters. And we do periodically hear the argument that students without disabilities should not have to wait while the technology is made accessible, and I think that one, in particular, misunderstands what needs to happen for accessibility to happen.

It is like if you build a school, a physical school, and you build it inaccessibly, well, yes, then it takes time to remediate and is a

---

Note: Pursuant to the CVAA the FCC created the Emergency Access Advisory Committee (EAAC) to determine the most effective and efficient technologies to enable access to NG 9–1–1 emergency services by individuals with disabilities and to make recommendations to the FCC as a part of the migration to a national IP-enabled emergency network. A representative of the Department serves as a Federal member of this committee. The committee issued its first report on July 21, 2011. On December 7, 2011, the EAAC issued technical and policy recommendations to the FCC that aim to ensure that individuals with disabilities can access current and future emergency communications services. Further, to assist in this effort, DOT and the Commerce Department provided more than $40 million in grants to help 9–1–1 call centers nationwide implement next-generation 9–1–1 technologies. *See http:// www.911.gov/pdf/911-Grant__ Program__Final__Reg.pdf*.

delay. Should the student with a disability take the punishment for that? I am not sure. But if you build the school correctly, it does not add time. Similarly, with technology, if it is built in from the beginning, it does not add delay, and nobody has to wait for it.

I think some companies that have really incorporated accessibility routinely, like Apple, have demonstrated that it does not cause a delay. I do not think anyone could say that this has slowed down the innovation of these companies.

The CHAIRMAN. No, I think they are coming out with their iPads—now the iPad 2. I am sure iPad 3 will be pretty soon and iPad 4. But I think you touch on another point I want to explore with you, and that is this idea that we tend to focus on the technology and making it accessible. But then you have to have the curricula, and that needs to be designed from the very beginning.

The one thing that we are concerned with and we look at a lot, not only in this committee but other committees—and that is that sometimes the technology is developed without the thought about the curricula. A lot of times, the curricula is developed without the thought of how it interfaces with technology. How do we bring those two together?

Ms. HILL. I think that is really on the teachers and technologists to work together. We know what we want to teach. We should assume that people of all types, people with and without disabilities, people with different English proficiencies and different language capabilities, people who learn in different ways, are all going to be part of our classrooms. And if we started to assume that and to build our curricula in ways that responded to that, I think a lot of that question would be answered.

The CHAIRMAN. OK. I understand that. It seems to me, though, the Federal Government, as you note, is a big purchaser of technology and technology that incorporates instructional materials. Under section 508, it must ensure that the technology it purchases is accessible to Federal employees and the public. You noted that President Obama last year called for the administration to develop a strategic plan to improve compliance with section 508's requirements.

Do you have any more you can tell us about that? Who's going to be involved in developing this strategic plan? I hope and assume that you are reaching out to a broad disability community out there to get their input and their suggestions and advice as to what is needed. But are we also looking at not just that the technology it purchases is accessible, but the material that is in the technology, the curricula, the instructional materials, is also developed so that people with disabilities can access it?

Ms. HILL. I do know about the plan to create a national strategic plan for the implementation of section 508. But that effort is not being led by the department, so I cannot speak further to it. What we are working on is a report on section 508 implementation governmentwide. And in the spring of last year, we conducted a really extensive survey of government agencies and how they are implementing and to what extent they are implementing their 508 obligations, and we expect to have a report out about that this year.

The CHAIRMAN. Who's leading that effort?

Ms. HILL. The Civil Rights Division at the Justice Department. You mean, about the national plan?

The CHAIRMAN. Yes. Right.

Ms. HILL. I believe that is being led by a group of agencies that are involved in accessibility—in technology accessibility. But we can certainly get you more information on who is leading that.

The CHAIRMAN. Yes. We need to find out who's in charge of that. I would like to know myself. We are trying to find that out. If you could help us, I would appreciate that.

Do you have more you could elaborate on about that recent Kindle case? It was very interesting. I want to know what does it mean for students with disabilities in higher education, if there's any more you want to add on that Kindle case.

Ms. HILL. It really is a focus that says think about accessibility from the beginning. Think about accessibility when you are choosing to buy new products and ask every time you choose to buy a new product whether it is accessible. This will allow the educational institutions to be the market that they really are and to exercise the market power that they really have, as well as allowing them to serve their clients, their students, without having to think of a work-around or make up something at the last minute or give something that does not work as well to the student with a disability.

I think that up front thought is really essential, and it is really the way that they avoid placing themselves in an ADA violation situation by making sure from the front that the person that created that, that developed that technology, developed it accessibly and gave it to them accessibly.

The CHAIRMAN. You mentioned something else that, quite frankly, Senator Enzi in his statement alluded to, and that is that many times, things that we thought were designed to respond to a situation in a disability environment has broader applications. Senator Enzi mentioned closed captioning. As the author of that bill in 1993, it was—let's face it—our focus was simply on making it easier for people who had hearing problems, deaf, hard of hearing. We also morphed into English language learners after the bill passed, and we started moving into closed captioning.

We mandated, that every television set in America, sold in America, that had a size 13-inch screen or bigger had to have the decoding chip built into it. It was a mandate, one of those awful Federal mandates. And, oh, I remember the hearings. I chaired them. And we had the television people in and everything and representing— manufacturers were there—that the cost was going to be prohibitive. It was going to cost a couple of hundred dollars more a set for TV for the consumer to purchase out there.

So I contacted one of my friends in the chip business, and I wanted to find out if this was true or not. How much more would it cost? And he said,

> "Yes, if you are only going to make 10 or 20 of them, it will cost you several hundred dollars per set. But if you are going to make zillions of them, it probably is not going to cost too much."

Today, the price of a television set—they do not even factor in the price of the chip. It is free. That is not even a factor of the cost

anymore. So sometimes you have to take the long view. But my point, I think, that I wanted to make is that we found that after the bill passed and after sets started getting the chip built into it, we found that its uses broadened out.

And as I said, it was being used for English learners. Sesame Street started being in Spanish and English, and words were in Spanish, spoken in English, vice versa, so kids were learning. And sports bars—need I mention sports bars?

It may be a little secret. I am sure it is not much of a secret. I mean, you can go in any Senator's office here—I will bet every Congressman's office, too, and they've got their TV set on, and it is on the Senate floor or on the House floor. The mute button is on, and the closed captions go across the bottom, because we want to keep up on what is going on, but we do not want all that noise. A lot of what is said probably is not very useful, anyway, but you want to catch those little gems once in a while that come across the screen. We never thought of it being used that way before.

So, my point is that a lot of times, when technology is accessible for users with disabilities, it becomes better for people without disabilities. We've found that time and time again. Is that your experience, too?

Ms. HILL. It certainly is. Imagine ramps for all of us who travel with roller bags or have strollers.

The CHAIRMAN. Oh, of course.

Ms. HILL. Ramps are fantastic.

The CHAIRMAN. I know.

Ms. HILL. Not just for wheelchairs anymore.

The CHAIRMAN. That is true.

Ms. HILL. But, yes, in the technology field, the ability to have flexibility of how you present the information, in writing, orally, and the two together, so you can track what the word sounds like and what it looks like, can be transformative for people who learn differently. Whether you have a disability or not, if you take in information orally better than you take it in through the printed word, you need that in order to get the information.

English language learners, similarly, can learn the language better if you can follow both the printed and the oral version. People with learning disabilities can do the same. And think about how for some of us, or many of us, I think, hearing something and seeing it reinforces the information, and you are able to remember it and understand it better in that way. That flexibility alone makes it much more than just something for blind people or just something for people with disabilities.

But think about also the ability to make the font bigger, the ability to hear the book, now that I am not able to see the tiny font. As I age, personally, I find those to be very valuable, and I think more and more people are going to find those to be very valuable outcomes from accessible technology.

And then to think about—I know that hardly—that none of us here do this, but that texting while driving thing that I hear is a problem—if your text could be read aloud to you, we might have much less accidents of that kind, less of the texting while walking that leads to trip and fall accidents.

The CHAIRMAN. Right.

Ms. HILL. So it has a much broader impact than just people with disabilities.

The CHAIRMAN. I can tell you as one of the early users of Dragon Speak how they have developed that over the last few years. And it is amazing now, how they can take the verbal words and put it in written form. I've always wondered how come—for example, if I call my bank or something like that about something, I have to go through a whole series of voice actuated things until I get to the right person or robot or whoever it is I am talking to. Why cannot they do that in ATM machines? That is just another point, you know.

Ms. HILL. They can.

The CHAIRMAN. Of course, they can do that in ATM machines. Anyway, a friend of mine who's blind says they could make them talking. You could go in there and say, "Here's what I want," push these buttons with Braille, count your bills, how many you've got— here's the twenties, here's the fives. It can be done, and it is——

Ms. HILL. It can be done.

The CHAIRMAN [continuing]. Very simple technology, but, again, if it is done from the beginning, you see. It works for everyone that way. The point, I think, is so salient, and that is to have universal design from the beginning, and it is better for everyone.

You mentioned the Law School Admission Council's case, and that is going to be done by this fall. Right?

Ms. HILL. Yes.

The CHAIRMAN. They are going to make that accessible by this fall.

Ms. HILL. The LSAC is required to make their Web site accessible by the fall.

The CHAIRMAN. Just one last thing. Do you have any information that you can share with me, with this committee, on what is being done internationally, international efforts to address Web accessibility and technology more broadly, since this is the worldwide Web? Do you know what we are doing internationally?

Ms. HILL. I know some of what is going on internationally. It is a very important global effort. In Europe, Canada, Australia, and New Zealand, there are all efforts to update their laws or provide laws to ensure accessibility of Web sites, both government Web sites and private Web sites. In addition, some of these countries are having private litigation go on that challenges the inaccessibility of the Web sites. In Canada, for example, there was a case that found that Canadian Federal Web sites needed to be accessible.

The Web is a global thing, and so the response should be global. We should be consistent so that businesses can be clear of what their obligations are across the world and not have to have a different Web site in the United States than they have in the U.K. I think our regulatory efforts and the efforts of these other countries which are working toward very similar, consistent, consensus standards about what accessibility means are really starting to accomplish that.

It also provides clarity for businesses and for people with disabilities to be able to know what to expect, wherever they are, when

they try to access a service or a good, that they can expect this level of accessibility.

The CHAIRMAN. Very good. We are also, again, working with the Department of Education, obviously, on this in terms of curricula and everything else in making sure—but I just want to make one last point before we bring on our next panel. And that is the Federal Government is a huge purchaser of this, driving the market, and we have to make sure that 508 is fully implemented, that it is adhered to, that the Justice Department makes sure of that, and that it goes not just after the technology but the curricula development that goes underneath it.

So I know you are on top of that, Ms. Hill. I thank you very much for your great leadership and the whole Civil Rights Division at the Department of Justice. I give my personal thanks also to Attorney General Holder for his great leadership in this area.

Ms. HILL. Thank you so much.

The CHAIRMAN. Thank you, Ms. Hill.

Now we will turn to our second panel. We have Mr. Mark Riccobono, executive director of the Jernigan Institute of the National Federation of the Blind in Baltimore. The Jernigan Institute is the only research and training institute founded and currently directed by people who are blind.

Mr. Riccobono was a member of the U.S. Department of Education's Accessible and Instructional Materials Commission, which released a report on The Disparities in Post Secondary Education for Students with Disabilities that was issued in December, just this last December 2011. At age 24, Mr. Riccobono became the first director of the Wisconsin Center for the Blind and Visually Impaired, and this followed his successes on the Wisconsin State Superintendent's Blind and Visually Impaired Education Council.

Next we have Dr. John Quick. Dr. John Quick has over 30 years of experience as an educational professional, over 20 years of service to Bartholomew Consolidated School Corporation in Columbus, IN. He has been the district superintendent since 2003.

Throughout his career, Dr. Quick has led efforts to improve educational practices, including implementing state-of-the-art technology, developing curriculum, and creating new educational programs. He serves as a member of the Indiana Association of Public School Superintendents and as an adjunct professor at Ball State University.

Then we have Mr. Mark Turner. He began working at the California State University's Accessible Technology Initiative in 2006. His work focuses on the accessibility of instructional materials. He is also responsible for the operations of the Center for Accessible Media. The CAM Web application provides a central clearinghouse for all University of California campuses to efficiently locate and share curricula content that has been adapted for students needing alternatives to standard textbooks and other print materials.

I welcome you all here, and I thank you all for your written statements which will be made a part of the record in their entirety. Starting with Mr. Riccobono, then Dr. Quick and Mr. Turner. If you could sum up in several minutes your testimony, I would certainly appreciate it.

Mr. Riccobono.

STATEMENT OF MARK A. RICCOBONO, EXECUTIVE DIRECTOR, JERNIGAN INSTITUTE, NATIONAL FEDERATION OF THE BLIND, BALTIMORE, MD

Mr. RICCOBONO. Thank you very much. There we go. And it is an accessible button. Look at that. You can even feel it.

Thank you very much, Chairman Harkin, Ranking Member Enzi, and other members of the committee. It is a great honor and privilege to have the opportunity to speak with you today on behalf of the National Federation of the Blind.

Today's hearing deals with a critical question of civil rights in the 21st Century. Will technology facilitate unprecedented access to education for all, or will it be the force that segregates students with disabilities into an unequal learning environment? Technology offers a new accessibility paradigm. In its basic form, digital content is accessible to everybody. It can be easily moved, converted, and translated into the form required by each individual student.

By universally designing technology to handle a broad range of physical and sensory interfaces, we can achieve the equality in education we seek. But in order to reach that goal, we must move beyond the old model of accommodation. Imagine a classroom where the iPad is used daily. A blind student now has the possibility of equal participation by using the built-in technology to access the same content and functionality as her sighted peers.

She can connect a refreshable Braille display and read the lesson the teacher uploaded just moments earlier. She can enter quiz answers in Braille, and they can be seamlessly translated into print and instantly transmitted to the teacher for grading. She has unprecedented access, and this is not the future. It is achievable today.

Alternatively, our blind student might be shut out of the curriculum if her school adopts Google Chrome Books or Apps for Education, My IT Lab, Barnes and Noble's Nook, Amazon's Kindle, and dozens of other inaccessible systems and devices that are being used to facilitate learning today. A school that wants to fix inaccessible technology that is already deployed faces the reality that the reconfiguration will be more expensive, and it is unlikely to produce a solution that is equally effective and equally integrated.

If the student chooses to file a formal complaint, she faces the personal and professional costs of taking that action. She has unequal access to education, and this, too, is not the future. It is the reality for many students with disabilities today. Congressional leadership begins with swift action to significantly improve accessibility within the Federal Government. We should no longer accept anything less than complete accessibility of technologies purchased and deployed by the Government. Similarly, all technologies used, developed, and disseminated as the result of a Federal grant award must unquestionably be accessible.

We need strong, functional, and enforced standards for educational technology. And, furthermore, the liability for failure to meet those standards must extend beyond the schools to the technology manufacturers and distributors. Government leadership could help make accessibility a core element of training for all IT professionals, and the Government should collect and disseminate best practices in accessibility.

America should be a world leader in the use of technology to educate and empower each of its citizens. This is a rare opportunity to establish a standard that will significantly improve access to education, promote innovation, and provide our Nation with both economic and social benefits. We know the type of future we want. We understand the promise of technology. We must now provide the leadership to secure that future and fulfill that promise for all Americans.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Riccobono follows:]

PREPARED STATEMENT OF MARK A. RICCOBONO

EXECUTIVE SUMMARY

The promise that technology holds for enhancing education and improving access to the curriculum is extraordinary. However, it is equally true that technology, if not appropriately designed and implemented, is the biggest threat to our Nation's ability to provide a free, appropriate public education to students with disabilities that we have faced since Congress enacted Public Law 94–142. Harnessing the extraordinary promise of technology is within our reach, but it will take leadership, commitment, and ongoing oversight. The alternative is a future where we spend our time, money, and innovative capacity retrofitting bridges to patch the digital divide rather than enjoying the economic and social advantages gained by the increased usability of technology and the increased leveraging of human capacity that results from technology that is designed and built to be accessible to all.

As a blind individual educated in public schools and in post-secondary institutions, an administrator of model educational programs, and a father of two young children about to enter public education, I am concerned that the future is still too unclear—will technology cause segregation or integration for students with disabilities?

Technology changes the paradigm of accessibility because it can be designed from the very beginning to provide the broadest access. In its basic form digital content is accessible to everyone, as it can be easily transformed, converted, and translated into the form that is required by an individual student. By universally designing technologies to handle a broad range of different physical and informational interfaces, we can get significantly closer to equality in education. The result is that we can move from the old accommodations model to a new paradigm of mainstream accessibility, and our practices and policies need to change to meet that new paradigm.

Recommendations for Federal Policy:

- Stronger Oversight and Accountability in Government
- Strong, Functional, and Rigorously Enforced Standards
- Projects to Collect, Develop, and Disseminate Best Practice Tools
- Improved Protections Against Inaccessible Technology in Education

Technology is transforming the way we create, share, and gain knowledge. If built universally and implemented effectively, technology will make the passion and skill of our greatest teachers even more powerful as we nurture the next generation of leaders for our Nation. If we fail to include accessibility in that technology, we will set this generation of students with disabilities back decades. The cost to those individuals and to our country is too great and the opportunity is too promising to stand by and let that happen.

———

Mr. Chairman, distinguished members of the committee, and other witnesses, my name is Mark A. Riccobono. I am the executive director for the Jernigan Institute at the National Federation of the Blind. My address is 200 East Wells Street at *Jernigan Place*, Baltimore, Maryland 21230; my telephone is (410) 659–9314, extension 2368.

I appreciate the opportunity to speak with you today on the tremendously important topic of technology and its ability to make education accessible to all students. I am happy to say that the promise that technology holds for enhancing education and improving access to the curriculum is extraordinary. However, it is equally true that technology, if not appropriately designed and implemented, is the biggest threat to our Nation's ability to provide a free, appropriate public education to stu-

dents with disabilities that we have faced since Congress enacted Public Law 94–142. Harnessing the extraordinary promise of technology is within our reach, but it will take leadership, commitment, and ongoing oversight. The alternative is a future where we spend our time, money, and innovative capacity retrofitting bridges to patch the digital divide rather than enjoying the economic and social advantages gained by the increased usability of technology and the increased leveraging of human capacity that results from technology that is designed and built to be accessible to all.

PERSONAL EXPERIENCE

By way of background, I was diagnosed as being legally blind at age five. I entered the Milwaukee Public Schools (Milwaukee, WI) and received all of my K–12 education as a blind student integrated into the public schools in that district. My vision loss is a result of glaucoma and aniridia. As I entered kindergarten, there was no doubt that the prospect of my vision getting better was zero and the chance of it getting worse as I progressed through school was very high. As it turned out, my vision steadily got worse—by eighth grade I had lost all of the vision in one eye and had less than 5 percent of normal vision in the other eye.

When I was a student in the K–12 system, technology was something used to supplement the educational curriculum. In my elementary school, the technology was limited to a few computers in the school library, which we used to play educational games in our free time. In middle school, we had a small computer lab, but its regular use was not fully integrated into the curriculum. In high school, we used computers to do specific projects, and a handful of individual classrooms had dedicated computers. However, technology was still not part of the daily curriculum and was not central to the experience of gaining knowledge. I learned to use a computer with software that read the text on the screen aloud using synthesized computer speech as a means to write papers—since I could not effectively read my own writing. Despite my extremely limited vision, I was never given the opportunity to learn Braille in school.

In 1994, I entered the University of Wisconsin-Madison to pursue a degree in business. With the support of the State's vocational rehabilitation program I was given a laptop computer that weighed about 20 pounds. I was able to use that computer to gain access to some limited online resources, which were still largely in the DOS rather than the Windows environment. Registration for classes was done on the telephone—providing me equal access to the registration system—and books were only available in hard-copy print from the bookstore. In order to gain access to the printed books and course packets, I worked closely with the disability resource center on campus. That office facilitated getting the printed materials read onto cassette tapes if the materials were not already available in that format from another source. The recordings were made by volunteers who chose which parts of the book to read based on where they fell in the course syllabus—assuming I was able to get the syllabus ahead of time.

By the beginning of my junior year, Windows 95 had helped to increase the computing power across campus and in individual dorm rooms, the fast growth of the World Wide Web had created new means for sharing knowledge, and the improvements in desktop scanning technologies made it feasible to create reasonably good electronic copies of printed books. During my junior year I was employed at the McBurney Disability Resource Center on campus and helped to implement improvements in the services to create accessible copies of reading materials for students with disabilities. I helped develop and implement the procedures for converting printed books into electronic files that students with disabilities could access and helped to train students on the systems necessary to access those files. The electronic files significantly reduced the waiting time for students with disabilities to receive their materials and improved our ability to produce materials in Braille.

When I graduated in the spring of 1999, technology was becoming increasingly more integrated into the fabric of the academic experience, but the old paradigm of access to information for students with disabilities still held true. Technology was implemented on campus, and it was the role of the McBurney Disability Resource Center to help figure out what modifications and additional access technologies might be needed to allow students with disabilities to gain access to those systems. Additionally, the primary means for disseminating information was still in hard-copy print, which we worked to convert to a format readable by students with disabilities. While the World Wide Web was used to disseminate some information, the configuration of Web sites was basic and generally easily handled by screen reading technology.

In 2000, I was appointed to be director of the Wisconsin Center for the Blind and Visually Impaired—the agency under the Wisconsin Department of Public Instruction responsible for carrying out statewide outreach services to K–12 students who are blind and the school districts serving those students. I served in that capacity for 3½ years, during which time we spent thousands of State and Federal dollars to purchase access technologies that students who are blind used to access curriculum materials. These specialized access technologies had very little interface with systems in the public schools. We worked closely with school districts to advise them on how to make their computer labs accessible, but we rarely faced instances where the technology was used in a classroom on a daily basis. Our agency had a high tech distance learning lab that we used to connect to similar sites around the State. The lab was used for live interactive learning experiences where students could talk to and be seen by a presenter at another location. We rarely needed to troubleshoot a situation where a student needed to take a course online, as distance learning was still in its infancy in K–12. Finally, we worked to further improve the accessibility of K–12 textbooks by supporting the provisions in the law that ultimately created the National Instructional Materials Access Standard (NIMAS). The theory behind NIMAS was that access to instructional materials would be improved by having a clear electronic file standard for book files coming from publishers. The paradigm was still about accommodating students with disabilities in educational environments largely dominated by chalkboards and paper shuffling rather than keyboards and mouse clicks.

I began overseeing national education programs for the National Federation of the Blind in late 2003, and soon after, I enrolled in a program at Johns Hopkins University to pursue a master's degree in education. My experience as a blind student in higher education was dramatically different than it had been just 5 years earlier as I finished my bachelor's degree. The vast majority of my interactions with the systems of the university were through the Internet. I registered for classes, accessed library materials, communicated with professors and advisors, downloaded course packets, and bought books online. The online systems were frequently challenging and forced me to find workarounds due to inaccessibility. Compared to my undergraduate experience, there was much more reasonably accessible digital content available, which resulted in my ability to navigate my coursework with a greater degree of independence than ever before. Where there were barriers, I was determined to figure out a way around them so I could get my degree. However, many students with disabilities are not prepared to fight through the frustration and delays. Had I been pursuing a degree in science or engineering, I would have had even more difficulty. Technology was rapidly becoming more complex and more integrated into the fabric of education, and blind students were beginning to face more barriers to accessibility. Meanwhile, in my coursework we studied the education system and the impact of technology on teaching and learning interactions. I came to understand that the future is uncertain—whether technology would facilitate unprecedented access to information and full integration or be the force that unintentionally segregates students with disabilities into an unequal learning environment.

Today as a lifelong learner still seeking new knowledge, and an administrator of model educational programs, and a father of two young children about to enter public education (one of whom has the same eye condition I have), I am concerned that the future is still too unclear—will technology cause segregation or integration for students with disabilities?

A NEW PARADIGM

There are two central elements to making education accessible to all students. The first is access to educational facilities. Although there still is work to be done in this area, the implementation of the Americans with Disabilities Act (ADA) has significantly improved this Nation's infrastructure for providing all people physical access to the educational environment. The second is access to information. For decades now we have been working to improve access to information in education for students with disabilities. Some of those efforts have been to make curriculum adjustments that better facilitate students obtaining and integrating knowledge. Other efforts have been to convey information in the form that makes it accessible—such as converting printed materials into Braille or using American Sign Language. Technology will either enhance our progress or make some of our previous efforts meaningless.

The schoolhouse is now more accessible to students with disabilities than at any other time in history. But how will history view the great progress we have made when students with disabilities can get in the front door, to the classroom, and to a desk, but in the end they are shut out of the curriculum because the powerful

technological tools used to convey knowledge are inaccessible to them and/or the alternative technologies are inadequate? Will we wait until families of young children with disabilities opt for home schooling in mass numbers because there are too many barriers to fight through in the mainstream educational technology in their local schools? Will we wait until students with disabilities stop coming to mainstream universities because the systems central to the student experience—everything from putting money on your meal card to reading the literature of the world—are not accessible to them in an equally integrated manner? Technology is no longer a supplement to the educational experience; it is an essential access point for education and employment in the 21st century.

Technology changes the paradigm of accessibility because it can be designed from the very beginning to provide the broadest access. In its basic form digital content is accessible to everyone, as it can be easily transformed, converted, and translated into the form that is required by an individual student. By universally designing technologies to handle a broad range of different physical and informational interfaces, we can get significantly closer to equality in education. Today we are getting a glimpse of what the well-designed future can be. Consider the blind student in a classroom environment that uses the iPad. The student can use Apple's built-in VoiceOver screen reading technology and participate in lessons alongside her sighted peers, and she can take out a refreshable Braille display (a supplemental access technology) and connect it to the iPad to read in Braille the reading lesson the teacher uploaded an hour before class. With this powerful accessibility built into a mainstream device, we begin to understand that technology can get us much closer to equality in education than even the most vocal advocates had imagined. But the opposite is also true.

When the old paradigm of "accommodation" persists, educational institutions adopt technologies that are incredibly complex but have not been designed for access by students with disabilities—they miss the opportunity and unknowingly create new challenges. This means the educational institution has to find an alternative, which brings an additional expense and will most likely be unequal. Imagine the blind student who attempts to log on to the university library site, search for research articles, and obtain relevant digital copies of articles for a course project. Imagine the frustration when the student cannot effectively perform the search because the database was not designed according to well-accepted Web accessibility standards. The student contacts the library (during normal business hours only), and the librarian is pleased to meet his responsibility to accommodate by performing the search for the student and pulling the relevant articles. The student provides as much information as possible about the desired search terms (even though nondisabled students use the process of searching to narrow their focus), and the librarian agrees to e-mail the student the digital copies of the articles. The librarian identifies 25 relevant articles but only 10 are available as full text (accessible to the student). The other 15 are provided in inaccessible PDF files, which the student must take and run through a program that attempts to perform optical character recognition on the files. All of that has to be done before even getting to the abstract of the article to know if it is one that is worth reading for the project. And just imagine if the search terms were not quite right and another search is needed but the library is closed until Monday. Meanwhile, other students in the project group are uploading notes to an online wiki for planning the project. Of course, the wiki is a Web platform that was also not built with accessibility in mind. The student decides to switch to work for another course so she attempts to pull up a required class video from an online learning management system. The video is offered in Flash, and accessibility has not been properly implemented, which results in the student being unable to play the video. All of these barriers and more are faced by students today, even though providing accessibility in these technology applications is possible. Unless we commit ourselves to the new paradigm, this is the experience for a student with a disability in the future where technology is built and implemented without accessibility from the beginning.

THE SHIFT OF TECHNOLOGY IN EDUCATION (THE OPPORTUNITY)

As technology becomes more central to the educational experience and accessibility is built into the mainstream technology, we should observe the technology market becoming more effective in its delivery of products to increase accessibility for people with disabilities. In the old paradigm, very expensive, low-volume products were created to assist people with disabilities to gain access to information. Specialized electronic devices allowing a blind person to write and read back the Braille code in electronic form have been produced for decades. These devices—generically referred to as electronic Braille notetakers—have historically had limited

interaction with mainstream computers and have generally cost more than $5,000. As mainstream technology incorporates more accessibility into the native design, the need for these highly specialized and segregated devices goes down. This means that the access technology industry can focus on needs that the mainstream market is unlikely to effectively address. For example, although Apple's iOS devices include great accessibility support (screen reading and screen magnification technology for blind users) and interoperability with third-party refreshable Braille displays, Apple itself is unlikely to get into the business of designing, building, and distributing Braille display devices. However, Apple's leadership in native accessibility in the iOS platform opens up a new market for devices that further enhance the accessibility of the Apple products and provide innovative solutions to the access to information challenge. In addition to refreshable Braille displays, there will still be a need for a number of products that are critical in providing access to the curriculum but are unlikely to come from the mainstream market. Examples of such technologies are tools for producing hard-copy Braille (Braille embossers) and tactile graphics.

To illustrate this technology shift, let's compare the old specialized model to the new paradigm of accessible mainstream technology. The old access technology model is represented by the BrailleNote Apex—a Braille notetaking/PDA device available from HumanWare at a retail price of $6,379. The BrailleNote Apex has a fairly wide distribution in K–12 education as a specialized device for blind students. The new paradigm is represented by an Apple iPhone 4S 16GB with a retail price of $199. Because the iPhone does not include refreshable Braille built into the device, we need to add a separate piece of access technology. In order to make the comparison fairly equal, I chose to add the Alva BC640 40-cell refreshable Braille display at a retail price of $4,199. This means on price alone our new mainstream option retails for $4,398 (almost exactly $2,000 less than the specialized technology option). Table 1 compares the products based on hardware capacity and processing speed. In this comparison we find that the mainstream option is not only less expensive but far more powerful than the specialized option. Finally, the chart does not compare the availability of applications between these two solutions. While we could easily detail the applications available for the BrailleNote Apex (those built in and those available for hundreds of extra dollars), we would not be able to do that for the iOS platform.

There are hundreds of thousands of applications in the Apple App Store. Even when you consider that Apple does not currently require applications to be accessible to be in the App Store, blind users of the iOS platform have found a growing number of powerful accessible applications to serve every need from taking notes to reading books to engaging in social networking. It is fair to say that the applications available in the mainstream model exponentially exceed those in the specialized model.

THE FAILURE IN TECHNOLOGY IMPLEMENTATION (THE CHALLENGE)

I believe it is fair to say that, with only a few limited exceptions, educational institutions at the K–12 and post-secondary level are currently failing to make a passing grade in the subject of realizing the promise of technology for students with disabilities. However, it is not entirely their fault. These institutions have 100 percent of the responsibility for ensuring their programs and services are accessible and, while they should develop more capacity to ensure the accessibility of the technologies they purchase, the reality is they cannot effectively test the accessibility for every piece of technology on the market—the technology vendors need to do better. There is a need for shared responsibility, clear standards, and strong enforcement.

BOOKS AND INSTRUCTIONAL MATERIALS

Let's examine just a few technologies in the educational space to understand the barriers students with disabilities currently face. Central to the educational experience is the book. In growing numbers K–12 schools and universities are moving away from static hard-copy, expensive print books to the use of dynamic, easily updated and supplemented, and less expensive e-books. The mainstream move to e-books has great promise for students with disabilities. Digital content is not inherently inaccessible like the print book. The basic digital content of a book can be read aloud using speech technologies or enlarged using magnification software without much trouble. In fact, people with disabilities, specifically those with "print disabilities," have been using digital versions of books since the late 1980s. The e-book is frequently delivered via a device or reading system (e.g., Amazon's Kindle, Apple's iPad, or Adobe's PDF product). As long as the delivery system for the e-book includes accessibility, students with print disabilities will have equal access to the

content of the book and the functionality of the reading system. In practical terms this means that we have the promise of all students having access to the same book, at the same time, and at the same price. This is a tremendous leap forward in terms of timely access to materials compared to the old paradigm, and it saves the significant amount of human resources that were being used to convert inaccessible print back into an accessible format.

The reality of e-book adoptions in both K–12 and higher education is that, in general, the producers of textbooks and to some extent the purchasers of those books are stuck in the old paradigm of accessibility. Accessibility is often not built into e-book readers and, when it is built in, it does not provide the same level of functionality and navigation that is provided to the reader without a disability. Two examples at either end of the spectrum of accessibility are products provided by Apple and Barnes & Noble. Apple recently launched iBooks 2.0 with an aim at revolutionizing the educational book space. Apple is the industry leader for built-in accessibility due to its commitment to out-of-the-box accessibility in their iOS (iPad, iPhone, iPod) and Mac products. This means that a blind student can purchase the iPad, for example, at the same price as everyone else and begin using it with the built-in VoiceOver screen reader from the moment it comes out of the box. While the blind student can purchase one of the new iBook 2.0 titles and read it straight through, she will not be able to navigate the book or have access to the same functionality as her nondisabled peers—not perfect but far more accessible than the old paradigm. In contrast, many universities have begun creating relationships with Barnes & Noble for provision of e-textbooks with focus on the relatively inexpensive Nook device for delivery of those books. The Nook includes no accessibility features and leaves a print-disabled student to find a separate solution. Most certainly the separate solution will also be unequal as the print-disabled student will not have any of the functionality that the Nook provides to all other users. There are a number of other book reading systems and devices delivering various e-book formats with varying degrees of inaccessible content and features and most fall down when accessibility is considered. The promise of "same book, same time" is near but not yet fully delivered.

Why would any educational institution choose the Nook considering its inaccessibility? I believe it is largely because they are stuck in the old paradigm of having to accommodate students with disabilities. Therefore, it is natural to the schools to purchase something that is inaccessible and figure out an alternative for students with disabilities. Furthermore, the educational institutions have complete responsibility under the law for ensuring equal access to their educational programs. The old paradigm has created the practice of buying the product you feel best meets what your need is and working out accessibility if you have to do so. However, the new paradigm should suggest that schools start demanding complete accessibility in their technology products, including e-books, and hold the producers of those technologies responsible. The educational textbook market is a significant piece of the publishing industry and, with the growing adoption of e-books, we need to ensure that the books being used in education are accessible to students with print disabilities.

A final problem related to the adoption of accessible e-books in K–12 is the existing NIMAS standard. Before the e-book market began taking off in education, NIMAS was the most effective policy solution to helping K–12 schools deliver more timely textbooks to their students with print disabilities. While NIMAS helped to create some standardization in the electronic files, it has not made a noticeable difference in the delivery of better and more timely instructional materials to students with disabilities. Furthermore, NIMAS is now a barrier to mainstream access to books at the K–12 level. There is little incentive for publishers of e-books for the K–12 market to produce fully accessible e-books as long as they can meet their legal obligation to provide a NIMAS file. As the e-books become more sophisticated and include greater functionality—ability to annotate, link to online content, etc.—the student using the NIMAS version of the book will receive increasingly unequal access.

CLOUD-BASED EDUCATION AND DEDICATED PORTABLE DEVICES

Many schools are utilizing the tremendous resources available through applications and databases available "in the cloud." Frequently schools make educational resources available through Web sites that are actually portals to sophisticated software applications that run over the Internet rather than being locally installed on a hardware device. This provides great flexibility to schools and allows them to take advantage of a tremendous amount of technology that can be freely implemented. Because cloud-based applications are not installed locally, the school can leverage

whatever Internet-enabled devices they have available or they can have individual students bring their own device.

Take for example Google's effort to gain wide support for adoption of Google Apps for Education in schools across the country as a means of providing e-mail and collaboration tools to students and faculty. Google Apps for Education is a free suite of hosted communication and collaboration applications that includes Gmail, Google Calendar, Google Talk, Google Docs, and Google Sites. We have found that each of these applications contains significant accessibility barriers for blind people utilizing screen access technology. These applications are attractive to schools because they are powerful and their price tag does not stretch the education budget.

However, you cannot accommodate students in an equally integrated manner when they are shut out of a technology as powerful as Google Apps for Education. Schools face the choice of segregating students with disabilities or enhancing integration by only adopting technologies that are accessible. While we hope all schools make the right decision, if they do not, the individual student has very few options available, and every day that a student with a disability waits for the technology to be made accessible is another day of learning lost.

In other cases, schools are adopting broad programs to purchase technology and put a device in the hands of each student. Consider a story from last summer's *Powell Tribune* (Powell, WY) entitled "School district adopts the iPad." The story details the plan to spend $722,000 for the purchase of 1,180 second-generation iPads in order to put one in the hands of each middle and high school student in the district. The story does not talk at all about accessibility, although it does talk about the ways that implementing this technology will cut down on other costs such as textbooks and computer-based testing. This raises the question of whether or not the applications used on the iPads will be designed to be accessible to students with disabilities. If not, how will the district accommodate those students, and will it create segregation or integration?

Even more alarming is a report from *CNET News* entitled "27,000 Google Chromebooks headed to U.S. schools." The article announces the plan to distribute new Chromebooks to school districts in Iowa, Illinois, and South Carolina. The article credits a Google official as saying, "We now have hundreds of schools across 41 States that have outfitted at least one classroom with Chromebooks." The Chromebook is a tablet device that provides computing power while operating applications from the cloud. This device presents significant access barriers to students who are blind, yet these school districts are proceeding with a plan to issue Chromebooks to students for use in school and at home. This means nondisabled students have around-the-clock access to information and those who are blind have unequal access and are potentially shut out of certain applications.

These are just a few examples of technologies that are being rapidly and broadly implemented with limited to no accessibility. There are dozens of other inaccessible technologies by dozens of other technology companies big and small being purchased by educational institutions largely using public money. Examples of other educational technologies where we have found limited accessibility even after the system was implemented in K–12 schools or universities include:

- Interactive White Boards (IWBs);
- Online course management systems;
- Software for performing virtual science experiments;
- Web sites for courses, programs, schools, and entire districts which provide important information and essential notices;
- Online journals;
- Educational resources produced and distributed by Federal grant projects;
- Computer-based assessments;
- Online applications for admission to programs; and
- Classroom devices such as clickers.

Furthermore, this does not take into account the technologies that teachers and faculty members with disabilities need to interact with to create and post educational content, perform research, log grades, or do any of the other staff functions required by their employer and utilizing a computerized system owned by the educational institution.

RECOMMENDATIONS FOR FEDERAL POLICY

Based on my personal experience as a blind person in the education system (K–12 through master's degree), an administrator of educational programs for blind children and adults, a father with young children about to enter America's public education system, and an advocate who works with blind students and faculty

across the country, I offer the following recommendations to facilitate the use of technology to enhance accessibility and academic outcomes for students at all levels.

Stronger Oversight and Accountability in Government

In order to meet the promise of technology in education we need strong leadership. That leadership begins with the Government cleaning up its own practices. Federal agencies dealing with educational institutions and providing grants to institutions to do cutting edge research and education are among the offenders. For example, while the U.S. Department of Education has been more responsive to dialog lately, they still do not have clear checks and balances to prevent the distribution of grants that will fund projects resulting in the development of inaccessible digital instructional materials. The agency needs to have an official who reports directly to the Secretary who can ensure that the entire infrastructure of educational technology efforts includes real accessibility. Furthermore, the Department of Education needs to closely monitor and enforce accessibility requirements in its distribution of grants.

Another significant agency of concern is the National Science Foundation, which funds a tremendous amount of research and educational innovation. In recent correspondence from the Foundation to Kareem Dale, Special Assistant to the President for Disability Policy, as a followup to concerns raised about the accessibility of NSF-funded projects, the Foundation said in part:

> When a grant proposal is submitted to the NSF, the Authorized Organizational Representative (AOR) from the proposing organization electronically signs the proposal. By electronically signing the proposal, the AOR certifies the organization agrees to comply with NSF's Nondiscrimination Certification. That certification states that the organization agrees to comply with a multitude of civil rights statutes, including the Rehabilitation Act, as well as all regulations and policies issued by NSF pursuant to these statutes.

The practical experience of researchers with disabilities and those attempting to use educational products from NSF-funded programs is that the technologies and materials are frequently not accessible. I would recommend that "checking a box" is not enough. We need a proactive approach. What tools is NSF giving potential grantees to understand accessibility and help them build it in? What guidelines and examples does the agency provide for grantees to know what works and what doesn't? How often does accessibility get discussed at project director conferences? And how clear is the complaint process to those who find violations? When America is interested in boosting its science, technology, and engineering workforce, we should not be leaving people with disabilities behind.

Finally, some agencies are working on being more proactive, strengthening their enforcement of accessibility requirements, and bringing more attention to the issues. A recent request for proposal from the U.S. Department of Labor included the statement,

> All online and technology-enabled courses developed under this SGA must incorporate the principles of universal design in order to ensure that they are readily accessible to qualified individuals with disabilities in full compliance with the Americans with Disability Act and Sections 504 and 508 of the Federal Rehabilitation Act of 1973, as amended.

A good step forward if the agency sticks to it, asks for clear documentation of how the project is meeting this requirement (not just a checkbox), and takes swift action when this provision is violated. However, what happens when you go to the Department of Labor Web site and click on one of the links that takes you to a third-party site like Facebook? You are met with a new page that states:

> You are exiting the Department of Labor's Web server. The Department of Labor does not endorse, takes no responsibility for, and exercises no control over the linked organization or its views, or contents, nor does it vouch for the accuracy or accessibility of the information contained on the destination server. The Department of Labor also cannot authorize the use of copyrighted materials contained in linked Web sites. Users must request such authorization from the sponsor of the linked Web site. Thank you for visiting our site. Please click on the link below to continue.

The Department is presumably posting information to Facebook for the purpose of communicating vital government information and news to the public. Facebook presents many accessibility challenges to people with disabilities. We might reasonably assume that the individual posting information to Facebook on behalf of the Department is an employee or contractor of the Government—unless there is a volunteer that has been authorized to perform this service. Yet the Department claims no responsibility for the accessibility of the content presented on the Facebook page.

Advocates have found getting Facebook to improve its accessibility frustratingly slow. Who is taking responsibility for accessibility? How many other third-party sites containing vital government information are not accessible and have nobody taking responsibility for their accessibility? Where is the leadership, and who is working to ensure that all citizens of this great Nation have access to information?

We need to do more to move government from the old accommodations model into the new mainstream access model of technology. Greater leadership, proactive training, and rigorous reinforcement is required. There should be more centralized responsibility for ensuring accessibility within Federal agencies and within the policies of those agencies. In particular, the Government needs to take more aggressive steps to ensure that Federal grant funds are not going to projects where accessibility is ignored. Furthermore, the Government needs to provide leadership in these areas by ensuring that government sites meet the highest standards of accessibility.

Strong, Enforceable, and Functional Standards

Those who resist the requirement that technologies be accessible from the design phase argue that it is too hard to know what accessible means and what truly is universal design, and that having a standard limits innovation. Despite these claims, many strong sets of standards have been developed that have gone a long way toward improving accessibility, and new innovative solutions are coming to market when the talent is focused in that direction (e.g., Apple's use of unique interface gestures that make the iPhone accessible to blind people). But there are not good comprehensive standards to guide the accessibility of technology in educational institutions.

I recommend that the Congress take swift action to authorize the U.S. Access Board to compile functional guidelines in the area of instructional materials. The recent report of the Federal Advisory Commission on Accessible Instructional Materials in Post Secondary Institutions for Students with Disabilities provided as their first recommendation that,

> "Congress should authorize the U.S. Access Board to establish guidelines for accessible instructional materials that will be used by government, in the private sector, and in post-secondary academic settings."

This Commission of experts defined "instructional materials" broadly by stating,

> Instructional materials are the curricular content (printed and digital books, journals, course packs, articles, music, tests, videos, instructor-created PDFs and PowerPoint documents, web pages, etc.), as well as the technologies required (hardware, firmware, software and applications) for the manipulation, annotation and dissemination of content. This definition also includes any other required instructional software and applications used to facilitate the teaching and learning process, including learning software, courseware/learning management systems, digital "learning objects," library databases, and others.

This Commission also emphasized the importance of functional requirements by noting that specifying file types or specific technologies was not the answer. The Commission went on to firmly State that:

> Technology developed or deployed to facilitate access to instructional materials must permit a user with a print disability the opportunity to acquire the same information, engage in the same transactions and enjoy the same services at the same time as the user without a disability, and with a substantially equivalent ease of use.

It is worth noting that a functional set of technology guidelines meant to specifically address education will apply in K–12 as well as post-secondary programs as the functional requirements for accessibility should be the same at all levels. This clarifies accessibility for all parties and reduces the uncertainty about whether a particular technology will be viewed as being accessible. This work will also create the framework for creating proactive tools and technical examples to help technology developers understand accessibility. These standards will become more critical as people with disabilities rely more on mainstream rather than specialized technology, to ensure that the accessibility of these technologies does not erode. Ultimately, these guidelines should be enforceable by linking them to existing civil rights and public accommodations protections.

Projects to Collect, Develop, and Disseminate Best Practice Tools

Congress and Federal agencies could help advance accessibility significantly by putting together more efforts to support the development and dissemination of resources in the areas of implementing accessible online content, tools to test accessibility of publications, best practices for purchasing and implementing accessible technologies, and other related topics. There is a great need to collect together best

practices related to the design and implementation of accessible technologies and content so it can be better understood in the educational system.

Federal agencies should make accessibility a priority track at conferences sponsored by the Government and consideration should be given to a national conference on accessible technology in education. Furthermore, the U.S. Department of Education should collect case studies of innovative approaches to ensuring accessibility across the technology infrastructure of school districts and universities and make those examples available via the Internet.

The Government could also help to raise understanding of accessibility within the information technology industry by first ensuring that government IT professionals receive more resources and training on what accessibility means, how to require it in the purchasing process, and how to test that accessibility has been met. The stronger the accessibility requirements in technology purchasing, the higher the demand will be in the industry for IT professionals, programmers, and computer engineers who truly understand accessibility and universal design. This will ultimately trickle down to the university programs and other professional training programs creating a systemic approach to raising the importance of accessibility.

Improved Protections Against Inaccessible Technology in Education

I believe that leadership, strong functional standards, proactive best practices, and greater government accountability for accessibility of technology in this Nation's educational facilities will make a tremendous difference. I am not convinced that it will be enough to really hit the tipping point where all technologies are universally designed and available to all students on the first day they are implemented in the classroom. This is a real threat to access, education for students with disabilities, and I believe Congress should strengthen the shared responsibility for accessibility and the remedies available to students and faculty with disabilities who are segregated to second-class access.

First, a disabled college student, faced with inaccessible technology and a school that is not interested in taking the steps necessary to make it accessible, has ways to address the problem for herself and systemically—with a complaint to either the Department of Education or Department of Justice or a suit under title II (if a public college) or title III (if a private one). The parents of a K–12 student, however, have a more complex set of hoops to jump through with relatively little possibility of making systemic change. Generally, parents of children with disabilities are restricted to provisions under the Individuals with Disabilities Education Act (IDEA) and challenges to the IEP. Take for example a school district that adopts an inaccessible technology that is used in every classroom for every student. Due to the priority of the IEP process for accommodating students, a claim of discrimination because of inaccessibility would first have to exhaust the complaint procedures under IDEA. This further emphasizes the old accommodations model rather than taking advantage of the promise for universal access that technology can deliver. We need clearer protection under the law in cases where inaccessible technology is widely adopted and systemically bars the participation of students with disabilities to clarify the unintended consequences of the IDEA and the IEP process.

Second, educational institutions at all levels have the entire responsibility under Federal law for providing equal access to instructional technologies. If a student encounters pervasive discrimination because of the proliferation of an inaccessible digital book, platform, or device, her remedies are entirely against the educational institution, including, in the case of section 504, cutting off Federal funding. Meanwhile, the companies that sell hundreds of thousands of dollars of inaccessible technology into the education market share none of the responsibility for the discrimination against students with disabilities. Furthermore, companies that do not include accessibility in their products may enjoy a price advantage because their products include less robust features than the technologies that come with accessibility built in. Schools can, of course, seek contractual representations and warranties and indemnity clauses to extend liability to educational vendors, but many lack the market power to insist on such provisions. The civil rights laws should be strengthened so that companies systemically placing inaccessible technologies into K–12 or postsecondary education programs can be held accountable for their role in shutting out students with disabilities. Specifically, I recommend that Congress consider extending the private right of action to companies whose products create systemic barriers to the full participation of students with disabilities in the educational system. Along with a strong functional standard of accessibility, this will encourage accessibility, reward those implementing universal design, and punish those misrepresenting the accessibility of their technologies.

Third, it is critical that we recognize the tremendous sacrifice that a student with a disability makes when bringing a complaint regarding accessibility against her

school. Consider the Ph.D. candidate pursuing a career in academia. If in the middle of her study she decides she can no longer take the technology barriers she faces in the university's systems, she has a terrible choice to make. Option 1: File a complaint against her university and potentially upset some of the very mentors she came to the university to work under. Furthermore, her complaint will put her in the position of applying for jobs at other universities and listing references from her current university where many will think of her as a troublemaker. Option 2: Bite her tongue, accept whatever extra cost there is to her to work through the inaccessible technology, and hope to get out successfully as fast as she can. Option 3: Drop out. In the same way any other group has faced real and perceived retaliation for attempting to achieve equality in society, students with disabilities face a real barrier when fighting for accessible technology. Congress needs to carefully consider the pressure on students with disabilities and create stronger protections that give stronger supports to students and help to share the responsibility of accessibility.

Technology accessibility is a central civil rights issue for the 21st century, and if Congress does not take stronger actions, we will make people with disabilities second-class citizens in a digital era.

CONCLUSION

Technology is transforming the way we create, share, and gain knowledge. If built universally and implemented effectively, technology will make the passion and skill of our greatest teachers even more powerful as we nurture the next generation of leaders for our Nation. If we fail to include accessibility in that technology, we will set this generation of students with disabilities back decades. The cost to those individuals and to our country is too great and the opportunity is too promising to stand by and let that happen.

As a blind father working to build a future for my own children as well as the blind children that are now entering the education system, it concerns me that we might miss the tremendous opportunity that is within our reach. It worries me that our failure to make universal access to technology a reality may potentially shut one of my children out of educational opportunities and may prevent me, as a blind parent, from having the same access to information and resources regarding my children's education as my sighted peers. By welcoming the new paradigm of mainstream access, providing government leadership in programs and grant-funded projects, collecting and disseminating best practices in implementing accessible technology, building tools to check for accessibility barriers, deepening awareness and expertise among IT professionals, and strengthening nondiscrimination protections under the law, we can make a huge difference.

Distinguished members of this committee, I deeply appreciate the opportunity to present my perspective and recommendations regarding the intersection of technology and education for students with disabilities. Your leadership in putting this hearing together is extremely meaningful and will contribute significantly to the shift to a new paradigm of accessibility in education. We know the type of future we want, we understand the promise of technology, and we must act quickly to make it a reality.

REFERENCES

"27,000 Google Chromebooks headed to U.S. schools," Deep Tech—*CNET News, http://news.cnet.com/8301-30685_3-57365703-264/27000-google-chromebooks-headed-to-u.s-schools/*.

"Mainstream Access to E-Books—What Works, What Doesn't, and What Is Still Unclear," *Braille Monitor*, January 2012, *http://www.nfb.org/images/nfb/Publications/bm/bm12/bm1201/bm120105.htm*.

"Notice of Availability of Funds and Solicitation for Grant Applications for Trade Adjustment Assistance Community College and Career Training Grants Program," Employment and Training Administration, U.S. Department of Labor, Notice of Solicitation for Grant Applications (SGA), *http://www.doleta.gov/grants/pdf/SGA-DFA-PY-10-03.pdf*.

Recent NFB Blog posts: Google Apps, *http://www.nfb.org/NewsBot.asp?MODE=VIEW&ID=850&SnID=178214263*. The Google Blog, *http://www.nfb.org/NewsBot.asp?MODE=VIEW&ID=848&SnID=178214263*. Google, *http://www.nfb.org/NewsBot.asp?MODE=VIEW&ID=782&SnID=178214263*.

"Report on the Accessibility of Google Documents," Access Technology Higher Education Network (ATHEN), *http://athenpro.org/google-docs-accessibility*.

"School district adopts the iPad," written by Don Amend, *Powell Tribune*, Powell, WY, *http://www.powelltribune.com/news/item/8470-school-district-adopts-the-ipad*.

Table 1.—Comparison of iPhone and BrailleNote

	iPhone 4S	BrailleNote Apex
Processor	1GHz dual-core A5[1]	Freescale iMX32[2] (approx. 532MHz[3])
RAM	512MB	256MB
Internal Storage	16/32/64GB	8GB
GPS	Internal	External
Camera	8-megapixel	None
External Synchronization	Wi-Fi/Cloud, USB	USB/SD Card
Web Browsing Capabilities	Full browser capable of rendering HTML 5	Mobile browser best for text or simple pages.
Price	16GB iPhone 4S ($199) + Alva BC640 40-cell refreshable Braille display ($4,199): $4,398.	BrailleNote Apex 32 cell Braille display: $6,379

[1] *http://www.pcworld.com/article/241158/iphone_4s_vs_the_competition_spec_showdown_chart.html*.
[2] *http://www.humanware.com/en-usa/products/blindness/braillenotes/_details/id_161/braillenote_apex_qt_32.html*.
[3] *http://www.freescale.com/webapp/sps/site/taxonomy.jsp?code=IMX31_FAMILY*. Information of iMX32 is not available, but datasheets show iMX31/32 listed together; specifications appear to be similar.

————

REQUESTED INFORMATION ABOUT NSF ENFORCEMENT AND MONITORING OF REHABILITATION ACT OF 1973

KAREEM DALE,
Special Assistant to the President for Disability Policy,
Office of Public Engagement,
The White House.

DEAR KAREEM: Thank you for inviting me to attend the October 28, 2011 "Briefing on the Accessibility of Science, Technology, Engineering and Mathematics (STEM) Education and Careers for People with Disabilities." During the meeting Dr. Gardner and you asked for information about how NSF enforces and monitors awardee compliance with the Rehabilitation Act of 1973 (29 U.S.C. §794). The following response is offered for your consideration.

When a grant proposal is submitted to the NSF, the Authorized Organizational Representative (AOR) from the proposing organization electronically signs the proposal. By electronically signing the proposal, the AOR certifies the organization agrees to comply with NSF's Nondiscrimination Certification. That certification states that the organization agrees to comply with a multitude of civil rights statutes, including the Rehabilitation Act, as well as all regulations and policies issued by NSF pursuant to these statutes.

NSF has the responsibility to monitor awardee compliance with the Rehabilitation Act. Specifically, in accordance with its regulations, NSF is required to conduct a prompt investigation whenever it receives information suggesting a possible failure to comply with the requirements of the Rehabilitation Act. At the conclusion of its investigation, NSF informs the awardee in writing of its findings of fact and conclusions of law. If NSF determines that the awardee failed to comply with the Rehabilitation Act, NSF sets forth the measures that the awardee must take to bring itself into compliance. If the awardee is unable or unwilling to take the measures set forth by NSF, NSF may take appropriate action against the awardee including, but not limited to, the termination of any NSF funding to the awardee.

In addition, pursuant to its regulations, NSF is authorized to periodically review the practices and policies of awardees to determine whether they are complying with the requirements of the Rehabilitation Act. The regulations do not specify a particular number of compliance reviews that NSF is required to undertake in a given year.

Thank you for this inquiry. Please advise if there is any additional information we can provide.

Best,

MARK H. LEDDY, PH.D.,
Program Director, Directorate for Education and
Human Resources, National Science Foundation.

The CHAIRMAN. Thank you, Mr. Riccobono—a very, very eloquent statement.

Now we will turn to Dr. Quick.

Dr. Quick, I read your testimony last evening—pretty phenomenal what you've done in Columbus, IN. Please proceed.

STATEMENT OF JOHN B. QUICK, SUPERINTENDENT, BARTHOLOMEW CONSOLIDATED SCHOOL CORPORATION, COLUMBUS, IN

Mr. QUICK. Good afternoon, Mr. Chairman. Thank you for inviting me to speak about Bartholomew Consolidated School Corporation and how we work to achieve the best possible outcomes for every student. I would like to share how we use Universal Design for Learning as our framework for curriculum instruction and how that helps our teachers effectively use accessible technology.

We are a district of 12,500 students. We are rural, about 50 miles south of Indianapolis and 90 miles west of Cincinnati. We have 18 schools serving our students. Of those students, 45 percent are eligible for free and reduced lunch, 16 percent are students of color, 14 percent receive special education services, and 11 percent are English language learners.

Therefore, in 2008, we made a purposeful decision to use Universal Design for Learning across all our programs as a framework to design all instruction and curriculum in our district. We find this framework has helped us uphold our expectation that all learners will achieve to their highest level.

Using Universal Design for Learning has advanced the educational outcomes that include: From 2009 through 2011, we had a 10.5 percent increase in the number of students with disabilities passing Indiana's statewide assessment; 68 percent of our English language learners increased their skill scores on a statewide assessment which was a greater increase than the State average; and we had a 7 percent increase of K–8 students receiving Pass-Plus. This is the State's highest recognition on the State testing in English language arts and math.

In 2011, we met annual yearly progress targets for both English language arts and math with our special education population and our English language learner population. Our district was honored by the College Board and placed on the 2d Annual Advanced Placement Honor Roll for increasing the number of students participating in AP and improving the percentage of underserved students earning advanced placement exam scores of three or higher.

At this point, let me take a minute or two to tell you about what Universal Design for Learning means to our schools. Just as the Americans with Disabilities Act requires buildings to be accessible to all who might enter, Universal Design for Learning serves as a framework to make learning environments accessible to all students. There are three overarching principles: engagement, representation, and action expression. When used, these create an accessible learning environment.

BCSC recognizes the need to create flexible learning environments which are standards-based and utilize accessible technologies when appropriate to the lesson. We are fortunate to have access to technologies such as computers, the Internet, smart phones, tablets, and other devices. However, those technologies only come into use when they have been identified as connected to the instruction.

Teachers utilize the framework of Universal Design for Learning as a decisionmaking tool to help them determine what strategies, accessible technology, and methods they will use to help the students achieve the goals of the lesson.

For example, a seventh grade student was recently experiencing significant behavior problems. This student with autism, who is also identified as high ability, continued to struggle in many of his high ability core courses. After investigation, it was determined that the current instructional strategies were not a match for the student. Because we provided the student access to a computer-based program, this student no longer exhibits the previous behaviors. In fact, this student is successfully completing high school courses as a seventh grader. The availability of accessible technology has allowed this student to remain in school.

BCSC's adoption of Universal Design for Learning and the use of accessible technologies had taken time, commitment, and persistence in an age of constant educational change. We believe that Universal Design for Learning and the use of accessible technology has placed us on a pathway to improve services for all our students. With its well-defined and flexible framework, Universal Design for Learning has provided the necessary structure within which BCSC's teachers can plan and feel confident in their profession.

Thank you for inviting me to share information about how BCSC uses Universal Design for Learning to choose accessible technology. My staff and I are at your service.

[The prepared statement of Mr. Quick follows:]

PREPARED STATEMENT OF JOHN B. QUICK

Chairman Harkin, Ranking Member Enzi and members of the Senate Committee on Health, Education, Labor, and Pensions, thank you for inviting me to testify before the committee. I am Dr. John B. Quick, superintendent of Bartholomew Consolidated Schools, Corporation (BCSC) in Columbus, IN. I want to share with you information about how our school district uses the framework of Universal Design for Learning (UDL) to expand and guide our use of accessible technologies to enhance our instruction and gain better outcomes for our students.

DEMOGRAPHICS

Bartholomew Consolidated School Corporation (BCSC) is located in Columbus, IN, 45 miles south of Indianapolis. Of our 12,500 students, 0.3 percent are American Indian, 1.8 percent are Black, 3 percent are Asian or Pacific Islander, 4.9 percent are Multicultural, 6.7 percent are Hispanic, and 83.4 percent are White. Within our population, 45 percent receive free/reduced meals. 11 percent are English Language Learners and 13.9 percent receive special education services. These students are served through our early childhood center, 11 elementary schools, two middle schools, three high schools, and our adult/alternative education center (Bartholomew Consolidated School Corporation, 2012). Two of our elementary schools utilize the New Tech Model, while a team within one middle school and one of our high schools are part of the New Tech network. (The New Tech Network, 2012).

Similar to other communities, the demographics in Columbus have shifted in recent years. Between 2002–3 and 2011–12, BCSC saw significant growth in the number of students qualifying for free and reduced lunches (31 percent to 45 percent) and the overall number of minority students served (9.7 percent to 15.7 percent). The most significant growth, however, has been in the number of students who are English Language Learners (ELL). In 2002–3, BCSC served 1.7 percent students identified as ELL. In 2011–12, that percentage increased to 11 percent. These individuals represent 50 different languages.

In 2002–3, 16.4 percent of BCSC students were eligible for special education services. It continues to be the goal of the administration that these students receive an overwhelming majority of their services alongside their general education peers. Currently, 13.9 percent of BCSC students are eligible for special education services

with approximately 90 percent of these students included within the general education setting for at least 80 percent of their instructional day. The high percentage of students with disabilities served in general education is reflective of BCSC's belief that full access to the curriculum should drive all instruction.

UNIVERSAL DESIGN FOR LEARNING AND ACCESSIBLE TECHNOLOGY: BCSC'S PHILOSOPHY

BCSC's expectation that *all* learners will achieve to their highest levels drove the need to identify an instructional framework. Thus, in 2004 the BCSC leadership identified Universal Design for Learning (UDL) as the framework to support the inclusive practices for students with disabilities *and* enhance the access of curriculum for *all* students (see Appendix A). One of the ways BCSC makes curriculum accessible to all students is through the use of accessible technology.

UDL is a curriculum designing tool that helps teachers design lessons that will be accessible to all students. There are three overarching principles (engagement, representation, and action and expression). Each is broken down into nine guidelines (three under each principle). The guidelines help teachers select teaching strategies, methods and accessible technologies, which will, when combined, create an accessible learning environment. Brain research (Rose & Dalton, 2006) tells us that learners' abilities are multi-faceted and no one method of presentation, instruction, or evaluation can address every learner in a meaningful way (Hitchcock, Meyer, Rose & Jackson, 2002). Fortunately, UDL provides a framework within which schools can investigate or build any curriculum. The curriculum is not altered; rather, it is enhanced through the teacher's application of the UDL principles and use of accessible technologies.

For example, a second grade teacher creates an introductory lesson about electricity. First and foremost, a goal linked to the State standards is determined: *Students will demonstrate their current knowledge of the flow of electricity*. Next, the teacher uses the nine guidelines to determine what strategies and technology to use. The following example focuses on the principle of engagement and the first guideline of "options for recruiting interest."

When the teacher considers options for recruiting interest, he designs the lesson so the topic is relevant and authentic to his students. He might use pictures, multimedia (e.g., showing a brief child-centered video about electricity or an app demonstrating how electricity is made), a group discussion to list what items utilize electricity, and/or allow students to safely hold or touch items that utilize electricity. The teacher knows, because of the defined guideline, that these activities must be personalized and contextualized to his students' lives while being relevant for different racial, ethnic, cultural, and gender groups. By addressing each of the nine guidelines, the teacher can be confident that he is creating a learning environment and using technologies, which are accessible to his learners.

UDL aligns with BCSC's beliefs in providing a structure for clear instructional practices while addressing a specific instructional goal (Center for Teaching and Learning, 2005). Because instructional goals might involve the use of technology, it is BCSC's expectation that teachers choose whether or not to utilize accessible technology to align with the standards-based goals they have determined for their lessons. Specifically, accessible technology must be chosen based on the framework of UDL. The use of technology must engage students; explain an idea, action or outcome; or provide an avenue for students to demonstrate knowledge (Doyle & Giangreco, 2009). If we do not use technology that makes curriculum accessible, within the framework of UDL, we will not be addressing the needs of *all* students and nothing in our classrooms will change.

OUR JOURNEY

BCSC's journey to the adoption of UDL began in 2002 when the director of special education worked with a consultant from The Center on Education and Lifelong Learning at Indiana University to answer the following question: *How are decisions made concerning special education services*? This inquiry led to conversations with general and special educators throughout BCSC and culminated in the creation of an instructional service delivery plan. This plan focused on how to best help students eligible for special education have access to the general education curriculum and become proficient in BCSC's learning objectives. All teachers involved in the education of children with special needs were trained on this new plan. This shift prompted BCSC to apply for participation in a statewide project titled PATINS. The goal of this project was to "impact both the organizational capacities of local public schools and the professional capabilities of school staff in the delivery of assistive technology services and the implementation of Universal Design for Learning principles" (PATINS Project, 2009). BCSC's participation, though encouraged by BCSC's

Director of Special Education, was supported by the directors of elementary and secondary education. This was a deliberate choice by BCSC's leaders to ensure UDL would not be viewed as a special education initiative but as a system-wide initiative. An instructional rubric was designed to help teachers recognize their own level of implementation and to help building leaders identify strong leaders in the implementation (see Appendix B).

In addition to UDL, BCSC adopted two other structures to ensure that: (a) teachers are supported in their ability to teach in diverse classrooms and, (b) all students are provided with behavioral supports so they can be successful within the learning environment. Examples of how these strategies link to UDL are given below under "Our Impact on Learning." Instructional videos linking UDL to these strategies can be found at *http://www.bcsc.k12.in.us/page/346*.

The Instructional Consultation Teams (IC–Teams) process was identified as a method teachers could use to problem-solve issues related to curriculum and instruction (Gravois & Rosenfield, 2006). As implemented in BCSC, the IC–Team model is grounded in the principles of UDL to assist teachers in creating an instructional match for the student. This process dictates that when there is no match, no one is at fault; rather, a series of data collection steps needs to take place so the teacher, child, classroom environment and accessible technology needs can come together to create an appropriate match. A seventh grade student recently was experiencing significant behavior problems. This student with autism, who also is identified as high ability, continued to struggle in many of his high ability core courses. Following an examination of the data and possible function of his behavior, it was determined the current instructional strategies were not a match for this student. After utilizing a computer-based program, this student no longer exhibits the previous behaviors, and in fact, is successfully completing high school courses as a seventh grade student. Without the availability of this accessible technology, this student would have most likely ended up as a dropout.

To ensure BCSC was supporting the behavioral needs of all students, we also adopted Positive Behavior Instruction and Supports (PBIS) in 2004–5 as a core process. PBIS, as recognized in IDEA (2004), is a systematic way to develop and implement school-wide behavioral expectations and "achieve socially important behavior change" (Sugai ET al., 2000, p. 133). These expectations are taught to students using age appropriate and culturally appropriate lessons. When students understand how they are expected to behave within a specific environment (e.g., the classroom, the hallways, the lunchroom, or the stair wells), students are more likely to demonstrate those behaviors (Sugai, Horner, & Gresham, 2002). PBIS teams were established at each school and continue to meet monthly to investigate behavioral and academic data to pinpoint trends and issues. Using this information, the teams design and implement plans to support positive changes in student and staff behavior.

In 2008, BCSC received a grant to support a project director to lead the implementation of UDL. During the grant year, the principals and staff in each building worked with the project director to decide what workshops or presentations would best suit the needs of their teachers. While some schools were experienced in applying the principles of UDL, other schools were relatively new to applying the principles school-wide. The principals reported that this was an effective way for their staff to become more knowledgeable and comfortable with the application of UDL in their classrooms. The role of project director has become UDL Coordinator as BCSC demonstrates its specific focus on UDL and the necessity to continue training and support for its teachers.

TECHNOLOGY AT BCSC

To support our implementation of UDL, BCSC's technology infrastructure includes the ratio of one computer for every 2.7 students. Our Technology Division supports 750 classrooms of which 360 have wireless access. In addition, we have a variety of hardware spread across the corporation including but not limited to: interactive white boards, document cameras, flip cameras, digital microscopes, clickers (i.e., hand-held voting devices) and iPads.

Currently, students at the secondary level are participating in a 1 to 1 pilot that encourages students to bring their own device or utilize BCSC-owned devices. The majority of student-owned devices include smart phones, tablets, and iTouches with the only requirement being that the device can reach the Internet and that students log on to the Internet through the district servers. Of those participating students, 748 bring their own devices while 380 BCSC-owned devices support the other students involved in the pilot. The creation of this pilot was fully guided by UDL. Ap-

pendix C includes the rubrics used by the 1 to 1 design teams. Appendix D includes the application teachers completed to participate in this pilot.

While BCSC is dedicated to accessible technology, we are committed to the use of UDL to help define how technology should be used. For example, our corporation is beginning to use an interactive information system called My Big Campus. Designed to look and operate like Facebook, this filtered, safe, on-line environment allows teachers to share information with other professionals and post assignments, exams (that open and close for specific students at specific times), and post items for discussion. One social studies teacher held a discussion during the South Carolina Republican debate where students responded to questions and posted their own thoughts and questions about the debate. How does this fit with UDL? The teacher was aware that some students were not participating during in-class discussions and were not earning participation points. This option provided those students a way to earn those points, demonstrating the principle of expression. Next, the teacher knew that some students were unfamiliar with the primary process. Students who were previously uncomfortable asking questions about that process felt safe using this monitored, on-line environment. In addition, the teacher linked them to other on-line resources about the primary process. This demonstrated the principle of representation. So, instead of using technology to show a video during and after which students complete a worksheet, this teacher utilized technology to engage the students, represent supporting information, and gain information on his students' understanding of the primary process.

OUR IMPACT ON LEARNING

BCSC takes great care to ensure UDL is not viewed as "one more thing" or a "special education thing." UDL is our guiding instructional framework; thus, we work diligently to clearly connect various BCSC instructional, curricula and assessment efforts initiatives to UDL. If we cannot make those connections, we question the value of the initiative. Examples of how UDL and its use of accessible technology have had an impact on student outcomes include:

• Schools implement UDL to ensure students experience a variety of learning opportunities when learning Positive Behavior Instructional Support strategies. A video from one of our middle schools shows how the students learned appropriate dress for school (Northside Middle School, 2012).

• Instructional Consultation Team facilitators are provided instruction on how to help teachers recognize and embed UDL strategies in their lessons (BCSC, 2011).

• English, math, social studies and science textbook and resource adoption committees were guided by the principles, guidelines and checkpoints of UDL (see Appendix E for the science example). In our recent social studies adoption, BCSC chose to adopt a portfolio of digital resources versus a hardback textbook (Lord Nelson, Arthur, Jensen, & Van Horn, 2011).

• Senior projects, a requirement for graduation, are designed to provide students the opportunity to demonstrate their accumulation of knowledge and experiences through a variety of options (Columbus East High School, 2012). Students' use of technology have included self-made videos, digitized musical productions, presentations utilizing on-line resources, and Power Point presentations. This level of choice (principle of engagement) and breadth of presentation style (principle of expression) helps ensure an exceptional rate of 95 percent completion.

• Between 2009 and 2011, the number of students with special needs in grades 3–8 who have passed the math portion of ISTEP increased 12.8 percent.

• Between 2009 and 2011, the number of students with special needs in grades 3–8 who passed the English portion of ISTEP has increased 8.7 percent.

• Sixty-eight percent of BCSC's English Language Learner (ELL) students in Grades K–12 increased 12 or more scale points from their most recent prior test to spring 2011 on the LAS Links (an Indiana statewide assessment). Across the State, only 64 percent of this same group improved.

• BCSC met the Annual Yearly Performance (AYP) in both English and math for students with disabilities.

• BCSC met the Annual Yearly Performance (AYP) in both English and math for students with ELL.

• BCSC is 1 of 367 public school districts in the Nation honored by the College Board and was placed on the 2d Annual AP Honor Roll. Since 2009, BCSC has increased the number of students participating in AP from 256 to 467, while improving the percentage of students earning AP Exam scores of three or higher from 48 percent in 2009 to 52 percent in 2011. The framework of UDL and the effective use of accessible technology have created a learning environment where more and more

students are academically successful. This success is translating into higher rates of participation in AP courses and on the AP exams.

• BCSC 2011 ACT scores show that the percent of students demonstrating college readiness was higher than the national percentage of students demonstrating college readiness. This was true in all four sub scores of the ACT with 40 percent of BCSC seniors participating in the ACT.

Finally, BCSC's focus on UDL to benefit all students has been recognized by the Center for Applied Special Technology (Center for Applied Special Technology, 2009), The Council for Exceptional Children (Council for Exceptional Children, 2010), and published articles in juried educational journals (Lord Nelson, Arthur, Van Horn & Jensen, 2009; Lord Nelson, Van Horn, Jensen, Vogel & Garrity, 2012).

NEXT STEPS

Perhaps most importantly, UDL will be a key driver in the new teacher evaluation process that is currently under development in BCSC. In the new district classroom success rubric, UDL will be the framework for instruction. The Indiana Department of Education offered school districts the option of utilizing an existing teacher evaluation model or creating a model based on researched practices. A team of BCSC teachers, principals, and administrators are working together to create an effective framework for professional practice and evaluation which is grounded in the principles of UDL.

CONCLUSION

The application of UDL and the use of accessible technology to implement aspects of UDL take initial focus and time and will always involve creativity, but the rewards for the student and teacher are tremendous. Three aspects to bring this effort to scale in BCSC were essential:

1. The collaboration of the director of special education, the director of elementary education and the director of secondary education who have conveyed the importance of UDL as the framework of instruction throughout the district;

2. The hiring of a dynamic instructional expert with knowledge of accessible technology to coordinate the implementation of UDL throughout the district.

3. The identification of practicing experts, also knowledgeable about accessible technology, who have been willing to share their classroom practices of UDL with other teachers throughout the district.

BCSC's adoption of UDL has taken time, commitment, and persistence in an age of constant educational change. We believe that UDL and the use of accessible technology has placed us on a pathway to improved services to all of our students. With its well-defined and flexible framework, UDL has provided the necessary structure within which BCSC's teachers can plan and feel confident in their profession.

————

BARTHOLOMEW CONSOLIDATED SCHOOL CORPORATION OVERVIEW

Good afternoon Chairman Harkin, Ranking Member Enzi and members of the committee. Thank you for inviting me to speak about Bartholomew Consolidated School Corporation and how we work to achieve the best possible outcomes for every student. I would like to share how we use Universal Design for Learning as our framework for curriculum and instruction and how that helps our teachers effectively use accessible technology.

BCSC, as we refer to Bartholomew Consolidated School Corporation, is a district of 12,500 students. We are a rural school district about 50 miles south of Indianapolis and 90 miles west of Cincinnati. We have 18 schools serving our students. Of those students, 45 percent are eligible for free or reduced lunch, 16 percent are students of color, 14 percent receive special education services, and 11 percent are English language learners.

We have a diverse student population and work to address their learning needs. Therefore, in 2008 we made a purposeful decision to use Universal Design for Learning (UDL) across all our programs as the framework to design all instruction and curriculum in our district. We find this framework has helped us uphold our expectation that all learners will achieve to their highest level. Using UDL has advanced the educational outcomes that include:

• From 2009 and 2011,

  □ we had a 10.5 percent increase in the number of students with disabilities passing Indiana's statewide assessment;

☐ sixty-eight percent of our English Language Learners increased their scale scores on the statewide assessment which was a greater increase than the State average; And, we had a 7 percent increase of K–8 students receiving pass+, which is the State's highest recognition on the State testing in English Language Arts and math.

- In 2011,
  - we met Annual Yearly Progress targets for both English Language Arts and math with our special education population and English Language Learner population;
  - and BCSC was honored by the College Board and placed on the 2d Annual Advanced Placement Honor Roll for increasing the number of students participating in AP and improving the percentage of underserved students earning AP Exam scores of three or higher; and

At this point, let me take a minute and tell you what universal design for learning means to our schools. Just as the American with Disabilities Act requires buildings be accessible to all who might enter, UDL serves as a framework to make learning environments accessible to all students. There are three overarching principles: engagement, representation, and action/expression. When used, these create an accessible learning environment.

Because our population is diverse, BCSC recognizes the need to create flexible learning environments which are standards-based and utilize accessible technology when appropriate to the lesson. We are fortunate to have access to technologies such as computers, Internet access, smart phones, tablets, and other devices; however, those technologies only come into use when they have been identified as connected to the instruction. Teachers utilize the framework of UDL as a decisionmaking tool to help them determine what strategies, accessible technologies, and methods they will use to help students achieve the goals of the lesson.

For example, a seventh grade student was recently experiencing significant behavior problems. This student with autism, who also is identified as high ability, continued to struggle in many of his high ability core courses. After investigation, it was determined the current instructional strategies were not a match for this student. Because we provided the student access to a computer-based program, this student no longer exhibits the previous behaviors. In fact, this student is successfully completing high school courses as a seventh grader. The availability of accessible technology has allowed this student to remain in school.

In another example, a social studies teacher held an on-line discussion during the recent South Carolina Republican debate. Our corporation uses an interactive information system called My Big Campus which looks like Facebook, but is a filtered, safe, on-line environment. In this class, students responded to questions and posted their own thoughts and questions about the debate. How does this fit with UDL and accessible technology? The teacher was aware that some students were not participating during in-class discussions and were not earning participation points. This option provided those students a way to earn those points, demonstrating the principle of expression. Next, the teacher knew that some students were unfamiliar with the primary process. Students who were previously uncomfortable asking questions about that process felt safe using this monitored, on-line environment. In addition, the teacher linked them to other on-line resources about the primary process. This teacher utilized technology to engage the students, represent supporting information, and gain information on his students' understanding of the primary process.

BCSC's adoption of UDL and the use of accessible technologies has taken time, commitment, and persistence in an age of constant educational change. We believe that UDL and the use of accessible technology has placed us on a pathway to improved services to all of our students. With its well defined and flexible framework, UDL has provided the necessary structure within which BCSC's teachers can plan and feel confident in their profession.

Thank you for inviting me to share information about how BCSC uses UDL to choose how to best use our accessible technology and my staff and I are at your service if there is any way we may be of help.

REFERENCES

Bartholomew Consolidated School Corporation. (2012). *Select a school.* Available from the Bartholomew Consolidated School Corporation Web site: *http://www.bcsc.k12.in.us*.

Bartholomew Consolidated School Corporation (2012). *UDL videos from BCSC: UDL and instructional consultation teams (ICT) at BCSC*. Retrieved from the Bar-

tholomew Consolidated School Corporation Web site: *http://www.bcsc.k12.in.us/ page/346*.

Bouck, E.C., Courtad, C.A., Heutsche, A., Okolo, C.M., & Englert, C.S. (2009). The virtual history museum: A universally designed approach to social studies instruction. *Teaching Exceptional Children*, 42, 2 PP. 14–20.

Center for Applied Special Technology. (Producer). (2010). *UDL unplugged: The role of technology in UDL*. Available from the Center for Applied Special Technology Web site: *http://www.udlcenter.org/resource_library/videos/udlcenter/meet authors#video1*.

Center for Applied Special Technology. (Producer). (2009). *A district implements UDL*. Available from the Center for Applied Special Technology Web site: *http://udlspotlight.wordpress.com/category/bcsc-district-udl-initiative/*.

Center on Teaching and Learning (2005). *A world class community learning system*. Retrieved from Bartholomew Consolidated School Corporation Web site: *http://c2.bcsc.schoolwires.net/cms/lib/IN01000842/Centricity/Domain/1/A%20World% 20Class%20Community%20Learning%20System.pdf*.

Columbus East High School. (2012). *What is senior project?* Retrieved from Bartholomew Consolidated School Corporation Web site: *http://www.bcsc.k12.in.us/ site/Default.aspx?PageID=1240*.

Council for Exceptional Children. (April, 2011). *AARA in action: Universal Design for Learning expanded in Indiana school district with stimulus funding*. Federal Outlook for Exceptional Children. Retrieved from the Council for Exceptional Children Web site: *http://issuu.com/ellipse1/docs/230249_cec_foec_fy2012? mode=embed&layout=http%3A%2F%2Fskin.issuu.com%2Fv%2Flight%2Flayout .xml&showFlipBtn=true*.

Doyle, M.B. & Giangreco, M.F. (2009) Making presentation software accessible to high school students with intellectual disabilities. *Teaching Exceptional Children, 41,* 3, PP. 24–31.

Gravois, T.A., and Rosenfield, S.A. (2006). Impact of instructional consultation teams on the disproportionate referral and placement of minority students in special education. *Remedial and Special Education, 27*, 1 January/February (PP. 42–52).

Hitchcock, C., Meyer, A., Rose, D., & Jackson, R. (2002). Providing new access to the general curriculum: Universal design for learning. *TEACHING Exceptional Children, 5*(2), 8–17.

Individuals with Disabilities Education Act of 2004, 20 U.S.C. §1414 (2004).

Nelson, L.L., Arthur, E., Jensen, W., & Van Horn, G. (April, 2011). Trading Textbooks for Technology: New Opportunities for Learning. *Kappan*, 92 (7), 46–50.

Northside Middle School. (2012). *What does PBIS look like at Northside?* Retrieved from the Bartholomew Consolidated School Corporation Web site: *http:// www.bcsc.k12.in.us//site/Default.aspx?PageID=9732*.

Lord Nelson, L., Van Horn, G., Jensen, W., Vogel, J., & Garrity, K. (2012). *Building School Capacity around the Implementation of Universal Design for Learning: Using a Rubric to Guide and Investigate Practice*. Manuscript submitted for publication.

Meo, G. (2008). Curriculum planning for all learners: Applying universal design for learning (UDL) to a high school reading comprehension program. *Preventing School Failure, 52,* 2 (PP. 21–30).

Indiana Department of Education. (2012). *Demographic data*. Retrieved from the Compass site of the Indiana Department of Education: *http://compass.doe.in.gov/ Dashboard.aspx?view=CORP&val=0365&desc=Bartholomew+Con+School+Corp*.

The New Tech Network. (2010). *Our model: What fuels our success*. Retrieved from New Tech Network Web site: *http://www.newtechnetwork.org/newtech_model*.

PATINS Project (2009). *Promoting achievement through technology and instruction for all students*. Retrieved from the PATINS Web site: *http://www.patinsproject .com/*.

Rose, D.H., & Dalton, B. (2006). Engaging the text: Brain research and the universal design of reading strategy supports. In D.H. Rose & A. Meyer (Eds.), A practical reader in universal design for learning (PP. 133–148). Cambridge, MA: Harvard Education Press.

Sugai, G., Horner, R.H., & Gresham, F. (2002). Behaviorally effective school environments. In M.R. Shinn, G. Stoner, & H.M. Walker (Eds.), Interventions for academic and behavior problems: Preventative and remedial approaches (PP. 315–50). Silver Springs, MD: National Association for School Psychologists.

Sugai, G., Horner, R.H., Dunlap, G., Hieneman, M., Lewis, T.J., Nelson, C.M., ET al. (2000). Applying positive behavioral support and functional assessment in schools. Journal of Positive Behavioral Interventions, 2, 131–43. ET al., 2000, p. 133.

A Description of UDL

Principles	Representation	Action and Expression	Engagement
Guidelines	1: Provide options for perception.	4: Provide options for physical action.	7: Provide options for recruiting interest.
Guidelines	2: Provide options for language, mathematical expression, and symbols.	5: Provide options for expression and communication.	8: Provide options for sustaining effort and persistence.
Guidelines	3: Provide options for comprehension.	6: Provide options for executive functions.	9: Provide options for self-regulation.

CAST graphic: ***http://www.udlcenter.org/sites/udlcenter.org/files/updateguidelines2__0.pdf***.

UDL calls for:

☐ Defining goals that provide appropriate challenges for all students, ensuring that the means is not a part of the goal.

☐ Using methods that are flexible and diverse enough to support and challenge all learners.

☐ Using materials that are flexible and varied and take advantage of the digital media, such as digitized text, multimedia software, video recorders, tape recorders, and the Internet.

☐ Using assessment techniques that are sufficiently flexible to provide ongoing, accurate information to inform instruction and determine student understanding and knowledge (Meo, 2008, p. 22).

UDL Rubric: A Portion

		Not Yet Evident	Emerging	Intermediate	Advanced
Individual Goals	Clarity of goals and evidence of different objectives for various learners.	No students are clear on the overall goal and all students are expected to have the same objectives.	Few students are clear on the overall goal for the lesson and their learning objectives.	Some students are clear on the overall goal for the lesson and their learning objectives.	Every student is clear on the overall goal for the lesson and their learning objectives.

UDL Principle	UDL Teaching Method	Not Yet Evident	Emerging	Intermediate	Advanced
Multiple means of representation.	Provide multiple examples.	Students are only given one example of skills needed to complete the assignment.	In preparation for a lesson, the teacher has few examples that identify skills and concepts needed to complete the assignment.	In preparation for a lesson, the teacher creates some examples to find and identify skills and concepts needed to complete the assignment.	In preparation for a lesson, the ***teacher and students*** create multiple examples of finding and identifying skills and concepts needed to complete the assignment.

UDL Principle	UDL Teaching Method	Not Yet Evident	Emerging	Intermediate	Advanced
Multiple means of representation.	Highlight critical features.	Teacher provides critical information for the lesson through only one modality.	Teacher provides critical information for the lesson through only two modalities.	The teacher provides critical information for the lesson through oral and visual presentation and highlights critical features in written and visual form, then monitors students to check their focus on important features of the lesson.	The teacher provides critical information for the lesson through oral and visual presentation and highlights critical features in written and visual form, then monitors students to check their focus on important features of the lesson. Additionally, by having texts available in digital format, the teacher or students could literally highlight critical features of the text while preparing the lesson assignments.

APPENDIX C

1:1 PILOT RUBRIC

SECTION I—One-to-One Observations: Classroom use of the technology
(used by teachers and administrators)

	Not evident	Emerging	Proficient	Advanced
1. UDL in action: seeing/hearing or hearing about examples of UDL.	There is no evidence of UDL being applied.	One or two of the principles are touched upon during the lesson.	The principles of UDL can be identified within the lesson.	The principles of UDL drive the presentation of the lesson.
2. Cramming: bringing computers into the classrooms but sustain current practices and pedagogies.	Computer use in class is limited to note taking and/or doing worksheets.	Computer use in class includes notetaking, reading articles and/or surfing the net.	Computer use in class is a companion to discussion groups.	Computer use in the classroom is clearly connected to 21st century skills (e.g., critical thinking, analysis and communication).
3. Access to on-line resources and system safety/integrity: access to on-line resources.	Teachers are denied access to on-line resources due to the school system's firewall.	Teachers can request access to on-line resources but can still be denied.	Teachers can request access to on-line resources and receive permission.	Teachers can access any on-line resource.

SECTION I—One-to-One Observations: Classroom use of the technology
(used by teachers and administrators)—Continued

	Not evident	Emerging	Proficient	Advanced
4. Teaching non-consumers*: engaging students who historically disconnected themselves from learning.	No strategies are used to engage the non-consumers.	Few strategies are used to engage the nonconsumers.	Occasional strategies are used to engage the nonconsumers.	There are clear and evident strategies to engage the non-consumers.
5. Going around and underneath: allowing for and encouraging innovation creates change.	Pure instructional focus on a standardized measurement.	Majority of instructional focus on standardized measurement.	Evidence of innovation and creativity while addressing standards.	Application of innovation and creativity while addressing standards.
6. Nuts and Bolts: learning when technology fails.	When technology fails the lesson is cancelled.	When technology fails, part of the lesson is taught.	When technology fails, the majority of the lesson is taught.	When technology fails, the entire lesson is taught in a different way.

*Non-consumers: For this observation sheet, non-consumers are students who are present in the classroom but who are not engaged.

APPENDIX D

1:1 PILOT APPLICATION

PERSONAL INFORMATION

1. Name
2. School

INSTRUCTIONAL FOCUS

Project abstract:

Please include the # of students, type(s) of device(s), # of devices, web-based applications, additional hardware, and/or other information that would support student learning.
☐ What are the essential questions you will address through this pilot? (FAQ)
☐ What are your professional driving questions (what will drive how you implement the devices)? (FAQ)

LEARNER FOCUS

Using the principles and guidelines of UDL to frame your description (see *www.cast.org*):
☐ Demonstrate how the use of the devices will enhance student learning.
☐ Demonstrate how the students will engage with and express higher order thinking.
☐ Demonstrate how the students will engage and express the habits of mind.
☐ Demonstrate the acquisition of 21st century skills by the students.
☐ How will you foster student ownership of learning?

DEPLOYMENT

4. How will you use Web applications to support the learning you expect to take place?
5. How will you foster a culture of responsibility? (FAQ)
6. Are you familiar with the devices you are proposing to use?
7. Does your device usage require the use of a separate server?
8. Are there any policy, rules, or regulations that will need to be addressed if your pilot is chosen? (FAQ) What will they be?
9. How will you measure your pilot? (consider student outcomes, rate of device use, how teacher friendly is the use of the devices, is it easy for your pilot to replicate within your discipline and across disciplines?)

PROFESSIONAL DEVELOPMENT

1. Pilot participants are expected to share lessons created using the technology to be shared with other BCSC teachers. Please check if you acknowledge this.

2. Pilot participants are expected to be interviewed and possibly recorded (tape or video) for in-house trainings of other staff members. Please check if you acknowledge this.

3. Pilot participants are expected to participate in a professional learning community. Please check if you acknowledge this.

APPENDIX E

2012 BCSC Secondary Science Adoption Rubric—Technology

Weak	Emerging	Advanced
	In addition to the ''Weak'' criteria:	In addition to the ''Emerging'' criteria:
☐ Technology options do not align with performance standards and applications.	☐ Technology options do align with current performance standards and applications.	☐ Technology resource is fast, stable, reliable, and provides individual and shared storage space for staff and students.
☐ School network is not able to support computer and technology options.	☐ IT support is sufficient to support computer and network infrastructure.	☐ Company support provides robust support and is very responsive to issues as they arise.
☐ Staff and/or students cannot use collaboration through technology as part of regular classroom practice.	☐ Staff and students can regularly collaborate through technology.	☐ Resources would be heavily used by staff and students as a communication and collaboration tool (within and between schools). And can be widely used to support the teaching methodology and inter-school sharing.
☐ Technology is not aligned with UDL ..	☐ Technology is somewhat aligned with UDL.	☐ Technology is completely aligned with UDL.
☐ Technology does not allow for agility within the curriculum to take advantage of change & updates in research/discovery.	☐ Technology allows for some agility within the curriculum to take advantage of changes or updates in research and discovery.	☐ Technology supports an agile curriculum to take advantage of current research and discovery.
☐ Training is not provided for the technology.	☐ Initial training is provided for the use of technology.	☐ Extended training is provided for the use of technology.
☐ Materials cannot be accessed at home or by parents.	☐ Material can be accessed at home and by parents.	☐ Resources allow other digital and online tools to support student engagement and instruction.
☐ Technology resources have unreasonable cost to both the school and student.	☐ Technology resources are somewhat reasonable cost to both the school and the student.	☐ Technology resources have a reasonable cost to both the school and the student.

The CHAIRMAN. Thank you very much, Dr. Quick.
Mr. Turner, please proceed.

STATEMENT OF MARK TURNER, M.A., DIRECTOR, CENTER FOR ACCESSIBLE MEDIA, ACCESSIBLE TECHNOLOGY INITIATIVE, CALIFORNIA STATE UNIVERSITY, LONG BEACH, CA

Mr. TURNER. Chairman Harkin, thank you for the opportunity to discuss issues of accessibility in the post-secondary environment. My testimony will focus on some of the issues faced by post-secondary institutions as we work to ensure that technology used to deliver educational programs and services are usable by all students, staff, faculty, and members of the public, irrespective of disability status.

As the largest and most diverse 4-year public university system in the country, the CSU serves 427,000 students across 23 campuses. The CSU has a long-standing commitment to ensuring that our programs and services are usable by everyone, and we currently serve more than 10,000 students with a variety of disabilities.

Over the past 20 years, technology usage in post-secondary has grown exponentially. Technology is now used to deliver online, hybrid, and face-to-face courses, using learning management systems, offer interactive digital textbooks, rich multimedia, and many other technologies.

While these technologies have the potential to enhance teaching and learning, they must be usable by everyone. Unfortunately, we have found that many technology vendors do not adequately support accessibility at this time. Many products manifest serious accessibility barriers for individuals with disabilities. Accessibility documentation is often unavailable or insufficient. Vendors are frequently unfamiliar with accessibility standards, and some vendors simply do not prioritize accessibility, citing financial, technical, or logistical hurdles.

Postsecondary institutions are experiencing significant challenges with these inaccessible technology products. For example, when instructional videos do not include closed captions, schools must bear the costs of providing captioning. If the vendor had incorporated closed captions at time of design, it would have likely cost them one time less than $100. However, if 1,000 institutions across the country must all individually accommodate that video, the cost to the Nation could exceed $100,000. This is not sustainable.

Under the leadership of Chancellor Reed, the CSU established the Accessible Technology Initiative, or ATI, as a comprehensive, systemwide effort to identify and remove existing accessibility barriers, and to avoid introducing new barriers when adopting technology products.

The ATI is founded on a strong technology accessibility policy, which requires an annual assessment that emphasizes continuous quality improvement. This progressive policy is vital to driving institutional change. The policy implementation involves administrators, staff, and faculty from the Chancellor's office and all 23 of our campuses.

Many ATI projects deliver shared services designed to reduce costs and leverage expertise across our system. So, for example, by collectively licensing a Web accessibility evaluation tool and deploying testing criteria and methods developed by CSU Web accessibility experts, we have saved $300,000 and supported a consistent, high quality implementation across CSU.

ATI projects also leverage our size to promote vendor improvements to project accessibility. For example, during a systemwide request for proposal for learning management systems, we established accessibility requirements, validated vendor accessibility claims, and selected only products that met our accessibility requirements.

When one of the most widely deployed learning management systems was not selected because they did not meet our requirements, the vendor subsequently undertook a major accessibility remediation process that now benefits all students and post-secondary institutions across the country. This culminated in an award by the National Federation of the Blind for the now robust non-visual support for individuals with disabilities.

The ATI also provides high quality services to work around existing accessibility gaps. For example, the CSU Center for Accessi-

bility Media allows CSU and University of California campuses to efficiently share specialized curriculum materials that have been produced for students with a variety of print disabilities. This project reduces redundant efforts and costs, and speeds delivery of these materials to students.

Postsecondary institutions are strongly committed to equal access for persons with disabilities, and removing technology accessibility barriers. There are, however, several areas for which we seek your assistance.

First, we suggest, echoing earlier testimony, that Federal entities strengthen their section 508 procedures by requiring that vendors validate their project accessibility documentation, that Federal agencies conduct testing for high impact implementation, and that share test results with one another. These changes we feel would reduce redundant efforts and costs, and drive vendor improvement to project accessibility support.

We also asked that the Department of Justice send a dear colleague letter to the 100 largest technology vendors emphasizing the importance of producing products that are accessible to everyone.

Finally, the CSU supports the recommendations of the recently released AIM Commission Report. In particular, we support a review of the Chaffee Amendment to the Copyright Act that would extend the definition of individuals eligible for specialized formats. This would reduce costs by providing campuses greater access to these materials for students with print disabilities.

The CSU applauds the committee's devotion to ensuring equal access to a quality education for all Americans, and appreciate your interest in technology as a promising tool in meeting that goal. We welcome the opportunity to be a resource to you as you continue to explore ways to ensure access and success in higher education.

Thank you.

[The prepared statement of Mr. Turner follows:]

PREPARED STATEMENT OF MARK TURNER, M.A.

Chairman Harkin, Ranking Member Enzi, and members of the committee, thank you for the opportunity to discuss issues of technology accessibility in the post-secondary environment. I began working in the post-secondary disability services environment nearly 2 decades ago and have proudly served in a variety of clinical and technical roles in both 2-year and 4-year public education institutions. My testimony today will focus on the issues faced by post-secondary institutions as they work to ensure that technology used to deliver educational programs and services are usable by all students, staff, faculty, and members of the public—irrespective of disability status.

THE CALIFORNIA STATE UNIVERSITY

Commitment to Excellence

The CSU is the largest and most diverse 4-year public university system in the country, with 23 campuses, approximately 427,000 students and 44,000 faculty and staff. The CSU's mission is to provide high-quality, accessible public education to meet the ever changing needs of the people of California. The CSU provides more than one-half of all undergraduate degrees granted to Latino, African-American, and Native American students in California. Since the system's creation in 1961, it has awarded in excess of 2.5 million degrees. We currently award approximately 90,000 degrees each year.

Commitment to Equal Opportunity

The CSU has a strong, longstanding commitment to ensuring that all members of the CSU community and the public at large are provided an equal opportunity

to participate in and receive the benefits of university programs and services. This commitment is demonstrated through the following actions:

• **1977:** CSU campuses prepared self-evaluations that identified steps needed to ensure students with disabilities had equal access to educational opportunities.

• **1980:** CSU developed a policy statement entitled *Policy for the Provision of Services to Students with Disabilities* which formalized the objectives of the disabled students program (increasing enrollment of students with disabilities and facilitating their access to educational programs), established common definitions of disabilities, listed support services to be offered, and served as the basis from which campus Disability Services programs were developed. The policy statement also clearly codified the CSU commitment to equal access:

> *". . . this policy is intended to ensure that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in the services, programs, or activities of the CSU and its campuses."*

• **1980:** CSU established the *Systemwide Advisory Committee on Services to Students with Disabilities*. This cross-disciplinary committee, comprised of administrators, faculty, staff, and students was charged with reviewing, evaluating, and recommending systemwide educational and administrative policies that address the needs of students with disabilities.

• **1990:** Pursuant to the Americans with Disabilities Act (ADA), CSU campuses appointed ADA coordinators and developed self-evaluation and transition plans to identify and remediate accessibility issues associated with additional areas including employment, construction, transportation, and telecommunication.

• **1990s–Present:** In the ensuing years, the CSU has affirmed and strengthened its commitment to accessibility. The policy statement has been reviewed and revised several times to reflect changes in the composition of students served by Disability Services offices, newly identified accessibility barriers, changes to available support services, and changes to the legislative or regulatory environment. In addition, the recently renamed *Services for Students with Disabilities Advisory Committee* remains an active and vital component of CSU's accessibility strategy.

The CSU Disability Community

The CSU community of students, staff, and faculty reflects the rich diversity of California's population including persons with disabilities. During the Fall 2010 term, 10,775 students were registered to receive services from a campus Disability Services office.[1] In other words, the number of students with disabilities served by the CSU is equivalent to a mid-sized campus by itself. These students manifest disabilities across a variety of domains:

• Visual
• Hearing
• Communication
• Mobility
• Psychological/Psychiatric
• Learning Disabilities
• Attention Deficit Hyperactivity Disorder
• Acquired Brain Injury
• Autism Spectrum
• Other Functional Limitations
• Temporary

The accessibility issues encountered by students with disabilities in a post-secondary environment are the result of a combination of factors including (1) the student's specific functional impairments, (2) the specific instructional and administrative programs/services with which they interact, and (3) the level and nature of accessibility support provided by those programs/services. For this reason, the campus Disability Services program meets with each CSU student to establish an individualized plan of services that constitute "reasonable accommodations." These services may include auxiliary aids and services which involve adjustments to the manner in which students participate in standard academic activities (e.g., interpreters, note-takers, alternate formats of print materials, adaptive technology) or, as appropriate, academic adjustments which involve modifications to the activities themselves (e.g., changes in the length of time permitted to complete a course requirement).

These services are essential for the success of students with disabilities. By addressing accessibility gaps in university programs/services, post-secondary institu-

---

[1] *http://www.calstate.edu/sas/documents/Fall2010Profile.xls.*

tions ensure students have the opportunity to fully utilize curricular materials, demonstrate a mastery of their curriculum, and develop the skills necessary for future employment. This is vital at a time when persons with disabilities have a far higher unemployment rate (13.5 percent vs. 8.9 percent) and far lower labor participation rate (20.7 percent vs. 69.6 percent) than those without disabilities.[2]

Current Challenges

Technology is rapidly and fundamentally changing the educational landscape.

Over the past 20 years, technology has become a tightly integrated and ubiquitous component in the lives of Americans. The widespread adoption of mobile devices (e.g., smartphones, ebook readers, portable media players), the enormous growth in web-based services and information, and the widespread use of IT hardware (e.g., kiosks, voice response phone systems) are fundamentally transforming the ways in which individuals connect with one-another, companies, government, and educational institutions.

Post-Secondary institutions have actively participated in this trend by incorporating technology products and services into instructional and administrative services. Campuses now commonly utilize web-based Learning Management Systems to deliver curricular content and activities, Lecture Capture systems to record and distribute audio/video recordings of class activities, audience response systems (aka "Clickers") to provide real-time, interactive evaluations and feedback, and digital textbooks which provide features (e.g., full-text searching, note taking) and supplemental materials (audio/video content, individualized assessment exercises) that are unavailable with conventional print-based books.

Educational technology adoptions may improve or exacerbate accessibility issues for both students and institutions.

Whether educational technology products help or hinder accessibility efforts depends largely on the extent to which the vendor incorporated accessibility into the product design and implementation. To exemplify this, consider the use of digital textbooks. Given that print-based textbooks are intrinsically inaccessible to those with print disabilities (e.g., blindness, partial sight, learning disabilities), university disability services programs often accommodate these students by producing accessible electronic versions of textbooks. While this process often delays the delivery of the book to students with disabilities and causes significant institutional expense, it does allow users with disabilities to then use assistive technology to convey the book content in an accessible format (e.g., Braille, large-print). Now let's compare the outcomes of three different scenarios:

• Vendor A produces both print books and accessible digital books. Thus students with disabilities simply purchase the accessible digital book—eliminating time-consuming and expensive accommodations. **This vendor's practices help both students and universities by eliminating an accessibility barrier.**

• Vendor B produces both print books and inaccessible digital books. Students with disabilities must request accommodations and wait for the institution to produce an accessible electronic version. **This vendor's practices harm both students and universities by requiring time-consuming, expensive accommodations.**

• Vendor C produces only digital books that are inaccessible. Students cannot use the digital book and universities cannot create an accessible digital book because there is no print version that may be converted into an accessible book. **This vendor's practices harm both students and institutions by denying students with disabilities the ability to access the book content.**

Accessibility Support for Many Educational Technology Products Remains Inadequate

Despite the development of accessibility standards for IT products[3] and an array of Federal and State legislation[4] requiring that accessibility status be a major factor in the adoption of IT products, accessibility support by most educational technology vendors remains weak. Specifically:

• **Awareness of accessibility requirements or technical standards among educational technology vendors is uneven.** While larger vendors often demonstrate some familiarity with the needs of users with disabilities, many small to

---

[2] *http://www.bls.gov/news.release/empsit.t06.htm*.

[3] See Section 508 Standards (*http://www.section508.gov*) and W3C Web Content Accessibility Guidelines (*http://www.w3.org/TR/WCAG20/*).

[4] See California's Senate Bill 105 (*http://info.sen.ca.gov/pub/01-02/bill/sen/sb_0101-0150/sb-105_bill_20020929_chaptered.pdf*).

mid-sized vendors have little or no knowledge in this area. Vendors cannot design accessible products if they are unfamiliar with technical standards and will not do so if they do not understand the accessibility requirements of educational institutions.

• **The quality of accessibility documentation available from educational technology vendors, while improving, remains poor—making it difficult for universities to accurately gauge the nature of the product's accessibility support (e.g., features, gaps, workarounds, remediation plans/timelines).** Many vendors do not offer any form of accessibility documentation including Voluntary Product Accessibility Templates (VPATs). Even among vendors that provide accessibility documentation, the information provided is often incomplete, out-of-date, or inaccurate.

• **The overall level of commitment to technology accessibility by educational technology vendors is also uneven.** Many vendors cite limited financial resources as an impediment to developing accessible products. Others suggest that there is limited customer demand for accessibility features. Even among vendors who have initiated earnest efforts to incorporate (or expand) accessibility support for their products, there is a strong tendency toward "low-hanging fruit" or "baseline compliance" that often leaves significant accessibility barriers.

Accommodations associated with educational technology are a growing strain for post-secondary institutions. Historically, disability services programs focused much of their efforts on providing accommodations associated with physical barriers while they worked to remediate those physical barriers. As educational technology adoptions have expanded, more instructional resources are being focused on accommodations associated with technology barriers. This is problematic for several reasons:

• **It is not always feasible to provide accommodations for inaccessible educational technology products.** Some technology products deliver information that cannot be conveyed via accommodations in a manner that is practicable or which provides equally effective access. For example, a post-secondary institution adopts a Web application which allows library patrons to request and download electronic reserves materials. However, the kiosk is not accessible to screen reader users. While onsite users may request the assistance of sighted library staff to download the materials, offsite users with disabilities are unable to use this service since library staff cannot travel offsite.

• **Accommodations associated with inaccessible technology often involve significant complexity and costs—particularly if the product is inaccessible to a wide range of users with disabilities.** For example, software applications that are unusable by those who are blind, those with limited vision, and those with limited dexterity will necessitate significant planning and coordination by the university since each group will likely require different accommodations. In addition, a larger number of disability groups impacted by inaccessible technology will likely increase the frequency with which accommodations are required—driving up the costs associated with providing accommodations.

• Whereas most post-secondary institutions control their physical infrastructure and thus have the authority to remediate physical barriers, **postsecondary institutions have few remedies to compel technology vendors to remediate inaccessible technology products**. While campuses may elect to discontinue the use of inaccessible products, this is infrequently used as the process of switching to alternative products can be disruptive or expensive.

THE CSU ACCESSIBLE TECHNOLOGY INITIATIVE (ATI)

Inception and Early Activities

Following passage of California Senate bill 105 in 2002[5] and in recognition of the challenges regarding technology accessibility outlined above, the CSU began developing a comprehensive strategy to effectively tackle this issue. In 2004, CSU Chancellor Charles B. Reed released Executive Order 926 which strongly affirmed CSU's commitment to ensuring equal access for persons with disabilities. EO 926 also recognized that accessibility was an institution-wide responsibility that must be managed by all campus units—not just disability services programs. Finally, EO 926 clearly outlined responsibilities of critical units and stakeholder groups and tasked campus executives (Presidents, Provosts) with designating a campus leader to co-

---

[5] *http://www.leginfo.ca.gov/pub/01–02/bill/sen/sb_0101-0150/sb_105_bill_20020929_ chaptered.html.*

ordinate ATI activities and build a cross-disciplinary team of administrators, staff, and faculty to implement the ATI.

KEY ACCOMPLISHMENTS

Building Robust Capacity

While the release of a policy statement such as EO 926 was critical to catalyzing substantive actions on campuses, it was also clear that the CSU would need to build sufficient capacity (staff, funds, technical guidance, logistical support) to operate an effective systemwide initiative on such a large scale. Several key accomplishments that helped to build capacity during this phase included:

• Hiring dedicated ATI staffing to provide central leadership;
• Releasing guidance (Coded Memorandum AA–2007–04 [6]) which outlined specific goals and success indicators to be addressed across three "Priority Areas" (Instructional Materials, Web, and Procurement and which required campuses to establish implementation plans and prepare annual reports to track progress;
• Releasing templates to assist campuses with developing their implementation plans and annual reports;
• Establishing "Communities of Practices" comprised of campus ATI leaders ("Executive Sponsors Steering Committee") and implementers across each of the three "priority areas" to coordinate activities, share promising strategies, and identify areas requiring additional support;
• Launching a central Professional Development Web site [7] to repose training/awareness resources;
• Launching a central Web repository to aggregate all ATI documentation and activities;
• Reviewing campus implementation plans and annual reports and providing responsive feedback;
• Conducting comprehensive section 508 training [8] for campus procurement staff; and
• Establishing a systemwide Web repository to store and share product accessibility documentation across the 23 CSU campuses.[9]

INFLUENCING PRODUCT ACCESSIBILITY

In 2007, the ATI had the opportunity to strongly influence the accessibility of several widely deployed educational technology products in a manner that benefited students and post-secondary institutions across the country.

• ATI staff evaluated Apple's iTunes U® product, which was being offered to post-secondary institutions across the Nation, and determined that the product manifested serious accessibility barriers that would prevent most persons with disabilities from being able to use this product. In coordination with executive leadership at the Office of the Chancellor, ATI released a policy statement indicating that CSU campuses should not adopt iTunes U® in a production (student-facing) environment. The ATI then began coordinating with Apple to review the identified accessibility barriers, establish appropriate milestones and a timeline for remediating the product, evaluate updated product versions to gauge progress, and share updates with campuses. By the end of the agreed upon timeline, Apple had addressed all identified "High Priority" accessibility barriers. As a result, the ATI issued guidance allowing CSU campuses to begin using iTunes U®.
• ATI staff participated in a systemwide Request for Proposal from vendors to provide Learning Management Systems (LMS) for CSU campuses. Learning Management Systems are used pervasively to deliver instruction where both faculty and student interact, faculty provide course assignments, and students turn in assignments. Accessibility problems with the technology would thus be a "high-impact, high-priority" issue for the CSU. The ATI was involved throughout the RFP process to ensure that accessibility was a core performance requirement and that this performance was verified. At the time of the RFP, Blackboard® was already the most widely deployed LMS in the CSU system. However, during accessibility testing, the Blackboard® system manifested significant accessibility barriers for students with disabilities and thus failed to meet minimum accessibility standards. As a result, Blackboard® was not an awardee for this RFP—a result which the company later acknowledged served as a "wakeup call". Subsequent to that RFP process, Black-

---

[6] *http://www.calstate.edu/AcadAff/codedmemos/AA-2007-04.pdf.*
[7] *http://teachingcommons.cdl.edu/access/.*
[8] *http://teachingcommons.cdl.edu/access/tech/508ProcurementTraining.shtml.*
[9] *https://diva.sfsu.edu/help/vpat.*

board® undertook a major accessibility review and remediation process for their product, culminating in an award by the National Federation of the Blind for its robust support for persons who are blind.

REVIEWING LESSONS LEARNED, OPTIMIZING OUR LEADERSHIP STRATEGY

It became apparent that there was a gap between the ideal vision of full accessibility and the capacity of campuses to deliver that vision. The ATI therefore conducted an analysis to determine areas where a shift in approach would improve or accelerate progress. This resulted in a number of important changes.

• **The most fundamental shift has been to ensure that campuses play a larger and more active role in shaping ATI priorities and driving system-wide projects.** Underlying this shift is the belief that the ATI office most constructively serves as a facilitator rather than as a policeman/auditor of progress. This shift has been achieved by leveraging our existing governance structures:

- The newly formed ATI Leadership Council provides guidance on the selection and prioritization of ATI projects;
- The Executive Sponsors Steering Committee provides feedback regarding the scoping and implementation of projects and discusses critical, institutional accessibility topics; and
- The three Communities of Practice (Instructional Materials, Web, and Procurement) discuss institutional strategies (policies, business processes) promising tools, and emerging accessibility issues.

• **The ATI shifted its approach from the use of systemwide deadlines to a focus on continuous process improvement.** This new approach, which is based on Capability Maturity Model Integration,[10] emphasizes that campuses continuously improve their capabilities to reliably, promptly, and effectively meet the accessibility needs of their students, staff, and faculty. This approach encourages campuses to assess their current capabilities and priorities to best determine where institutional efforts should be directed and then tailor their accessibility implementation to the specific needs of their campus community.

• **ATI accessibility requirements for procurement were revised to focus on technology products with the highest impact, rather than those within specific product categories or whose purchase met specific, prescriptive thresholds (e.g., dollar limits).** This shift encourages campuses to focus resources on those products for which accessibility limitations would pose the greatest barrier to persons with disabilities. In addition, it emphasizes that the accessibility status of high-impact products which are not subject to traditional procurement procedures (e.g., free applications or services such as Google Apps for Education®) should still be considered.

• **The ATI significantly expanded and improved gathering and sharing of data derived from campus annual reports.** Improvements include use of a web-based reporting application to streamline submissions, greater standardization of goals, success indicators, and status levels, and greater consistency in reporting structure across the three priority areas. These changes make it easier to gauge campus progress relative to the system as a whole, more easily discern areas of weakness/strength, and more easily select projects which targets areas of weakness. The CSU now has a reliable, replicable evaluation process that allows campuses to (1) review evidence-based management processes to evaluate campus ATI process and (2) use the new progress status level measurement system to assess ATI implementation progress.

DELIVERING SOLUTIONS

The CSU is committed to leveraging our size to target critical institutional goals including achieving cost efficiencies—whether through coordinated procurement activities or the operation of shared services—and working with vendors to improve the accessibility level of products used by the CSU system and other post-secondary institutions throughout the country. Several examples of how we are delivering effective solutions are provided below.

CENTER FOR ACCESSIBLE MEDIA (CAM)

Each of the 23 CSU campuses provides alternate formats of print materials for students with print disabilities (e.g., blindness, partial sight, learning disabilities) registered at that campus. Beginning in the early 2000s, utilization of alternate media services began to grow such that significant resources were being expended

---

[10] CMMI Overview (*http://www.sei.cmu.edu/cmmi/*).

to produce these materials. Thus in 2004, the CSU Center for Accessible Media (CAM)[11] was launched to provide a central web-based clearinghouse for all campuses to list, locate, and share curricular materials that have already been converted for use by students with print impairments. CAM currently lists 21,000 titles and facilitated 1,500 file exchanges during the 2011 calendar year. **By reducing or eliminating redundant efforts to produce these specialized materials, CAM produces hundreds of thousands of dollars in savings annually and improves time-to-delivery for students.** Many of the University of California campuses currently contract with the CSU for access to CAM, allowing institutions and students from both systems to benefit from the agreement.

AUTOMATIC SYNC CAPTIONING SERVICES CONTRACT

All 23 CSU campuses work to ensure that audio/video content is provided in a manner that is accessible to persons with disabilities including providing transcripts for audio files and captions for video files. Campuses historically contracted for captioning/transcription services independently. As a result, there was little consistency regarding which vendors were used or the rates they charged. In 2008, the ATI coordinated a systemwide RFP for captioning/transcription services. The primary goal of the project was to leverage the volume of transcription/captioning occurring across the system to secure volume discounts for all participating campuses. Automatic Sync Technologies, the winning vendor, provided CSU users a customized Web portal to their CaptionSync® service. In order to achieve the desired cost savings, the ATI pre-purchases 6 month blocks of anticipated service usage for the entire system and then bills campuses back for actual usage at the end of each block. During the first 2½ years of this contract, the CSU has yielded savings of nearly **$90,000**. Service usage has increased each year since contract inception and satisfaction rates have been consistently high.

PROFESSIONAL DEVELOPMENT WEB SITE

A critical component of campus ATI implementations is the effective use of training and awareness materials that build campus capacity to effectively address technology accessibility issues. Given that all CSU campuses share this goal, the ATI launched the ATI Professional Development Web site[12] to serve as a central web-based repository for materials developed by ATI staff, CSU campuses, and external entities with expertise in technology accessibility issues. **Materials from this site are extensively used by CSU campuses and have been adopted by numerous post-secondary and government agencies.**

ETEXTBOOK ACCESSIBILITY PROJECT

eTextbooks are a rapidly growing segment of the post-secondary textbook market with a majority of the most commonly adopted post-secondary textbooks now available in electronic format. eTextbooks are being heavily marketed to post-secondary institutions and students both for the expanded range of features they offer and potentially significant cost savings vs. print-based books. The ATI eTextbook Accessibility project[13] is committed to supporting campuses in making informed adoption decisions regarding eTextbooks. To that end, the ATI recently released several checklist documents that campuses may use to gather consistent, standardize eTextbook product information. These documents were developed in close collaboration with CSU campuses and higher education publishers/distributors. The ATI will centrally aggregate these documents along with other relevant product accessibility information in order to reduce redundant efforts to gather this information. Moving forward, the eTextbook Accessibility project is currently developing a standardized template for conducting eTextbook accessibility evaluations that will facilitate comparing accessibility support across various eTextbook platforms.

GOOGLE APPS FOR EDUCATION PROJECT

The CSU continues to leverage its size to advocate for improved accessibility support in widely deployed educational technology products. In 2010, the Google Apps for Education® application suite was being considered for adoption by some CSU campuses; however the accessibility of the suite was questionable and needed fur-

---

[11] Center for Accessible Media (*http://cam.calstate.edu*).

[12] ATI Professional Development site (*http://teachingcommons.cdl.edu/access/docs_multi/pdf_vid_tut/videos_only.shtml*).

[13] CSU ATI eTextbook Accessibility Project Briefing (*http://ati.calstate.edu/mod/book/view.php?id=315*).

ther review before campus adoption. The CSU assembled a group of campus experts from several of our campuses (CSU Channel Islands, CSU Fresno, CSU San Diego, CSU East Bay) as well as the Center for Usability and Accessibility in Design at CSU Long Beach. These experts then performed an accessibility evaluation of the product and released the CSU Google Apps Evaluation report [14] in 2011. This report described the accessibility gaps in the Google Apps for Education® product and provided campuses information regarding potential workarounds for those gaps. The evaluation team then met with Google to share the report. By leveraging the accessibility expertise in the system to conduct a single coordinated evaluation, the CSU avoided the costs associated with conducting individual campus-based evaluations and ensured that all campuses received consistent information. In addition, the report led Google to make substantial changes to their Google Apps for Education® applications which removed accessibility barriers for all users.

WEB ACCESSIBILITY EVALUATION AND IMPLEMENTATION PROJECT

The CSU systemwide Web presence encompasses millions of Web pages and numerous Web applications and is the basis for delivering many of our instructional and administrative programs and services. It is therefore crucial that the CSU establish a comprehensive Web accessibility evaluation process that allows campuses to gauge the accessibility of our Web presence in an efficient and effective manner. In support of this goal, the ATI established two key objectives:

• Institute a standardized set of automated and manual testing accessibility criteria for all CSU campuses that will result in more accessible content across the system and a more efficient workflow for users; and

• Provide a broad audience of CSU personnel access to a Web accessibility evaluation tool that will help them publish accessible content.

THE CSU ATI ACCESSIBILITY REQUIREMENTS

A systemwide work group composed of representatives from the Office of the Chancellor and several campuses (CSU San Bernardino, CSU San Diego, CSU Channel Islands, Cal Poly San Luis Obispo) worked together to create a standardized set of accessibility requirements that integrate both automated and manual evaluation of Web page accessibility and associated procedures for completing the evaluation. The Universal Design Center at Cal State University Northridge is providing support to the entire system by managing the requirements as they are fine-tuned and providing training and support services to all campuses so that the CSU ATI Accessibility Requirements are successfully and effectively implemented at all CSU campuses. This project is delivering the following benefits:

• Increasing the accessibility of Web content and Web applications by identifying barriers so that they may be removed;

• Increasing Web accessibility at the time Web content is published by providing easy to use accessibility checkpoints and remediation resources;

• Increasing the accessibility of web-based products purchased by the CSU by providing standardized Web accessibility evaluation criteria that 23 campuses may use when evaluating Web products; and

• Providing cost savings to the system in personnel time and effort by offering these shared services.

The CSU Web accessibility evaluation process has also been shared with a nationwide post-secondary audience via an online webinar. Other post-secondary institutions have expressed great interest in learning more about this process.

THE CSU ATI WEB ACCESSIBILITY EVALUATION TOOL IMPLEMENTATION

The CSU ATI recognized that a reliable evaluation methodology that is adopted systemwide would produce great benefits for students as well as improve the cost-effectiveness of the evaluation process. The CSU wanted to avoid having 23 different evaluation methodologies and tools that would result in confusion, conflicts, and inefficient use of our limited resources. The CSU ATI, in cooperation with our campuses, selected the HiSoftware Compliance Sheriff Web® evaluation tool which resulted in a cost savings of $300,000 over 3 years. We also recognized that the tool needed improvements in order to extend its use to the wide variety of Web content personnel on CSU campuses and to help fulfill our goal to publish and purchase accessible content rather than remediate content after publication. The working relationship between the vendor and the CSU system brought together the necessary stakeholder groups to solve this problem. A group of students at Cal Poly Pomona

---

[14] CSU Google Apps Evaluation report (*http://ati.calstate.edu/mod/book/view.php?id=280*).

conducted a needs analysis involving input from several campuses which resulted in a scope of work that the vendor (HiSoftware) agreed to use to make product improvements. Upon completion of the improvements to the tool, Cal Poly San Luis Obispo will be testing the product and documenting the process to ensure that the campuses will be able to utilize the tool to its full potential. This project has provided a more effective implementation of this Web accessibility evaluation tool across the CSU system and has led to meaningful improvements to a Web accessibility evaluation tool that is used by post-secondary institutions across the country.

SURVEYGIZMO® PRODUCT ACCESSIBILITY PROJECT

SurveyGizmo® [15] is a popular survey tool used by many post-secondary institutions and corporations. The CSU ATI has been working with this company to improve the accessibility of the surveys created by the product. As a result of this work, the company has dramatically improved accessibility support over the past year—particularly for persons with visual impairments. The removal of these accessibility barriers benefits persons with disabilities across the country. In addition, SurveyGizmo® has significantly improved the quality of its accessibility documentation including the development of a Voluntary Product Accessibility Template. This will allow institutions across the country that are considering this product to clearly understand the extent and nature of accessibility support provided by the product. Moving forward, the CSU will be working with SurveyGizmo® to produce training materials that guide survey authors through the steps necessary to create accessible surveys.

ACCESSIBILITY AND OPEN EDUCATION RESOURCES

The CSU has been a leader in open education resources (OER)—free online teaching and learning materials—to improve the affordability and quality of learning though its project, called MERLOT (Multimedia Educational Resources for Learning and Online Teaching.[16] CSU–MERLOT has made accessibility of OER a high priority and is implementing programs to raise the visibility and implementation of accessibility requirement in OER.

• MERLOT has added easy to use tools for accessibility experts and users of OER to contribute structured information about the accessibility of the OER;
• MERLOT has cataloged almost 100 open textbooks that have links to accessibility evaluation reports, providing users an assessment of the accessibility features of the resource;
• MERLOT, in cooperation with the OpenCourseWare Consortium, will be building an online community and hosting an online webinar during International Open Education week (March 5–10, 2012);
• MERLOT's Content Builder authoring tool to create OER is designed to product accessible OER; and
• MERLOT will be facilitating higher education institutions and the OER community to grow the awareness of accessibility requirements and build accessibility into OER tools and services.

STANDARDIZING THE ACCESSIBILITY COMPONENTS OF THE PROCUREMENT PROCESS

By embedding accessibility into the procurement process, the CSU has the opportunity to minimize or avoid introducing accessibility barriers when purchasing technology products. The goal of this ATI project is to more tightly integrate accessibility into the procurement process by focusing on several key areas including process improvement, market research timing/techniques, and business procedures. A workgroup comprised of staff from the Office of the Chancellor and CSU campuses (CSU Sacramento, Cal Poly Pomona, San Francisco State, CSU Long Beach, CSU Channel Islands, CSU Fresno, and Cal Poly San Luis Obispo) are developing a number of important resources (e.g., standardized accessibility language for product solicitations and purchase contracts, Equally Effective Access Plan templates) and recommendations (e.g., adoption timelines, testing practices, and creating equally effectively access plans). Several of these resources are currently being piloted by campuses. This project is expected to significantly improve the ability of CSU campuses to ensure they are purchasing the most accessible, barrier-free EI&T products.

---

[15] SurveyGizmo (*http://www.surveygizmo.com/*).
[16] *http://www.merlot.org*.

CSU ACCESSIBLE TECHNOLOGY NETWORK (CSU ATN)

The CSU is developing the Accessible Technology Network (CSU ATN), a shared services network, that will serve the CSU and other higher education institutions. This network will leverage the campus accessibility experts across the system to provide shared services in several areas of accessibility including: (1) Accessible product review and testing; (2) Working with vendors to increase the accessibilities of products; (3) Exploring new and innovative solutions for accessible instructional materials; (4) Promoting accessibility awareness; and (5) Providing training.

The CSU ATN is currently in the planning and development phases. When completed, the project is expected to provide numerous benefits including:

• Reducing redundancy and lowering accessibility costs by reviewing and testing commonly used CSU products once;

• Improving the accessibility of technology products and accessibility documentation (e.g., Voluntary Product Accessibility Templates) for all educational institutions through vendor collaborations; and

• Providing CSU campuses and other post-secondary institutions with high quality training by leveraging campus experts in various disciplines.

CALIFORNIA DEPARTMENT OF REHABILITATION (DOR)/CSU INTERAGENCY AGREEMENT

In 2011, the California Department of Rehabilitation contracted with the CSU to deliver a comprehensive Web accessibility training curriculum for a group of Community Based Organizations (CBO's) that serve persons with disabilities across the State. Staff from the CSU Office of the Chancellor, CSU campuses (CSU Northridge, CSU Channel Islands, Cal Poly Pomona, and CSU Long Beach), and the Center for Usability in Design and Accessibility at CSU Long Beach conducted 14 sessions covering a variety of topics and produced a collection of training materials to accompany these sessions. The CSU intends to share these training materials publicly later this year.

ALEKS® PRODUCT ACCESSIBILITY PROJECT

In an effort to develop and distribute web-based course products that are fully accessible to blind and low-vision students, ALEKS Corporation [17] will be engaging the consulting, testing and research capabilities of the CSU. This project will result in significant improvements to accessibility support for their widely deployed mathematics application—particularly for those with visual impairments. The improvements made to ALEKS will benefit post-secondary institutions and students across the Nation.

NATIONAL FEDERATION OF THE BLIND

The CSU recognizes that post-secondary institutions share common goals with disability advocacy groups regarding the removal of technology accessibility barriers. To that end, the CSU has established relationships with executives at the National Federation of the Blind. This partnership, while young, has led to several collaborations including a CSU presentation on eTextbook Accessibility at the NFB eBook Symposium in 2011 and a shared presentation to be delivered at the CSU Northridge Annual International Technology and Persons with Disabilities Conference in March 2012, as well as extended discussions regarding future joint projects.

SUGGESTIONS FOR FEDERAL POLICY

As the testimony above has outlined, the level of accessibility support provided by educational technology products is inadequate. The CSU certainly recognizes that section 508 accessibility requirements apply to those who adopt technology (rather than those who produce it); however, our experience operating the ATI for the past 7 years suggests that this model of driving vendor accessibility improvements via procurement activities has not resulted in sufficient progress. We therefore offer the following suggestions.

First, CSU campuses commonly hear from technology vendors that other customers including Federal and State Government entities across the country are adopting products despite the presence of serious accessibility barriers. This suggests that their section 508 implementation is insufficient to drive market changes. We therefore suggest that Federal entities be charged with ensuring that section 508 procedures are revised to more adequately address accessibility including:

---

[17] ALEKS (*http://www.aleks.com/*).

- Validating product accessibility documentation;
- Conducting conformance testing prior to adopting high-impact products; and
- Sharing test results with other government and education entities to reduce redundant efforts.

Next, the CSU would also ask that Congress require recipients of Federal grant funds to ensure that technology products developed as components of these grants conform to section 508 standards and would urge the Department of Justice to send a "Dear Colleague" letter to the 100 largest IT vendors, reminding them of the importance of ensuring that their products are accessible to persons with disabilities.

Finally, the CSU also strongly supports the recommendations from the AIM Commission report[18] including revising the scope, effectiveness, and function of the Copyright Act as amended (Section 121, the Chafee Amendment) to broaden the definition of individuals eligible for specialized formats, and authorizing the U.S. Access Board to establish guidelines for accessible instructional materials that will be used by government, the private sector, and post-secondary institutions.

The CSU applauds the committee's devotion to ensuring equal access to a quality education for all Americans, and appreciates your interest in technology as a promising tool in meeting that goal. We welcome the opportunity to be a resource to you as you continue to explore ways to ensure access and success in higher education.

The CHAIRMAN. Thank you very much, Mr. Turner. I noticed Attorney Hill was taking a note on that issue about what they should be doing. Mr. Riccobono, we will start with you. In your written testimony, you did not mention it verbally, but I understand you have a child about to enter kindergarten or somewhere in that neighborhood?

Mr. RICCOBONO. I do, yes.

The CHAIRMAN. OK. And I understand that child has a visual disability.

Mr. RICCOBONO. That one does not.

The CHAIRMAN. Pardon?

Mr. RICCOBONO. It is my younger child that has the same form of eye condition that I do.

The CHAIRMAN. OK.

Mr. RICCOBONO. She is a ways from school yet.

The CHAIRMAN. OK. I guess I wanted to talk about that to say, OK, so what are you focusing on to make sure that all children like yours, when they enter preschool and they get into kindergarten, that they have that technology and the curricula readily available, as we always say, from the very beginning?

Mr. RICCOBONO. Absolutely. There is a huge awareness piece that we are working on through the National Federation of the Blind to help these companies design this technology from the beginning. And the educational technology is some of the most important technology.

But we do not think we have met the tipping point yet. I mean, recently the Baltimore City Schools, which is where I live, announced a project to put the Barnes & Noble Nook product into their middle school libraries. This is public/private partnership. And we said to the Baltimore City Schools, the Nook is not a product that is accessible, that has any accessibility for people with disabilities. And, the school district's response was, well, we will get our folks to look into it.

Now, we have the headquarters of the National Federation of the Blind right there in Baltimore. It is probably the best collection of

---

[18] Report of the Advisory Commission on Accessible Instructional Materials in Post-Secondary Education for Students with Disabilities (*http://www2.ed.gov/about/bdscomm/list/aim/publications.html*).

experts on technology anywhere in the world, and we are available to them. So, it is quite frustrating to try to get people's attention and awareness to know that, they are making a huge mistake when we could solve this from the beginning if we worked on it together.

The CHAIRMAN. What is that saying about nothing about us without us, you know?

Mr. RICCOBONO. Absolutely.

The CHAIRMAN. Nothing about dealing with the disability community without having them involved from the very beginning.

Mr. RICCOBONO. And, something you said earlier really resonates, that it is not just about education. I am a blind father. I am examining schools to see where is the best place for my son to go to school. And many of the Web sites for the schools are not very accessible, or the data about how the school is performing is not accessible.

If the students are not getting it, and the parents are not getting it, that just radiates also to the employees of the school district.

If this was accessible for one category of students, the same technology is going to be filtering information to the public, to the parents, to the employees. So, the economies of scale and accessibility are just tremendous.

The CHAIRMAN. Yes, exactly. Thank you.

Dr. Quick, you have a marvelous outcome that many school districts have been striving for over the past 6 years. Your special education population has decreased by 2 percentage points, a 14 percent drop. Pretty significant.

What role has your UDL, as you call it, played in this decrease? Has it contributed to that?

Mr. QUICK. Absolutely, it has helped. We look at students a couple of different ways. I mean, all of our students should be included. All of our students are general ed students. Some happen to have a disability. And all of our general ed students need special services because we know that it needs to be a school of one.

What we try to do is look at options. So, a student that comes to us, what are the barriers, what are those options? Does the student need recorded textbooks, Braille, and voice to text? Whatever they need, those are the things that we look at.

It has helped us because you look at it on the front end. I work with architects a lot in Columbus, and we build a lot of buildings. We should be at least as thoughtful in our curriculum instruction because no architect I sit down with ever thinks about designing anything that we build without the accessibility. But yet, sometimes we do not look at things on the front end and say, how are we going to make these things accessible? So, we should be at least that thoughtful.

The only way I think that we are going to sustain that is for folks to write great policies because we know that the policies of that—and you were a part of a lot of those policies, they drove change. And they drove a different reality for our students. So, we appreciate that.

The CHAIRMAN. Yes, because I think a lot of times students that are in special education is simply because they do not have the

right accessibility to either the material or the technology. Once they get that, they are not a special ed student any longer.

Mr. QUICK. Absolutely, it is the case.

The CHAIRMAN. So, this is another factor for schools to think about, the expense and everything. Again, if we do not have that expense of what they call special education and you decrease it by 2 percentage points, not only are you helping the budget problems, you are also helping the other students who are not disabled.

Mr. QUICK. Absolutely.

The CHAIRMAN. They call that a win-win situation.

Mr. QUICK. I think so. And, I think sometimes folks want to look at, well, I have to have enough money to do everything that I want to do, rather than start, because this is a journey.

The CHAIRMAN. Sure.

Mr. QUICK. We have to take a bite of this elephant one bite at a time here kind of thing. And sometimes folks want to wait, but we cannot wait for the iPad 3, you know.

The CHAIRMAN. That is right.

Mr. QUICK. We have to start and we have to work with all of the stakeholders to find out what is that environment that serves the student the best.

We certainly have had a lot of success with Universal Design for Learning using project-based learning in a technology-rich environment, and trying to get to the point where we have one device for every three students. But in some of our schools, we are one-to-one with devices.

Folks are talking about how do you have scale up, and if I would have some advice for you there, Senator Harkin, is after working on this for a number of years that we have had and trying to have ambition is, we are going to have to have centralized support for a decentralized philosophy, which says students can bring their own device. Students can bring their own technology, and we are going to have to support it.

Now, some students cannot afford to bring their own device, so then we need to use our textbook rental differently to rent devices instead of renting textbooks, or to budget our capital dollars differently, or bond some money differently so that we can get the devices to students that cannot bring their own device. But we are going to have to be able to support it.

It needs to get to the point where, a few years ago you were in trouble if you brought your cell phone to school. You need to be in trouble now if you do not bring your smart phone to school, or some device. That is what we have to do, get that centralized support and get the infrastructure so that the students—because students have these things, a lot of our students now.

Even though half of my students are on lunch assistance, three-quarters of them have some sort of device now. And we are going to have to say bring that device and we will support it, and then expand on that, but not be tied to a specific device, because I did not have an iPad. I did not carry an iPad, a year ago or 2 years ago, so we cannot be tied to a specific device.

The CHAIRMAN. It is an interesting concept. I do not know that I have really thought about that. We always tend to think about a specific device.

Mr. QUICK. I think the only way we can afford to scale up is if students can bring their own device, and those that do not have the device, we need to find the funding to get the device for those students.

The CHAIRMAN. I guess the more I think about it, most of the devices we have had, what would I call it, interoperability or something like that? Programs are being designed and software is being designed to be applicable to different devices. We know that.

Mr. QUICK. Right.

The CHAIRMAN. So, you could obviously design curricula that would be adaptable for different devices.

Mr. QUICK. Right.

The CHAIRMAN. I will have to think about that. That is very perceptive. I have never thought about that before.

If you have some more on that, Dr. Quick, that you have developed, just your thinking on that, and how that would proceed in an elementary and secondary education school system, I would like to have that.

Mr. QUICK. We are doing it now with about 1,400 in a pilot. We have two magnet elementaries where it is one-to-one, second grade through six. And we are doing a project based on a technology pre-K to 12 now. So, we have a place where you can visit and see this kind of thing, and you would be welcomed. But we can send you more information on that.

The CHAIRMAN. Are you covering blind students that come in?

Mr. QUICK. We do. We work with the families. There is also a residential setting in Annapolis. We bus some students up Sunday night and pick them up Friday. But we also have a vision-impaired specialist that works with the district, depending on, again, whatever environment when we work with the families and the students that they think they can best serve.

The CHAIRMAN. One last thing before I turn to Mr. Turner. I had an instance of this some time ago when we were doing some grants to schools for technology. This has been almost not quite 20 years ago, maybe 15 years ago. And what we found the biggest stumbling block was, was getting the teachers who knew how to use the technology. They were not trained to do that. And so, it set us back a couple of years while teachers learned how to use the technology.

So, what I just want to know about is, are the new teachers you are hiring, are they coming in with the knowledge about your Universal Design for Learning, or UDL, and accessible technology? If not, what training do you need to do to get them to understand the framework? Should teacher preparation programs be teaching UDL?

Mr. QUICK. They should be, and there is not enough scale up in that. But I do see a shift. Think about this. Pretty soon there will be someone that—you are born in 1980 and you got 12 years of teaching experience now. And you are probably a digital native because you have lived with it. So, do not be afraid to get technology into the classrooms, because the natives will use it, including all of those folks there. So, we need more training and particularly in a framework.

But the Universal Design for Learning is not taught to the degree we would like, and so we do take the teachers through a 3-

day orientation on their dime before they teach any of our students.

The CHAIRMAN. How about your State education association? Are they involved—you have schools in Indiana where you have teacher preparation courses.

Mr. QUICK. Right, absolutely.

The CHAIRMAN. Are they involved at all in making sure that the respective teachers know how to use this technology?

Mr. QUICK. Yes. I think that part is pretty good.

The CHAIRMAN. OK.

Mr. QUICK. But, again, it is about designing it from the framework. Make sure that folks understand the framework that you need to tie this technology to so that it has its best use. That we need some more work, teacher training, and IU in charge of that is on my school board. So, we are texting today.

I think that has come a long way, but there is—certainly teacher preparation is key. I am concerned about that. I am also concerned about the number of young people not going into teaching because of the job market and everything. So, I think that technology could be and this kind of thing could be a hook to get some of those young people in if they thought that they would have the tools that they needed.

The CHAIRMAN. Sure. How do you feel about using technology in the lowest grades, kindergarten, first, second, third?

Mr. QUICK. In our corporation, there are about 900 4-year-olds in my 10 counties; 750 are in pre-K this week using technology through efforts that we have had. So, our businesses has been very good partners with that. So, from day one.

My 2-year-old grandson uses my iPad. You need to start from day one. It is intuitive. You need to start. And iPads particularly because it is interactive, and that is really going out there.

Let me give you an example. We had a non-English speaker come to us, 4 years old. Everywhere he went, they took an interpreter. When he enrolled, mom and dad came with an interpreter. By Christmas, they had a doctor's appointment, and the 4-year-old says, no need, I got this. I can do this. So, that is how quickly I think that we can do it if we put the right information there.

The CHAIRMAN. Thank you very much, Dr. Quick.

Now, let us move to higher education. Mr. Turner, again, you think about higher education and the applicability of this. You have extended this to all your campuses in California. Google Apps for Education made substantial changes to their applications to remove all accessibility barriers from working with Cal State and your program. What role did your office and program play in this process? And how has the technology improved for people with disabilities? And, again, segue from that into what can you tell other education settings about working with manufacturers and providers who do not produce or distribute accessible technology?

Mr. TURNER. With forgiveness, Chairman, I should also clarify—I should start by clarifying that, lest I be stoned by the crowd. Google Apps for Education continues to manifest some accessibility gaps. I would not want to characterize that the result of our work with Google has resulted in an accessibility barrier free product.

Having said that, the nature of our work with Google involved bringing together a panel of Web accessibility experts from across the CSU, identifying critical use cases that reflected the common functions and activities for which Google Apps for Education applications would likely be used in a higher ed implementation, and then conducting testing to validate the extent to which accessibility support was or was not present for those functions and those applications.

One of the critical components was that we not only make that report that listed both barriers and recommendations for work arounds available to our campuses, but that we turn around and provide that report to the vendor. And that is a feedback loop that I often see higher education institutions fail to exercise.

Vendors, we find, will be responsive when we bring them specific problems with specific suggestions for how they can be resolved, and an understanding as to why they are important.

That was something of the nature of our process, and we did have a meeting where we shared those findings with Google. And they made a somewhat general forward looking statement with respect to the manner in which and the timing by which the gaps that we identified would be resolved.

If I might, you asked a second question, which was, do we have recommendations for post-secondary institutions? Might I briefly speak to that?

The CHAIRMAN. Yes.

Mr. TURNER. I would like to piggyback on earlier testimony and your interest in operability, and suggest that if interoperability is building, the foundation for that building is accessibility standards and coding the standards. And one of the key messages we convey to vendors, irrespective of the type of technology product, is to the extent that you build products that comply with accessibility standards, you will resolve likely a large percentage, perhaps a large majority, of the potential accessibility barriers that might otherwise be present in your product.

So, a very strong message to vendors is you do not have to be an accessibility expert to make an accessible product. What you have to do is start with coding the standards, and then bring in feedback from your user base, from disability advocacy groups, and from the outside experts if necessary in accessible technology, and they can help you build that accessible product.

The CHAIRMAN. I am still thinking that what you have done in California, and you started on this about 6 or 7 years ago, something like that?

Mr. TURNER. That is correct.

The CHAIRMAN. Six years ago?

Mr. TURNER. Yes.

The CHAIRMAN. Are there any other State systems doing what you are doing that you have been working with, mentoring?

Mr. TURNER. There are a number of institutions across the country. I would imagine what distinguishes the CSU is just the sheer size of our system.

The CHAIRMAN. True.

Mr. TURNER. Attempts to coordinate a systemwide effort of this sort when, again, as we said, our community is a half million peo-

ple when you add in staff, faculty, and students. There is an extraordinary amount of coordination involved in trying to achieve that. But there are innumerable other institutions across the country that are demonstrating leadership in various areas, and we regularly will talk with one another, compare notes, compare strategies, in efforts to, kind of both harmonize and strengthen one another's messaging.

The CHAIRMAN. I guess what I am thinking of is, earlier, last week—what I would refer to as the private non-profit colleges were all here in Washington from around the country, a number from my home State of Iowa. And some of them I know very well; I have visited their campuses in my State. Some do a much better job than others. Some are a little bigger. Some have a better endowment than others, and they can do things.

But I guess I wish I had had this hearing before I met with them. I am wondering why—they have a national network. They have a national office for the private non-profit colleges. I am just wondering, though, they can have a big stick if they all joined together and did what you did at CSU.

Mr. TURNER. I would agree with that, and I would encourage them to do so.

The CHAIRMAN. I will encourage them to do so. Believe me. As I said, I wish I had had this hearing and read your testimony before I met with them last week. But I am going to meet with them and ask them—I guess I am asking, do you know if you have met with any representatives from the private colleges about this? And I do not mean to pick on the privates. I mean, how about the regent schools, all of the State schools, whether it is Arizona or Iowa or Nebraska or whatever, with the public universities? Have they been reaching out to you to get advice, suggestions, how they should do things, what mistakes you made and they do not need to make now.

Mr. TURNER. Indeed, I would not consider it a systematic campaign to beat down our doors for information. But there is a tendency for campuses to want to somewhat discretely reach out and ask for suggestions on lessons learned with respect to particular technologies, to understand the nature of discussions we may have already had with vendors so that they can reinforce, where appropriate, messaging, and things of that nature.

The CHAIRMAN. Let me reemphasize what you said in your verbal statement. It is part of your written statement. Suggestions for Federal policy, you said,

"First, CSU campuses calmly hear from technology vendors, that other customers, including Federal and State Government entities across the country, are adopting products, despite the presence of serious accessibility barriers. This suggests that their section 508 implementation is insufficient to drive market changes. We, therefore, suggest that Federal entities be charged with ensuring that section 508 procedures are revised to more adequately address accessibility, including validating performance testing, sharing results."

Are you saying that perhaps in our education policy for higher education, I think of anything from our Pell grants to our guaranteed student loans, our Stafford Loans, Perkins, all the different

things that we are involved in, in higher education work study programs. Are you saying that Federal policy ought to weave into that, that 508 has to be implemented by these schools, I mean, as an extension of the Federal Government, that we are providing all of this, so, therefore, we ought to make sure that their vendors are adopting products that do not have serious accessibility barriers? Did I make myself clear?

Mr. TURNER. Yes, your question is clear. It may be perhaps that my written testimony was perhaps less so, so let me clarify, if I might.

The CHAIRMAN. OK.

Mr. TURNER. What I am speaking to in that statement is the observation over a period of many years that 10 years postpassage of section 508, there is a significant disconnect between division of a market-based solution to universal technology and the array of technologies that are actually in the marketplace, and with rather distressing frequency.

When we raise questions or concerns with vendors regarding the accessibility of their products, we regularly hear something to the effect of, well, such and such department in, the Government uses this product and they did not have any concerns about accessibility. Or, the State of Massachusetts is using it, and they do not have concerns about technology.

But it appears that there is product adoption occurring by entities subject to 508, at both State and Federal levels, where by all appearances the level of analysis that is undertaken to credibly review vendor accessibility statements is insufficient, and where products are being accepted despite the presence of more accessible alternatives in the market place.

What I am respectfully suggesting is not that 508 procedures are not in place, but that they are not sufficiently robust to provide the feedback loop we feel is critical for the development of a market-based solution where vendors deliver more accessible products.

The CHAIRMAN. I understand. I understand that clearly now. However, having asked that question in the way I did, let me restate it then. How would you feel, what do you think about the Federal Government then using all the grant programs and everything that we do for higher education, and having some requirements therein for schools to adopt stronger accessibility requirements?

Mr. TURNER. In principle, I strongly support that.

The CHAIRMAN. Reading your testimony, I got an idea for maybe doing some prodding and some mutual work here with our institutions of higher learning, because what you have done in California, from what I know of it, has been really good. And I just see that it is not happening like that around the country. And I think we have to have a more determined effort to, again, do in higher education what Dr. Quick has done in Columbus, IN in his elementary and secondary schools, and I guess preschool, too, from what I have just heard.

Michael, my staff, just said to ask you about how you got Apple, and I read it in your testimony last night about how you got them to change their iTunes. How did you do that? That was in your testimony. I read it last night. Oh, yes. Your staff evaluated Apple's

iTunes U product, which was being offered to post-secondary institutions across the Nation, and determined that the product manifested serious accessibility barriers, ET cetera, ET cetera. Tell us about that a little bit.

Mr. TURNER. Certainly. I will try and do so as briefly as possible.

This was one of the earliest activities upon my arrival to the Accessible Technology Initiative. At that time, Apple had recently expanded the iTunes application, which had heretofore been used primarily for, individuals accessing their individual libraries of media, into an initiative entitled iTunes U or iTunes University. They were very aggressively marketing iTunes U as a free—free as no licensing fee—adoption option for universities across the country to make available audio and video content, whether it be related to instructional activities or for administrative functions, such as committee meetings and things of that nature.

A number of CSU campuses approached the staff at the Accessible Technology Initiative and requested that we provide guidance to them on the suitability of iTunes U as a platform to be made available for deployment across the system.

We undertook an accessibility evaluation of iTunes U and found it to be profoundly inaccessible, which is to say, for those familiar with the iTunes U interface, it is extremely rich. It has a number of controls, a high degree of functionality. And there was one user interface element on that entire interface that was accessible, and that was the search field.

If you were a user of screen reader technology, that was the one control you could perceive out of that entire program's interface.

So, we had grave reservations about recommending that technology at that time to campuses, and indicated so in a coded memorandum to campuses, prescribing that the technology not to be used in a production environment until such time as the vendor had made material improvements to the accessibility of the product.

We then began coordinating activity with Apple, directly with their accessibility engineers, their product managers, to make them aware of the range of accessibility issues we encountered, to provide guidance on particular priorities we needed them to address in order to provide the most substantive improvements to accessibility, and offered to be available to review intermediate steps, beta builds to the product as they made those improvements. So, that was all codified in our coded memo, and became the basis for a relationship with iTunes U that spanned the year of, I want to say, 2008.

By the end of that year, they had met all, I believe it was, eight of the essential requirements we set forth. And to refer to an analogy you had drawn earlier where you talked about the technology and the curriculum. We used the term "content and container." So, the technology was the container. That was the application. But one of the gaps that we asked Apple to address was that video content that flowed through iTunes did not have the capacity to support closed captioning at the time that we evaluated the product.

So, by the end of 2008, they had met all of our requirements, all of our highest priority requirements. And we provided clearance

through another coded memo to our campuses allowing them to consider usage in a production environment.

The CHAIRMAN. So, you got it done in, what, 2 years?

Mr. TURNER. In a period of about 12 months.

The CHAIRMAN. Oh, 12 months? So, it was less than a year. My goodness. Do you think that is possible with all these other applications that we can get it done that fast?

Mr. TURNER. Not all applications have the depth of resources——

The CHAIRMAN. That Apple does.

Mr. TURNER [continuing]. That Apple does. And, indeed, one of my messages to Apple was that they were not leveraging the accessibility expertise that existed in their own institution; that they had become so large that we felt the accessibility team had not been deeply involved enough with the product team because they were in different silos.

The CHAIRMAN. Good. You know, we are talking about ATI today. What is the Center for Accessible Media? Can you explain that? How has it saved money, I understand, for the university?

Mr. TURNER. Absolutely. I would be happy to speak to that.

The CHAIRMAN. Just tell me about that.

Mr. TURNER. In the early 2000s, we began to notice a significant up-tick in requests for alternate media. These would be specialized curricula materials that are adapted for use by students with a variety of print disabilities. That could be blindness, low vision, learning disabilities, or any number of other conditions that create a functional impairment in the area of reading.

As we began to see utilization increase significantly, we began to look to opportunities to leverage the work that was being done across the systems so that we were producing an accessible version of a book once rather than 23 times across 23 campuses.

We conducted a needs assessment, conducted a feasibility study, and began development in 2003 on a Web application that would facilitate campuses listing, requesting, and receiving copies of specialized materials that have already been adapted for use by students with print disabilities so that they could be shared across our system.

That Web service launched in 2004. It now lists 21,000 titles that are available to CSU campuses. In subsequent years, the University of California, I want to say six of the UC campus now, also contract, have access to this repository. And annually it facilitates between 1,400 and 1,500 requests from campus to campus. That is 1,400 to 1,500 instances in which campuses avoid redundant efforts to produce these specialized materials.

The CHAIRMAN. That is good.

Mr. TURNER. Obviously that significant cost savings for those of us familiar with producing specialized formats, it can be a very time and resource intensive process.

The CHAIRMAN. Very good. Great explanation. I see my time is running out.

Again, Mr. Riccobono, Dr. Quick, and Mr. Turner, have things come up in this hearing that you want to respond to, or are there some questions I should have asked you that maybe you wish I had asked and I had not asked that you would want to expound upon?

Mr. Riccobono.

Mr. RICCOBONO. I would just add a few things. First of all, to say I really appreciate your leadership in putting this hearing together, in fact, a series of hearings on educational technology because it is a critical issue.

You know what Dr. Quick talked about in terms of interoperability and students bringing devices is quite important. And I think it underscores two things: one, that there needs to be more understanding of accessibility amongst the general IT professionals where the access to technology is not a separate product that comes out of a closet, that it is in all these devices, and they are going to need to know how to deal with them.

Also, to your point about the curriculum. It is great that the iPad has built in accessibility, but if the educational apps that are being used from whatever the book publisher is or the educational content producer that has produced an app to deliver the particular content, if that app does not have controls that are labeled properly or the app does not interact properly with accessibility, then it does not matter if the device is accessible. So, that is where the curriculum accessibility really comes in and those standards comes in.

Another two things I would say is, we need to change the culture around accessibility to get people talking about it more. Even Apple, who we all acknowledge is doing some innovative things in accessibility, they do not talk about it. It is like taboo to talk about that there is accessibility in a product.

I am not sure where that comes from, but I think, leadership on this committee could really help companies that are trying. I think part of it is that they do not feel like they have everything figured out. I think we need to get that out in the open to say, "Hey, we are working on it, and here are some innovative ideas we have." But no one is talking about accessibility. And you certainly do not see them waving the flag when they are trying to sell it. It is sort of very much very behind the scenes.

The final thing is, I think that market power, if we can get the schools and the universities to start working together, again, start talking about accessibility, requiring it in their contracts, and then sharing information amongst each other about what is accessible and what is not, and really requiring it, not buying products. I think Mr. Turner's examples are great ones of companies that, when they said, "No, we are not going to deal with your product because it is not accessible," that got the company's attention, and they made substantive changes that made their product accessible, not just in California, but across the Nation.

Mr. TURNER. Very good. Your point is well-taken that this should be discussed more, it should be out in the open more. We need to be asking more questions. And those companies that are doing a good job of this ought to put that in their advertising.

I think it has a much broader appeal than just to the disability community.

Mr. RICCOBONO. Absolutely.

The CHAIRMAN. Much broader.

Dr. Quick.

Mr. QUICK. Engagement is also awfully important. I can remember as an elementary principal going from class to class, I would

too often hear, "Well, you just missed it, we are getting ready"—or, there was not the engagement.

Technology, and, it is a tremendous waste not to have access and not to have engagement. One of those, since I am also the fellow that gets some of the discipline things that comes my way, one school that we redesigned, and this project, technology-rich environment, UDL doing these things that we did. They had 400 discipline referrals the year before the design. Now, if they have two or three a month.

Mr. TURNER. Really?

Mr. QUICK. It makes a difference. Students need to be challenged, and they need to be engaged. And there is a lot of wasted time on discipline, and part of it is just clearly that our students are frustrated. So, I would recommend that there are some other kinds of results that you may not think of as traditional.

The CHAIRMAN. Put a little bit more meat on that bone. Why did all the discipline things go down so big after the adoption?

Mr. TURNER. Because the students felt they had ownership, first of all. Project-based learning that we try to do, and then we used technology with it. They feel like it is authentic. They are involved with it. They are engaged. You have a lot of students that need—maybe their attention span is 10 or 15 minutes or so, and technology is very patient, too. They do not lose their temper or their patience with a student. And that can be helpful, too.

It is a give and take. But I think that if we engage students and do a better job at this accessibility, the discipline issues that we have in schools will greatly—and any time that you can spend time working with students rather than working with the discipline issue, that just snowballs the amount of learning that happens. It is much more learning centered, and that is the key.

When you make a decision, is it going to enhance the likelihood of learning or not? And that is what we should be looking at. Learning is our product here.

The CHAIRMAN. That is very interesting. That is something I never even thought about, but now that you have jogged my thinking on it. Of course I have seen a lot of kids who are discipline problems because maybe they are autistic or borderline autistic, and they are not being challenged in the right way. They are not getting the learning material in a way that they can understand, and they get frustrated, and they act it out. So, if technology can overcome that, as you indicated earlier in your testimony, I can see now that that reduces discipline problems.

Mr. QUICK. Absolutely.

The CHAIRMAN. Interesting. Any last things, Mr. Turner?

Mr. TURNER. I would just indicate that we stand arm in arm with the National Federation of the Blind on our core messaging, which is we want all students to be able to use the same products at the same time with the same features for the same cost.

The CHAIRMAN. Do you have that written down? I want to use that in the future. I cannot think of a better way to end the hearing.

Thank you all very, very much for your input. As I said, this is the first of a series of hearings that we are going to be having on this topic. Again, thank you all very, very much.

Mr. TURNER. Thank you.

The CHAIRMAN. The committee will stand adjourned.

The record will stay open for 10 days for Senators to submit statements and questions.

[Whereupon, at 4:13 p.m., the hearing was adjourned.]

○