

Proceedings

Technology Capacity Building Institute

Empowering Students with Disabilities as They Transition to College and Careers

April 7th–8th, 2003
Seattle, Washington

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For more information about future Institutes, to view the document online, or to request a copy of this Proceedings in an alternative format, please contact Velina Sugiyama or Megan Conway, NCSET Postoutcomes Network, 1776 University Avenue, UA 4-6, Honolulu, HI 96822, Tel: 808-956-5688, Email: velina@hawaii.edu, web: www.ncset.hawaii.edu.

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Introduction

A *Technology Capacity Building Institute* was hosted in Seattle on April 7 and 8, 2003. Fifty individuals attended, representing a wide variety of stakeholder groups, including people with disabilities, parents, mentors, precollege educators, postsecondary educators, vocational rehabilitation counselors, policy makers, service providers, employers, and technology developers. The purpose of the *Institute* was to discuss how stakeholders can assure that:

- All individuals with disabilities have access to technology that promotes positive academic and career outcomes.
- All people with disabilities use technology in ways that contribute to positive postsecondary academic and career outcomes and self-determined lives.
- There is a seamless transition of availability of technology for all people with disabilities as they move from K-12 to postsecondary to career environments.

This publication provides (a) an overview of the topic, (b) the agenda, (c) biographies of the invited speakers, (d) abstracts of the papers presented, (e) a summary of the findings, (f) discussion group notes, (g) content from the online discussions, and (h) a list of the participants. It provides a record of the event as well as content useful to those who wish to promote the use of technology to increase the academic and career success of people with disabilities at local, state, regional, and/or national levels.

Overview of Institute Topic

The following paragraphs provide an introduction to the motivation for and content of the *Technology Capacity Building Institute*. Most of the content is excerpted from the publication, *Bridging the Digital Divide in Postsecondary Education: Technology Access for Youth with Disabilities* (Burgstahler, 2002), published by the National Center on Secondary Education and Transition (NCSET). The entire document can be found at <http://www.ncset.org/publications/viewdesc.asp?id=718>.

Introduction

Today, technology plays a role in almost all educational, employment, and recreational activities. Computer access has the potential to help people with disabilities complete coursework independently, participate in class discussions, communicate with peers and mentors, access distance learning courses, participate in high tech careers, and lead self-determined lives (e.g., Burgstahler & Cronheim, 2001).

People with disabilities benefit from the opportunities technology offers everyone else, such as word processing, Internet exploration, and database access. In addition, however, some individuals use technology to compensate for the inability to perform a specific function due to a disability. For example, a person who cannot speak with his or her own voice can use a computer-based speech synthesizer to “speak” for him or her.

Although the benefits of technology may be even greater for people with disabilities than for those without disabilities, individuals with disabilities are less likely to own a computer or to use the Internet (Kaye, 2001). Even for those who can operate a computer, the design of many Web pages, instructional software programs, and other electronic and information technologies create access barriers (Waddell, 1999). For example, Web pages that do not include text alternatives that can be read by speech and Braille output systems limit information access by a student who is blind; the content of multimedia resources that do not have captions is inaccessible to a

viewer who is deaf; and scientific equipment that cannot be operated from a seated position is inaccessible to a lab assistant who uses a wheelchair.

Because of the positive impact of postsecondary education and the challenge of poor employment rates for people with disabilities, increasing their success in college is an important goal (Yelin & Katz, 1994). Clearly, technology access that leads to success in postsecondary education has the potential to improve career outcomes for people with disabilities, but what challenges exist, and how can they be overcome to ensure that students with disabilities have access to the technology they need?

Case Study

Imke, who is blind, uses a refreshable Braille display (which displays screen text in Braille, line by line, using plastic pins) to access text on a computer screen. Her system cannot interpret graphic images.

Problem

Imke completed a Ph.D. degree in Atmospheric Sciences at the University of Washington. While pursuing her studies there, some plots of climate indices on a Web site were not accessible to her, since her refreshable Braille display is not capable of reproducing graphics.

Solution

Imke contacted the person responsible for placing the indices on the Web site and described the challenges she was facing. The idea to include text descriptions came out of their conversation. Basically, he created a short text description to appear directly above or below each plot. Imke can access this text with her Braille output system. People who have slow modems and others using speech synthesizers now also have access to this content.

Conclusions

This case demonstrates that for success in higher education, students with disabilities need to know what technology solutions will work for them and how to advocate for their own needs. In addition, the following points should be kept in mind:

1. Access barriers for a specific student with a disability can be best resolved when the content developer works in collaboration with the student.
2. For a student who is blind, the greatest challenge in accessing Web sites is gaining access to the content embedded in graphics. Many times, all that is required is that the Web content developer posts graphics with the information in text form.
3. The need for making accommodations for a specific student can be minimized if universal design principles are employed when Web pages are being developed. Universal design means that the wide range of characteristics of potential product users is anticipated ahead of time and accessibility features are built into the product's design (Disabilities, Opportunity, Internetworking, and Technology, n. d., Conclusions sections, para. 2-4).

More information about this case can be found at: http://www.washington.edu/doi/Faculty/Strategies/Academic/Webpages/webpages_case_study.html

Challenges

In order for students with disabilities to pursue postsecondary academic and career options, they must have access to the high tech tools available to their nondisabled peers. These include

computers, Web sites, Internet-based distance learning courses, instructional software, and scientific equipment. Achieving this goal requires that (a) appropriate assistive technology be readily available, and (b) barriers to electronic tools and resources be eliminated.

For example, it is important that students who are blind have access to speech and/or Braille output devices. But access to this assistive technology is not enough. In order for them to benefit fully from this technology, the educational software, applications software, Web pages, and other electronic resources they use must be designed in such a way that their full functionality can be accessed by using their keyboard and speech or Braille output system.

Legal mandates (e.g., the Individuals with Disabilities Education Act, Section 504 of the Rehabilitation Act, the Americans with Disabilities Act) that apply to computer access for students and employees with disabilities are not always reflected in practice. Consumers and service providers identify the two biggest barriers to assistive technology access to be the lack of knowledge about appropriate assistive technology and lack of funding. Stakeholders are not fully aware of technology options, legal issues, and advocacy strategies. These stakeholders include people with disabilities, parents and mentors, government entities, paraprofessionals, policymakers and administrators, precollege and postsecondary educators, librarians, technical support staff, and employers. Studies have found that other access challenges include (a) lack of trained professionals to evaluate assistive technology, and (b) the bureaucracy of public programs and insurance companies (National Council on Disability, 2000; National Center for Educational Statistics, 2000).

Educational systems need to overcome these challenges in order to ensure:

- That people with disabilities gain access to the technology that has the potential to promote positive postsecondary and career outcomes;
- That people with disabilities learn to use technology in ways that contribute to positive postsecondary academic and career outcomes;
- A seamless transition of availability of technology as students move from K-12 to postsecondary and career environments, and
- The right balance between universal design and the provision of assistive technology in academic and employment computing environments.

Meeting the Challenges

Options that can be considered in order to meet these challenges include the following:

- Stakeholders should have access to training so they can design and select accessible facilities, utilize computers and software, purchase appropriate assistive technology, and ensure that students with disabilities use technology for their maximum benefit as they pursue academics, careers, and self-determined lives.
- Policies and procedures should be established at all academic levels to ensure that universal accessibility is considered when electronic and information technology is procured.
- Policies, procedures, training, and support should be established at all educational levels to ensure that Web page, library resource, and distance learning program developers make their electronic resources accessible to everyone.
- Interagency collaboration on planning, funding, selecting, and supporting assistive technology should be fostered to ensure continuous technology access and support as students with disabilities transition through academic levels and to employment.

- Students with disabilities should be included at all stages of technology selection, support, and use, so that they learn to self-advocate regarding their needs for accessible technology in the classroom and workplace.
- Students with disabilities at high school and college levels should participate in internships and other work-based learning experiences where they can practice using technology in work settings.
- Legislators and policy makers should disseminate information about current laws, policies, and resources that are universally designed to meet the needs of various stakeholders. They should also identify and correct inconsistencies and gaps in legislation and policies regarding the selection, funding, and support of technology for people with disabilities.

Conclusion

Access to electronic and information technology has the potential to promote positive postsecondary academic and career outcomes for students with disabilities. This potential will not be realized, however, unless stakeholders (a) become more knowledgeable about appropriate uses of technology, (b) secure funding, and (c) work together to maximize the independence, participation, and productivity of students with disabilities as they transition to college, careers, and self-determined lives. Ultimately, ensuring that all of the educational and employment opportunities that technology provides are accessible to everyone will strengthen our economy and contribute to the creation of a level playing field.

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Institute Agenda

Technology Capacity Building Institute Empowering Students as they Transition to College and Careers

**April 7-8, 2003
Claremont Hotel, Seattle**

Monday April 7

- 8:30 Registration (at Ballroom)
Continental breakfast (in Ballroom balcony area)
- 9:00 Welcome, purpose of Institute, process, agenda, logistics, introductions
Sheryl Burgstahler, DO-IT, University of Washington
- 9:30 Introduction to NCSET, overview of issues related to transition and post-school outcomes and relevance of the topic for this CBI
Bob Stodden, Megan Conway, NCSET, University of Hawaii
- 10:00 Roles and uses of technology in precollege, college, employment, and independent living; historical perspectives; accommodation vs. universal design
Short videotape: *Computer Access: In Our Own Words*
Stakeholder group assignments and instructions
Sheryl Burgstahler
- 11:00 Break
- 11:15 Stakeholder discussion groups: participant introductions, reflection and discussion about barriers to technology access, effective use, and transition for individuals with disabilities
- 12:15 Lunch in balcony area
- 1:00 No child left behind: How technology can be used to help the struggling learner find success in precollege school and prepare for transition to postsecondary education and employment
Lynne Anderson-Inman, The Center for Electronic Studying, College of Education, University of Oregon
- 1:55 Technology access issues, access solutions and persisting challenges, impact/application of Section 508, accessible Web pages, distance learning, and other electronic and information technology used in precollege, college and employment settings
Terry Thompson, DO-IT, University of Washington
- 2:45 Break
- 3:00 Panel of people with disabilities discussing value of technology and access issues, solutions and ongoing challenges in education and employment
Megan Conway, Richard Radtke, Michael Richardson, Jessie Shulman, Todd Stabelfeldt
- 3:50 Summary, plans for tomorrow, daily evaluation
- 4:00 Reflection and discussion in stakeholder groups regarding recommendations for policy, practice and research
- 5:00 Adjourn

Tuesday, April 8

- 8:30 Continental breakfast in Ballroom balcony area
- 9:00 Reactions to discussions and insights from yesterday's presentations; response to daily evaluations
Richard Radtke, Sheryl Burgstahler
- 9:35 How teachers can employ universal design for learning strategies and use technology to help all students access the general curriculum and meet classroom, district, and state standards for success and prepare for college studies
Chuck Hitchcock, National Center for Accessing the General Curriculum
- 10:25 Break
- 10:40 Panel - Technology access in post-secondary institutions: the players, legal issues, typical policies and practices, challenges to effective collaboration, comparisons with the K-12 environment
Dan Comden, Adaptive Technology Lab; Rick Ells, Computing & Communications; Dyane Haynes, Disabled Student Services; Jan Herdman (represented by Dan Comden), Disability Services; Joan McCarter (represented by Sheryl Burgstahler), Distance Learning University of Washington
- 11:30 Reflection and discussion in stakeholder groups regarding recommendations for policy, practice and research
- 12:15 Lunch in balcony area
- 1:00 Roles of rehabilitation counselors and other service organizations in assuring the availability of and effective use of technology as students with disabilities transition from precollege education to postsecondary education and to careers
Peg Lamb, NSF Bridges Transition Project, Holt Public Schools
- 1:50 Technology and employment: Value of technology access and skills in obtaining employment; employer perspectives on providing assistive technology and other workplace supports and in creating an accessible environment; impact of the *New Freedom Initiative*
Richard Leucking, TransCen, Inc.
- 2:40 Break
- 2:55 Reflection and discussion in stakeholder groups regarding recommendations for policy, practice and research; preparation of group reports
- 3:45 Presentation of small group reports and recommendations (5-6 minutes each)
- 4:40 Closing remarks
Evaluation
- 5:00 Adjourn

Speaker Biographies

Lynne Anderson-Inman, Ph.D., is director of the Center for Advanced Technology in Education and the Center for Electronic Studying, divisions of the College of Education at the University of Oregon. Dr. Anderson-Inman's research interests span three areas of investigation, all focused on making the general education curriculum more accessible to students with disabilities. These include (a) computer-supported strategies for empowering students as learners, (b) the use of electronic "supported text" to help students comprehend textbooks and other reading materials, and (c) networked notetaking as an approach to bridging the communication gap in classrooms. She has pioneered research on the use of computers as study tools, developing a nationally recognized curriculum of Computer-Based Study Strategies (CBSS) for students with learning disabilities at the secondary and post secondary levels. She has published widely in journals for practitioners as well as researchers.

Sheryl Burgstahler, Ph.D., is the Assistant Director of the Information Systems, Computing & Communications, at the University of Washington. She has assisted K-12 schools to connect to and productively use the Internet, provided computing services for students, faculty and staff with disabilities, directed the UW Computer Fair; written grant proposals, and directed funded projects. Since 1992, she has directed DO-IT (Disabilities, Opportunities, Internetworking, and Technology), a project which employs computers, adaptive technology, and the Internet to maximize the independence, productivity, and participation of individuals with disabilities in post-secondary education and careers. DO-IT won multiple awards, including the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring, the National Information Infrastructure Award in Education, Golden Apple Award, and DO-IT showcase at Presidents' Summit for America's Future. She also Co-Directs the National Center on Accessible Information Technology in Education (AccessIT).

Megan A. Conway, Ph.D., is an Assistant Professor with the Center on Disability Studies at the University of Hawaii at Manoa and coordinates the post-outcomes network of the National Center on Secondary Education and Transition. Dr. Conway has presented at numerous national and international conferences and workshops in the areas of postsecondary support, technology, and sensory impairment. She has served as a consultant on several state and international projects in the area of severe disability, and has authored papers on postsecondary supports for individuals with disabilities, disability culture, the implications of acquired disability, and the application of technology for individuals with vision and hearing loss. Dr. Conway received her doctorate in Special Education from the University of California at Berkeley in 2001.

Chuck Hitchcock is Director of the National Center on Accessing the General Curriculum (NCAC), a five-year cooperative agreement with OSEP. NCAC partners include Harvard University Children's Initiative/Harvard Law School, Boston College School of Education, the Council for Exceptional Children, and the Parent Advocacy Coalition for Educational Rights (PACER). As CAST's Chief Education Technology Officer, Mr. Hitchcock oversees CAST's software development, technology innovation, and Web site development and was the original developer of the CAST eReader and Bobby, the Web access tool. Mr. Hitchcock has had practical experience in special education administration, technology education, teaching at all levels from early childhood to graduate school and in private industry. He co-directed a private learning disabilities clinic and served as the founding director of a Massachusetts statewide technology training and support center that served 180 school districts.

Margaret Lamb, Ph.D., is a Director of the National Science Foundation Bridges Project, a Collaborative Transition Model connecting a high school and a community college, Holt Public Schools, Michigan. With faculty from Holt High School, Lansing Community College, and Michigan Rehabilitation Services, she works collaboratively to support students with disabilities at the Community college pursuing careers in Science, Mathematics, Engineering, and Technology. The Bridges Project is a comprehensive model to develop the linkages between these institutions and other agencies to better prepare students in their transition to post-secondary education. Dr. Lamb has a Ph.D in teacher education and policy from Michigan State University. Her research interest include self-determination, transition, and post-secondary educational supports for students with disabilities.

Richard G. Luecking, Ed.D. is President of TransCen, Inc., a non-profit organization based in Rockville, MD that specializes in school-to-work transition initiatives, systems change in education, and career development of individuals with disabilities. During his 15 year tenure with the organization he has written, directed and/or overseen over two dozen federal research and demonstration projects and a nearly equal number of foundation-funded projects that address school to work transition and employment services for people with disabilities. He was an original consultant in the development of the *Bridges from school to work* program of the Marriott Foundation for People with Disabilities, which has since been replicated and established in several national locations with the help of TransCen and which has resulted in the employment of over 6,000 people with disabilities. Dr. Luecking and his colleagues at TransCen are currently partners in the National Center on Secondary Education and Transition for Youth with Disabilities and the National Collaborative on Workforce and Disability for Youth.

Richard Radtke, Ph.D., recently retired as a Full Professor in Biological Oceanography, in the School of Ocean and Earth Sciences and Technology at the University of Hawaii. Some of his other interests include photography, scuba diving, fishing and sailing. He is credited with over 70 publications and numerous scientific meeting presentations. His experiences at sea include two trips to Antarctica and he is the first scientist with a disability to accomplish research in Antarctica, for which he was awarded a U. S. Presidential Commendation, just one of many awards and honors he has been accorded. Dr. Radtke is presently President and CEO of the Sea of Dreams Foundation, a non-profit organization dedicated to providing disadvantaged groups, especially individuals who experience disabilities, the opportunity to learn and achieve their fullest potential and quality of life. Recently, Dr. Radtke received a US Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring for his work with Sea of Dreams (one of ten in the nation).

Robert A. Stodden, Ph.D. is Director of the Center on Disability Studies and the National Center for the Study of Postsecondary Educational Supports, and is a Professor of Special Education at the University of Hawaii at Manoa. He is also the current President of the Association of University Centers on Disability (AUCD). Dr. Stodden has served as chairperson of the Department of Special Education at the University of Hawaii at Manoa and Coordinator of Career/Vocational Special Needs Training Programs at Boston College. Over the past 25 years, Dr. Stodden has served as principal investigator/director of more than 100 research and training projects spanning the areas of secondary school transition, postsecondary education, and employment for youth with special learning and behavior needs. During the process of reauthorization of the Individuals with Disabilities Education Act (IDEA) of 1997, Dr. Stodden served as a Kennedy Senior Policy Fellow with the Disability Policy Subcommittee in the United States Senate, drafting and negotiating much of the transition service language found in the legislation. He currently serves on numerous association and editorial boards and has an active record in the field for more than twenty years.

Terry Thompson is Senior Computer Specialist with the University of Washington (UW), where he divides his time between AccessIT, the National Center on Accessible Information Technology in Education, and AccessSTEM, the Northwest Alliance for Access to Science, Technology, Engineering and Mathematics. He has presented at numerous national conferences, seminars and workshops on the topic of technology accessibility. Prior to his work with the University of Washington, Mr. Thompson served as Coordinator of Assistive and Information Technology at North Carolina State University, and as Coordinator of the Computer Learning Center at Independence, Inc., the independent living center in Lawrence, Kansas. He received his Bachelors Degree from Purdue University, and pursued his Masters in Special Education at the University of Kansas.

Abstracts of Papers

The following are abstracts of papers presented at the *Technology Capacity Building Institute*. The complete papers can be found at <http://www.ncset.hawaii.edu/institutes/april2003/papers/default.htm>

Findings from the Study of Postsecondary Education: Implications for the Value of Technology for Students with disabilities in Secondary School and Transition

Robert A. Stodden, Ph.D. & Megan A. Conway, Ph.D.

University of Hawaii at Manoa

Over the last twenty years, changes in the nation's labor market have increased the importance of possessing a postsecondary education. Students who continue their education after high school maximize their preparedness for careers in today's changing economy as they learn the higher order thinking and technical skills to take advantage of current and future job market trends. For persons with disabilities, completion of some type of postsecondary education, including vocational-technical training, significantly improves their chances of securing meaningful employment. Therefore, it is necessary to ensure that youth with disabilities are fully prepared in secondary school to continue on to and to meet the challenges of postsecondary education. The successful use of technology plays a critical role in this preparation. The purpose of this article is to (a) describe findings from a five year research project at the University of Hawaii at Manoa that demonstrate the importance of postsecondary school for individuals with disabilities, (b) explore the implications of these findings for secondary school preparation, and (c) highlight the link between the use of technology in secondary school and access to and success in postsecondary education.

The Role of Technology in Preparing Youth with Disabilities for Postsecondary Education and Employment

Sheryl Burgstahler, Ph.D.

University of Washington

Access to electronic and information technology has the potential to promote positive postsecondary academic and career outcomes for students with disabilities. However, this potential will not be realized unless stakeholders assure that all individuals with disabilities have access to technology that promotes positive academic and career outcomes; learn to use technology in ways that contribute to positive outcomes; and experience a seamless transition of availability of technology as they move through educational and career environments. This paper explores the role technology can play in helping students with disabilities successfully transition to postsecondary studies and employment. It (a) defines terms, (b) provides examples of electronic

and information technologies and their applications in precollege and postsecondary education and employment, (c) summarizes legal issues that apply to technology access for students with disabilities in precollege, postsecondary, and employment settings, (d) explores promising practices and, (e) lists topics for future research. Ultimately, assuring that all of the educational and employment opportunities that technology provides are accessible to everyone will strengthen our economy and promote equal opportunities in all adult life activities.

Computer-Supported Studying: Stories of Successful Transition to Postsecondary Education

Lynne Anderson-Inman, Carolyn Knox-Quinn and Mark Szymanski

University of Oregon

Note: This paper was originally published in Career Development for Exceptional Individuals (1999), 22(2) 185-212.

This paper describes the use of “computer-supported studying” as an approach to helping students with disabilities develop and apply skills needed for successful transition from secondary to postsecondary education. The paper provides vignettes of three students with learning disabilities who participated in one of three federally funded projects designed to research the impact of computer-supported studying on student retention and academic achievement. Each vignette describes the way in which technology was used to minimize the negative impact of the student’s disabilities and build upon the student’s learning strengths. Results revealed that students who successfully adopted a computer-supported approach to studying also successfully adapted to the instructional demands of postsecondary education. Results are interpreted in terms of the literature on cognitive strategy instruction as well as the literature on social constructivism.

Spokes in the Wheel: The Critical Role of All Players in Making Technology Accessible

Terry Thompson

University of Washington

The wheel: A smooth ride depends on the strength of each of spoke, and no spoke provides its support in isolation. Spokes support one another, and operate in relationship to one another. Like spokes in the wheel, a variety of players, individually and through relationships with one another, play critical roles in making technology accessible. As electronic and information technology continues its exponential growth toward permeating all aspects of contemporary society, it also continues to offer great potential to individuals with disabilities in attaining independence, including their K-12, postsecondary and career goals. However, in order for this potential to be realized, all players must be educated about their roles, must accept their roles, and must fulfill their roles in making technology accessible to all users. Players include consumers, technology developers (including developers of assistive technology, operating systems, software applications, user agents, and authoring tools), standards organizations, K-12 and postsecondary schools, employers, advocates and legislators. This paper examines the role of each of these players, and explores the relationships between players.

AT, UD, UDL and Improved Learning Opportunities

Chuck Hitchcock

National Center on Accessing the General Curriculum (NCAC)

This article addresses the benefits that are likely to derive from shifting our focus to developing and implementing a Universally Designed Curriculum. It considers the goals for learning, the learning materials, the instructional methods, and the learning assessments. Benefits are

expressed in terms of improved access, participation and progress in the general education curriculum. Some of the forces that support UDL and possible barriers are addressed. Appropriate uses of technology within UDL educational learning environments are also addressed. Assistive Technology, Universal Design, and Universal Design for Learning are defined and pointers to additional resources are listed.

The Role of the Rehabilitation Counselor in Procuring Assistive Technology to Facilitate Youth with Disabilities Success in Postsecondary Education

Peg Lamb, Ph. D.

Holt Public Schools

Business leaders across the country are clamoring for highly skilled workers in all industries to fill the large void left by the retirement of the “Boomer Generation” and to meet the demands of a technological global economy. The U.S. Department of Education has reported that postsecondary education is the entryway to professional and technical training and higher wages. Youth with disabilities are pursuing postsecondary education in greater numbers in the last two decades, however with limited success. Given the present vacancies in the workforce and the projected future needs, it is critical that youth with disabilities succeed in postsecondary education in order to access high skilled jobs. Access to assistive technology has the capability to facilitate positive educational and career outcomes in postsecondary education. Rehabilitation counselors play a critical role in transitioning youth with disabilities through postsecondary education and into employment. However, little is known about the role of the counselor in the transition process, or the types of supports students with disabilities believe are necessary to succeed in postsecondary education. This paper discusses the findings from a study designed to investigate these issues as well as implications for policy and practice.

Doing It The Company Way: Employer Perspectives On Accommodations And Workplace Supports

Richard G. Luecking, Ed.D.

TransGen, Inc.

Note: A version of this manuscript was originally prepared for the National Capacity Building Institute, “Supporting Individuals with Disabilities across Secondary School, Postsecondary School, and Employment” Honolulu, HI, March 6-8, 2002.

This paper examines workplace supports that have proven effective for people with disabilities and relates them to employer perspectives of hiring and accommodating people with disabilities. Employment supports are also examined using an organization development (OD) framework that often influences general human resource management. A review of the literature and two case studies illustrations strongly suggest that employer attitudes toward disability are less significant when making hiring decisions than other factors, notably the identification of workplace supports and interventions that also contribute to improvement of companies’ operational and organizational processes. Combining disability employment interventions with OD interventions can facilitate the achievement of a more accessible workplace for people with disabilities. Implications for education and employment programs are discussed.

Summary of Findings

The following paragraphs provide a summary of the group discussions conducted at the *Technology Capacity Building Institute*. For details, consult the next section of these proceedings. The discussion groups were organized around three levels - precollege, postsecondary and

employment. Group members were asked to discuss barriers to technology at their assigned levels and then develop a list of recommendations for policy, practice, and research.

Primary stakeholders (i.e., who cares or is impacted the most regarding technology use by people with disabilities) include students with disabilities and their families; K-12 and postsecondary educators and administrators; K-12 special educators, college disability support staff; vocational rehabilitation (VR) counselors; local, state, and federal policy makers; textbook and technology publishers; employers.

Barriers to technology access include lack of awareness of K-12 and college educators, employers, and vocational rehabilitation counselors regarding the technology that is available; limited funding to purchase technology; inadequate technology knowledge of K-12 educators, college faculty and employers; lack of integration of technology services between departments in educational settings.

Barriers to maximizing the effective use of technology include the limited ability of students with disabilities to self-advocate for technology to accommodate their needs; lack of staff and student knowledge regarding the wide range of potential applications of technology at precollege, postsecondary, and employment levels; insufficient follow-up after initial employment by a responsible agency.

Barriers to a smooth transition of technology from K-12 to postsecondary education to employment include students' limited development of self-determination and self-advocacy skills (in terms of learning new technologies and advocating for access in precollege, postsecondary, and employment settings); lack of integration of technology training and availability at each level.

Policy recommendations:

- Allocate specific funds to purchase technology for people with disabilities in precollege, postsecondary, and employment settings.
- Require technology and accessibility training for all stakeholders and include training in technology and accessibility as a part of the professional certification and re-certification process for educators at K-12 and postsecondary levels.
- Provide technology training for students with disabilities and their parents at the precollege level and include a technology component in IEP/transition plans to address long-term needs in postsecondary education and employment.
- Promote universal design in precollege, postsecondary education and employment as an approach that benefits everyone in these settings, and require textbook publishers and technology companies to develop their products in accessible formats to benefit users with a broad range of abilities and disabilities.

Practice recommendations:

- Allocate funds for adaptive technology that is consistent for all school districts and colleges. Monies should also be readily available for technology in the workplace.
- Provide training in technology and accessibility for educators, employers, students with disabilities and families, and develop work-based learning experiences for students that require them to advocate for technology and apply technology.
- Include specific technology recommendations in IEPs and transition plans and provide technology assessments for high school students to determine their needs in postsecondary education and employment settings.
- Promote awareness of the benefits of universal design for all students at the precollege

and postsecondary levels, and in the workplace, and require that accessibility be considered in the technology procurement process.

Research recommendations:

- Allocate funds to research and compile a comprehensive guide of available technology solutions and funding sources, and identify best practices in the use of technology.
- Survey people with disabilities in the workplace to determine what technology is most useful for them, how they learned to use it, and the source of funding for their technology . Research should address whether technology training in precollege/postsecondary school leads to positive employment outcomes.
- Research the graduation rates of students with disabilities who are provided with training in the use of technology at the elementary/middle school level rather than at the high school level. Study the role of the rehabilitation counselor in procuring technology to facilitate the transition of students with disabilities from postsecondary education to employment.
- Research the impact of universal design on the success rate of students with disabilities in postsecondary education, and research the benefits of universal design in terms of productivity, efficiency, and safety in the workplace.

Notes from Discussion Groups

The following comments reflect key points that emerged from the *Technology Capacity Building Institute* discussion groups. During the brainstorming sessions participants were encouraged to contribute a wide variety of ideas and experiences.

Barriers to Technology for Precollege Students

Who are the primary stakeholders regarding this issue at the precollege level (i.e., who cares most and/or is impacted most)?

- Students with disabilities
- General and special education teachers
- K-12 support personnel (high school counselors, speech and language therapists, assistive technology specialists, information technologists, transition specialists, paraprofessionals)
- Families
- School, district, regional, and state administrators of K-12 education
- Instructors of teacher preservice and inservice programs
- Textbook and curriculum publishers and technology producers
- Postsecondary educators, administrators, and technology support staff
- Vocational rehabilitation counselors
- Employers
- Legislators
- Taxpayers.

What are the barriers to access to technology for individuals with disabilities at the precollege level?

- Inadequate technology support
- Lack of integration of services
- Low expectations on the part of teachers

- Limited funding and resources
- Lack of knowledge about what kind of technology resources are available
- Inadequate training/professional development for teachers and technology support staff
- Lack of parental involvement and support
- Least-cost or minimum legal obligation approach instead of a need-based approach
- Lack of initiative to take a proactive approach to technology as an accommodation
- Inaccessible design of software
- Lack of integration of services and departments
- Lack of time for teachers, students, and technology specialists to research and learn how to use new technology.

What are the primary barriers to maximizing the effective use of technology for individuals with disabilities at the precollege level?

- Lack of awareness of what is available and of best applications
- Negative attitude or lack of interest of general and special educators; technology accommodations often become secondary to other issues such as discipline and attendance
- Low expectations for students with disabilities
- Low self esteem, lack of self-determination skills, and “learned dependence” of students with disabilities
- Poor testing and assessment methods
- Cost of technology and software
- Lack of staff and student training in technology
- Inadequate knowledge about resources that can be provided by other agencies (such as the Department of Vocational Rehabilitation, DVR)
- Inadequate technical support to maintain and troubleshoot equipment
- Lack of parent education and advocacy
- Inaccessible software
- Grade level paradigm is not flexible enough to address the developmental needs of students.

What are the primary barriers to a smooth transition of technology from elementary to secondary school for students with disabilities?

- Inconsistency in expectations of the student
- Some issues complicated by the involvement of more teachers in each student’s program
- System fosters dependence over independence
- Poor student self-determination skills
- Lack of models/strategies for incorporating technology
- Lack of awareness of need for training to use technology well; lack of continuum of training between levels.

Policy Recommendations: Precollege Level

What are your recommendations for policies that will have a positive impact on the access, use, and transition of technology for students with disabilities?

Funding:

- Policies need to provide funding to school districts to purchase and support technology for students with disabilities.

Knowledge of stakeholders:

- Policies to bridge the gap in knowledge and to enhance collaboration in technology to include training for:
 - Students
 - Educators and administrators, K-12 and postsecondary
 - Agencies
 - Legislature.
- Make sure front-line staff are trained routinely in order to keep with current technology.

Role of technology in transition planning:

- Students with disabilities need to be involved in their Individualized Education Plan (IEP) early in elementary school so they are a part of planning their program and transition to secondary education.
- Create state-level policies regarding accessible educational software, web pages, and other information technology.
- Assure that transition plans include adequate plans for technology use and transition between academic levels.

Accommodations vs. universal design:

- Require professional stakeholders to have basic knowledge of adaptive technology and universal design and to be proactive in creating accessible classrooms, computer labs, web pages, and other learning environments.
- Require publishers of school textbooks and literature to provide materials in accessible formats.

Practice Recommendations: Precollege Level

What are your recommendations for practices to be undertaken that will positively impact the access, use, and transition of technology for precollege students with disabilities?

Funding:

- Develop incentives such as tax breaks to companies that are willing to support technology and training in schools.
- Funding needs to be provided for teachers to learn about adaptive technology and universal design.
- The availability of funds for adaptive technology should be consistent for all districts, buildings, and students.

Knowledge of stakeholders:

- Integrate accessibility issues into technology training for staff, students, and support personnel at all levels.
- Coordinated services.
- Promote universal design of instruction as a best practice to get teachers to “buy into” strategies that benefit all students, including students with disabilities.
- Provide more internships and other work-based learning experiences where students with disabilities can use technology.
- Increase expectations for students with disabilities.
- Create a simple, articulated process for students with disabilities to request and receive accommodations, including technology.

Role of technology in transition planning:

- Provide adaptive technology training starting at the pre-service level for teachers and administrators.
- Promote collaboration with agencies who focus on adaptive technology.
- Include specific wording in IEPs about adaptive technology needs of students.
- Increase the availability of adaptive technology specialists at the K-12 level to assess technology needs, purchase products, and train stakeholders.
- Include parent involvement and training in technology needs assessments.
- Provide appropriate technology for all students to support learning differences (not just disabilities).
- Increase supports for students with disabilities in state-wide transition improvement plans.
- Provide an adaptive technology assessment for students with disabilities prior to leaving high school to determine what they need to be successful in college and careers.
- Assure that high schools provide quality work experiences for students with disabilities.
- Increase connection and communication between schools and adult services such as DVR.
- Make sure that students with disabilities exit high school with the skills they need to self-advocate so that they can communicate with college faculty and employers about the accommodations they need, including adaptive technology.
- Set up teams that include parents, special education teachers, regular education teachers, administrators, technology specialists, and students with disabilities to help in decision making and planning for technology purchase and use.

Accommodations vs. universal design:

- Promote awareness-building regarding the benefits of universal design.
- In special education teacher evaluations rate their knowledge and implementation of adaptive technology in their practice.
- Require ongoing training in adaptive technology for teachers and technology support staff.
- Develop and enforce standards for consideration of accessibility and universal design in technology purchase and use.
- Provide pre-service and in-service training on multiple intelligences and other learning differences.
- Increase access to Capacity Building Institutes like this for teachers of students with disabilities!

Research Recommendations: Precollege Level

What are your recommendations for research related to the access, use, and transition of technology for precollege students with disabilities?

Funding:

- Research companies should be willing to supply or donate technology.
- Conduct research on who is funding technology for other agencies and what other groups are already receiving funding.

Knowledge of stakeholders:

- Research the best ways to train stakeholders.
- Survey successful people with disabilities about what technology worked for them, how

they got it, how they used it, and who funded it.

- Explore what technology accommodation practices have been successful for employers.
- Compare graduation and transition success rates for students with disabilities who had good technology access and use at high schools with an adaptive technology focus compared with those who did not.

Role of technology in transition planning:

- Investigate the impact of technology skills for students with disabilities who transition from high school to college.
- Investigate the impact that technology access and use have on the students with disabilities completing postsecondary education.
- Research best practices of vocational rehabilitation counselors in facilitating the transition of students with disabilities from postsecondary education to employment regarding technology issues.
- Look at graduation and success rates for students with disabilities who are provided with technology at an earlier rather than later point in their education.

Accommodations vs. universal design:

- Develop and research pilot projects that solicit support from technology companies to increase capacity of technology in schools to meet the “no child left behind” mandate.
- Research the impact of universal design on the success rate of students with disabilities in postsecondary education.
- Determine the long-term benefits of universally designed products in terms of productivity, safety and efficiency in the workplace.

Barriers to Technology for Postsecondary Students

Who are the primary stakeholders regarding this issue at the postsecondary level (i.e. who cares most and/or is most impacted)?

- Students with disabilities
- Family
- Providers including disabled student services (DSS) staff and administrators and technology support staff and administrators
- Faculty
- Career counselors and academic advisors
- Financial aid counselors
- Administrators
- Equal Opportunity Office and non-traditional and minority student organizations
- Distance education programs
- Libraries and other student services
- Classroom support services
- Student groups
- Student housing office
- Textbook publishers
- Technology providers
- Department of Vocational Rehabilitation.

What are the barriers to access to technology for postsecondary students with disabilities?

- Lack of awareness of the need for accessible technology
- Misconceptions about what is and is not accessible
- Lack of knowledge about available resources and technology for all stakeholders
- Lack of funds
- Negative attitudes about non-traditional learning
- Faculty resistance to change
- Lack of coordination of resources and services between departments and between faculty and students
- Lack of policies for purchase, development, and use of accessible technology
- Incompatibility of computers, operating systems, and software with adaptive technology
- Physical access (e.g., no elevators in building where computers are located)
- Lack of time for technology specialists to research products for specific populations and students and to keep pace with rapidly changing technology
- Students with disabilities inadequately prepared to request and use appropriate technology
- Lack of clarity about who is responsible for providing adaptive technology
- Misconceptions about complexities of adaptive technology solutions
- Lack of support for troubleshooting and maintenance
- Lack of knowledge about what features are already built in to standard products regarding accessibility
- Lack of staff devoted to assuring access to technology.

What are the primary barriers to maximizing the effective use of technology by postsecondary students with disabilities?

- Student avoidance of stigma associated with using adaptive technology and DSS services and desire to not stand out
- Technology that is fine-tuned to meet the needs of individual students
- Student reluctance to learn new technologies and desire to stick with what is familiar
- Lead time required to obtain and set up adaptive technology especially at the start of the term; lack of advance planning and collaboration between students, faculty, DSS staff, and technology specialists
- Course materials provided only in inaccessible formats
- Instructors not having materials ready in advance, or even once the class is going, resulting in inaccessible materials
- Students reluctant to self-disclose to professors because they anticipate discrimination
- Inadequate knowledge of current technology and resources of stakeholders
- Lack of disability awareness in general on the part of campus stakeholders
- Lack of clarity about who is responsible for providing accessible technology and inadequate coordination of services
- Misconceptions about complexities of technology
- Inadequate resources for installation, support, and maintenance
- Inaccessible computer facilities
- Lack of awareness of needs of students with disabilities
- Inadequate self-advocacy and disclosure skills on the part of students with disabilities
- Lack of commitment by high-level administrators
- Inaccessible design of online material
- Inadequate number of staff devoted to the design of accessible technology (e.g., Web pages) and the purchase and support of adaptive technology.

What are the primary barriers to a smooth transition of technology between precollege and postsecondary education for students with disabilities?

- Variations between K-12 school districts regarding the provision of technology for students with disabilities
- Inadequate communication between students and counselors
- Student inability to effectively self-advocate
- Lack of adaptive technology evaluation for students with disabilities
- Lack of funding
- Lack of standards regarding technology used, requiring that students learn new technology systems once they get to college
- Technology that students use in high school doesn't transition with them to college
- Differences in expectations regarding self-advocacy
- Lack of stakeholder awareness about what is involved in transition.

Policy Recommendations: Postsecondary Education

What are your recommendations for policies that will have a positive impact on the access, use, and transition of technology for students with disabilities?

Funding:

- We need stronger mandates for universal design and access across all environments.
- Provide incentives for postsecondary institutions to spend money on accessibility (e.g., grants for assistive technology).
- It should be required that universal design be taken into account in the design phase of developing Web sites, computer labs, and other technology-enhanced learning environments since it is less expensive to make things accessible in the beginning than to retrofit at a later date.
- Develop procurement policies requiring the purchase of accessible technology.
- Develop policy statements that address who pays for accessibility in specific situations.

Knowledge of stakeholders:

- Require technology and accessibility training for all stakeholders.
- Provide individualized technology assessment for students.
- Include accessible technology issues in the professional certification and recertification process for educators.
- Assure better communication between providers and users.
- Have postsecondary staff assist with developing transition plans as part of student exit IEPs.
- Give incentive (research credit) for people wanting to take accessible technology training classes.
- Include people with disabilities in the development and implementation of policies, procedures, and practices.
- Develop a standard expectation for K-12 educators and administrators who work with people with disabilities so that there is more consistency of services and training.
- Back-up mandates with funding.

Role of technology in transition planning:

- Mandate that technology a high school student uses will stay with them when they graduate, at least for the first term of college, in order to facilitate the transition process.
- There should be a technology consultant assessment with people who register with DSS.

- During high school offer training to students with disabilities and parents training regarding technology use as part of transition planning.
- Wherever possible, deploy “universally designed” technology in K-12 and postsecondary educational settings.

Accommodations vs. universal design:

- Promote universal design with faculty so that they understand how universal design is beneficial for all students, not just students with disabilities.
- Show Web page and software programmers and technology companies that there is a market beyond the disability market for universally designed products.

Practice Recommendations: Postsecondary Education

What are your recommendations practices to be undertaken that will positively impact the access, use, and transition for postsecondary students with disabilities?

Funding:

- Revise the system so that technology funding follows the student from secondary to postsecondary school.
- Tap into student technology fees to support adaptive technology.
- Look for outside sources of funding; utilize grant opportunities.
- Gain administrator support.
- Develop procedures for purchasing accessible technology.

Knowledge of stakeholders:

- Develop training for faculty and students; provide professional development opportunities for faculty and staff.
- Build universal design into existing courses.
- Offer a for-credit course on accessible technology.
- Integrate accessibility into existing technology training for faculty and staff.
- Send a publication to faculty at the start of term regarding accessible practices and resources.

Role of technology in transition planning:

- Collaborate with K-12 support services.
- Make accommodations timely.
- Include understanding and use of technology in the transition process.
- Provide ongoing support beyond initial contact.
- Give youth opportunities to develop self-determination skills.
- Provide an academic coaching and mentoring program to students; locate successful people with disabilities in employment to serve as mentors.

Accommodations vs. universal design:

- Identify a “hub” for universal design efforts.
- Identify a point person in procurement/purchasing to assure that accessibility is considered in product purchasing decisions.
- Provide/reward good examples of the application of universal design.

Research Recommendations: Postsecondary Education

What are your recommendations for research related to the access, use, and transition of technology in postsecondary education by students with disabilities?

Funding:

- Survey funding models for assistive technology purchase and support in higher education.
- Identify and publish best practices.
- Research and compile a comprehensive guide of available technology solutions and funding sources.

Knowledge of stakeholders:

- Assess the specific needs of stakeholders.
- Determine whether accessibility training leads to positive measurable outcomes.
- Determine what training methods are most effective; disseminate best practices.
- Identify technology access and use that helps students succeed in postsecondary education.
- Learn about success strategies from people with disabilities who are employed.
- Determine what motivates people with disabilities to become mentors.

Role of technology in transition planning:

- Identify specific barriers to a seamless transition.
- Identify and promote best practices.

Accommodations vs. universal design:

- Measure how universal design technology benefits everyone.
- Conduct a cost-benefit analysis of universal design vs. accommodation.
- Identify and disseminate best practices.
- Identify other populations that can benefit from adaptive technology and universal design (e.g., ESL students, aging population).

Barriers to Technology for Employees with Disabilities**Who are the primary stakeholders regarding this issue at the employment level (i.e., who cares most and/or is impacted most)?**

- People with disabilities, especially those transitioning to postsecondary education and employment
- Parents/ families of people with disabilities
- Employers, human resource departments, hiring managers
- Other employees, including supervisors, subordinates, and co-workers
- DVR and placement agencies
- High school and postsecondary educators and administrators
- Local, state, federal government
- Medical professionals and other Health professionals (e.g., medical doctors, occupational and physical therapists)
- Insurance companies
- Job coaches
- Tax payers.

What are the barriers to access to technology for employees with disabilities?

- Lack of funding for technology and training
- Lack of information and awareness on the part of stakeholders
- inadequate training, implementation and follow-up
- Employer fear of legal issues

- Productivity concerns of employers
- New barriers created by the evolution of technology
- Negative attitudes and stereotypes on the part of employers and co-workers
- Bureaucratic barriers in education and DVR
- Intimidation due to lack of awareness of AT legislation
- Jealousy by co-workers because people with disabilities are treated as “special”
- Lack of self advocacy skills of people with disabilities; fear of being different.

What are the primary barriers to maximizing the effective use of technology for employees with disabilities?

- Poor preparation and transition plans at the high school level
- Insufficient follow-up after initial placement by DVR or other service
- Lack of self-advocacy skills of people with disabilities
- Inadequate consultation regarding the specific needs for the employment setting.

What are the primary barriers to a smooth transition of technology from school to work for people with disabilities?

- Lack of initial and ongoing training of stakeholders to keep up with current technology
- People with disabilities reluctance/hesitation to use technology and advocate for themselves
- Lack of outside support (e.g., DVR) for some people with disabilities who do not qualify for assistance
- Lack of role models for people with disabilities
- Lack of early work experiences
- Lack of applications of universal design in the workplace
- Lack of career preparation for people with disabilities
- Lack of funding for adaptive technology, especially in low socioeconomic areas
- Unrealistic expectations when students with disabilities go to work
- Challenges related to moving from a high tech school to a low tech job or from a low tech school to a high tech job
- Having a too narrow focus for employment preparation
- Unavailable transportation (e.g., lack of bus service at on needed days)
- Not enough early identification of transition needs by parents, teachers and advisors
- Limited coordination between professionals.

Policy Recommendations: Employment Settings

What are your recommendations for policies that will have a positive impact on the access, use, and transition of technology for employees with disabilities?

Funding:

- Assure better communication between levels and agencies to create smoother transitions; provide increased funding for people to collaborate.
- Specifically allocate state funds to purchase adaptive technology, making the allocation related to the number of students with disabilities at a particular location.
- Institute something similar to the Computer/Electronic Accommodations Program (CAP) (a federally funded program to provide adaptive technology for any federal employee) at the state level.
- Offer incentives (such as tax write-offs) to companies who manufacture accessible technology.
- Offer government subsidized training.

- Develop a community resource to help students with disabilities who don't qualify for DVR purchase a computer at a reduced rate or on a payment plan.
- Assure coordination between various agencies providing funding and access to resources.

Knowledge of stakeholders:

- Increase knowledge of laws and practices for each stakeholder group and promote collaboration.
- Make training mandatory for policy-makers.
- Offer accessible technology endorsements within education fields.

Role of technology in transition planning:

- Include a technology component in IEP transition plans, looking at long-term needs in technology for postsecondary education and employment.
- Assure coordination between agencies.
- Gain high-level buy-in.
- Require training for teachers.

Accommodations vs. universal design:

- Get the word out about how universal design benefits everyone.
- Add universal design components to preservice education programs.
- Require training on adaptive technology and universal design for educators.
- Assure front-line staff training regarding universal design in order to take advantage of readily available accessibility features; publications that highlight built-in access features.
- Assure consistent implementation of universal design guidelines for technology (e.g., Web pages) across all districts.

Practice Recommendations: Employment Settings

What are your recommendations for practices to be undertaken that will positively impact the access, use, and transition of technology for employees with disabilities?

Funding:

- Assure better communication among agencies such as a network of employers that share accommodation/access practices, success, and funding issues.
- Allocate more money for technology for people with disabilities at secondary and postsecondary levels.
- Provide tax incentives for employers purchasing adaptive technology.
- Publish a set of consistent guidelines regarding the use of adaptive technology in the workplace.
- Set aside funds for the purchase of accessible technology.

Knowledge of stakeholders:

- Provide disability simulations and related awareness activities.
- Share information about Federal targeted tax credits.
- Encourage disability consumer and related groups to advocate for accessible technology.
- Help employers learn to view hiring people with disabilities as good business practice.
- Provide training and cross-training between stakeholders; especially employers, people with disabilities, and educators.

- Promote student participation in work force offices and transition fairs.
- Provide information and education to parents regarding IDEA and Section 504.
- Provide better training for job coaches.
- Break down stereotypes using education and mentoring.
- Communicate with policy makers.
- Set up a clear and concise process for obtaining accommodations, including technology.
- Implement more community awareness events such as National Disability Mentoring Day.
- Provide work-based learning experiences for students with disabilities that involve human resource personnel to allow them to practice how to accommodate employees with disabilities.

Role of technology in transition planning:

- Include technology in IEPs.
- Provide education on how technology and accessibility can benefit all employees.
- Provide technology assessments for high school students.
- Provide quality internships and other work-based learning experiences where there is use of technology in an employment context.
- Increase knowledge of stakeholders about readily-available accessibility features and low-tech strategies.
- Integrate resources and work of funding agencies.
- Provide information to parents, students, and support groups (such as PAVE) regarding IDEA and Section 504.

Accommodations vs. universal design:

- Apply universal design to the job site.
- Use readily accessible accommodations; including low-cost, low-tech options.
- Breakdown stereotypes; education of employers.
- Train people with disabilities on how to educate employers about accessibility.
- Share innovations among management.
- Train with front-line staff regarding universal design.
- Replicate successful practices and programs.
- Transfer lessons learned in the education environment to the business environment.
- Show companies how the universal design can benefit them.

Research Recommendations: Employment Settings

What are your recommendations for research related to the access, use, and transition of technology for employees with disabilities?

Funding:

- Identify various funding sources for training.
- Determine at what rate tax credits are utilized for workplace accommodation for people with disabilities; assess what impact the tax credits have on hiring practices.
- Research how well technology companies are informed about adaptive technology needs and how their awareness can be increased.
- Research best practices of companies currently providing adaptive technology for one or more employees.
- Determine the average cost of accommodations per employee.
- Locate grants available to fund technology.

Knowledge of stakeholders:

- Explore how people with disabilities can market themselves and their technology skills for gaining employment.
- Develop a broader understanding of accessibility, universal design in a manner that makes it inviting to employers.
- Identify employer needs in the workplace.
- Research strategies that positively influence employers to hire people with disabilities.
- Locate employers and employees that have successful working relationships and determine what makes the relationship work for them.

Role of technology in transition planning:

- Determine what technology is most utilized and transferable from postsecondary education to the workplace, from secondary education to the workplace, and from workplace to workplace.
- Compare advanced high school programs (schools that above average regarding accessible computer and science labs) to see if this makes a difference in post high school success.
- Research how much employers know about disabilities and accommodations and what are their fears and attitudes.
- Gather and disseminate successful practices.

Accommodations vs. universal design:

- Promote universal design concepts.
- Determine what works for special education, what works for general education, and what works for employment.
- Develop a better understanding of universal design implementation and evaluate its impact on success of all students and employees.
- Predict what products are currently being used as an accommodation but may soon become part of the universal design of products (such as speech to text software); determine implications for people with disabilities.
- Determine the long-term benefits of universal design for society as a whole (e.g., workers compensation, productivity, efficiency, safety).

Sample Content from the Pre and Post-Institute Online Discussions

Participants in the *Technology Capacity Building Institute* engaged in lively discussions using an online bulletin board system both before and after the Institute. The following excerpts provide a sample of the content of the discussions.

Topic: Stakeholders and Incentives

Original Message: A lot of the messages posted in this discussion board point out the many challenges in gaining access to computers, learning to use them effectively and transitioning between academic levels. ... [For example:] How can stakeholders assure that all individuals with disabilities have access to technology that promotes positive academic and career outcomes? That all people with disabilities use technology in ways that contribute to positive postsecondary academic and career outcomes and self-determined lives? That there is a seamless transition of availability of technology for all people with disabilities as they move from K-12 to postsecondary to career environments? Regarding access to technology, participants at the CBI will explore solutions that:

- apply universal design principles to create accessible technology and learning environments;
- assure that assistive technology and other accommodations are provided to students with disabilities in order for them to have independent access to all of the functions and applications of technology.

Response: One point I heard when I first started in the adaptive technology realm was that those providing AT would need to make money doing that line of work or there'd cease to be development in that arena. Likewise, the explanation I've heard for high priced AT is that there isn't a wide market appeal/need for the products so the costs must be incurred by fewer people, most often those with the least financial resources. I've wondered what can be done to allow AT software/hardware makers to earn a living AND keep prices down. Would quantity purchases by states, or other large agencies help reduce costs for the end user (just as it is cheaper to be insured as an employee in a large firm)? What role can government play in providing research funding to create the AT advancements of the future without stifling creative advancements?

Response: ...[I attended a presentation by the CEO of] a not-for-profit high tech company whose slogan is "Technology Serving Humanity". [They are] involved with an amazing array of projects, from improving technologies that detect and remove landmines to "bookshare.org", their service for increasing access for people with disabilities to print media. [They] also have a strong interest in making handhelds fully accessible, and have been working with Palm and others toward this goal. Their vision, however, goes beyond simply creating handheld-based AT. They're envisioning an accessible wireless handheld as the common user interface by which users with disabilities access devices in their environment, including ATMs, vending machines, elevators and other appliances. Such devices might also have cameras with built-in optical character recognition, so they can read signs, and built-in GPS so they can assist with navigation. ...The only way to get computers into the hands of students of all socioeconomic levels, particularly during financially difficult times, is to provide computers at a rock bottom price. As computer parts continue to get smaller and cheaper, a \$100 handheld in the near future could conceivably have the processing power of today's desktops. ...K-12 schools with strained budgets can buy far more handheld computers than desktops. ...That said, however, technology solutions don't solve all the problems, as they need to be supplemented with human solutions like counseling, support, and training. How can the human solutions also be delivered at low cost, without leaving people out?

Response: I think that as we see more affordable solutions, and the rise of ubiquitous computing, whether the chips we're using are in our handhelds, cell phones, or our clothing, we will see a wider mix of solutions that will allow folks to get to the tool they can effectively and appropriately use more easily. In order to achieve this goal, designers need to be in the loop from the start, though, so we don't end up with the patched on solutions that are so often the case with traditional desktops.

Topic: Technology and Transition

Original Message: I have found that students with disabilities are much stronger now as self-advocates, perhaps with the exception of students with LDs, ADD, and psychological disabilities who are recently diagnosed or who never before needed to use or manage disability accommodations in high school or college. Regarding technology, especially computing tech, it is essential now that students with disabilities, particularly those with severe disabilities have their own computer and any necessary AT with it. They need to have it up and running, in their home or residence hall, when they take their first postsecondary class. . . . While the VR agency

sometimes funds computing tech, the agency does not fund it for all clients, and the funding may be delayed for long periods. Too often students and their parents don't understand the importance of computing access in today's higher ed. . . . How can we better inform and educate students, parents, high school personnel, VR counselors, etc. about the importance of computers in college, and securing the technology?

Response: These issues - AT and transition - are supposed to be covered in the IEP, but, from what I hear from parents and students, this is not always done in an effective manner. Sometimes they don't have the right people at the table; sometimes the group does not understand the tremendous role technology can play in promoting the success of people with disabilities in education and employment; sometimes they don't understand that these kids need support in using their technology, not just in purchasing it and that the training/support is best delivered before they get to college. . . I don't know what we can do to assure that these issues are effectively covered before the end of high school.

Response: I agree with you that it's a given: all students need personal access to a computer for academic success in postsecondary environments. And students with disabilities must have all the AT necessary to encourage their success. Having access to the library and computer lab is not easy for all students, so having their own equipment is a must. Certainly one of the biggest barriers is the lack of funds. I agree that educating teachers, advisors, and parents on the necessity of personal computers with necessary software and AT is vital, and they also must be educated on/assisted in funding strategies and access. Certainly VR isn't covering the needs. Loans, grants, scholarships and financial aid packages must include computer technology funding along with tuition, books, residence, etc. This is a basic part of access that must be discussed in the IEP college prep planning. Is this happening, as a rule? Addressing the issue after the student starts college classes is a little late.

Response: It is such a simple, logical idea that students with disabilities should have access and be able to effectively use technology that supports their academic studies in precollege and college settings. What are all the steps necessary to make this happen?

Topic: The Role of VR in Acquiring Technology for Postsecondary Students

Original Message: As a former VR Counselor, Peg Lamb's paper hit home. The availability (or lack of) of VR funding for AT in post-secondary education is a very critical issue that needs to be addressed. Peg mentions a solution: "One solution to this monetary dilemma is for rehabilitation counselors and college disabilities support staff to collaborate about the assistive technology available in colleges and universities and the process for accessing the equipment." I couldn't agree more. However, the dilemma goes even deeper. In addition to funding concerns, many state VR agencies have now implemented an Order of Selection (OOS) priority system, in which available VR funding and services are given to "the most severely disabled" first. The two other subgroups of VR participants are "severely disabled" and "non-severely disabled." Depending on how many people are being served and how much funding is available, many people who fall into the latter two groups may go on a waiting list. Many will not see any services at all, especially the "non-severes." . . . a large number of high school students with learning disabilities (LDs) are categorized as being "non-severely disabled." Many people with LDs can really benefit from AT, yet once again they are falling through the cracks. Not only are they ineligible for VR funding, but they are also ineligible for basic counseling and guidance. If they don't have the appropriate AT and support in high school, who is going to facilitate their transition to college? As stated in other discussion threads, systemic change needs to start at the secondary level, especially for this disability group.

Response: Yes, I agree with the need for systemic change at the secondary level. Why are so many students with disabilities transitioning to adult life (college, other postsecondary education, employment) without the technology and the skills they need to maximize success?

Response: With the financial state of our country, I'm sure people would say money is the biggest barrier to this right now. But, I think that a key barrier is that people in policy-making roles don't understand the importance of this.

Response: How exactly is the assessment of "most disabled" arrived at and what is the objective of that priority? I'm wondering if someone with a disability that is rated as less severe, with proper funding/resources would transition away from dependency on VR and would instead be self-sufficient once trained and employed, whereas some with more severe needs would continue to need a great deal of assistance.

Response: The main objective in DVR is to enable someone to become successfully employed. The more functional limitations and resulting barriers to employment one has, the more priority they have for services. Severity of disability is based on a checklist of various indicators within 7 categories: Mobility, Work Tolerance, Communication, Self-Care, Interpersonal Skills, Self-Direction, and Work Skills. Someone with a significant LD will obviously not meet many indicators in this system and therefore will most likely go on a waiting list or not receive services at all.

Response: It would be wonderful if the school districts had a program similar to the Computer/Electronic Accommodations Program (CAP) that promotes AT, accommodations and the inclusion of people with disabilities in the Federal Government (www.tricare.osd.mil/cap). What is the main barrier for such a program? Money? Attitudes? Low priority?

Topic: Employment Perspectives and Workplace Supports

Original Message: It's apparent that many employers feel more comfortable with a workplace support system to transition new employees with disabilities. Traditionally, this has been an outside system consisting of a job placement agency for people with disabilities and/or State Vocational Rehabilitation. As part of DO-IT's new NW Alliance Grant, one of our objectives is to place high school and college students with disabilities (in Washington, Alaska, Idaho, and Oregon) into paid internships (in the science, technology, engineering and math fields). Many of these students may not be involved with placement agencies and VR, so supports for internship placements are going to be an interesting challenge. I'm looking forward to hearing some ideas and perspectives!

Response: In the absence of a formal relationship with VR or other employment support entities, it is helpful for job seekers to first outline how their individual competencies will benefit the employer's enterprise, and then disclose the need for accommodations in the context of how such accommodations will affect the internal quality of the company.

Response: The circumstance you describe requires self-advocacy that shows the employer how company operations improve when accommodations are made for an individual. Another example: computer macros that speed up keyboarding for an individual using a light scan keyboard can also be adopted to enhance the productivity of other workers.

Response: When you find students with disabilities in high school and college with whom you arrange job experiences, do they usually have a pretty good skills with mainstream technology and assistive technology when needed, or do they lack technology skills?

Response: Many of the college students we have worked with seem to have adequate self-advocacy skills and good knowledge regarding their adaptive tech needs. Many high school students, on the other hand, may need extra preparation and support prior to an internship. [There is a] potential need for technical support to keep some of the adaptive tech, or software, up an running. . . . Students may be knowledgeable about their adaptive tech, but addressing some common glitches in the software interface, for example, may require outside expertise. . . . I am wondering what the best approach would be to establish back-up technical support to address potential “malfunctions”[in internships]. Should the employers be trained? Should students know how to troubleshoot their technical glitches? Should we enlist the support of outside organizations/agencies who specialize in setting up adaptive tech?

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