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FROM THE EDITOR

JAMES MARTIN

I became the JPED editor with Volume 20, Issue 1, which was published in 2007, and my time as editor will end when Volume 23, Issue 3 is published in a few months. During this time, JPED increased from two to three annual issues, is now indexed by EBSCO and ERIC, and full-text downloads of articles are available to the interested reader from these sources as well as from the AHEAD web site. Numerous other improvements headed by Managing Editor Richard Allegra and Production Manager Valerie Spears from the AHEAD office enabled JPED to be timely and accurately published. Thanks need to go to behind the scenes work completed by Marsha Dempsey and other graduate students, and to Donna Willis, staff assistant, at the OU ZC who kept incoming and outgoing manuscripts organized, proofed every issue, and facilitated correspondence.

My time as Executive Editor has now come to an end. I am pleased to announce that David Parker, Ph.D. has become the new Executive Editor. He has been the editor in charge of new manuscripts submitted since July 1, 2010, and the results of his editorial work will be seen with JPED Volume 24, Issue 1, when the last of the papers that I edited and the manuscripts for which he provided editorial guidance will be published together. Dr. Parker is an accomplished scholar and will provide years of dedicated service as he leads JPED into the future.

In this issue of the JPED, four research papers, one practice brief, and one book review await your discovery.

In the first article, Steven Brown and colleagues from the University of Hawaii examine literature about mentoring students with disabilities in higher education. Probably like you, I’ve heard that mentoring is an excellent strategy to improve the outcomes of students with disabilities, but I never made the time to find out the effectiveness of this strategy. Fortunately, these researchers have. They conducted a literature review to determine if evidence exists to support mentoring for students with disabilities in postsecondary education. Read their paper to find out what the literature tells us.

Stephanie Cawthon and Emma Cole examine student perceptions of their transition from high school into a selective public university. These researchers found that the students with disabilities often received more accommodations in college than they did in high school, but they did not access all the resources available. They also found that only about a third of the students discussed their disability and accommodations with faculty. Read this paper to learn more of these interesting findings.

Brad Hedrick and associates look into the differences between students with and without disabilities while taking into account enrollment in STEM (Science, Technology, Engineering, and Mathematics) and non-STEM classes. Students with disabilities view their student-faculty interactions more favorably than students without disabilities. But, students with disabilities perceive their campuses as being less supportive than students without disabilities. Read this paper to learn more details, especially where students with and without disabilities do not differ on their perceptions.

Catherine Fichten and colleagues present a study examining the effectiveness of the POSITIVES Scale to measure how well the Information and Communication Technology needs of postsecondary students with disabilities are being met. Participants in this study came from 111 postsecondary programs across all 10 of the Canadian provinces. Read this paper to learn about this new tool, and to discover interesting data on what students with disabilities think about their Information and Communication Technology resources.

The Practice Brief section of JPED provides an opportunity for emerging interventions and support strategies to be reported so that they may spark an idea for more in-depth study. The Practice Brief in this issue, written by Kate Chanock from Victoria, Australia, describes the effective and supporting relationship between a student with deaf-blindness, a disability office tutor, and an interpreter.

JPED’s intrepid book reviewer Rebecca Daly Cofer describes a book that made her more committed than ever to support students with disabilities. She warns that this book, titled After This: An Inspirational Journey for all the Wrong Reasons, presents the reality behind an acquired disability. The book also describes goal attainment and overcoming obstacles in stark detail. Rebecca tells us this has been one of the most informative books that she has read.
Mentoring Individuals with Disabilities in Postsecondary Education: A Review of the Literature

Steven E. Brown
Kiriko Takahashi
Kelly D. Roberts
University of Hawaii at Manoa

Abstract
The purpose of this literature review was to locate, describe, and analyze empirical data on mentoring individuals with disabilities in postsecondary (or higher) education. The fundamental question posed was: Is there evidence to support effective mentoring practices for students with disabilities in postsecondary (or higher) education? This paper begins with a brief description of several types of mentoring models to establish context, followed by a presentation of the parameters of the literature search. Findings demonstrate that evidence-based research about mentorship for students with disabilities in postsecondary education is minimal. Only 10 articles fit the search criteria. These articles are categorized into three areas: a) transition to higher education, b) success in higher education, and c) work and higher education. A discussion of themes in the articles reviewed is followed by suggestions for future research.

A 2005 report by the National Council on Disability (NCD) on the status of disability in the United States fifteen years after the passage of the Americans with Disabilities Act (ADA) described the importance of a college education for individuals with disabilities. The NCD stated, “Out of people ages 25-64, 43.1 percent of those without a disability graduated from college, compared with 32.5 percent of individuals with a non-severe disability and just 21.9 percent of those with a severe disability.”

Might mentoring improve those statistics? At least two authors (Burgstahler & Crawford, 2007) believe so, contending:

Mentoring relationships can occur naturally, but students with disabilities rarely have opportunities to meet adults with disabilities with the potential to be significant positive influences in their lives. Implementing an intentional mentoring program for students with disabilities can help ensure that these students are not left behind their peers in academic and career achievement (pp. 99-100).

In support of this perspective we conducted a literature review on mentoring in postsecondary (or, interchangeably in this article, higher) education asking the question: Is there evidence to support effective mentoring practices for students with disabilities in postsecondary education?

Prior to conducting this literature review, the authors’ hypothesized that there would be evidence indicating that mentoring has a positive impact on students with disabilities in postsecondary education. We discovered, however, a general lack of evidence to support this hypothesis. Only 10 articles met the established criteria. We categorized these articles into: a) transition to higher education, b) success in higher education, and c) work and higher education.

The remainder of this article is organized by a) a general description of types of mentoring, b) an in-depth exploration of the methodology, c) an analysis of each article, d) discussion, and e) suggestions for future directions.

Types of Mentoring

Mentoring, both conceptually and in practice, is ancient, existing at least since the time of Homer. The Greek author described Odysseus leaving for battle and requesting his friend Mentor to guide and protect his son in his absence (National Center on Secondary Education and Transition [NCSET], 2003). Over the
centuries, and especially since the twentieth century when organizations such as Big Brothers/Big Sisters and twelve step programs became popular, mentoring models have proliferated. Understanding mentoring in contexts other than that of disability assisted the authors in understanding how, or if, mentoring worked in a higher education setting. Therefore, different types of mentoring are described in this section as a prelude to discussions of the specific articles included in the literature review.

There are many overlapping categories of mentoring and mentoring environments. Mentoring roles include career sponsors, peer counselors or peer supporters, coaches, and mentors (Bierema & Merriam, 2002). Types of mentoring include one-on-one, group, community-based, electronic, peer, faith-based, and senior citizens (Timmons, Mack, Sims, Hare, & Wills, 2006; Axelrod, Campbell, & Holt, 2005). In a postsecondary setting, faculty may be both mentor and mentee, depending on areas of expertise (Anderson, 2000).

Each mentoring example may be found in many settings, such as employment, educational, home, or community. Table 1 provides brief descriptions of several forms of mentoring relevant to postsecondary education.

Table 1

**Sample Types of Mentoring**

<table>
<thead>
<tr>
<th>One-on-One</th>
<th>Group</th>
<th>Community-based</th>
<th>Electronic</th>
<th>Peer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-face meetings, telephone conversations, letters, email, chat rooms, social networking, text messaging, or other activity providing direct contact.</td>
<td>A Mentor works with more than one mentee at the same time.</td>
<td>Located in a community-based situation, such as a volunteer setting like a Senior Citizen’s Recreational Center.</td>
<td>Bulletin boards, listservs, discussion groups.</td>
<td>Two people of equal status, and similar situations, who share many common characteristics and experiences, for example, individuals with disabilities in a work or educational setting.</td>
</tr>
</tbody>
</table>
Foster Heckman, Brown, and Roberts (2007) defined mentoring as a dynamic, reciprocal, long-term formal, or informal relationship that focuses on personal and/or professional development. A mentor is a sounding board and guide. Mentors provide perspective, resources, and ask thought-provoking questions. In the ideal mentoring relationship, mentors and mentees, or protégés, learn from and teach each other. (p. 2)

A graphic representation of this mentoring definition is shown in Figure 1.

Another component to consider in today’s multicultural postsecondary education is cultural brokering or the importance of understanding cultural differences. Cultural backgrounds impact the ways individuals and their families may view disability and disability support services. Cultural brokering aims to bridge the divide between culture and support services. It is helpful for mentors to know about a protégé’s culture and understand how cultural differences may impact the relationship between mentor and protégé. For example, some men may find it culturally awkward to be mentored by a woman, potentially causing a strain on the mentor-protégé relationship and making it less effective than it might be otherwise.

Method

This section includes a detailed description of the search methodology. In reviewing each of these articles,
the authors sought to answer the research question, is there evidence to support effective mentoring practices for students with disabilities in postsecondary education? Three criteria were established to guide our literature search. Articles had to: a) be published in peer-reviewed journals; b) describe evidence-based research about mentoring programs focused on transition to, retention in, or matriculating from, postsecondary education; and c) be published after 1990, the year the ADA became law.

To validate the utility of mentoring in postsecondary education the authors included only evidence-based articles discussing mentoring in higher education, thereby excluding thousands of articles about mentoring in general, many of which promoted the efficacy of mentoring without demonstrating proof. The authors searched for articles published since 1990 because of the potential impact on higher education following passage of the ADA. Our literature search was inclusive of 1990 to 2007 and included one-half of 2008, when the article was submitted for publication.

We considered articles to be relevant when they a) included evidence-based literature on mentoring and disabilities, b) the main subjects of the study were students with disabilities, and c) the first two also aligned with the established research criteria. Because the majority of articles did not specifically concentrate on mentoring and postsecondary education, we then looked for data describing success in a) transitioning to, b) remaining in, c) graduating from, or d) finding a job after postsecondary education. If any article included a degree of success related to one of these four criteria, it is included in this literature review. A description of how each article addressed these topics is discussed in the three summary sections that immediately follow this section.

The authors conducted primary searches using the following electronic databases: Academic Search Premier, Psychology and Behavioral Sciences Collection, Professional Development Collection, Educational Resource Information Center (ERIC), Teacher Reference Center, Springer Link, and EJS-E-Journals. The initial search used keyword combinations referencing postsecondary education ("postsecondary," "college," "university," and "higher education") with "disabilities" and "mentor" or "mentoring." Additional keyword searches were also conducted using terms for postsecondary education in combination with "disability awareness" as well as a combination of terms for "postsecondary education," "disabilities," and either "peer support," or "natural supports." In total, 20 possible keyword combinations were used to search seven different electronic databases as shown in Table 2, listing database search terms.

Results from the electronic literature search are presented in Table 3, illustrating the total number of articles generated using 20 possible combinations of key terms and the number of "relevant" articles that met the three criteria from each database search. Since the articles generated are not exclusive to particular databases, many searches resulted in multiple returns of the same articles, leading to a seemingly large number of "relevant" articles. Furthermore, many articles included a sentence about students with disabilities and mentoring in a postsecondary education setting, but did not contain enough substance to be included in the final review.

In addition to the online keywords database search, two authors conducted manual hand-searches through a total of 38 peer-reviewed journals. The journals were selected based on relevant hits from the database search. The hand-search involved going through every abstract of all articles of each volume for the years specified. Thirty-eight hand-searched journals led to 25 pertinent hits. Detailed lists of journals and the number of corresponding pertinent hits are listed in Table 4, showing a detailed summary of the manual searches.

Because of the minimal number of articles fitting the criteria, two additional actions were taken. First, articles in English describing mentoring outside the United States were included if they matched the criteria. This increased the reviewed articles from eight to ten. Second, the lead author sent e-mails to disability and higher educations listservs to request references to relevant articles. The e-mail described the research, its parameters, and the authors’ difficulty in locatng articles meeting the criteria, concluding with a request for appropriate referrals. E-mails were posted on the following three listservs:

1. Society for Disability Studies;
2. Disability Research Discussion List (United Kingdom); and
3. Disability Student Services in Higher Education

Eight responses resulted from these emails. The majority asked to share what we discovered. Three respondents suggested over 50 articles, all but two of which had already been uncovered in the authors’ searches. Based on this feedback, one article was added to the review.
Table 2

Database Search Terms

Combinations of database search terms

1. Mentoring + Disabilities + Higher Education  
   Mentoring + Disabilities + Postsecondary Education  
   Mentoring + Disabilities + University  
   Mentoring + Disabilities + College

2. Mentors + Disabilities + Higher Education  
   Mentors + Disabilities + Postsecondary Education  
   Mentors + Disabilities + University  
   Mentors + Disabilities + College

3. Natural Supports + Disabilities + Higher Education  
   Natural Supports + Disabilities + Postsecondary Education  
   Natural Supports + Disabilities + University  
   Natural Supports + Disabilities + College

4. Peer Support + Disabilities + Higher Education  
   Peer Support + Disabilities + Postsecondary Education  
   Peer Support + Disabilities + University  
   Peer Support + Disabilities + College

5. Disability Awareness + Higher Education  
   Disability Awareness + Postsecondary Education  
   Disability Awareness + University  
   Disability Awareness + College

Note. Limiters set for the database search: 1. Between 1990-2008; 2. peer reviewed; and, 3. scholarly/journal article.
### Table 3

**Results of Database Search**

<table>
<thead>
<tr>
<th>Databases</th>
<th>Number of Hits</th>
<th>Number of Pertinent Hits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Search Premier</td>
<td>180</td>
<td>33</td>
</tr>
<tr>
<td>ERIC</td>
<td>621</td>
<td>104</td>
</tr>
<tr>
<td>Psychology and Behavioral Science Collection</td>
<td>103</td>
<td>18</td>
</tr>
<tr>
<td>Professional Development Collection</td>
<td>125</td>
<td>20</td>
</tr>
<tr>
<td>EJS-E-Journals</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>Teacher Reference Center</td>
<td>78</td>
<td>14</td>
</tr>
<tr>
<td>Disability and Society</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Springer Link</td>
<td>220</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,351</strong></td>
<td><strong>199</strong></td>
</tr>
</tbody>
</table>

Note. The number of hits includes duplication of articles.
Table 4

*Detailed Summary of Manual Search*

<table>
<thead>
<tr>
<th>Journals</th>
<th>Number of Pertinent Hits</th>
</tr>
</thead>
<tbody>
<tr>
<td>JN Disability &amp; Rehabilitation</td>
<td>0</td>
</tr>
<tr>
<td>JN Disability &amp; Society</td>
<td>0</td>
</tr>
<tr>
<td>JN Disability, Culture &amp; Education</td>
<td>0</td>
</tr>
<tr>
<td>Int'l JN of Disability, Development &amp; Education</td>
<td>0</td>
</tr>
<tr>
<td>JN of Disability &amp; Policy Studies</td>
<td>0</td>
</tr>
<tr>
<td>JN of Intellectual &amp; Developmental Disability</td>
<td>0</td>
</tr>
<tr>
<td>JN of Intellectual Disability Research</td>
<td>0</td>
</tr>
<tr>
<td>JN of Learning Disability Practice</td>
<td>0</td>
</tr>
<tr>
<td>JN Learning Disability Quarterly</td>
<td>0</td>
</tr>
<tr>
<td>JN Technology and Disability</td>
<td>0</td>
</tr>
<tr>
<td>JN of Mentoring &amp; Tutoring Partnership in Learning</td>
<td>0</td>
</tr>
<tr>
<td>College Student Journal in Professional Development</td>
<td>0</td>
</tr>
<tr>
<td>JN of Behavioral Sciences &amp; the Law</td>
<td>0</td>
</tr>
<tr>
<td>Communication and Education</td>
<td>2</td>
</tr>
<tr>
<td>JN of Community Psychology</td>
<td>0</td>
</tr>
<tr>
<td>JN of Exceptional Children</td>
<td>1</td>
</tr>
<tr>
<td>JN of Exceptionality</td>
<td>0</td>
</tr>
<tr>
<td>JN of Postsecondary Education &amp; Disability</td>
<td>1</td>
</tr>
<tr>
<td>JN of Vocational Rehabilitation</td>
<td>6</td>
</tr>
<tr>
<td>American Rehabilitation Journal</td>
<td>2</td>
</tr>
<tr>
<td>Preventing School Failure</td>
<td>4</td>
</tr>
<tr>
<td>Psychiatric Rehabilitation Journal</td>
<td>4</td>
</tr>
<tr>
<td>JN of Primary Prevention</td>
<td>1</td>
</tr>
<tr>
<td>JN of Career Development</td>
<td>1</td>
</tr>
<tr>
<td>Annals of Dyslexia</td>
<td>0</td>
</tr>
<tr>
<td>The School Counselor</td>
<td>0</td>
</tr>
<tr>
<td>American Journal of Community Psychology</td>
<td>0</td>
</tr>
<tr>
<td>Innovative Higher Education</td>
<td>0</td>
</tr>
<tr>
<td>Educational Psychology Review</td>
<td>0</td>
</tr>
<tr>
<td>Educational Studies</td>
<td>0</td>
</tr>
<tr>
<td>Int'l JN of Evidenced Based Coaching and Mentoring</td>
<td>0</td>
</tr>
<tr>
<td>Career Development for Exceptional Individuals</td>
<td>2</td>
</tr>
<tr>
<td>JN of Vocational Education Research</td>
<td>0</td>
</tr>
<tr>
<td>JN of Special Education</td>
<td>0</td>
</tr>
<tr>
<td>British Journal of Special Education</td>
<td>0</td>
</tr>
<tr>
<td>Remedial and Special Education</td>
<td>0</td>
</tr>
<tr>
<td>Journal of Further and Higher Education</td>
<td>0</td>
</tr>
<tr>
<td>Studies in Higher Education</td>
<td>0</td>
</tr>
</tbody>
</table>

Total Number of Pertinent Articles                            25
In an attempt to identify all returns meeting the review criteria, the lead author searched numerous articles for the terms, “mentoring” and “students with disabilities.” For example, a search for “mentoring” was conducted in articles about leadership, study skills, or career advancement. The phrase “students with disabilities” was sometimes included in articles about at-risk students, women, or students in general, so a search was conducted to determine if any of these articles discussed topics related to this literature review. Additional searches to find relevant narrative sentences or paragraphs within each article included entering the words, “mentor,” “mentoring,” “mentors,” “coach,” “coaching,” “peer,” “peers,” and “peer support,” “students with disabilities,” “disability,” “disabled,” “disabilities,” “handicap,” “handicaps,” “disability services,” and “disabled students.”

After identifying each of the 10 articles meeting the review criteria, the information from the articles was placed in three categories: a) transition to higher education, b) success in higher education, and c) work and higher education.

**Transition to Higher Education**

Four studies included mentoring related to transition from high school, or a high school equivalent, to the postsecondary education level.

Iowa’s High School High Tech (HSHT) program (Nietupski, et al., 2004), in the Cedar Rapids and the Iowa City areas worked with high school students who had mild disabilities (disabilities vary, but students needed to have an IEP or 504 accommodation plan), were interested in technology, and deemed likely to be successful in postsecondary high tech endeavors. Graduates of the program were encouraged to become mentors and assist mentees with: a) identifying suitable tech career goals, b) choosing appropriate educational or training programs, and c) completing postsecondary programs. Mentoring in this program was intended to serve the dual purpose of keeping graduates connected to the program and providing ongoing mentoring for younger students.

The authors explored the efficacy of the program with both quantitative methods such as evaluation and measurement of program growth, student enrollment, and business partnerships; and qualitative ones, including a case study in their analysis. This program succeeded, based on growth in partner schools from 5 to 15 during the study’s time frame and students from 19 to 119. Tracking postsecondary efforts was problematic and the authors share a lack of data on that subject. The word “mentor,” however, appeared only four times in the 14-page article, and was a minor component of the overall portrayal. The article provides an excellent description and analysis of one type of program serving one group of individuals with disabilities. It is typical, however, of the majority of articles reviewed in a) describing a specific program, b) targeting a specific disability group, and c) including mentoring as one of many components addressed. The next article details more particular demographics.

The Bridge Program (Gutman, et al., 2007), developed as part of the Occupational Therapy (OT) Program at Richard Stockton College in Pomona, New Jersey assessed 18 students with psychiatric disabilities, 11 female and seven male, ages 24-50, who participated in a pilot program to acquire foundational academic and social skills necessary for college coursework, technical training, or completing a GED. The program occurred over three months. It consisted of an initial orientation day and 11 academic modules, such as time and stress management and basic computers skills, with two-hours of lecture/lab followed by one hour of mentoring. This included motivation, identifying educational opportunities, completing admissions and financial aid applications, studying GED and college entrance exams, and applying materials learned in each module to individual educational goals.

The study measured five outcomes on pretest/posttest assessments: a) enhanced skill in academic areas; b) comfort in the student role; c) enhanced social skills; d) overall participant satisfaction; and e) percentage of participants who successfully completed the program and enrolled in further coursework, completed a GED or obtained employment. Additionally, the comfort of the OT students in working as mentors was evaluated on pre- and post-scales.

Sixteen of 18 participants completed the program. Of these, 86% reported the program assisted their preparation for future academic pursuits and 100% relayed the mentoring process helped them “set and achieve personal educational goals” (pp. 32-33). Twelve of the 16 who completed the program enrolled in further education, completed a GED or obtained a vocational internship one month after the program ended.

The authors provided an in-depth analysis of both the successful outcomes and the limitations of this small
program. Because many quantitative and qualitative factors were used to evaluate the success of the program, the authors felt they provided a model for similar projects. However, limitations, including a small sample size, the brevity of the program, specific focus on one disability type and one occupational area, and lack of a control group, made it difficult to predict if this type of program would translate well to other schools or areas. The authors shared their intent to modify future studies to explore these limitations.

Across the Atlantic, Gulam and Triska (1998) conducted interviews with graduating students of a high school in England to understand concerns students with disabilities faced upon completion of high school, including what facilitated a smooth transition from high school to college, and to create a model to ease the transition to further education.

The high school used in the study was small and intended for 11 to 16 year olds with learning disabilities, behavioral problems, visual impairments, communication difficulties, and physical difficulties. In total, 152 students were designated as “special needs” students attending the school. For their sample, the authors randomly selected 50% of the 28 graduates from 1995 (14 students) and 50% of the 36 (18 students) graduates from 1996, with an equal number of males and females selected from both years (seven males and seven females from 1995 and nine males and nine females from 1996). They also conducted less structured interviews with two school principals, the local Careers Advisory service, the regional educational officer in charge of special needs, and four Further Education college (similar to U.S. Community Colleges) principals.

Based on their research, the authors suggest using post-schools as a middle point between high school and college to help ready persons with disabilities for postsecondary education. Following high school graduation, those wishing to go on to college or university would first attend a post-school to ready students for the increasing demands that come with postsecondary education.

While the preceding recommendation may seem out of place in the United States, many educators have lamented to the lead author there is a disconnect between high schools where the specific requirements of the Individuals with Disabilities Education Act (IDEA) are paramount and postsecondary education where students with disabilities are left to fend for themselves, often without adequate training, in enforcing the educational tenets of the ADA. This need appears in the final article in this section by Alston, Bell, and Hampton (2002) who surveyed 140 parents and 323 teachers in the U.S. midwest about students with learning disabilities and career entry into science and engineering careers.

The article clearly explained certain aspects of the study. For example, 219 females and 140 males participated in the study responding to research questions, such as, “The facilities in science and engineering environments are inappropriate for persons with learning disabilities,” which were then analyzed with a five-point Likert scale (p. 266). The article is vague, though, about who the teachers were and at what level they taught. Conclusions are nevertheless quite specific in stating both parents and teachers believed students with learning disabilities needed mentors or role models to succeed in science and engineering:

Providing learning disabled students with both peer and professional mentors could give these students their first opportunity to identify with and model themselves after persons with learning disabilities successfully involved in science and engineering fields. Students with learning disabilities could use these mentoring relationships to ask basic questions common to persons with learning disabilities such as how to secure extra time on examinations, finding a note-taker, using audio-recorded textbooks, finding an internship/job, etc. In addition, mentors could share from personal experience their strategies for handling negative attitudes and feedback from family members, teachers, counselors, peers, employers, and co-workers (p. 273).

While each of these articles is limited in scope, geography, demographics, and disability groups analyzed, all reach a similar conclusion about mentoring being a needed, valuable, and positive component in the transition from high school to postsecondary education or a career.

**Success in Higher Education**

The first of only two studies meeting the review criteria in this section, and the first article reviewed with a primary emphasis on mentoring is by Zwart and Kallemeyn (2001) of Calvin College. A Christian school in Grand Rapids, Michigan, with an enrollment of about 4,000 students, the authors reported on a peer-based coaching program directed at students, mostly freshmen, primarily diagnosed with ADHD and/or learning disabilities. Twenty-seven students participated in the
program and 22 volunteered for a control group testing the hypothesis students in the program would show significant improvements in self-efficacy, measured by a Self-Efficacy Scale, and study skills, measured by the Learning and Study Strategies Inventory.

Twenty-two students in the experimental group, who attended between 2 and 10 coaching sessions involving mentoring in self-advocacy, study, organization, and time-management skills, and 20 in the control group, completed posttests one month before the end of the semester.

The authors provided a detailed analysis of program component test results. An initial analysis of both the experimental and control groups differed from later findings, leading the authors to re-analyze the data looking separately at each group. From both analyses, they concluded general self-efficacy improvement occurred, but advised the data should be viewed with caution because of study limitations, including size and disparity between the numbers of the experimental and control groups. Nevertheless, they professed significant improvement in attitude, motivation, use of time management principles, a decrease in anxiety about school performance, selecting main ideas, and test preparation. They concluded, as do the authors of this paper in suggestions for future directions, more research is required to understand the practical value of mentoring programs.

Moving from a small private school study of students with disabilities in Michigan further north to Canada, another study also included a focus on students primarily with learning disabilities. Bat-Hayim (1997) investigated a seminar in the Languages, Literature, and Linguistics Department at York University in Toronto, Canada where the goal was development of critical skills to enable students to handle the writing requirements and other academic demands of university courses.

Bat-Hayim’s extensive, longitudinal study of the 10-year program included the role of advanced linguistics students as mentors in weekly discussion and writing labs. These students prepared for their role by receiving training in cohesion analysis, issues about learning disabilities, providing feedback, and conflict resolution techniques. Students in the study spent more total time in the seminar by an average of 50% over two semesters than in their other classes. While formal mentoring had its greatest success during the first semester when students applied techniques learned from mentors in their own studies, some of these peer mentoring relationships continued for entire university careers, providing perhaps the most concrete evidence of the value of mentoring relationships thus far.

**Work and Higher Education**

Employment, or a desire to work, is an important need in the lives of individuals with disabilities and four articles of the 10 reviewed focused on this subject in relation to all phases of postsecondary education. The first three of these studies emanated from the University of Washington’s DO-IT (Disabilities, Opportunities, Inter-networking, and Technology) Program, which highlights mentoring as an essential ingredient of its activities.

Burgstahler (2001) described a three-year project intended to increase the career readiness of students with disabilities in pre-college and college settings. Collaborating with employers, college staff, parents, mentors, educators, and community-organization leaders, DO-IT sought work placement opportunities for students with disabilities. In total, 60 high school and higher education students completed 104 work-placements over the three-year project period. An estimated 1,000 other students with disabilities benefited from online discussions, workshops, and the dissemination of materials such as videotapes, printed materials, and Web resources on topics ranging from disability rights to types of assistive technology.

Part of this effort involved adult and peer mentors, many of whom had disabilities themselves. Mentors provided strategies, advice, encouragement, and even work opportunities for program participants through in-person meetings, phone calls, and electronic discussion boards.

Project researchers administered a post-participation survey to determine if changes in attitudes and skills occurred after completion of work-based learning experiences. The survey was distributed via email to students who had completed 83 work experiences, and of these, 55 (66%) were returned.

Using seven Likert Scale questions, participants rated the level of change in motivation, workplace skills, job skills, knowledge of personal career interests, computer skills, knowledge of disability accommodations, and knowledge of legal rights. The data indicated participants experienced a positive change in their motivation to work toward a career and an increase in the skills needed in a workplace.

Other research on the DO-IT Program illustrated the benefit of using the Internet to maintain mentor-protégé relationships (Burgstahler, 2002; Burgstahler & Cron-
the following section. By analyzing electronic messages, distributing surveys, and conducting focus groups, the authors learned communication via the use of computers could eliminate many barriers in mentor-protégé relationships caused by time, scheduling problems, distance, and disability. Additionally, participants said computer use enhanced equal treatment because others did not know about their disabilities. Problems of computer-mediated communication participants included difficulty with clarity, a high volume of messages, lack of in-person communication, and technical problems.

The articles (Burgstahler, 2002; Burgstahler & Cronheim, 2001) concluded by recommending practitioners and parents consider using the Internet to help create and support positive mentoring relationships, and that such relationships may help students with disabilities achieve their social, academic, and career potential.

Burgstahler is a leading researcher and disseminator of information about students with disabilities and mentoring. She, and various co-authors, have provided specificity and detail, both quantitatively and qualitatively, about the subject. The three articles detailed here and the plethora of material available on the DO-IT website (http://www.washington.edu/doit/) are persuasive about the utility of mentoring in the lives of individuals with disabilities in all aspects of life.

Much more narrowly focused, Noonan, et al. (2004) studied the successful career paths of 17 women with physical and sensory disabilities via in-depth semistructured interviews. The purpose of these interviews was to gather data and produce a grounded theoretical model to explain factors that contributed to the women’s successful career experiences. Questions were asked regarding career paths, influences, coping techniques, attitudes about work, personality, role models, mentors, personal career decisions, and behaviors.

In general, the interviewees stressed the importance of role models and mentors, and described mentors as giving direction, guidance, and advice. Additionally, the majority said they had several mentors and role models, who had appeared later in their lives. They also stated it was important for them to try and act as role models and mentors for other females with disabilities.

The theme of longer-term mentoring relationships weaved its way throughout many of the articles reviewed. The potential for mentoring beyond time boundaries seems to be one result of implementing successful mentoring situations, as discussed with more specificity in the following section.

Discussion

Despite a history of thousands of years of mentoring, research about mentorship and postsecondary education is limited. This literature review pursued the research question: does evidence demonstrate what works in mentoring for students with disabilities attending postsecondary education? To provide a response the authors conducted a database search, a complementary hand-search, and e-mailed requests to three disability and education listservs requesting suggestions for evidence-based articles about mentoring students with disabilities in postsecondary. The database search returned 1,300 hits. Between all three search methods, only 10 articles met all of the following criteria: a) being published in peer-reviewed journals; b) describing evidence-based research about mentoring programs focused on transition to postsecondary education, success in postsecondary education, or matriculating from postsecondary education; and c) being published after 1990, the year the ADA became law. Of these 10 articles, only four included mentoring and disability in postsecondary education as their primary subject. Using as a criteria, data about the success of transitioning to, remaining in, graduating from, and finding a job after postsecondary education, the literature review revealed almost no data.

Within these 10 articles, however, several themes did emerge, including: a) the positive role of technology; b) the desire to use current mentees to become future mentors; c) a focus on specific disability groups, such as learning disabilities, psychiatric disabilities, and disabilities perceived as mild; d) the usefulness of mentoring for academic, career, and social skills; and e) the value of establishing long-term mentoring relationships.

Locating evidence-based studies that focused on the postsecondary experience of mentoring for students with disabilities was difficult. Mentorship is typically integrated into a larger system of services provided by programs to help young people with disabilities find employment or transition to postsecondary education (Burgstahler, 2001; Noonan, et al. 2004).

Based on the data from these 10 articles, we conclude students with disabilities are provided with the best opportunity for mentoring success when a flexible, multi-layered system of supports exists. Table 5 includes four columns describing supports or resources mentoring programs have used to benefit students with disabilities. Under each of the four columns: a) Training
Future Directions

The limited evidence-based research available suggests mentoring has had a positive impact on students with disabilities. Further research into mentoring at the postsecondary education level for students with disabilities may enhance the field, leading to better programs designed around effective research-based practices. This will hopefully increase access, retention, and completion of postsecondary education by students with disabilities.

There is a need for evidence-based research of every aspect of mentoring at the postsecondary level. Suggested research topics are listed below:

1. Analyze the role of successful graduates with disabilities who mentor students with disabilities.
2. Document any differences between students with disabilities who have mentors and those who do not.

Table 5

**Mentoring Program Components Benefitting Students with Disabilities**

<table>
<thead>
<tr>
<th>Training or Workshops</th>
<th>Workshops</th>
<th>Technology</th>
<th>Human Supports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support planning for Academic Goal</td>
<td>Promote disability awareness for mentors, mentees, and supporting personnel</td>
<td>Use computers to communicate between mentors and mentees</td>
<td>Encourage appropriate parental involvement</td>
</tr>
<tr>
<td>Use trained and motivated mentors</td>
<td>Understanding financial aid</td>
<td>Provide supportive accommodations to help meet adaptive and accessibility needs</td>
<td>Facilitate collaboration between students, parents, educators, community-organizers, and mentors</td>
</tr>
<tr>
<td>Learning about services for students with disabilities and available services and supports</td>
<td>Learning job related issues, such as employment searches, résumé writing, and interviewing</td>
<td>Tutoring and online editing services to assist with academic performance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Study tips, time management skills, and managing the social scene</td>
<td></td>
<td></td>
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</tbody>
</table>
3. Describe any differences between students having a mentor with similar disabilities from one with a different disability, or no disability.
4. Analyze which mentor characteristics contribute the greatest positive effect on a protégé with disabilities.
5. Validate specific, effective mentoring practices for training mentors to provide the fullest possible benefits to mentees.
6. Explore the possibility of developing a mentor evaluation tool, similar to a teacher evaluation.
7. Explore benefits, or limitations, to faculty with disabilities who mentor students with disabilities.
8. Describe roles of students with disabilities who mentor faculty, with and without disabilities.

Conclusion

Evidence-based research about mentorship for students with disabilities in postsecondary education is sparse. While there is a general belief, expressed in many articles, that mentoring works in the postsecondary environment, the research does not yet support this feeling, therefore more evidence-based research about many aspects of mentoring is needed.

Understanding what characteristics lead to effective mentors and mentoring programs may enhance the enrollment, retention, and matriculation rates of students with disabilities attending postsecondary institutions. If mentorship enhances positive experiences for students with disabilities in postsecondary education, appropriate research may be invaluable in reversing the dismal graduation rates of students with disabilities and the just as abysmal employment statistics of individuals with disabilities.

References


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Postsecondary Students who have a Learning Disability: Student Perspectives on Accommodations Access and Obstacles

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Abstract
Students with Learning Disabilities (SLD) face unique challenges when entering postsecondary education after high school. A successful navigation of postsecondary context requires knowledge of one’s own disability and needs as well as access to what resources may be available at the institution. The purpose of this study was to gather SLD perspectives on accommodations use and obstacles they faced in gaining access to services. A total of 110 undergraduate students at a selective, four-year public University completed an online survey as part of a research subject pool requirement. The study collected information about the following areas: (a) accommodations use, (b) opportunities/barriers faced during transition, (c) knowledge students had regarding their disability and available services, and (d) self-advocacy strategies. Results indicated that this student population might not have used the University resources to the extent that they were available, pointing towards a potential need for greater awareness of campus resources. However, it was also true that students generally knew the implications of their disability and were utilizing many of the same resources that they did in high school. The article concludes with implications for education professionals who serve SLD.

Students with learning disabilities (SLD) comprise a small but growing proportion of the college-bound student population. In 2002, SLD comprised 9% of the national population of students attending college in the United States (Kurth & Mellard, 2006). Students with Learning Disabilities (SLD) face unique challenges when entering postsecondary education after high school. One of the largest challenges is ensuring that they obtain the necessary disability services needed to be successful in their postsecondary program. The effectiveness of high school transition teams in preparing SLD for college has been examined from the viewpoints of both secondary and postsecondary special education personnel (Janiga & Costenbader, 2002; Milsom & Hartley, 2005). Special education students’ views are an essential component of ensuring a successful postsecondary preparation and implementation of the transition process. The purpose of this study is to explore SLD perspectives on levels of access to accommodations and resources at a highly competitive, four-year, postsecondary institution.

Legal Context
There are three main legislative acts that affect how SLD access accommodations: (a) the Individuals with Disabilities Education Act (IDEA), (b) Americans with Disabilities Act (ADA), and (c) the Rehabilitation Act of 1973 (Section 504). Students making the transition between high school and college also make a shift between legislation that guides their eligibility and access to support services. There are significant differences between the IDEA, the law that governs special education in secondary institutions, and ADA, which applies to postsecondary institutions. Among these differences are the purpose of the law, how one is determined to be eligible for services, and to what accommodations eligible SLD are entitled. The Rehabilitation Act applies to students in both settings, but follows different principles and guidelines for receiving services.

Individuals with Disabilities Education Act. The Individuals with Disabilities Education Act (IDEA) first originated in 1975 as the Education for All Handicapped Children Act (EHA). Renamed in 1990 as Individuals
with Disabilities Education Act (IDEA), it has been reauthorized about every five years, the latest in 2006 (as Individuals with Disabilities Education Improvement Act, or IDEIA). IDEA specifically lists areas in which disabilities may occur, including a learning disability. The purpose of the law is to identify eligible students and provide services to them that are educationally focused and aimed at helping the student achieve academically to the best of their ability. These services are to be given at no cost to the student or their families. Once a child is determined to have a learning disability, schools are required to provide an Individualized Education Program (IEP) plan. When a student reaches high school, the role of this IEP plan is not only to identify and document current services, but also to articulate what the student’s postsecondary goals might be. As early as age 14 and no later than age 16, the IEP team must meet with the student (and parents) and lay out a plan for the transition from high school into the student’s chosen postsecondary setting, one of which may be college or a university.

**Americans with Disabilities Act.** When a SLD enters a postsecondary institution, or more specifically, when they attain the age of majority (18-years-old), they have the option to seek protection under ADA. Passed in 1990, the ADA is a federal civil rights law that protects all persons with disabilities from discrimination. Unlike IDEA, where the school is responsible for providing services, under ADA the student must initiate this process, and is not entitled to protection if they do not inform the school of their disability. Additionally, unlike IDEA, ADA does not provide explicit guidelines on how to determine if a person has a learning disability or who makes that determination. The ADA states that a person has a disability if the individual has a “physical or mental impairment which substantially limits one or more major life activities of such individual, the individual has a record of such an impairment; or is regarded as having such impairment” (Americans with Disabilities Act, 1990). Once a person is considered to have a learning disability under ADA they are entitled to accommodations that enable persons with disabilities to engage in activities at the same level as their peers without a disability. Unlike IDEA, ADA accommodations are not necessarily educationally focused. There is more flexibility in the kinds of services that can be obtained through ADA.

**Rehabilitation Act.** A precedent to later legislation such as the ADA (1990), the Rehabilitation Act of 1973 prohibited discrimination by federal agencies and by federally funded programs. Following the lead of reforms such as those initiated by Brown v. the Board of Education, the Rehabilitation Act was passed during the civil rights era and reflects the focus on access and inclusive participation in publicly funded institutions. Because most school districts and universities in the country receive federal aid, Section 504 of the Rehabilitation Act effectively covers all students in public education from discrimination or limited access to services on the basis of a disability. Section 504 has a broad definition of disability:

Under this law, individuals with disabilities are defined as persons with a physical or mental impairment which substantially limits one or more major life activities. People who have a history of, or who are regarded as having a physical or mental impairment that substantially limits one or more major life activities, are also covered. Major life activities include caring for one’s self, walking, seeing, hearing, speaking, breathing, working, performing manual tasks, and learning. Some examples of impairments which may substantially limit major life activities, even with the help of medication or aids/devices, are: AIDS, alcoholism, blindness or visual impairment, cancer, deafness or hearing impairment, diabetes, drug addiction, heart disease, and mental illness. (United States Department of Health and Human Services, n.d.)

Applied to schools, Section 504 requires schools at both the secondary and postsecondary level to provide necessary accommodations for students with disabilities. Adequate access to curriculum is the central question when a school or district is asked to provide services to a student with a disability. The Rehabilitation Act does not require that the student be designated as a special education student in order to receive these services, nor does it require the district or university to pay for these services, particularly if it would cause an undue burden on the institution. In this way, the Rehabilitation Act is a less codified legislation than other avenues for receiving accommodations in public schools. The long-term impact of the Rehabilitation Act was, in part, to put language into place that includes students with disabilities into larger educational reforms.
Planning for Postsecondary Education

IDEA requires that the student be an active participant in the transition process from the secondary to postsecondary setting. For example, student presence is required at all IEP transition meetings and it is preferred that students take an active role in the formation of their IEP. The intent is to provide students with critical knowledge and information that prepares them to advocate for themselves when they reach college. Knowledge of disability, knowledge of postsecondary support services, and the ability to self advocate have been identified as contributors successful high school to college transitions for SLD (Milsom & Hartley, 2005).

Potential obstacles to transitions. Within the transition experience there are many potential obstacles that may hinder a successful transition from secondary to postsecondary institutions. The first obstacle can be at early stages of the transition process. The reauthorization of IDEA required that students be present and actively involved in their IEP meetings (Hammer, 2004). When students do attend their meetings parents report that they understand the meeting better and feel more comfortable expressing their opinions, while teachers are more likely to express the SLD interests, talents, and requirements. Both parents and teachers feel more optimistic about the IEP meeting with student attendance. However, a majority of students historically do not have the opportunity to participate in the formation of their IEPs (Reusen & Bos, 1994). Research investigating rates of student participation in the IEP process indicate that 35% of states failed to invite students to participate in their IEP meetings (Williams & O’Leary, 2001).

The effects for a student can be felt over time; only about half of students ever attend their IEP meetings (Mason, Field, & Sawilowsky, 2004). Even if students are able to attend their IEP meetings, active involvement by the student in IEP formulation is still difficult to achieve (Mason et al., 2004). Although research (Martin et al., 2006) has shown that 40% of special education teachers believe that SLD participate in their IEP meetings “a lot”, in reality students only talk for about 3% of the meeting time. It is not surprising that Mason et al. (2004) found that only 34% of IEP team members reported that they were satisfied with the level of student involvement in IEP meetings. Students who do attend their meetings have many opportunities where they could become involved, such as expressing their interests and closing out the meeting. However, without prior preparation for these meetings, students often feel lost and do not understand what’s going on, contributing to their conceptualization that the IEP meeting is a meaningless activity (Martin et al., 2006).

From a service provider perspective, Janiga and Costenbader (2002) researched college administrator satisfaction with the bridge between services in high school to the postsecondary setting. This research found that administrators were not satisfied with the overall transition services secondary students were provided, with the average satisfaction score rating 2.8 out of 10 (Janiga & Costenbader, 2002). Specifically, administrators felt that students (a) lacked self-advocacy skills; (b) entered postsecondary institutions without an understanding of the difference between high school and college in class size, instructional time, teaching and examination methods; (c) didn’t understand their own strength and weaknesses and the specific accommodations that they need; (d) couldn’t function independently without relying on parents or special education teachers; and (e) disability assessments lacked adequate documentation for specific accommodations.

Participants in this study felt that students’ lack of involvement in their transitional IEP may contribute to potentially lower levels of academic preparedness to enter their chosen postsecondary institution and, more relevant to this discussion, an unawareness of the accommodations they may need to succeed in such an institution (Janiga & Costenbader, 2002). University faculties also cite their own level of disability knowledge as inadequate. Faculty report that they feel that they do not have an adequate understanding of disability law, enough of an understanding of specific learning disabilities (LD) to create accommodations for students, and that they aren’t accustomed to working with the disability offices at their institution (Murray, Flannery, & Wren, 2008). Overall less than 18% of faculty reported that they were knowledgeable about section 504 of the Rehabilitation Act; 50% reported being familiar with ADA (Thompson, Bethia, & Turner, 1997).

Level of knowledge. When student knowledge of disability, disability law, and accommodations are examined, research has found that students know more about the services that their special education program provides than about what is on their IEP, or knowledge about their specific disability. Schreiner (2007) asked high school SLD who were about to graduate to compose classroom situations where they may encounter difficulties because of their LD and then explain how they
would communicate their needs and find help. Essays were scored on realism about possible difficulties, adequacy in telling others of their difficulty, and adequacy in seeking help. The average score of these students was 18.22 out of 36 points, with no students scoring above 22.41 points. Schreiner (2007) suggests that the poor performance of SLD on this task indicates a lack of self-awareness and self-advocacy skills. Similar findings have also been reported by Cummings, Maddux, & Casey (2000), who found that SLD may not be effective advocates because they lack understanding about their strengths and weaknesses, and are inadequately prepared to communicate these to their universities.

**Accommodations in Postsecondary Settings**

After transition to college, SLD usually have a range of accommodations available to them. ADA and Section 504 mandate that services provided by postsecondary institutions must only provide students with an equal opportunity to learn, it does not require that schools provide accommodations that would provide equal results with non-disabled peers (Brinckerhoff, Shaw, & McGuire, 1992). Universities must provide an accommodation if it does not fundamentally alter the program of study and does not produce excessive financial or logistical hardship. If an accommodation is found to be unreasonable the university must only provide the most basic accommodation (e.g. providing a student with dysgraphia with a note taker instead of a course transcript) (Brinckerhoff, Shaw, & McGuire, 1992). A national survey of 98% of all institutions with at least one student with a disability provided a minimum of one support service. Reported accommodation rates varied: 88% of all institutions offered extended time, 77% provided tutors, 69% supplied note takers, 62% made class registration assistance available, 55% offered text on tape, 58% provided adaptive technology, and 45% made sign language interpreters available (Janiga & Costenbader, 2002).

However, many SLD students rate these accommodations as ineffective as often as 25% of the time (Kurth & Mellard, 2002). Kurth and Mellard hypothesized that many accommodations offered by universities are ineffective and inappropriate because they assign accommodations based on the student’s disability rather than understanding what a SLD will practically need in their classroom environment. From a SLD perspective, accommodations are often selected based on multiple factors, including the effectiveness and availability of the accommodation, as well as the amount of increased independence associated with the accommodation and the ease of use. Of these factors, effectiveness of the accommodation was reported as the most important by SLD (Kurth & Mellard, 2002). SLD students rated note takers, extended time on tests, adaptive technology, preferential classroom seating, and public transportation as being effective 80-88% of the time. Tutoring services, tape recorders, alternate test locations, taped text/notes, and mental health services were considered effective 64-78% of the time.

**Potential Barriers to Access**

Even if students receive effective accommodations, they still may encounter many obstacles in the course of their education. In fact, up to 86% of SLD may encounter some type of barrier in their postsecondary education (West et al., 1993). One of the major potential areas for the development of obstacles is faculty/SLD interactions. Research has found that faculty members consider themselves to have positive attitudes toward SLD and are willing to accommodate and advocate for SLD in their classes (Murray, Flannery, & Wren, 2008; Debrand & Salzberg, 2005). A high percentage (80%) of faculty wanted to know what their responsibilities are towards SLD and many want to give additional time and help to SLD (Salzberg et al., 2002).

Yet, even if faculty members do report mainly positive interactions with SLD, students often do not feel the same way. Interviews conducted with SLD indicate that they often lack a sense of belonging (Kurth & Mellard, 2002). SLD sometimes felt that faculty either believes that they are incompetent and must “help” them succeed, or that SLD should not be enrolled in their classes altogether. Additionally, some students felt that they have difficulty accessing academic information because their professors do not know how to properly accommodate them, that faculty are unwilling to provide specific accommodations, or that the accommodation provided by the university was unsubstantial (e.g. a note taker whose handwriting was illegible). Finally, some students feel discriminated against whether in only perception or in reality (Kurth & Mellard, 2002). The potential barriers many SLD face are important to understand as they highlight the need at the high school level for high quality transition services that create SLD with high levels of self-awareness and self-advocacy.
skills. At the college level, it illustrates the need for effective and adequate accommodations, and faculty education and support for working with SLD.

**Study Objective**

Previous studies looking at transition services for SLD focused mainly on how high school and college counselors view the transition process (e.g., Milsom & Hartley, 2005). Under the ADA, students are ultimately responsible for ensuring that they receive the services they need so it is important to ask the students directly their perspectives on accessing accommodations, when needed. This study explores the possible effects of key variables that could influence how SLD access services once in the university setting: student level of knowledge about their disability; transition services provided by their high school programs; skills to advocate for themselves in a college setting; and their experiences with peers, faculty, and administration at the postsecondary level.

The context of this study is the student experience accessing resources in a highly competitive, four-year research-intensive university. This population is important because, in secondary institutions, high-achieving SLD were competing with a peer group composed of varying academic abilities. However, once they reach college, SLD compete with other high achieving students and a higher level of academic competence will be expected of them (Dexter, 1982). In this competitive environment, even high achieving SLD may find themselves with academic difficulties that they never experienced before.

Three research questions guide this study:

1. Are there differences between the accommodations and services SLD received in high school and what they now receive in this university setting?
2. What opportunities or barriers did SLD face in the accessing services at the university?
3. What level of knowledge do SLD have regarding their disability, available services, and strategies for self-advocacy?

**Method**

**Population and Sample**

Participants were undergraduate SLD who were enrolled in an education department subject pool at a large, public, research one University. Undergraduate enrollment at the University is 37,459 students. The University is highly selective in its student admissions process. Students who are in the top 10% of their class have automatic acceptance to a state university, including the study site. In 2008, 81% of students at the University were admitted under the 10% rule, with a mean GPA of 3.08 and mean SAT of 1219. The student body is diverse, with 51% White/Non-Hispanic, 20% Hispanic, 20% Asian/Pacific Islander, and 6% Black/Non-Hispanic. The department subject pool from which this sample was drawn was made up of 1,297 students, with similar ethnic distribution as the overall undergraduate enrollment at the University (Lavergne & Walker, 2008). A total of 1,161 students utilized disability services at the University in 2007, with roughly equal proportions of men and women. However, the ethnic distribution of students accessing services was more heavily skewed towards students who were White (70%), with lower proportions of Asian (7%) and Hispanic (14%) than in the overall student population. Of the 1,161 students who accessed University services, 15.7% had a specific learning disability (Shultz-Hampton, 2008).

A total of 110 participants completed the study. Unless otherwise indicated, all results in this study are reported as a percentage of the 110 participants. We first asked participants when they were diagnosed with a learning disability. Students responded across a wide range of time periods. Roughly a third, or 28% of students, were diagnosed before 7th grade. Another 43% were diagnosed either in middle (7th-8th grade) or high school (9th-12th grade). A small percentage, 5%, indicated that they were diagnosed in college. About a sixth of students (16%) were not sure when they were diagnosed. The remainder of the students (7%) indicated that they did not receive a formal diagnosis of a learning disability.

We then asked participants whether they knew what diagnosis process was used to determine their learning disability. A total of 30% of students indicated that they were diagnosed using an IQ discrepancy model and 14% checked the Response to Intervention option. However, an IQ Discrepancy Model is a method of diagnosing a specific LD; diagnosed if there is at least a Standard Deviation be-
even with these designations, the majority of participants (71%) indicated that they were not sure about their diagnosis. Students were more certain about the kind of LD that they had. Only 15% were unsure as to the nature of their LD. Participants could check more than one kind of LD in their responses. Most were related to a reading or language processing skill. A total of 32% indicated that they had a listening or auditory comprehension disability, 35% had a reading (e.g., decoding, comprehension, fluency) disability, 16% had a writing disability (e.g., spelling, sentence structure), and 8% had a mathematics disability (e.g., computation, problem solving). In addition to LD, some students indicated that they had disabilities such as ADHD (10%), bipolar (3%), or anxiety (1%).

**Recruitment**

Participants were recruited from an undergraduate Educational Psychology Subject Pool (SP) at the University. Recruitment occurred during the 2007-2008 and 2008-2009 academic years. The SP was composed of students from four undergraduate classes: Individual Learning Skills, Human Sexuality, Adolescent Development, and Introduction to Statistics. As part of their course credit, students had the option of either participating in research studies or completing an alternate essay assignment. At the start of the recruitment process, students filled out an SP screening questionnaire. Researchers were allowed to include questions that related to the specifics of the needed samples. The researchers in this study included information about the grade level of the student and whether they self-identified as a SLD. Students who indicated that they had LD and who were sophomores or older were invited to participate in the survey.

**Survey Instrument**

The data for this study was collected in the form of an online survey. The survey was piloted before the main study to estimate the length of participation (about 15 minutes). The survey format included multiple choice questions, Likert scale, check-list questions, and open-ended questions. The survey was administered through Survey Monkey at http://www.surveymonkey.com/. Once students were recruited via the University SP, participants were provided the link to the online survey.

Students provided a unique identifier (student ID) that both allowed for follow-up with participants if there were questions and to verify that each person completed the survey only once. After they were finished, students received an e-mailed receipt for their participation that was used to document fulfillment of the course requirement. Students had approximately six weeks to complete the study.

The survey (see Appendix A) asked participants to provide information about the accommodations and services they received a) in high school and b) during their undergraduate experience (thus far). This information was gathered using both a checklist and open-ended questions. To gather accommodation information, students were provided with a list of common accommodations and asked to check if they received those accommodations in high school and if they had received these accommodations in college. To gather information about transition experience, students were asked to answer a series of open-ended question about experiences in the transition.

**Analysis**

We used a mixed-methods approach to data analysis for this study. Data analysis for each of the research questions is as follows:

1. **Are there differences in the accommodations and services SLD received in high school and what they now receive in college?**

The questions related to specific services only provided descriptive data. Results from both checklists, one for high school and one for college, were analyzed in summative form (percent of respondents indicating each type of accommodation or service). Results were analyzed using the Chi Square method to determine if accommodations and services used in high school were used to the same extent at the University. There were also several open-ended questions about services or accommodations. After all responses were reviewed, they were independently coded by two researchers on a set of content themes that emerged from the data. The coding process was repeated until there was 100% agreement on coded categories. Results were aggregated in summative form (i.e., percent of respondents addressing each topic).
2. What opportunities or barriers did SLD face in accessing services at the university?

This research question was answered using the open-ended questions in the second portion of the survey about experiences at the University. After all responses were reviewed, they were independently coded by two researchers on a set of content themes that emerged from the data. The coding process was repeated until there was 100% agreement on coded categories. Results were aggregated in summative form across the categories of opportunities and barriers.

3. What level of knowledge did SLD have regarding their disability, available services, and strategies for self-advocacy?

This research question was answered using descriptive data from questions regarding the transition preparation process. Results from both checklists were analyzed in summative form (i.e. percent of respondents indicating each type of preparation activity).

**Results**

**Accommodations and Services**

Figure 1 summarizes the accommodations and services SLD receive in high school (HS) and now at the University (only those with statistical differences in overall frequency are shown in the Figure). Students were presented with 16 accommodation options and asked to indicate which accommodations they received in each institution and who provided them. The source

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**Figure 1. Mentoring Model**

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<table>
<thead>
<tr>
<th>Accommodations</th>
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</thead>
<tbody>
<tr>
<td>Provided by School</td>
</tr>
<tr>
<td>Provided by Parents</td>
</tr>
<tr>
<td>Provided by Other Source</td>
</tr>
<tr>
<td>Provided by OSD</td>
</tr>
<tr>
<td>Provided by Self</td>
</tr>
<tr>
<td>Provided by Multiple Sources</td>
</tr>
<tr>
<td>Provided by Mixed UT Sources</td>
</tr>
<tr>
<td>Provided by Other University Source</td>
</tr>
<tr>
<td>Provided by Mixed Parent/University Sources</td>
</tr>
</tbody>
</table>

Figure 1 Note. This figure provides information on the overall prevalence and source of accommodations students received in High School (HS) and then at the University. Participants (N = 110) checked off the accommodation (on the y-axis) the location (UT vs. HS), and the source (provided by school, parents, other source, office of students with disabilities and combined categories).
of service varied widely across the kinds of accommodations or services.

Statistical analyses about the frequency of accommodations or services are collapsed across all sources of the service. A significant difference was found between use in high school and college in nine of the 16 accommodations that were surveyed. The direction of that difference, however, depended on the specific accommodation or service. Students were more likely to have an assistive technology accommodation in HS (13% vs. 10%), $X^2(1, N=110) = 58.199, p<.05, \phi = .727$. Alternate format tests were more often given as an accommodation in HS (7% vs. 5%), $X^2(1, N=110) = 21.628, p<.01, \phi = .443$. Use of a tutor was more prevalent as an accommodation when students were in HS (32% vs. 29%), $X^2(1, N=110) = 35.849, p<.05, \phi = .571$. Physical Therapy was more common as an accommodation in HS (7% vs. 5%), $X^2(1, N=110) = 61.752, p<.01, \phi = .749$. For all of the above, even with statistical significance, the actual percentage difference was quite small.

There were some greater differences in accommodations and services that were more frequently received at the postsecondary institution than in high school. Students at the University (11% vs. 6%), were more likely to receive the accommodation of a classroom assistant, $X^2(1, N=110) = 29.571, p<.001, \phi = .518$. Students at the University (35% vs. 26%) were more likely to receive the accommodation of extended time in college, $X^2(1, N=110) = 13.332, p<.01, \phi = .348$. Separate settings for tests was also more common as an accommodation when students were in HS (7% vs. 5%), $X^2(1, N=110) = 17.798, p<.001, \phi = .402$. Students in college (28%) were more likely to attend individual counseling than they were in HS (19%), $X^2(1, N=110) = 100.6, p<.001, \phi = .956$. Lastly, other accommodations (i.e. reduced course load, priority registration, etc.) were given to students attending college (6%) at a greater rate than when they were in HS (4%), $X^2(1, N=110) = 71.689, p<.05, \phi = .807$.

**Opportunities and Barriers**

The second question addresses what opportunities or barriers students face in the transition between high school and college. Results detailing information gathered from students regarding opportunities and barriers students faced in college are shown in Table 1. The left side of the table gives the overall question stem and the percentage of students who responded that they had interacted with various members of the University community or, for the last item, experienced obstacles. The right hand side of the column is the distribution of explanations for their responses. These are the themes that arose in the content analyses for each item.

Results shown in this table indicate that there was an overall low level of interaction between students and college faculty and staff. About a third (32%) of students had contacted their faculty, mostly in order to ask for letters of recommendation for jobs, graduate school, or other competitive endeavors. More students (48%) had contacted the Office of Students with Disabilities (OSD) about their learning disability, most with the task of obtaining accommodations. Very few SLD (2%) participated in other OSD activities or received academic counseling (2%). In addition, very few students contacted residential life (2%), learning center (5%), or academic counseling within their department or college (2%) about their learning disability. As far as interaction with peers, about a third (32%) indicated they had shared information about their LD with friends or colleagues.

The last question asked students to indicate where they had faced obstacles in obtaining services at the University. About a fifth (21%) noted that they indeed had difficulty obtaining accommodations services related to their LD. There was a range of challenges noted by participants in this survey. Two categories of responses were related to faculty, specifically, with 5% noting that faculty members were unwilling to accommodate and 2% noting the challenges of scheduling time with faculty. Two additional categories were related to other institutional aspects of the University, including 1% noting a refusal by the University to provide a specific accommodation and 1% saying it is hard to get a counseling center appointment. The remaining categories address other specific difficulties, such as getting a test set up (2%), getting to a doctor’s appointment (2%), or getting an evaluation (2%). Only 3% of all students commented on the academic rigor as a challenge to their obtaining services and only 2% indicated that they did not know that services might be available.

**Student Knowledge**

The third question asks what level of knowledge students have regarding their disability, available services, and strategies for self-advocacy. As described earlier, results indicate that almost 84% of students were able to identify their learning disability and when they were diagnosed. They were less confident as to how the
### Table 1

**Opportunities and Barriers in Obtaining University Accommodations and Services**

<table>
<thead>
<tr>
<th>Have you...</th>
<th>Yes</th>
<th>Explanations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 110</td>
<td></td>
</tr>
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</table>
| Interacted with faculty about your Learning Disability?   | 32% | 25%: Provide accommodation letters  
                                                                 3%: Discuss Strategies for Studying  
                                                                 4%: Informed of disability |
| Interacted with Office of Disabilities about your LD?      | 43% | 31%: Met in order to receive accommodations  
                                                                 3%: Discuss available assistance  
                                                                 2%: Academic Counseling  
                                                                 3%: Took exams in office  
                                                                 2%: Participated in OSD activities  
                                                                 2%: Multiple |
| Interacted with other administrative staff about your LD?  | 7%  | 5%: Learning Center  
                                                                 2%: Academic Counselor |
| Interacted with other students about your LD?              | 32% | 20%: Informed peers about disabilities  
                                                                 5%: Asked for work completion strategies  
                                                                 2%: Emotional support  
                                                                 2%: Asked advice for getting accommodations  
                                                                 1%: Joined Study Groups  
                                                                 2%: Asked for note takers |
| Interacted with residential life staff about your LD?      | 2%  | 1%: Informed resident life staff about disabilities  
                                                                 1%: Dorm resident made fun of disability |
| Experienced obstacle(s) to obtaining accommodations or services for your LD? | 21% | 5%: Professors unwilling to accommodate  
                                                                 2%: Professors were hard to schedule with  
                                                                 1%: U refused to provides specific accommodation  
                                                                 1%: Hard to get counseling center appointment  
                                                                 2%: Difficulty in getting/paying for an evaluation  
                                                                 2%: Difficulty setting up extended tests  
                                                                 2%: Not aware services were available  
                                                                 2%: Difficulty getting to doctor’s office  
                                                                 3%: General school difficulties (i.e. work was hard) |

Table 1 Note. This table provides information on opportunities/barriers that students have faced in obtaining accommodations/services. The first column lists the specific survey question and the second is the percentage of students who answered yes to that question. The last column provides a break down of the specific content themes elicited for the yes responses. The denominator for all percentages is the total number of students in the study (N = 110).
diagnosis was made, with 71% indicating that they were unsure. Knowledge about specific services or accommodations also varied across the sample. IEP plans and transition goals were the first source of information we asked students about in this survey. Transition-related information they recalled being covered in IEP meetings is shown in Figure 2. Results indicate that 91% of students did not recall having an IEP at all. This is despite data that indicates that they did receive accommodations for which an IEP would have been necessary. Of those who could recall an IEP, a large proportion of students could not recall covering basic transition topics in their final IEP meetings, teacher responsibilities, or goals towards academic progress.

**Discussion**

**Limitations**

The results from this study provide a starting point for further discussion about the postsecondary transition experience for students with LD. The results from this study will be discussed in reference to the three research questions guiding this study from a provider and student perspective. The findings here must be viewed with caution, however, due to a number of limitations in the study design. The first limitation is that this is not a representative sample of SLD, either at the University or those leaving secondary education settings. The results are also limited due to the sampling frame. Participants represent a convenience sample obtained from a subject pool that was a part of their course requirements. We did not include the service providers on the campus in a parallel form of the survey. Additionally, the results here rely heavily on student recall of information from their primary and secondary school experiences. Participants may not have an accurate memory of their transition planning. Mitigating this limitation is the fact that many participants indicated that learning disability diagnosis occurred relatively recently in their school careers, thus IEP team experiences may be more salient for these late-diagnosis students. Lastly, it is possible that many students who participated in the study actively choose not to use their accommodations, either due to lack of need or other factors. Because these data draw from a single University, the findings here may be most appropriately considered as a case study rather than as a representative sample of SLD at four-year postsecondary settings. The discussion below must be viewed with
these limits and specifications in mind.

**Accommodations and Services**

Results regarding the accommodations and services that students received indicate, in most cases, some stability in the level of access to services between the high school and postsecondary setting. Seven of the 16 accommodations showed no difference in the number of students who received that accommodation in high school and in college. Of the nine accommodations that did show a significant difference, only four (assistive technology, tutoring, alternate format tests, and physical therapy) showed a decrease over the transition process. This is an interesting finding from a provider prospective because it indicates that generally students are receiving similar or more accommodations in college than they were receiving in high school. This result is surprising because it is contrary to what many might expect when students need to advocate for their own services after having the process facilitated by an IEP team. It could be that providers are simply offering SLD a “menu” of options based on their disability, rather than less and more specific educationally focused accommodations offered under IDEA (Brinckerhoff et al., 1992).

From a student perspective, it may be that students reported that they have more accommodations (e.g. extended time and separate setting) than they did in high school because the academic demands changed from high school to college. Previous literature has shown that students tend to utilize accommodations that they view as “effective” (Kurth & Mellard, 2002). The use of a classroom assistant, extended time, separate setting, individual counseling, and other services may be accommodations that are more salient and therefore are viewed as more “effective” by students in college than those in high school, resulting in students who were more proactive in obtaining these specific academic services.

The accommodations that decreased (e.g. physical therapy) may not be applicable to the kind of services that are a part of the (now) adult’s relationship with school staff. This idea is supported in that the accommodation identified in research (Kurth & Mellard, 2002) as the second most effective, extended time on tests, was also the accommodation most often reported by SLD. However, other accommodations reported to be highly “effective” in Kurth and Mellard’s (2002) study, such as note takers and use of adaptive technology, were reportedly accessed less by students. In Kurth and Mellard’s study, only 39% of students identified as having a LD. It may be that the accommodations viewed as the most “effective” to SLD are different than those which are identified by individuals with different disabilities attending other institutions. In sum, as the context of accommodations use changes, so does the use of specific accommodations.

**Accessing Resources**

Although there was an increase in accommodations and services from high school to college, results showed that students may have the opportunity to access even further support than they currently report. Only 43% of the students in this study indicated that they interacted with the OSD, most often to obtain accommodation letters to provide to faculty. Students who interacted with OSD were more likely to interact with their faculty about their LD (and vice versa). In addition, students who initiated contact with faculty and OSD reported that they were more satisfied with the overall services they received from the University. From a student perspective, it may be that low student utilization of OSD is a result of this population not needing to access their accommodations. In this study only sophomores and above participated. It may be that these students have found, in their first year on campus, that they are able to meet the University’s academic demands without accessing OSD, resulting in the low utilization of this office. Another explanation may be that SLD found the accommodations offered were inadequate or difficult to implement and as a result stopped utilizing OSD. Research has found that even effective accommodations that students identify as highly valued may be rendered useless by poor execution and implementation (Kurth & Mellard, 2002).

About a third (32%) of students interviewed had discussed their disability and necessary accommodations with faculty members. The majority of interactions among students and faculty regarding LD are more formal interactions, related to official requests for letters of accommodations, rather than informal meetings and discussions. The low percentage of interaction among students and faculty is potentially a concern for service providers as faculty members are in the best position to provide direct help and services to SLD. An additional concern is if students limit themselves to formal meetings (i.e. giving faculty a copy of accommodation letters) rather than interacting frequently and informally with professors (e.g. in office hours), the student may miss out on supplementary support that previous research (Murray
et al., 2008) has shown professors are willing to provide (e.g. advice about future plans or personal goals).

Again, a student perspective on these results may be that there is less of a desire or a need to contact faculty than one may assume. Previous research has shown that often SLD feel that faculty view them as if they do not belong, are incompetent, and that faculty do not possess the knowledge or desire to effectively accommodate them (Kurth & Mellard, 2002). This perception may drive SLD from approaching faculty for assistance.

However, it may be the case that these students do not feel that they need to inform the faculty of their disability. SLD may not be struggling academically, or may have already found ways to independently work in this new setting. Another explanation could be that classes are taught differently at the university level than in high school, with more group projects and untimed assignments (compared with timed class tests). They may have also have discovered alternative means of supplementary support (e.g. parents, classmates) and, as a result, do not need to interact with faculty about their disability unless they wish to access formal accommodations. In specific instances, such as a particularly demanding course, students might have greater academic difficulty that goes beyond their current support network or strategies. It may be that in such cases students are motivated to interact further with their faculty, resulting in the lower but still present 32% student-faculty interaction rate.

Obstacles

The next component of the study focused on what obstacles students had in obtaining their accommodations. A total of 21% of students surveyed indicated that they had encountered an obstacle to obtaining accommodations while at the University. A total of 13% participants reported obstacles that could be remediated such as setting up tests or getting an evaluation. A service provider might wonder whether, if more students interacted with faculty or OSD, would the number of students encountering obstacles be reduced? It may be that the low level of OSD utilization is itself an institutional obstacle and that service providers should do more to encourage their students to at least touch base with them, even if in the end they choose not to utilize services.

However, even though students noted a wide range of obstacles, relatively few students encountered each challenge. West et al. (1993) also found that the barriers students faced were varied, ranging from barriers associated with disability specific services and accommodations (e.g. lack of a ramp into a building), to being unaware of available services and to which ones they were entitled to, to non-disability specific barriers (e.g. lack of understanding and cooperation from faculty), and social and emotional barriers (e.g. feeling socially isolated, or as if they were an outcast). The variety of challenges found in our study indicated that students did not identify an overarching institutional obstacle. Rather, they viewed obstacles as dispersed and due to individual circumstances. Supporting this conclusion is the result that satisfaction with disability services was not significantly correlated with obstacles students faced. Even if students did encounter obstacles to obtaining accommodations, it did not appear to impact significantly their satisfaction with the services they received.

Knowledge as a Resource

Knowledge about one’s disability and educational needs is essential to a successful transition to a postsecondary setting. Unfortunately, from a service provider perspective, the overall finding in this study is that students have varying levels of knowledge in many aspects of having a learning disability. When looking at results for knowledge of disability, 84% of students could identify in what area they had a specific disability. This was an area of strength in this population. However, 70% of students were unsure as to the method by which their diagnosis was reached. When examining this question, we found that students lack knowledge of their IEP plans. All students in this study reported that they received at least one accommodation in K-12 that could have only been given through an IEP (or 504) Plan. However, only 9% of students indicated that they had an IEP (or 504) plan. From a provider prospective, this response seems to signify that a majority of the students questioned in this study lacked some basic knowledge about certain aspects of their disability and IEP process at their primary and secondary schools.

When looking at college preparation received by these students, 82% of students reported that they did not have a final IEP meeting in high school. Additionally, an average of 48% reported that they received no guidance on who to contact in the OSD at their university, what accommodations or services they may need from their university, how to document their disability for their university, or discuss their most recent evaluation. Of greatest concern to providers may be that only 2% of students discussed how to communicate to their University about what services and accommodations
they would need to be successful during their last IEP meeting. This indicates that SLD are potentially under-prepared to locate services, obtain services, and advocate for services once they reach college. Other research has found that many providers feel that SLD enter college with a deficit in knowledge about some aspects of their disability and that most administrators view this information as being necessary for the successful navigation of college (Janiga & Costenbader, 2002). It is possible that students without services in an academically rigorous setting would struggle until they begin to fail, and only then begin to search for the help they were entitled to and should have been informed about prior to the beginning of their college career.

However, from a student’s perspective, results could be interpreted differently. A total of 84% of students could identify their disability, and while method of diagnosis maybe helpful for service providers to know, one could argue it’s not vital that students know this in order to receive services. The same might be said for IEP knowledge. On the whole, students reported information about the accommodations and services they received; in contrast with the diagnostic process, services were a salient component of the IEP process to participants. This finding is in line with other research (Schreiner, 2007) which discovered that students tend to know more about the services that their special education program provides than about what is on their IEP. While other IEP content specifics could be helpful for postsecondary providers, lack of this knowledge may not hinder motivated students from receiving basic accommodations. Finally, students reported low knowledge about final transition meetings. It may be that students attended the meetings but don’t remember it. This concept is supported in research conducted by Lehmann, Bassett, and Sands (1999) which found that if students are not prepared for their IEP meeting, they often feel lost, do not know what is going on, and view the meetings as meaningless. Another hypothesis is that that most SLD at the University are academically competent enough that the lack of transition information does not harm them.

**Future Research**

There is a great deal of future research that would be beneficial to SLD and those who serve them. One area that these findings could be extended is through a longitudinal study design. This study asked SLD to recollect their experiences with IEP teams and accommodations in high school. An alternative approach would be to begin documenting SLD experiences as they are completing middle school and high school years, and to follow them through to their postsecondary experiences. While some may matriculate at a four-year institution, others would take different paths. The variability in career planning and implementation may be a significant factor in how SLD access and use resources. A second area for future research is one on a local level, perhaps documenting the interaction between students and faculty when SLD request accommodations for classroom activities. This would provide a more nuanced perspective on how SLD approach, with OSD assistance, their faculty on such issues. Finally, the field would benefit from a clearer understanding of how high school SLD are coached in discussing their needs and rights during discussions about transitions to postsecondary settings. Research that studies the efficacy of various approaches, including those that focus on self-knowledge and advocacy, would aid in best-practices for high school IEP teams.

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Rehabilitation Act of 1973 (Public Law 93-112)


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Appendix

Survey Instrument

1. In what areas do you have a Learning Disability? (Please check all that apply)
   a. Language processing (listening, comprehension)
   b. Reading (decoding, comprehension, fluency)
   c. Writing (spelling, sentence structure, paragraph structure, fluency)
   d. Mathematics (computation, problem solving, fluency)
   e. I am not sure.

2. What grade were you in when you first received a formal Learning Disability diagnosis? (Please check one.)
   a. Kindergarten - 3rd grade
   b. 4th - 6th grade
   c. 7th - 9th grade
   d. 10th - 12th grade
   e. I am not sure.
   f. I never received a formal Learning Disability diagnosis. (exit survey)

3. What method was used to determine your Learning Disability diagnosis? (Please check all that apply.)
   a. IQ discrepancy model (scores on intelligence tests are higher than scores on proficiency in specific academic content area).
   b. Response to Intervention (students receive remedial instruction first, then receive diagnosis if this is not successful in raising achievement)
   c. Other (please describe)______________________________
   d. I am not sure.

4. Do you currently have any additional disabilities or diagnoses that may affect your college learning experience?
   a. Yes
   b. No
   c. If yes, please describe.

5. Do you know what the Americans with Disabilities Act is?
   a. Yes
   b. No
   c. Not sure
   d. If yes, describe its purpose and how it relates to you and your experience in college.

6. Did you have an Individualized Education Program (IEP) plan in high school?
   a. Yes
   b. No (if no, skip to question # 9)

7. Do you have a copy of your last IEP?
   a. Yes
   b. No
   c. I used to, but I don’t know where it is now.

8. What was on your final IEP? (Please check yes, no, or not sure for each item)
   a. Goals/objectives for academic achievement
   b. Instructional strategies to aid meeting academic goals
   c. Assignment of team members responsibilities in plan implementation
d. Methods for evaluation of progress towards goals
e. Other ______________________
f. I don’t know

9. When was your last Individualized Education Plan (IEP), 504 plan, or Admission Review Dismissal (ARD) meeting in high school?
a. Senior year
b. Junior year
c. Sophomore year
d. Freshman year
e. I don’t remember.
f. I didn’t have one. (Skip to Question # 11)

10. In this last meeting, did you discuss any of the following? (Please check yes, no, or not sure for each item)
a. Who to contact in the Office for Students with Disabilities at your college or university
b. What accommodations or services you may need from your college or university
c. How to document your disability for your college or university
d. Your most recent evaluation
e. Communicating to the University what services and accommodations you need to be successful

11. What types of accommodations or services did you receive in high school? (checklist with provided by school, provided by parents, provided by other source, and did not receive)
a. Alternative format assignments
b. Extended time on assignments
c. Learning strategies or study skill assistance
d. Note taker services
e. Interpreter services
f. Assistive technology
g. Classroom assistants
h. Tutoring (peer tutoring or other additional one on one instruction)
i. Pull-out instruction (additional instruction with aide or other teacher)
j. Alternate format tests
k. Extended time on tests
l. Separate setting for tests (reduce distraction)
m. Individual counseling or therapy
n. Support groups
o. Physical therapy or functional training
p. Other (Please describe)

12. What types of accommodations or services have you received while enrolled at the University? (checklist with provided by Office of Disabilities, provided by parents/self, provided by other University source, did not receive)

(same list as above)

For each of the following, participants responded with Yes, No, and If yes, please describe.

13. Have you interacted with faculty about your Learning Disability?

14. Have you interacted with Office of Disabilities about your Learning Disability?
15. Have you interacted with other administrative staff (The Learning Center, Department administration, Dean’s office) about your Learning Disability?

16. Have you interacted with other students about your Learning Disability?

17. Have you interacted with residential life staff (dorm R.A.s, etc.) about your Learning Disability?

18. Have you experienced obstacle(s) to obtaining accommodations or services for your Learning Disability?

The final question in this section was answered on a 7 point Likert scale from strongly dissatisfied to strongly satisfied.

19. How satisfied have you been with the services you have received at The University?
   a. What has led to your level of satisfaction or dissatisfaction with services you have received? (please describe)
Perceptions of College Students With and Without Disabilities and Effects of STEM and non-STEM Enrollment on Student Engagement and Institutional Involvement

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Abstract
In a college student sample (n = 4,467) chosen among the National Survey of Student Engagement (NSSE) participants in 2006, group differences based on disability (i.e., no disability, single primary disability, multiple primary disabilities) were examined on five NSSE benchmarks of student engagement and institutional performance (i.e., academic challenge, active and collaborative learning, student-faculty interaction, enriching educational experiences, supportive campus environment) and taking into account curricular status (i.e., Science, Technology, Engineering, and Mathematics-STEM, non-STEM). Students with disabilities differed from their counterparts without disabilities in their perceptions related to student-faculty interactions and the extent to which they experienced supportive campus environments. Students with disabilities were significantly more favorable in their perceptions of student-faculty interactions, but reported significantly less favorable supportiveness of their respective campus environments. Although curricular status had independent effects on most of the measured outcomes, no compounding effects of curricular status on disability status were found.

According to recent statistics from the U.S. Department of Education, up to 11% of all undergraduates report having a disability (National Center for Education Statistics, 2006). Previous research has found that students with disabilities who enroll in postsecondary education are less prepared academically for college, have lower overall retention rates (Horn & Berktold, 1999), take longer to obtain a degree (Freiden, 2004; Stodden, Conway, & Chang, 2003) and have lower persistence rates than their counterparts without disabilities (Horn & Berktold, 1999). According to National Organization on Disabilities survey (2000), only 12% of individuals with disabilities graduate from college, as opposed to 23% of their non-disabled counterparts. In addition, even though the underrepresentation of persons with disabilities in Science, Technology, Engineering, and Mathematics (STEM) majors has been shrinking (National Postsecondary Student Aid Study, 2004), and approximately 7% of all scientists were individuals with disabilities, they are still underrepresented (i.e., 2%) among those younger than age 35, compared to 15% of those between ages 65–75 (National Science Foundation, 2006). Higher education is one of the most effective means of diminishing the negative consequences of disability (Stodden, Jones, & Chang, 2002).

Research on experiences and perceptions of students with disabilities in postsecondary education mostly focused on student factors like self-determination skills as being critical in transitioning, adjusting, and remaining in college (e.g., Getzel & Briel, 2006; Stodden, Galloway, & Stodden, 2003; Thoma & Wehmeyer, 2005; Wehman, 2001). In addition to self-determination skills, self-management skills such as time management, organizational skills, and study skills have also been identified as important student variables (e.g., Mull, Sitlington, & Alper, 2001). Research has also looked at the barriers to the access and utilization of disability support services on campuses (e.g., Dowrick, Anderson, Heyer, & Acosta, 2005; Getzel, 2008) as variables that impact persistence and retention in postsecondary edu-
The goal of this study is to extend the literature on experiences and perceptions of students with disabilities in postsecondary education by looking at their perceptions of student engagement and institutional performance that have been extensively documented as leading to student achievement and other desired outcomes of college (e.g., Pascarella & Terenzini, 2005; Pike, 2006; Tinto, 1987, 1993). More specifically, we examined if and how college students with disabilities differed from their counterparts without disabilities in terms of student engagement and perceptions of institutional performance.

The construct of student engagement generally refers to the quality of effort and involvement in productive learning activities and highlights the importance of student involvement, student effort, and student time on task (e.g., Kuh, 2009). However, student engagement is not only conceptualized as an indicator of “student performance,” but also as an indicator of “institutional performance,” and it also highlights the role that institutions have in inducing students to take part in educationally purposeful activities (e.g., Kuh, 2001, 2003; Kuh, Schuh, & Whitt, 1991). The National Survey of Student Engagement (NSSE) Institute developed five benchmarks to measure various aspects of student engagement and institutional performance:

- **Academic Challenge** measures the level of academic effort and expectations set for students by the institutions;
- **Active and Collaborative Learning** measures the level of involvement in learning in different settings as well as collaborating with others;
- **Student-Faculty Interaction** measures the amount of learning first-hand by interacting with faculty members both inside and outside the classroom;
- **Enriching Educational Experiences** measures the amount of complementary learning opportunities in and out of class augmenting academic programs and having diverse set of experiences to integrate and apply knowledge; and
- **Supportive Campus Environment** measures if the environments are committed to student success and cultivating positive working and social relations among different groups.

Even though engagement in effective educational practices generally benefits all students, the conditional and compensatory effects for specific student groups have been documented (Cruce, Wolniak, Seifert, & Pascarella, 2006; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008; Pascarella & Terenzini, 2005). Conditional effects are the differences in the amount of learning or development experienced by one group of students relative to other groups. Compensatory effects indicate differences among various groups of students, like students who may start college underprepared, and their differential gains and benefits compared with their relatively advantaged peers. For example, Kuh et al. (2008) documented compensatory effects of student engagement for historically underserved students in terms of earning higher grades and persistence. Since students with disabilities in postsecondary education are shown to be less prepared academically for college and have lower persistence rates than their counterparts without disabilities, it appears that the assessment of student engagement may be critical to the identification of effective interventions for ameliorating the aforementioned negative consequences of disability.

The first goal of this study was to examine, if and how, college students with disabilities differed from their counterparts without disabilities on five benchmarks of student engagement and institutional performance in a nationally representative sample: (a) Academic Challenge, (b) Active and Collaborative Learning, (c) Student-Faculty Interaction, (d) Enriching Educational Experiences, and (e) Supportive Campus Environment. The second goal was to assess whether STEM and non-STEM curricular status compounded any effects of disability status in terms of student engagement and institutional performance.

**Method**

**Participants and Procedure**

NSSE is an annual survey obtaining information from random samples of first-year and senior students in four-year colleges and universities nationwide about various aspects of undergraduate experience since 2000. Ten disability-related questions were added to the end of the NSSE since the core survey does not include questions that assess disability status. A randomly selected sample of institutions (n = 56) among all the participating institutions (n = 557) received these additional disability questions, resulting in 16,995 total respondents. Participants were first asked if they had a disability that affected their ability to succeed as a student. Students
who answered “yes” to the disability question were then asked to identify their primary disability as well as all the other secondary disabilities among ten categories: (1) mobility impairment, (2) blindness/low vision, (3) deaf/hard of hearing, (4) learning disability, (5) attention deficit/hyperactivity disorder, (6) autism-spectrum disorder, (7) speech disorder, (8) psychological condition, (9) medical/systemic impairment, and (10) brain injury.

**Demographics and sample characteristics.** Participants were 4,467 undergraduate students (64.6% female) chosen among the participating students (n = 16,995) in the NSSE Survey in 2006. Of those participants who specified their ethnicity, the majority (81.3%) were White. In addition, 1% were American Indian or Native American, 4.6% were Asian or Asian American, 1.6% were Mexican or Mexican American, and 6.3% were from various other ethnicities. A total of 4.4% indicated themselves as being international students or as foreign nationals. Overall, 30.7% of students with disabilities (i.e., single or multiple disabilities) were classified as being enrolled in STEM curricular, compared to 29.4% students in the no disability comparison group.

**Disability groupings.** Overall, 7.9% of the students responded as having a disability (n = 1,335) that affected their ability to succeed. The disability conditions indicated by the respondents were learning disability (24%), attention deficit/hyperactivity disorder (23%), psychological condition (16%), medical/systemic impairment (10%), deaf/hard of hearing (9%), mobility impairment (6%), blindness/low vision (6%), speech disorder (4%), brain injury (2%), and autism-spectrum disorder (1%). Respondents who identified only one “primary” disability were classified into a single disability group (n = 1,052). If two or more conditions were identified as “primary,” they were grouped under the multiple disability group (n = 283). In addition, a random sample of students (n = 3,132) matched by gender, race, and institutional type was selected among the students that indicated no disabilities (n = 15,660) to serve as a no disability comparison group resulting in three groups: (1) no disability group (n = 3,132), (2) single disability group (n = 1,052), and (3) multiple disability group (n = 283), resulting in a total sample size of 4,467.

**Curricular groupings.** All participants (n = 4,467) were classified into two curricular groups (i.e., STEM, non-STEM) based on the alignment of their academic major with the National Science Foundation Division of Human Resource Development (HRD) field of study categories. The STEM group was comprised of the science, technology, engineering, and mathematics majors and the non-STEM group consisted of all remaining majors. Three investigators assigned all NSSE majors (n = 85) into STEM and non-STEM categories by consensus according to the NSF guidelines. All three raters had to agree for a major to belong to the STEM group. Any major that was not unanimously identified as a STEM group was assigned to the non-STEM group. Of the total students, 63.4% (n = 2,833) were identified as enrolled in STEM curricula, leaving 36.6% (n = 1,634) enrolled in non-STEM curricula.

**Measures**

Five index scores were computed by NSSE for each of the benchmarks of student engagement and institutional performance: (a) Academic Challenge, (b) Active and Collaborative Learning, (c) Student-Faculty Interaction, (d) Enriching Educational Experiences, and (e) Supportive Campus. The index scores are the students’ average response to items within the index, after all items have been placed on a 100-point scale. Index scores were created for all students that answered three-fifths or more of the items within the group.

**Academic challenge.** Index score measures the time spent preparing for class, the amount of reading, writing, and deep learning required, as well as the amount of institutional expectations for academic performance. It was computed by averaging eleven items in the survey (α = .73). Sample items are:

- “During the current school year, about how much reading and writing have you done?”
- “During the current school year, how much has your coursework emphasized analyzing the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components?”
- “To what extent does your institution emphasize spending significant amounts of time studying and on academic work?”

**Active and collaborative learning.** Index score measures the extent of class participation, working collaboratively with other students inside and outside of class, and tutoring and involvement with a community-based project. It was computed by averaging six items in the survey (α = .68). Sample items are “In your
experience at your institution during the current school year, about how often have you -- asked questions in class or contributed to class discussions, --made a class presentation, --worked with other students on projects during class?"

**Student-faculty interaction.** Index score measures the extent of talking with faculty members and advisors, discussing ideas from classes with faculty members outside of class, getting prompt feedback on academic performance, and working with faculty on research projects. It was computed by averaging the six items in the survey (α = .76). Sample items are “In your experience at your institution during the current school year, about how often have you -- discussed grades or assignments with an instructor, --talked about career plans with a faculty member or advisor, --discussed ideas from your readings or classes with faculty members outside of class?”

**Enriching educational experiences.** Index score that measures extent of interaction with students of different racial or ethnic backgrounds or with different political opinions or values, using electronic technology, participating in activities such as internships, community service, study abroad, co-curricular activities, and culminating senior experience. It was computed by averaging twelve items in the survey (α = .65). Sample items are:

- “In your experience at your institution during the current school year, about how often have you had serious conversations with students who are very different from you in terms of their religious beliefs, political opinions, or personal values”
- “About how many hours do you spend in a typical 7-day week participating in co-curricular activities?”
- “To what extent does your institution emphasize encouraging contact among students from different economic, social, and racial or ethnic backgrounds?”

**Supportive campus environment.** Index score measures extent to which students perceive the campus helps them succeed academically and socially, assists them in coping with non-academic responsibilities, and promotes supportive relations among students and their peers, faculty members, and administrative personnel and offices. It is computed by averaging six items in the survey (α = .76). Sample items are “To what extent does your institution emphasize -- providing support you need to thrive socially, --providing support you need to help you succeed academically, --help you cope with your non-academic responsibilities (work, family, etc)?”

**Results**

An analysis of variance (ANOVA) was conducted for each of the NSSE benchmarks (i.e., academic challenge, active and collaborative learning, student-faculty interaction, enriching educational experiences, supportive campus) to evaluate the effect of disability status and curricular groupings. The between-subjects factors were disability status with three levels (i.e., no disability, single disability, multiple disabilities), and curricular status with two levels (i.e., STEM, non-STEM). Post-hoc tests were conducted to evaluate pairwise differences among the means using a Tukey HSD test when significant differences were noted.

The two-way ANOVA testing differences in academic challenge found no significant main effect for disability status, F (2, 4459) = 1.35, p < 0.26. However, the main effect for curricular status was significant, F (1, 4459) = 8.89, p < 0.01, ηp² = .002 with a small effect size. The mean of STEM students for perceived academic challenge was 56.31 (SD = 14.11) and the non-STEM students was 55.02 (SD = 13.87) indicating that STEM students perceived greater levels of academic challenge than non-STEM students. There was no significant interaction between the curricular status and disability status, F (2, 4459) = 0.11, p < 0.90.

The two-way ANOVA testing differences in active and collaborative learning found no significant main effects for either disability status, F (2, 4461 = 2.20, p < 0.11) or curricular status, F (1, 4461) = 0.67, p < 0.41 or for their interaction term, F (2, 4461) = 0.37, p < 0.41 indicating that students did not differ in their perceived opportunity for and exposure to active and collaborative learning depending on their disability status or curricular status.

The two-way ANOVA testing differences in enriching educational experiences did not find a significant main effect for disability status, F (2, 4456) = 0.80, p < 0.45. However, the main effect for curricular status was significant, F (1, 4456) = 6.00, p < 0.02, ηp² = .001 with a small effect size. The mean of STEM students for enriching educational experiences was 38.31 (SD = 18.16) and the non-STEM students was 36.95 (SD =
17.73) indicating that STEM students perceived greater levels of enriching educational experiences than non-STEM students. There was no significant interaction between disability status and curricular status, $F(2, 4461) = 1.26, p < 0.28$.

The two-way ANOVA testing differences in the level of perceived student-faculty interaction identified two main effects for both disability status $F(2, 4457) = 7.21, p < 0.001$, $\eta^2_p = .003$ and curricular status $F(1, 4457) = 11.60, p < 0.001$, $\eta^2_p = .003$ with small effect sizes. The pairwise differences among the means using a Tukey HSD test found that even though students with single (M = 41.38; SD = 20.25) and multiple disabilities (M = 42.25; SD = 21.23) did not differ from each other; they both differed from students without disabilities (M = 39.03; SD = 20.56) in their levels of perceived student-faculty interactions, indicating more favorable perceptions of their student-faculty interactions. In addition, STEM students (M = 41.17; SD = 21.43) differed from non-STEM students (M = 38.99; SD = 20.01) in their level of perceived student-faculty interactions indicating more favorable student-faculty interactions than non-STEM students. There was no significant interaction between disability status and curricular status, $F(2, 4457) = 0.07, p < 0.93$.

Finally, the two-way ANOVA testing differences in supportive campus environment also found two main effects for both disability status $F(2, 4458) = 11.26, p < 0.001$, $\eta^2_p = .005$ and curricular status $F(1, 4458) = 9.94, p < 0.01$, $\eta^2_p = .002$ with small effect sizes. Similar to the findings with perceived student-faculty interaction, the pairwise differences among the means using a Tukey HSD test found that students with single (M = 57.78; SD = 20.24) and multiple disabilities (M = 56.67; SD = 19.63) did not differ from each other. However, they both differed from students without disabilities (M = 60.13; SD = 18.57) in their perceptions of supportive campus environment with both reporting lower levels of supportiveness. Furthermore, STEM students (M = 58.11; SD = 19.00) also differed from non-STEM students (M = 59.97; SD = 19.11) in their levels of perceived campus supportiveness, indicating that they also perceived the campus environment less favorably. There was no significant interaction between the curricular status and disability status, $F(2, 4458) = 1.06, p < 0.35$.

Discussion

The current study examined group differences based on disability (i.e., no disability, single disability, multiple disabilities) on five NSSE benchmarks of student engagement and institutional performance (i.e., academic challenge, active and collaborative learning, student-faculty interaction, enriching educational experiences, supportive campus environment), taking into account curricular status (i.e., STEM, non-STEM) in a nationally representative student sample. Results revealed that student with disabilities (i.e., single and multiple) differed from students without disabilities in two of the measured outcomes (i.e., student faculty interaction, supportive campus environment) even though the effects sizes were small. Namely, students with disabilities reported perceiving their student-faculty interactions as more favorable than students without disabilities. In contrast, they reported less favorable ratings on the supportiveness of their respective campus environments compared to students without disabilities. However, no differences were found between the two disability groups (i.e., single and multiple) in terms of their perceptions on either of these benchmarks.

These findings suggest that despite their sense of greater opportunity to engage with faculty in and outside the classroom on academic matters, compared to the students without disabilities, students with disabilities perceive their institutions as being less committed to support them socially, assist them in coping with non-academic responsibilities, and generally promote their engagement in supportive relationships (e.g., peers, faculty members). In other words, students with disabilities report greater opportunities to engage with faculty on academic performance matters. These results can also be due to students with disabilities being more engaged than students without disabilities in terms of eliciting faculty interactions. It is conceivable that some of these interactions can be about discussing academic accommodations or negotiating alternative forms of evaluation due to the nature of their disability. However, in terms of social or non-academic responsibilities and the quality of their relationships with their peers, faculty members, and personnel, students with disabilities perceive their campuses as being less supportive than students without disabilities. These findings highlight the importance of improving the quality of relationships of students with disabilities in non-academic or co-curricular areas and making the campus climate more welcoming so that
students with disabilities truly feel more connected to the overall campus community. Future research needs to delineate the specific factors that could contribute the supportiveness of the campus environment for students with disabilities.

Other findings include the lack of differences between students with and without disabilities regarding their perceptions of the amount of academic challenges provided by their institutions, the active and collaborative learning opportunities presented to them, and the enriching educational experiences provided to them by their respective campuses. These findings indicate that students with disabilities have similar levels of academic challenges and expectations compared to their counterparts without disabilities. Furthermore, the perceptions of students with and without disabilities did not vary in terms of their perceived levels of exposure to diverse student populations, diverse opinions and values, diversified technologies, and diverse set of activities (e.g., internships, study abroad). Finally, students with and without disabilities also reported similar amounts of enriching educational experiences (e.g., levels of class participation, working collaboratively with other students inside and outside of class). The absence of differences in these areas is promising in that it indicates egalitarian access to such enrichment experiences. Future research will need to focus on the experiences of different disability subtypes (e.g., mobility, blind, deaf, LD) to see if there are within-group differences for various outcomes (including but not confined to the NSSE benchmarks).

This study did not find any interactions between disability status and curricular type on any of the NSSE benchmarks, indicating that the impact of disability status was not compounded by curricular status. Overall, the lack of interactive effects is an important finding indicating that there were no additive effects of curricular status on disability status. Namely, students with disabilities did not differ from students without disabilities on any of the outcome measures based on their curricular enrollment status (i.e., STEM or non-STEM). Notably, however, significant group differences between STEM majors and non-STEM majors were observed on all but one NSSE benchmark (i.e., academic challenge, enriching educational experiences, student faculty interaction, supportive campus environment) even though the effect size were small. Namely, students in STEM majors reported that their institutions were providing them with greater academic challenges and opportunities for engagement in enriching educational experiences, and that they had more favorable student-faculty interactions but, in contrast, they reported their respective campus environments to be less supportive than did their peers in non-STEM majors. The only outcome on which STEM majors did not differ from non-STEM majors was in their perceived opportunity for participating in active and collaborative learning. These findings are important in understanding the experiences of STEM majors. It is somewhat remarkable that STEM major’s perceptions of having less supportive campus environments mirror the perceptions of students with disabilities in the sense that both groups (i.e., STEM majors and students with disabilities) report having less supportive campus environments contrasting with their other more favorable perceptions on the above measured outcomes.

These findings draw attention to the importance of understanding and tailoring to the specific needs of various student populations (e.g., students with disabilities, STEM majors) in terms of the support they need over and beyond academics and the need to tailor services across various domains of life (e.g., social, work, family) as well as making sure that various campus groups (e.g., administrative personnel, offices) are aware and attuned to such needs while interacting with various student populations (e.g., students with disabilities, STEM majors).

Another important finding of this study was the lack of differences between individuals with single primary disabilities and those reporting multiple primary disabilities on NSSE benchmarks. In addition, the effect sizes were small for the observed group differences. It is conceivable that these could be an artifact of having created these groups by collapsing across various “types” of disabilities. More detailed groupings (e.g., primary psychiatric disability versus multiple psychiatric disabilities) might uncover more group differences, including but not confined to, the outcome measures included in the present study. Future research needs to tease apart how experiences of such groups differ from one another in order to reach a better understanding of their characteristics.


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The POSITIVES Scale: Development and Validation of a Measure of How Well the Information and Communication Technology Needs of Students with Disabilities are Being Met

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Abstract
Data on perceptions of 1354 Canadian college and university students with disabilities about how well their information and communication technology (ICT) needs are being met on and off campus were collected. These formed the basis for the POSITIVES Scale (Postsecondary Information Technology Initiative Scale). The measure contains 26 items which use a 6-point Likert scale (1 = strongly disagree, 6 = strongly agree) to indicate level of agreement with each of the positively worded items. The Scale has three factor analysis derived subscales (ICTs at School Meet Student’s Needs, ICTs at Home Meet Student’s Needs, e-Learning ICTs Meet Student’s Needs) and a total score. Reliability and validity are excellent for both English and French versions. Versions that could be completed online, on paper (printable PDF), and within a Microsoft Word document were found to be equivalent. Both the measure and the norms are provided.

Skill using information and communication technologies (ICTs) has become mandatory in postsecondary education and the workplace (Stodden, Conway, & Chang, 2003). For example, literature shows that computer use on the job is linked to higher salaries for employees both with and without disabilities (Canadian Council on Social Development, 2004; Kruse, Krueger, & Drastal, 1996). This makes it important that empirical data about the degree to which ICT related needs of learners with disabilities are being met is made available to decision makers involved in ICTs in postsecondary education. Having a means of gathering of such data will help to achieve this.

The use of ICTs, including e-learning, both on campus and in distance education, is ubiquitous (Campus Computing Project, 2008). By now, it is self-evident that for students to succeed in postsecondary education they need to have good access to computer technologies both on and off campus (Green, 2005). As the numbers of students with disabilities in postsecondary education continue to rise both in Canada (Fichten, Jorgensen, Havel, & Barile, 2006; Tremblay & Le May, 2005) and the US (National Council on Disability, 2003), where a recent large scale study showed that in 2003-2004, 11% of undergraduates had a disability (Snyder & Dillow, 2007), so does the need to assure that the growing array of available ICTs on campus is accessible (Konur, 2007; Waddell, 2007).

General Use ICTs, E-learning, and Adaptive Computer Technologies

Students need to use a variety of general use software such as Microsoft Word for writing papers and e-mail programs as well as software related to their specialties (e.g., for statistical analyses, for virtual science experiments, for language tutorials). To succeed in college or universities, learners must also adapt to the extensive use of e-learning used by faculty (Abrami et al., 2006; Weller, Pegler, & Mason, 2005). This includes PowerPoint presentations in class, web-based discus-
sions to further in-class dialogue, and the full range of ICTs that professors use when teaching their courses entirely in the classroom, entirely online, or a combination of both. Students are expected to download materials from course web sites, to access course management systems (CMS) such as WebCT and Blackboard, and to give presentations using PowerPoint. In addition to general use and e-learning ICTs, many students with disabilities also need to acquire and learn to use adaptive software as well as software which allows them to use ICTs effectively.

ICTs have many benefits for students with disabilities. These include: the availability of online course notes and course materials; the ability to work at one’s own pace and to work and learn from home; the ease of communicating with peers and professors; the availability of information anywhere and at any time; autonomy and feeling more independent, confident and less stressed; the ability to keep up with the rest of the class; and to use materials in alternate formats (Fichten et al., 2009). Nevertheless, a variety of barriers can interfere with the effective use of ICTs. These include: poor accessibility of needed hardware and software necessary in labs and student work areas; inadequate administrative support and funding for the purchase of adaptive technologies and for disability services staffing and training; lack of awareness and knowledge about adaptive technologies among students with disabilities; unreliable and incompatible hardware and software; the cost of adaptive technologies and their upgrades; difficulties acquiring alternate format course materials; technical problems connecting to websites and course management systems; difficulties encountered using online discussions and activities; poor faculty awareness and support for students who use adaptive technologies; inaccessibility of adapted audio and video clips; ergonomic issues; poor accessibility of course content, PowerPoint and data projection during in-class lectures; inaccessibility of course notes and materials; inadequate technical support for adaptive technologies; lack of technology/software required for home access needs; poor use of e-learning by professors and their lack of knowledge of how to make e-learning accessible; and time limits on online exams/assignments (Michaels, Prezant, Morabito, & Jackson, 2002; Fichten, Jorgensen, Havel, & Barile, 2005; Fichten et al., 2009).

**Evaluation of How Well Students’ ICT Related Needs are Being Met**

An important aspect of increased use of ICTs on campus includes ongoing evaluation of how well these technologies meet the needs of students, faculty and other members of the institution’s constituencies (Educause, n.d.). Evaluation should be carried out for a variety of reasons. These include ensuring a return on investment, measuring penetration and acceptance, and pinpointing areas for improvement (Bullock & Ory, 2000). A neglected topic in such evaluations has been consideration of how well students with different disabilities perceived their ICT related needs being met. It was recently noted by Burton and Nieuwenhuijzen (2008) that, “The instruments currently used to measure issues and concerns about computer-related technologies among the disabled community clearly are inadequate” (p. 105). They recommended that survey items specifically applicable to computer related ICTs for individuals with disabilities be developed. This is especially true for postsecondary students with disabilities, where ICT use is ubiquitous.

Recent investigations surveyed junior/community college and university adaptive computer technologists in seven countries, including the USA and Canada (Asuncion, Draffan, Guinan, & Thompson, 2009; Thompson, Draffan, & Patel, 2009). These investigations inquired about adaptive ICT use at postsecondary institutions. While these reports are based on extensive investigations of policies and practices, they did not evaluate the views and experiences of the students themselves. To obtain the student view, the present investigation explored the types of ICTs students indicated using on and off campus.

Recently, we developed a scale concerning adaptive ICTs for campus disability service providers (Fossey et al., 2005) as well as a companion measure to evaluate the availability of adaptive ICTs from the students’ vantage point (Fichten, Nguyen, Barile, & Asuncion, 2007). Because of the variety of ICTs used by students with different disabilities, it is important to evaluate not only adaptive technologies, but all types of ICTs, including e-learning, general use products, and those needed for the student’s program of study. Therefore, in the present investigation we developed the POSITIVES Scale, a brief measure to evaluate how well the ICT related needs of postsecondary students with various disabilities are being met in a variety of contexts both on and off campus.
Method

Participants

A convenience sample of 1354 students with various disabilities (456 males, 894 females, 4 did not indicate; mean age = 28.10, median = 24, standard deviation = 9.42, range = 18–64), from 111 different Canadian universities and junior/community colleges who completed the items that make up the POSITIVES Scale and the other measures were participants. Of these, 972 students (73%) attended a university and 368 (27%) a junior/community college. Participants attended school in all 10 of Canada’s provinces. All were either current students or had attended a postsecondary institution within the past year. One hundred twenty-nine attended French speaking institutions (38 university, 91 junior/community college), 1397 attended English speaking institutions (866 university, 329 junior/community college) and 16 attended bilingual institutions (15 university, 1 junior/community college). One hundred forty-one participants (97 females and 44 males) chose to complete measures in French and 1213 in English (797 females, 412 males, 4 did not specify). Students’ disabilities are presented in Table 1.

Measures

Demographic questions. These include objective questions related to: sex, age, postsecondary institution name and language, and the nature of students’ disabilities/impairments. We have used most of these questions in previous studies (Fichten, Barile, & Asuncion, 1999; Fichten et al., 2005; Fichten, Asuncion, Barile, Ferraro, & Wolfforth, 2009).

Disabilities. We provided a list of 13 disabilities / impairments and asked students to self-identify as many as applied to them. These are presented in Table 1.

Overall Criterion Items. Using a 6-point Likert scale (1 = strongly disagree, 6 = strongly agree), participants rated two Overall Criterion Items that inquired about how well their computer and/or adaptive computer needs are being met at school and at home: “In general, my computer and/or adaptive computer technology needs at my school are adequately met” and “In general, my computer and/or adaptive computer technology needs at home are adequately met.”

POSITIVES Scale (Postsecondary Information Technology Initiative Scale). We developed this 26-item objective measure concerning how well students’ ICT related needs are being met for the present investigation. We adapted the items from a questionnaire we developed earlier to evaluate the accessibility of adaptive computer technologies used by junior/community college students (Fichten et al., 2007) and for disability service providers (Fossey et al., 2005), with modifications suggested by our partner groups of students with disabilities and campus disability service providers. Questions were pilot tested by key informant students with different disabilities to uncover problems related to possible ambiguities, concerns about appropriate language, and the accessibility of the interface.

The POSITIVES Scale examines the extent to which students’ computer related needs are being met. To complete the measure, students use a 6-point Likert scale (1 = strongly disagree, 6 = strongly agree) to indicate their level of agreement with each of the positively worded items. The measure has three subscales derived using factor analysis (ICTs at School Meet Student’s Needs, ICTs at Home Meet Student’s Needs, e-Learning ICTs Meet Student’s Needs), and a Total Score. The measure can be administered online, on paper (printable PDF), and within a Microsoft Word document that can be submitted on a diskette or emailed as an attachment. The measure is available in both French and English.

Procedure

In 2007, an online questionnaire was developed and completed by 1354 Canadian university and junior/community college students with various disabilities. Participants were recruited through email discussion lists dealing with Canadian postsecondary education and disability. Project partners publicized the study to their memberships and students who had participated in previous investigations carried out by the authors were contacted. The research protocol was approved by Dawson College’s Human Research Ethics Committee.

Potential participants were asked to email the researchers for more information. Those indicating interest were directed to the study’s web site where they chose the language (English or French) in which they preferred to read the consent form, which provided information about the study, including the honorarium of $10, and to complete the questionnaire. Clicking the “I consent” button brought participants to the online questionnaire, which took approximately 10 minutes to complete.

Once participants clicked on the “Submit” button, they were brought to a screen which asked for contact information to enable us to send the honorarium of $10. Students were also asked if we may contact them again for future projects.
### Table 1

**Age and Disabilities of Participants: Single Versus Multiple Disabilities**

<table>
<thead>
<tr>
<th>Type of Disability/Impairment</th>
<th>Number of Students</th>
<th>Percent</th>
<th>Mean Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single disabilities/ impairments</td>
<td>894</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totally blind</td>
<td>17</td>
<td>1%</td>
<td>30.71</td>
</tr>
<tr>
<td>Low vision</td>
<td>62</td>
<td>5%</td>
<td>27.26</td>
</tr>
<tr>
<td>Deaf</td>
<td>14</td>
<td>1%</td>
<td>27.36</td>
</tr>
<tr>
<td>Hard of hearing</td>
<td>43</td>
<td>3%</td>
<td>26.58</td>
</tr>
<tr>
<td>Speech/communication impairment</td>
<td>2</td>
<td>&lt;1%</td>
<td>21.00</td>
</tr>
<tr>
<td>Learning disability/ADD/ADHD</td>
<td>386</td>
<td>29%</td>
<td>24.44</td>
</tr>
<tr>
<td>Mobility impairment</td>
<td>51</td>
<td>4%</td>
<td>31.02</td>
</tr>
<tr>
<td>Limitation in the use of hands/arms</td>
<td>47</td>
<td>3%</td>
<td>29.49</td>
</tr>
<tr>
<td>Medically related/health problem</td>
<td>67</td>
<td>5%</td>
<td>30.82</td>
</tr>
<tr>
<td>Psychological/psychiatric disability</td>
<td>172</td>
<td>13%</td>
<td>27.52</td>
</tr>
<tr>
<td>Neurological impairment</td>
<td>27</td>
<td>2%</td>
<td>29.63</td>
</tr>
<tr>
<td>PDD</td>
<td>6</td>
<td>&lt;1%</td>
<td>25.00</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0%</td>
<td>n/a</td>
</tr>
<tr>
<td>Multiple disabilities/impairments</td>
<td>460</td>
<td>34%</td>
<td>30.70</td>
</tr>
<tr>
<td>Total number of students</td>
<td>1354</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Disability/Impairment</th>
<th>Number Reporting Each Disability</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>All participants reporting each disability (^1)</td>
<td>24</td>
<td>2%</td>
</tr>
<tr>
<td>Totally blind</td>
<td>116</td>
<td>9%</td>
</tr>
<tr>
<td>Low vision</td>
<td>19</td>
<td>1%</td>
</tr>
<tr>
<td>Deaf</td>
<td>92</td>
<td>7%</td>
</tr>
<tr>
<td>Hard of hearing</td>
<td>45</td>
<td>3%</td>
</tr>
<tr>
<td>Speech/communication impairment</td>
<td>603</td>
<td>45%</td>
</tr>
<tr>
<td>Learning disability/ADD/ADHD</td>
<td>176</td>
<td>13%</td>
</tr>
<tr>
<td>Limitation in the use of hands/arms</td>
<td>258</td>
<td>19%</td>
</tr>
<tr>
<td>Medically related/health problem</td>
<td>429</td>
<td>32%</td>
</tr>
<tr>
<td>Psychological/psychiatric disability</td>
<td>107</td>
<td>8%</td>
</tr>
<tr>
<td>Neurological impairment</td>
<td>17</td>
<td>1%</td>
</tr>
<tr>
<td>PDD</td>
<td>4</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total disabilities reported by the 1354 students</td>
<td>2062</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) 1354 participants reported reported 2062 disabilities. Subjects reporting a disability may have more than one impairment.
Retest. Four weeks after receipt of students' completed questionnaires, we e-mailed those who indicated that we may do so to request that they complete the measure a second time. Of the original sample, 638 participants (47%) completed the measure a second time (432 females, 205 males, 1 did not indicate; mean age = 28.70, median = 25, standard deviation = 9.45, range = 18-59). Of these students, 496 (78%) attended a university and 141 (22%) a junior/community college. Participants attended school in 9 of Canada’s 10 provinces. Sixty-eight students completed measures in French (51 university, 17 junior/community college) and 569 in English (445 university, 124 junior/community college).

Alternate formats. To determine the equivalence of POSITIVES Scale versions that could be completed online, on paper (printable PDF), and within a Microsoft Word document, we randomly assigned a subset of English speaking participants with learning disabilities to complete the retest in one of these three modalities (stratified random sampling by sex). This was done to ascertain whether the POSITIVES Scale could be administered in different formats and still yield similar results. Fifty-nine students participated in this trial (31 females and 28 males). Twenty-one students completed the online version, 14 the paper (printable PDF) version, and 24 the Microsoft Word version.

Results

Sample Characteristics

Students' disabilities. Table 1 shows that the 1354 students reported a total of 2062 disabilities (mean = 1.53 disabilities/student). Four-hundred and sixty students (34%) reported more than one disability: 22% of students indicated two, 8% indicated three, and 4% of students indicated four or more disabilities. It can be seen in Table 1 that the most common disability reported by participants was a learning disability (with or without attention deficit or attention deficit hyperactivity disorder), followed by a psychological/psychiatric disability, and by a medically related/health problem.

POSITIVES Scale Properties

Two types of reliability estimates were obtained for the POSITIVES Scale: temporal stability (test-retest) and internal consistency (Cronbach’s alpha, split half, item:total). All items with acceptable test-retest reliability were included in a principal components analysis with varimax rotation which yielded 3 factors (Subscales). Construct, concurrent, and criterion validity were evaluated (a) by correlating POSITIVES Scale Subscale and Total scores with each other, (b) by correlating Subscale scores with scores on the two Overall Criterion Items, (c) by correlating Subscale scores with aspects that were not expected to be related to how well ICT related needs are being met, and (d) by comparing the scores of groups of students with different impairments whose ICT related needs were expected to be met especially well and those whose needs were expected to be met especially poorly.

Reliability. Six hundred thirty-eight participants completed the POSITIVES Scale twice an average of 4.59 weeks apart (range = 1 week to 17.6 weeks, median = 4.24). Pearson product-moment correlation coefficients for all scores are significant at the .001 level or better. The coefficients for POSITIVES Scale single items range from .47 to .73, and the coefficients for the Subscales range from .73 to .79. The coefficient for the Total score is .81. We also carried out paired t-test comparisons on test and retest scores. The results show no significant differences for POSITIVES Scale Subscale and Total scores. Five of the 26 item-by-item t-tests were significant at the .05 level. Because of the number of comparisons, a Bonferroni correction to the alpha level was made. Following this correction, none of the comparisons remain significant.

We also conducted a series of internal consistency analyses. These can be seen in Table 2. Results show that Cronbach’s alpha for the three Subscales ranges from .786 to .910 and that it is .936 for the Total score. The results also show that the removal of any item would not greatly affect alpha. Guttman split-half coefficients for the factors range from .715 to .852. Item-Total Pearson correlation coefficients range from .466 to .714 and the correlations between Subscale and Total scores range from .762 to .920.

Derivation of Subscales: Factor Analysis

We established Subscales using factor analysis (see Table 3). A principal components analysis with varimax rotation was carried out both with and without mean substitution. This was done because of the large amount of missing data. Three factors were extracted. Table 3 presents the rotated factor loadings for each item for the entire sample, with and without mean substitution. Table 6 presents the results of the factor analysis. Items were generally assigned to the factor (Subscale) corresponding to the highest factor loading for factor
The findings show remarkable consistency, regardless of the way in which the factor analysis was carried out (i.e., with or without mean substitution). Subscales are described below. Table 4 includes all items comprising each Subscale.

Subscale 1 - ICTs at School Meet Student's Needs. This twelve-item subscale evaluates the extent to which students' ICT related needs are being met while they are at school (e.g., My school has enough computers with internet access to meet my needs. The hours of access to computer technologies at my school meet my needs).

Subscale 2 - ICTs at Home Meet Student's Needs. This five-item subscale evaluates the extent to which ICT related needs are being met while students are off campus (e.g., Funding for computer technologies for personal use is adequate to meet my needs. My personal computer technologies are sufficiently up-to-date to meet my needs).

Subscale 3 - E-learning ICTs Meet Student's Needs. This nine-item subscale evaluates the extent to which the school's e-learning meets the student's needs (e.g., My school's web pages are accessible to me. I have no problems when professors use e-learning for tests and exams).

Scoring, Standardization and Norms
Table 4 shows mean scores for all POSITIVES Scale single item, Subscale, and Total scores for all participants. These indicate that although all items have scores that are more favorable than unfavorable (i.e., scores > 3.5 on the 6-point scale of agreement - items all positively worded), the most problematic items are those that deal with the availability of adapted computers at school in specialized computer laboratories as well as those available through the school’s loan program. In addition, funding for computer technologies for personal use as well as problems with training, both on and off campus, had low scores, as did the item dealing with poor technical support when the student is not at school.

On the other hand, the results also show that students felt the school’s web pages are accessible, that they can effectively use the computer technologies they need, that expertise in adaptive ICTs was readily available on campus, that needed electronic format course materials are available, and that the school’s interactive online services (e.g., registering, financial aid applications on the web) as well as the library’s computer systems were generally quite accessible.

Students with different disabilities. The findings above represent the sample as a whole. To facilitate interpretation and to provide POSITIVES Scale norms for the different groups of participants, in Table 5 we provide preliminary norms (i.e., mean scores) for the three POSITIVES Scale Subscales and for the Total score for the different disability groups. Although overall the findings suggest that the ICT related needs of students in all groups are relatively well met, needs of students who are totally blind, those with multiple disabilities, and those

Table 2

<table>
<thead>
<tr>
<th>POSITIVES Scale Internal Consistency: Item Analysis - All Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Items</strong></td>
</tr>
<tr>
<td>Subscale 1 - ICTs at school meet student's needs</td>
</tr>
<tr>
<td>Subscale 2 - ICTs at home meet student's needs</td>
</tr>
<tr>
<td>Subscale 3 - E-learning ICTs meet student's needs</td>
</tr>
<tr>
<td>Item - Total</td>
</tr>
<tr>
<td>Subscale - Total</td>
</tr>
</tbody>
</table>

1 Cronbach's alpha based on standardized items.
2 Cronbach's alpha for Total (based on the 26 items).
3 Cronbach's alpha for Total (based on the 3 subscales).
**Table 3**

**POSITIVES Scale Factor Loadings: Analyses with and Without Mean Substitution**

<table>
<thead>
<tr>
<th>Item</th>
<th>Subscale 1 - ICTs at School Meet Student's Needs</th>
<th>Subscale 2 - ICTs at Home Meet Student's Needs</th>
<th>Subscale 3 - E-learning ICTs Meet Student's Needs</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 There are enough computer technologies in my school's specialized labs/centres for students with disabilities to meet my needs</td>
<td>0.701</td>
<td>0.283</td>
<td>0.252</td>
<td>0.694</td>
<td>0.086</td>
<td>0.250</td>
</tr>
<tr>
<td>1 My school has enough computers with internet access to meet my needs</td>
<td>0.685</td>
<td>0.265</td>
<td>0.040</td>
<td>0.666</td>
<td>0.247</td>
<td>0.020</td>
</tr>
<tr>
<td>5 The availability of computer technologies in my school's general use computer labs meet my needs</td>
<td>0.676</td>
<td>0.345</td>
<td>0.200</td>
<td>0.696</td>
<td>0.224</td>
<td>0.100</td>
</tr>
<tr>
<td>3 At my school, computer technologies are sufficiently up to date to meet my needs</td>
<td>0.666</td>
<td>0.298</td>
<td>0.086</td>
<td>0.693</td>
<td>0.213</td>
<td>0.059</td>
</tr>
<tr>
<td>11 The availability of technical support when I am not at school meets my needs</td>
<td>0.665</td>
<td>0.117</td>
<td>0.387</td>
<td>0.408</td>
<td>0.153</td>
<td>0.484</td>
</tr>
<tr>
<td>14 Informal help is available at my school to show me how to use technologies if I need this</td>
<td>0.659</td>
<td>0.085</td>
<td>0.385</td>
<td>0.493</td>
<td>0.147</td>
<td>0.420</td>
</tr>
<tr>
<td>8 The technical support provided at my school for computer technologies meets my needs</td>
<td>0.637</td>
<td>0.195</td>
<td>0.417</td>
<td>0.575</td>
<td>0.111</td>
<td>0.379</td>
</tr>
<tr>
<td>24 The physical access to computer technologies at my school meets my needs</td>
<td>0.638</td>
<td>0.162</td>
<td>0.026</td>
<td>0.445</td>
<td>0.166</td>
<td>0.231</td>
</tr>
<tr>
<td>9 When I approach staff at my institution with problems related to the accessibility of computer technologies on campus they act quickly to resolve any issues</td>
<td>0.621</td>
<td>0.246</td>
<td>0.387</td>
<td>0.461</td>
<td>0.246</td>
<td>0.306</td>
</tr>
<tr>
<td>13 Training provided by my school on how to use the computer technologies meets my needs</td>
<td>0.618</td>
<td>0.129</td>
<td>0.485</td>
<td>0.405</td>
<td>0.139</td>
<td>0.550</td>
</tr>
<tr>
<td>2 The hours of access to computer technologies at my school meet my needs</td>
<td>0.605</td>
<td>0.385</td>
<td>0.123</td>
<td>0.632</td>
<td>0.203</td>
<td>0.050</td>
</tr>
<tr>
<td>10 There is at least one person on staff at my school who has expertise in adaptive hardware and software</td>
<td>0.484</td>
<td>0.071</td>
<td>0.344</td>
<td>0.471</td>
<td>0.100</td>
<td>0.269</td>
</tr>
<tr>
<td>7 Funding for computer technologies for personal use is adequate to meet my needs</td>
<td>0.612</td>
<td>0.292</td>
<td>0.713</td>
<td>0.028</td>
<td>0.113</td>
<td>0.962</td>
</tr>
<tr>
<td>12 I know how to effectively use the computer technologies that I need</td>
<td>0.268</td>
<td>0.021</td>
<td>0.702</td>
<td>0.157</td>
<td>0.206</td>
<td>0.031</td>
</tr>
<tr>
<td>23 My personal computer technologies are sufficiently up-to-date to meet my needs</td>
<td>0.196</td>
<td>0.288</td>
<td>0.672</td>
<td>0.085</td>
<td>0.311</td>
<td>0.564</td>
</tr>
<tr>
<td>6 My school's loan program for computer technologies meets my needs</td>
<td>0.217</td>
<td>0.338</td>
<td>0.661</td>
<td>0.158</td>
<td>0.121</td>
<td>0.092</td>
</tr>
<tr>
<td>15 Training available off campus on how to use computer technologies meets my needs</td>
<td>0.394</td>
<td>0.070</td>
<td>0.477</td>
<td>0.231</td>
<td>0.091</td>
<td>0.524</td>
</tr>
<tr>
<td>21 My school's interactive online services are accessible to me</td>
<td>0.192</td>
<td>0.705</td>
<td>0.115</td>
<td>0.215</td>
<td>0.691</td>
<td>0.050</td>
</tr>
<tr>
<td>18 Distance education courses offered by my institution are accessible to me</td>
<td>-0.040</td>
<td>0.694</td>
<td>0.186</td>
<td>0.051</td>
<td>0.483</td>
<td>0.105</td>
</tr>
<tr>
<td>25 My school's web pages are accessible to me</td>
<td>0.328</td>
<td>0.601</td>
<td>-0.008</td>
<td>0.214</td>
<td>0.667</td>
<td>0.026</td>
</tr>
<tr>
<td>22 The accessibility of the library's computer systems meets my needs</td>
<td>0.423</td>
<td>0.535</td>
<td>0.043</td>
<td>0.350</td>
<td>0.528</td>
<td>0.116</td>
</tr>
<tr>
<td>26 The availability of electronic format course materials meets my needs</td>
<td>0.308</td>
<td>0.530</td>
<td>0.282</td>
<td>0.248</td>
<td>0.551</td>
<td>0.262</td>
</tr>
<tr>
<td>17 I have no problem when professors use eLearning for tests and exams</td>
<td>0.121</td>
<td>0.560</td>
<td>0.352</td>
<td>0.088</td>
<td>0.534</td>
<td>0.194</td>
</tr>
<tr>
<td>19 If I bring computer technology into the classroom I am able to use it</td>
<td>0.239</td>
<td>0.469</td>
<td>0.160</td>
<td>0.140</td>
<td>0.405</td>
<td>0.196</td>
</tr>
<tr>
<td>20 I feel comfortable using needed computer technologies in the classroom</td>
<td>0.272</td>
<td>0.461</td>
<td>0.281</td>
<td>0.101</td>
<td>0.402</td>
<td>0.369</td>
</tr>
<tr>
<td>16 When professors use eLearning, it is accessible to me</td>
<td>0.306</td>
<td>0.445</td>
<td>0.455</td>
<td>0.189</td>
<td>0.636</td>
<td>0.176</td>
</tr>
</tbody>
</table>


1 Test sample, n = 207. Percent of variance for rotated factors is as follows: Factor 1 = 22.728%, Factor 2 = 14.606%, Factor 3 = 14.360%.

2 Test sample, n = 1354 (mean substitution). Percent of variance for rotated factors is as follows: Factor 1 = 16.592%, Factor 2 = 12.724%, Factor 3 = 12.537%.
Table 4

**POSITIVES Scale Items, Factors, and Scoring**

<table>
<thead>
<tr>
<th>Subscale / Factor</th>
<th>Item number, item wording and scoring</th>
<th>Mean</th>
<th>SD</th>
<th>n</th>
</tr>
</thead>
</table>

**Subscale 1 - ICTs at school meet student's needs (Scoring: average all Factor 1 single item scores other than "not applicable")**

<table>
<thead>
<tr>
<th>Item number, item wording and scoring</th>
<th>Mean</th>
<th>SD</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My school has enough computers with internet access to meet my needs</td>
<td>4.83</td>
<td>1.46</td>
<td>1315</td>
</tr>
<tr>
<td>2. The hours of access to computer technologies at my school meet my needs</td>
<td>4.91</td>
<td>1.45</td>
<td>1290</td>
</tr>
<tr>
<td>3. At my school, computer technologies are sufficiently up to date to meet my needs (e.g., grammar checking, adaptive mouse, software that reads what is on the screen)</td>
<td>4.90</td>
<td>1.43</td>
<td>1221</td>
</tr>
<tr>
<td>4. There are enough computer technologies in my school's specialized labs/centres for students with disabilities to meet my needs</td>
<td>4.19</td>
<td>1.69</td>
<td>1069</td>
</tr>
<tr>
<td>5. The availability of computer technologies in my school's general use computer labs meet my needs</td>
<td>4.47</td>
<td>1.62</td>
<td>1273</td>
</tr>
<tr>
<td>8. The technical support provided at my school for computer technologies meets my needs</td>
<td>4.59</td>
<td>1.46</td>
<td>1172</td>
</tr>
<tr>
<td>9. When I approach staff at my institution with problems related to the accessibility of computer technologies on campus they act quickly to resolve any issues (e.g., cannot see the PowerPoint presentation, cannot hear a video clip, need a grammar checker to write an essay)</td>
<td>4.72</td>
<td>1.43</td>
<td>978</td>
</tr>
<tr>
<td>10. There is at least one person on staff at my school who has expertise in adaptive hardware and software (e.g., knowledgeable about software that reads what is on the screen, keeps up to date with the latest in adapted keyboards)</td>
<td>5.00</td>
<td>1.37</td>
<td>1046</td>
</tr>
<tr>
<td>11. The availability of technical support when I am not at school meets my needs (e.g., school IT help desk, vendor support)</td>
<td>4.22</td>
<td>1.55</td>
<td>1054</td>
</tr>
<tr>
<td>12. Training provided by my school on how to use the computer technologies meets my needs</td>
<td>4.29</td>
<td>1.60</td>
<td>996</td>
</tr>
<tr>
<td>14. Informal help is available at my school to show me how to use computer technologies if I need this</td>
<td>4.54</td>
<td>1.46</td>
<td>1167</td>
</tr>
<tr>
<td>24. The physical access to computer technologies at my school meets my needs (e.g., adjustable table, wide enough doorway)</td>
<td>4.90</td>
<td>1.49</td>
<td>976</td>
</tr>
</tbody>
</table>

**Subscale 2 - ICTs at home meet student's needs (Scoring: average all Factor 2 single item scores other than "not applicable")**

<table>
<thead>
<tr>
<th>Item number, item wording and scoring</th>
<th>Mean</th>
<th>SD</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. My school's loan program for computer technologies meets my needs</td>
<td>3.88</td>
<td>1.86</td>
<td>703</td>
</tr>
<tr>
<td>7. Funding for computer technologies for personal use is adequate to meet my needs (e.g., government, foundation, rehab center, loan program)</td>
<td>4.07</td>
<td>1.85</td>
<td>955</td>
</tr>
<tr>
<td>12. I know how to effectively use the computer technologies that I need</td>
<td>5.08</td>
<td>1.25</td>
<td>1331</td>
</tr>
<tr>
<td>15. Training available off campus on how to use computer technologies meets my needs</td>
<td>3.64</td>
<td>1.65</td>
<td>803</td>
</tr>
<tr>
<td>23. My personal computer technologies are sufficiently up-to-date to meet my needs</td>
<td>4.76</td>
<td>1.52</td>
<td>1318</td>
</tr>
</tbody>
</table>

**Subscale 3 - e-Learning ICTs meet student's needs (Scoring: average all Factor 3 single item scores other than "not applicable")**

<table>
<thead>
<tr>
<th>Item number, item wording and scoring</th>
<th>Mean</th>
<th>SD</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. When professors use eLearning, it is accessible to me (e.g., PowerPoint in the classroom, course notes on the web, CD-ROMs, WebCT)</td>
<td>4.99</td>
<td>1.32</td>
<td>1186</td>
</tr>
<tr>
<td>17. I have no problems when professors use eLearning for tests and exams (e.g., quizzes in WebCT)</td>
<td>4.71</td>
<td>1.57</td>
<td>941</td>
</tr>
<tr>
<td>18. Distance education courses offered by my institution are accessible to me</td>
<td>4.70</td>
<td>1.56</td>
<td>726</td>
</tr>
<tr>
<td>19. If I bring computer technology into the classroom I am able to use it (e.g., can plug it in)</td>
<td>4.59</td>
<td>1.50</td>
<td>1150</td>
</tr>
<tr>
<td>20. I feel comfortable using needed computer technologies in the classroom</td>
<td>4.63</td>
<td>1.54</td>
<td>1137</td>
</tr>
<tr>
<td>21. My school's interactive online services are accessible to me (e.g., registering, financial aid applications on the web)</td>
<td>5.36</td>
<td>1.06</td>
<td>1297</td>
</tr>
<tr>
<td>22. The accessibility of the library's computer systems meets my needs (e.g., catalogues, databases, CD-ROMs)</td>
<td>5.02</td>
<td>1.28</td>
<td>1290</td>
</tr>
<tr>
<td>25. My school's web pages are accessible to me</td>
<td>5.52</td>
<td>0.94</td>
<td>1341</td>
</tr>
<tr>
<td>26. The availability of electronic format course materials meets my needs (e.g., Word, PDF, MP3)</td>
<td>5.04</td>
<td>1.35</td>
<td>1293</td>
</tr>
</tbody>
</table>

**Total (average) score (Scoring: average all single item scores other than "not applicable")**

4.75 0.86 1354

**Scoring:** For all statements, rate your level of agreement using the following scale: 1 = Strongly Disagree, 2 = Moderately Disagree, 3 = Slightly Disagree, 4 = Slightly Agree, 5 = Moderately Agree, 6 = Strongly Agree, 7 = Not Applicable

**Note:** n= 1354.
Table 5

**POSITIVES Scale Preliminary Norms for Students with Different Disabilities**

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subscale 1 - ICTs at School Meet Student's Needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totally blind</td>
<td>4.21</td>
<td>1.12</td>
</tr>
<tr>
<td>Low vision</td>
<td>4.47</td>
<td>1.13</td>
</tr>
<tr>
<td>Deaf</td>
<td>4.60</td>
<td>0.81</td>
</tr>
<tr>
<td>Hard of hearing</td>
<td>4.95</td>
<td>0.76</td>
</tr>
<tr>
<td>Learning disability / ADD / ADHD (e.g., dyslexia)</td>
<td>4.76</td>
<td>0.98</td>
</tr>
<tr>
<td>Mobility impairment (e.g., use of a wheelchair / cane / crutches)</td>
<td>4.81</td>
<td>0.97</td>
</tr>
<tr>
<td>Limitation in the use of hands / arms</td>
<td>4.56</td>
<td>0.86</td>
</tr>
<tr>
<td>Medically related / health problem (e.g., diabetes, Crohn's)</td>
<td>4.94</td>
<td>0.86</td>
</tr>
<tr>
<td>Psychological / psychiatric disability (e.g., anxiety, depression)</td>
<td>4.81</td>
<td>0.89</td>
</tr>
<tr>
<td>Neurological impairment (e.g., epilepsy, traumatic brain injury)</td>
<td>4.52</td>
<td>1.08</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>4.45</td>
<td>1.11</td>
</tr>
<tr>
<td>Whole sample</td>
<td>4.65</td>
<td>1.02</td>
</tr>
<tr>
<td><strong>Subscale 2 - ICTs at Home Meet Student's Needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totally blind</td>
<td>4.80</td>
<td>0.96</td>
</tr>
<tr>
<td>Low vision</td>
<td>4.69</td>
<td>1.11</td>
</tr>
<tr>
<td>Deaf</td>
<td>4.86</td>
<td>0.67</td>
</tr>
<tr>
<td>Hard of hearing</td>
<td>4.73</td>
<td>0.92</td>
</tr>
<tr>
<td>Learning disability / ADD / ADHD (e.g., dyslexia)</td>
<td>4.39</td>
<td>1.20</td>
</tr>
<tr>
<td>Mobility impairment (e.g., use of a wheelchair / cane / crutches)</td>
<td>4.70</td>
<td>1.21</td>
</tr>
<tr>
<td>Limitation in the use of hands / arms</td>
<td>4.48</td>
<td>1.02</td>
</tr>
<tr>
<td>Medically related / health problem (e.g., diabetes, Crohn's)</td>
<td>4.47</td>
<td>1.15</td>
</tr>
<tr>
<td>Psychological / psychiatric disability (e.g., anxiety, depression)</td>
<td>4.37</td>
<td>1.21</td>
</tr>
<tr>
<td>Neurological impairment (e.g., epilepsy, traumatic brain injury)</td>
<td>4.58</td>
<td>0.93</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>4.19</td>
<td>1.26</td>
</tr>
<tr>
<td>Whole sample</td>
<td>4.38</td>
<td>1.20</td>
</tr>
<tr>
<td><strong>Subscale 3 - E-learning ICTs Meet Student's Needs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totally blind</td>
<td>4.63</td>
<td>0.69</td>
</tr>
<tr>
<td>Low vision</td>
<td>4.90</td>
<td>0.93</td>
</tr>
<tr>
<td>Deaf</td>
<td>5.15</td>
<td>0.80</td>
</tr>
<tr>
<td>Hard of hearing</td>
<td>5.30</td>
<td>0.54</td>
</tr>
<tr>
<td>Learning disability / ADD / ADHD (e.g., dyslexia)</td>
<td>5.01</td>
<td>0.80</td>
</tr>
<tr>
<td>Mobility impairment (e.g., use of a wheelchair / cane / crutches)</td>
<td>5.37</td>
<td>0.76</td>
</tr>
<tr>
<td>Limitation in the use of hands / arms</td>
<td>5.02</td>
<td>0.69</td>
</tr>
<tr>
<td>Medically related / health problem (e.g., diabetes, Crohn's)</td>
<td>5.28</td>
<td>0.86</td>
</tr>
<tr>
<td>Psychological / psychiatric disability (e.g., anxiety, depression)</td>
<td>5.13</td>
<td>0.76</td>
</tr>
<tr>
<td>Neurological impairment (e.g., epilepsy, traumatic brain injury)</td>
<td>4.91</td>
<td>0.86</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>4.85</td>
<td>0.92</td>
</tr>
<tr>
<td>Whole sample</td>
<td>5.00</td>
<td>0.85</td>
</tr>
<tr>
<td><strong>Total (average) score</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totally blind</td>
<td>4.48</td>
<td>0.73</td>
</tr>
<tr>
<td>Low vision</td>
<td>4.67</td>
<td>0.90</td>
</tr>
<tr>
<td>Deaf</td>
<td>4.86</td>
<td>0.64</td>
</tr>
<tr>
<td>Hard of hearing</td>
<td>5.05</td>
<td>0.63</td>
</tr>
<tr>
<td>Learning disability / ADD / ADHD (e.g., dyslexia)</td>
<td>4.81</td>
<td>0.84</td>
</tr>
<tr>
<td>Mobility impairment (e.g., use of a wheelchair / cane / crutches)</td>
<td>5.03</td>
<td>0.82</td>
</tr>
<tr>
<td>Limitation in the use of hands / arms</td>
<td>4.72</td>
<td>0.73</td>
</tr>
<tr>
<td>Medically related / health problem (e.g., diabetes, Crohn's)</td>
<td>5.03</td>
<td>0.78</td>
</tr>
<tr>
<td>Psychological / psychiatric disability (e.g., anxiety, depression)</td>
<td>4.87</td>
<td>0.79</td>
</tr>
<tr>
<td>Neurological impairment (e.g., epilepsy, traumatic brain injury)</td>
<td>4.69</td>
<td>0.90</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>4.57</td>
<td>0.92</td>
</tr>
<tr>
<td>Whole sample</td>
<td>4.75</td>
<td>0.86</td>
</tr>
</tbody>
</table>
Table 6: Correlations Among POSITIVES Scale Subscales, Total, and Overall Item Scores

<table>
<thead>
<tr>
<th>Variables</th>
<th>Subscale 1 - ICTs at School Meet Student's Needs</th>
<th>Subscale 2 - ICTs at Home Meet Student's Needs</th>
<th>Subscale 3 - E-learning ICTs Meet Student's Needs</th>
<th>Overall (average) score</th>
</tr>
</thead>
<tbody>
<tr>
<td>In general, my computer technology needs at school are adequately met.</td>
<td>0.086 0.590</td>
<td>0.000</td>
<td>0.000 0.730</td>
<td>0.000 1.000</td>
</tr>
<tr>
<td>In general, my computer technology needs at home are adequately met.</td>
<td>0.000 0.000</td>
<td>0.000 0.000</td>
<td>0.000 0.000</td>
<td>0.000 0.000</td>
</tr>
</tbody>
</table>

Note: Table 6 presents the correlations among the POSITIVES scale subscales, total, and overall item scores. The table shows the strength and significance of correlations between different aspects of technology needs at school and home, as well as e-learning needs.
with low vision were met least well. Needs of students who are hard of hearing, have a medically related/health problem, have a mobility impairment, and those with psychological/psychiatric disabilities were met best. However, Subscale results suggest that while this pattern is true for Subscale 1 (ICTs at School Meet Needs) and Subscale 3 (e-learning ICTs meet students’ needs), the pattern of results is very different for off campus use, where the ICT related needs of the following groups are being met least well: multiple disabilities, psychological/psychiatric disability, learning disability/ADD/ADHD. In contrast, the needs of students with mobility impairment, those who are hard of hearing, and those who are totally blind are best met in this context.

Validity

Two types of construct validation were undertaken: convergent and discriminant validity. In addition, concurrent and criterion validity were examined.

Convergent validity. Examination of the properties of the POSITIVES measure, provided in Table 6, shows moderate correlations among the three Subscales (range $r = .521$ to $r = .622$). Internal validity correlation coefficients in this table also show strong relationships between Subscale scores and the Total score (range from $r = .762$ to $r = .920$). Overall, the coefficients indicate that Subscales measure different concepts, all of which are important components of the accessibility of ICTs as measured by the Total score.

Discriminant validity. There was no reason to expect that females’ and males’ POSITIVES Scale Subscale or Total scores would differ. Therefore, to test discriminant validity we compared female and male participants’ POSITIVES Scale Subscales and Total scores. The means, and the multivariate analysis of variance (MANOVA), ANOVA and t-test findings show that none of the Subscales differentiated between these two groups; nor did the Total score.

Concurrent validity. Although the two Overall Criterion Items are significantly correlated with all Subscale and Total scores, coefficients in Table 8 show that, as expected, the Overall Item “In general, my computer and/or adaptive computer technology needs at my school are adequately met” was most closely correlated to Subscale 1 - ICTs at School Meet Student’s Needs and that the Overall item, “In general, my computer and/or adaptive computer technology needs at home are adequately met” was most closely related to Subscale 2 - ICTs at Home Meet Student’s Needs.

In addition, we examined the relationship between POSITIVES Subscale as well as Total scores and selected questions from data collected in the context of two studies conducted in 2005 (Fichten, Jorgensen, Havel, & Barile, 2006) and 2006 (Fichten et al., 2006). These are presented in Table 7 and show that the two POSITIVES Subscales that deal with ICTs in schools (Subscales 1 and 3) are especially highly correlated with items which deal with ICTs and e-learning in school, along with the extent to which the college environments meets students’ needs, and that students’ personal situation is most closely related to POSITIVES Subscale 2 (how well ICTs at home meet students’ needs). In addition, The POSITIVES Total score is significantly related to scores on all items.

Criterion validity. Based on a priori assumptions, students with psychological/psychiatric disabilities would be expected to have their ICT related needs better met than students with multiple disabilities. We selected these groups because we thought that students with psychological/psychiatric disabilities were less likely to need specialized adaptive technologies than students with other disabilities, especially students with multiple disabilities. In addition, we thought that students with multiple disabilities would be especially likely to experience ICT related problems because of compatibility issues between different types of needed ICTs.

To test criterion validity we wanted to examine the extent to which the POSITIVES Scale Subscale and Total scores were able to differentiate between these two groups of participants. The means and MANOVA, ANOVA and t-test findings presented in Table 8 show that all three Subscales differentiated between these two groups, as did the Total score.

Equivalence of Formats

To evaluate whether the POSITIVES Scale can be administered in alternate formats we used a 1-way ANOVA to compare scores of English speaking participants with learning disabilities who had been randomly assigned to one of three experimental conditions: completing the retest Online, within Microsoft Word, and on Paper (printable PDF) formats. Mean scores and 1-way ANOVA test results indicate that there were no significant differences on the 26 POSITIVES Scale single items or on the 3 Subscales or the Total score.
Table 7

Correlations Among POSITIVES Scale Subscales, Total, and Overall Items with the e-learning Scores

<table>
<thead>
<tr>
<th>Variables</th>
<th>POSITIVES Subscale 1 - ICTs at School Meet Student's Needs</th>
<th>POSITIVES Subscale 2 - ICTs at Home Meet Student's Needs</th>
<th>POSITIVES Subscale 3 - E-learning ICTs Meet Student's Needs</th>
<th>POSITIVES Total (average) score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>r</td>
<td>Sig =</td>
<td>n</td>
</tr>
<tr>
<td>Cross-Canada study of college and University students ¹</td>
<td>73</td>
<td>0.479</td>
<td>0.000</td>
<td>63</td>
</tr>
<tr>
<td>There are individuals at the student's school who are knowledgeable about how</td>
<td>ICTs and e-learning used by professors in their courses is accessible to the student (e.g., PowerPoint in the classroom, downloadable PDF files, CD-ROMs, WebCT)</td>
<td>74</td>
<td>0.570</td>
<td>0.000</td>
</tr>
<tr>
<td>ICTs and e-learning used by professors over the Internet are accessible to the student (e.g., downloadable PDF files, course web pages, discussion boards)</td>
<td>74</td>
<td>0.422</td>
<td>0.000</td>
<td>64</td>
</tr>
<tr>
<td>Inaccessibility of ICTs and e-learning in a course has posed difficulties for the student</td>
<td>75</td>
<td>-0.446</td>
<td>0.000</td>
<td>65</td>
</tr>
<tr>
<td>Average accessibility of 18 different types of ICTs and e-learning used by professors to the student</td>
<td>74</td>
<td>0.456</td>
<td>0.000</td>
<td>64</td>
</tr>
<tr>
<td>Junior/community college students in Quebec ²</td>
<td>42</td>
<td>0.327</td>
<td>0.035</td>
<td>32</td>
</tr>
<tr>
<td>Student's personal situation has made college studies harder-easier</td>
<td>42</td>
<td>0.333</td>
<td>0.031</td>
<td>32</td>
</tr>
<tr>
<td>The college environment has made college studies easier-harder</td>
<td>42</td>
<td>0.327</td>
<td>0.035</td>
<td>32</td>
</tr>
</tbody>
</table>

¹Unpublished data: Fichten et al.
²Higher scores indicate "easier" - Fichten et al., 2006.

Table 8

Criterion Validity: Comparison of POSITIVES Scores of Participants with Psychological / Psychiatric Disabilities and with Multiple Disabilities

<table>
<thead>
<tr>
<th>Positive Scale Variables</th>
<th>Psychological / psychiatric disability</th>
<th>Multiple disabilities</th>
<th>Significance test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Whole sample</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subscales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subscale 1 - ICTs at School Meet Student's Needs</td>
<td>115</td>
<td>4.78</td>
<td>0.84</td>
</tr>
<tr>
<td>Subscale 2 - ICTs at Home Meet Student's Needs</td>
<td>115</td>
<td>4.43</td>
<td>1.17</td>
</tr>
<tr>
<td>Subscale 3 - E-learning ICTs Meet Student's Needs</td>
<td>115</td>
<td>5.08</td>
<td>0.77</td>
</tr>
<tr>
<td>Total (average) score</td>
<td>172</td>
<td>4.87</td>
<td>0.79</td>
</tr>
<tr>
<td>English speaking participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subscales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subscale 1 - ICTs at School Meet Student's Needs</td>
<td>112</td>
<td>4.78</td>
<td>0.85</td>
</tr>
<tr>
<td>Subscale 2 - ICTs at Home Meet Student's Needs</td>
<td>112</td>
<td>4.43</td>
<td>1.19</td>
</tr>
<tr>
<td>Subscale 3 - E-learning ICTs Meet Student's Needs</td>
<td>112</td>
<td>5.09</td>
<td>0.77</td>
</tr>
<tr>
<td>Total (average) score</td>
<td>169</td>
<td>4.88</td>
<td>0.79</td>
</tr>
</tbody>
</table>

Note. There were insufficient numbers of French speaking participants with psychological/psychiatric impairments to carry out meaningful comparisons.
Discussion

POSITIVES Scale Properties

The goal of the research was to develop the 26-item POSITIVES Scale (Postsecondary Information Technology Initiative Scale), a valid and reliable measure of how well postsecondary students with various disabilities perceive that their ICT related needs are being met. The measure has a total score as well as three factor analysis derived subscales which evaluate how well ICTs available at school, at home, and in e-learning contexts meet the needs of students with different disabilities in postsecondary education. In addition, alternate formats of the measure (i.e., versions that can be completed online, on paper (printable PDF), and within Microsoft Word) yielded equivalent results. The Scale, in both French and English, is available from the authors. Norms for Canadian postsecondary students are provided and preliminary norms for students with different disabilities are also provided. These are preliminary because of sample size limitations.

POSITIVES Scale Subscales

In addition to a Total score, the POSITIVES Scale has the following Subscales:

Subscale 1 - ICTs at School Meet Student’s Needs. This twelve-item subscale evaluates the extent to which students’ ICT related needs are being met while they are at school (e.g., My school has enough computers with internet access to meet my needs. The hours of access to computer technologies at my school meet my needs).

Subscale 2 - ICTs at Home Meet Student’s Needs. This five-item subscale evaluates the extent to which ICT related needs are being met while they are off campus (e.g., Funding for computer technologies for personal use is adequate to meet my needs. My personal computer technologies are sufficiently up-to-date to meet my needs).

Subscale 3 - E-learning ICTs Meet Student’s Needs. This nine-item subscale evaluates the extent to which the school’s e-learning meets the student’s needs (e.g., My school’s web pages are accessible to me. I have no problems when professors use e-learning for tests and exams).

Reliability

Reliability and validity estimates indicate excellent psychometric properties for the scale. Four-week test-retest reliabilities for the three Subscales range from .73 to .79 and the reliability of the Total score is .81. Paired t-tests on test and retest scores show no significant differences. Cronbach’s alpha, a measure of internal consistency, ranges from .79 to .91 for the three Subscales and is .94 for the Total score. Split-half reliabilities and Subscale:Total correlations all exceed .70.

Validity

Convergent validity. Data show moderate correlations among the three subscales and strong relationships between subscale and total scores, suggesting that the subscales measure different concepts, all of which are important components of the accessibility of ICTs as measured by the Total score.

Discriminant validity. We compared female and male participants’ POSITIVES Scale subscale and total scores because we had no reason to assume that their scores would differ. Consistent with this prediction, we found no significant differences between the groups.

Concurrent validity. As a measure of criterion validity we predicted - and found - that scores on Subscales 1 and 2 would be most closely related to scores on the criterion items, “In general, my computer and/or adaptive computer technology needs at my school are adequately met” and, “In general, my computer and/or adaptive computer technology needs at home are adequately met,” respectively. In addition, we found that subscale scores were logically related to selected items answered by a small subset of students from two previous studies conducted up to two years earlier.

Criterion validity. Based on a priori assumptions, students with psychological/psychiatric disabilities were expected to have their ICT related needs better met than students with multiple disabilities. To test criterion validity we examined the extent to which the POSITIVES Scale subscale and total scores were able to differentiate between these two groups. The findings show significant differences between the two groups on all subscales as well as on the total score.

Limitations of the Present Study

Although the POSITIVES Scale has demonstrated acceptable reliability and validity, the present investigation has some limitations that need to be taken into account when interpreting the findings. The samples of French and English speaking students are neither random nor fully representative of the populations studied. First, students self-identified as having a disability. Second, given the nature of participant recruitment and
self-selection biases, students who read online discussion lists, had experience using e-learning, or were power-users of ICTs are over-represented. Especially troubling is that calculating a “return rate” was impossible because of the manner in which participants were recruited.

Yet, most available indices suggest that the studies’ samples have characteristics which resemble the realities of Canadian postsecondary education. For example, the samples contained more females than males, students were older than typical postsecondary samples, and the proportions of students with different disabilities reflect the realities of many postsecondary institutions.

It should also be noted that the norms have not been cross-validated on another, independently recruited sample and that the sample sizes for the alternate formats comparison were especially small. All students are from Canada, necessitating additional validation of the POSITIVES Scale involving samples of postsecondary students from other English and French speaking countries. Thus, we present the POSITIVES Scale as a promising research tool that needs additional validation.

**Key Findings**

**Sample characteristics.** Consistent with others’ findings, students with disabilities were relatively older (mean age was 28) and approximately half of the sample reported a learning disability (e.g., Stodden, 2005). Approximately 1/3 of the sample reported a psychological/psychiatric disability. This is not surprising given Blanco et al.’s (2008) findings showing that close to 50% of a large representative sample of American university students had a diagnosable psychiatric condition during the past twelve months.

It is noteworthy that over a third of our sample reported more than one disability, a finding similar to those of earlier investigations (e.g., Asuncion, Fichten, Fossey, & Barile, 2002; Sharpe, Johnson, Izzo, & Murray, 2005). This implies that ICTs need to be operable together and that conflicts between different adaptive technologies meant to support people with different disabilities need to be avoided.

**Findings Using the POSITIVES Scale: How Well are Students’ ICT Related Needs Met?**

Consistent with data from other researchers (Sharpe et al., 2005) our results show more favorable than unfavorable scores and no significant differences between college and university students’ ratings. Nevertheless, there are some concerns around the availability of adapted computers in the school’s specialized computer laboratories as well as with institutional computer technology loan programs. The accessibility of computers in campus computer labs has been noted as an issue of concern by students elsewhere as well (e.g., Armstrong, Lewis, Turingan, & Neault, 1997). In addition, funding for computer technologies for personal use and poor technical support when the student is not at school had low scores. As highlighted by others (e.g., Berkowitz, 2006), training, both on and off campus, was also seen as relatively problematic.

On the plus side, the findings show that students feel the school’s web pages are accessible, that they can effectively use the computer technologies they need, that expertise in adaptive ICTs was readily available on campus, that needed electronic format course materials are readily available, and that the school’s interactive online services (e.g., registration, financial aid applications on the web) as well as the library’s computer systems were generally quite accessible.

**Students with different disabilities.** Although overall the findings suggest that the ICT related needs of students in all groups are relatively well met, those of students who are totally blind, those with multiple disabilities, and those with low vision were met least well, while the needs of students who are hard of hearing, have a medically related/health problem, have a mobility impairment or have a psychological/psychiatric disability were met most effectively. However, the findings on POSITIVES Scale subscales suggest that while this pattern is true for Subscale 1 (ICTs at School Meet Needs) and Subscale 3 (e-learning ICTs meet students’ needs), the pattern of results is very different for home use, where the ICT related needs of the following groups were met least well: multiple disabilities, psychological/psychiatric disability, learning disability/ADD/ADHD. The home based ICT related needs of students with a mobility impairment, those who are hard of hearing and those who are totally blind were being met best.

**Implications for Future Research and Practice**

As a key step in addressing the evaluation of how well the ICT needs of students with disabilities in post-secondary education are being met, the POSITIVES Scale fills a gap. The reliability and validity testing conducted to date allows students with disabilities to assess the availability and accessibility of campus computing as well as of ICTs available for off campus
use. The measure has a variety of features that make it easy-to-use. Only 26 items long, it is easy for learners with all types of disabilities to complete. The simple scoring requires only a straightforward calculation of means. The measure, which can be completed online, within a Microsoft Word file, and in print formats, has the advantage of flexibility due to its “face validity.”

**Potential uses.** The POSITIVES Scale (a) permits item-by-item analysis to identify individual areas of perceived strength and weakness, (b) can assess modifiable aspects of the accessibility, usability, and availability of ICTs both on and off campus, as well as (c) permit monitoring and evaluation of the effects of efforts to improve meeting students’ needs. For example, the measure could be administered at different times as major modifications occur in campus computing infrastructure or in ICT related policies as these relate to students with disabilities. Other uses of the scale include: (d) evaluation of one’s own institution; (e) a means for continuously measuring progress through internal and external benchmark setting; (f) identifying gaps and targeting specific areas for improvement; and (g) a means of informing policy documents, ICT strategy, and ICT budget allocations.

The POSITIVES Scale can be used in a number of ways by disability service providers in concert with their colleagues in IT and other domains. For example, internally, through an item-by-item analysis, individual areas of strength and weakness, as indicated by the student end-users, can be identified, with areas requiring further investigation given focus, possibly leading to building a case for increased funding or other organizational improvements. For the off-campus items, institutions can use data from the POSITIVES Scale to help advocate for change with external stakeholders in the broader community. Strategically, postsecondary educational institutions could use data based on the Scale to drive key performance indicators. In addition, the data can be useful for year-over-year internal and/or external benchmarking. Finally, the POSITIVES Scale, in whole or in part, could be folded into larger satisfaction surveys of the entire student population to inquire about their ICT use and experiences.

Possible research directions include: (a) continued validation by comparing scores of students with disabilities with their grades as well as with their views about other aspects of their postsecondary experience; (b) additions to the normative data by testing larger, more diverse samples, by providing separate norms by student disability, by school type, location, and nature (e.g., junior/community college versus university, urban versus rural, private versus public); and (c) collecting data from new samples, including nondisabled students, as well as from samples outside Canada such as the U.S., Great Britain, Australia, France and Belgium.

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Supporting a University Student who is Deaf-blind in Writing for the Disciplines

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Abstract

Bhattacharyya (1997) finds that universities must scramble to accommodate students who are Deaf-blind “because of limited literature regarding post secondary education for Deaf-blind students and the fact they have not yet experienced serving this unique population.” This Brief focuses on a supportive collaboration between an Academic Language and Learning (ALL) tutor, a B.A. student with Deaf-blindness, and her interpreter.

Literature Review

Not many people with Deaf-blindness have attended university to date, and the literature is sparse (Bhattacharya, 1997; Everson & Enos, 1995). However, there are some useful introductory articles informing prospective students and their supporters about the legal obligations of higher education institutions (Everson & Enos, 1995; Simon, 1999) and the kinds of assistance, equipment and accommodations available to students with a disability (Enos & Jordan, n.d.; Everson & Enos, 1995; Ingraham, Belanich, & Lascek, 1998; Pasupathy, 2006; Transition guide for students who are Deaf-blind, n.d.). There are also articles offering advice to university staff who support such students’ efforts, emphasising the individual nature of each student’s abilities, educational history, and accommodation needs, and the student’s central role in establishing what is required to help them study without disadvantage (Bourquin, 1995; Spiers & Hammett, 1995; Talbot-Williams, 1996; Bhattacharya, 1997; Orlando, 1998; Jordan, 2001; Lago-Avery, 2001; Stodden & Conway, 2003).

Most published guidance is addressed to prospective students; to staff who teach the subjects in which students are enrolled; or to the disability officers who liaise with those teachers, with technicians who provide texts in accessible formats, with note-takers, with sign language interpreters, and with library staff who help students to source the readings assigned in their subjects. Beyond the logistical arrangements and technical provisions that students with disabilities need, however, many Australian universities employ Academic Language and Learning (ALL) tutors whom any students may consult to develop their academic skills and in particular, their writing. The literature offers little guidance to students with Deaf-blindness, or to tutors, on how to make this work for students with a dual sensory impairment.

Problem

This needs to be addressed because, while universities may be experienced in supporting students who are blind or Deaf, the strategies staff have developed to work with either kind of student may not be helpful to a student with both conditions. For example, when working with a student who is Deaf, the tutor usually sits next to the student, poring over their draft together, making notes above and below the lines and in the margins, and writing questions on the back. To follow themes through a text, and facilitate restructuring of material, different ideas are highlighted in different colours. For a student who cannot see, however, any annotation must be electronic, so it can be accessed by Braille; leaving marginalia or colour coding of no use. Conversely, with a student who is blind, the tutor can read sections of their draft aloud, ask for clarification or amplification, and we can talk about the structural and language choices they have made and others that they might consider. Again,
this activity is not available when working with a student who is both Deaf and blind. Other methods are needed, and will be suggested in the remainder of this Brief.

Students and Location Information

Individual students have different combinations and severity of impairment to their sight and hearing, and will want to adapt any methods to their particular needs. The student with whom the ALL tutor evolved the methods here is a middle-aged woman whose sight was damaged by premature birth and whose hearing was limited, from early childhood, by ear infections and the growth of cholesteatoma. Over the course of her life, both sight and hearing have deteriorated, and as each diminished, she has sought opportunities to learn new methods of communication, until currently she uses tactile signing to converse (feeling, with her hands, as her interpreter signs Australian Sign Language: Auslan); and to read, she uses a refreshable Braille display attached to her computer keyboard.

Strategy

Because of the constraints outlined above, we separate the two main functions that a writing consultation usually carries out at one time. The first, which is central to the work of writing centres and ALL tutors, is to draw out the student’s ideas about her writing assignments, the knowledge she has gained from lectures, tutorials, and readings in her subjects, and her plans for making her own arguments in light of these. We meet each week for this purpose with her interpreter, providing the student with an opportunity to work out her ideas orally, with a person who is experienced in the purposes, questions, structures, and language of academic enquiry, ahead of putting them in writing. Because the student and interpreter are using their hands throughout these sessions, the tutor takes notes of the discussion and, within a day or two, e-mails these to the student as a record of what we talked about. Although this approach is costly in terms of professionals’ time, it is particularly important for a student who is Deaf-blind, because the usual opportunities to discuss assignments with peers are not available to her.

The second function of a writing consultation is to focus on the student’s written text itself, and suggest ways in which it might be further developed, corrected, or otherwise improved. It is impractical to attempt this face-to-face, so the student and tutor e-mail drafts back and forth with annotations. Over time, we have developed a format for annotation which does not rely on vision at all, but is readily conveyed via Braille. Comments must immediately follow the word or sentence they apply to, they must be easily recognisable, and they must be as simple as possible. We use very few instruction words – “ADD, DELETE, CHANGE … TO…” – and all comments are in capital letters, enclosed in square brackets, to set them off from the student’s own writing. For example:

History inspired Deaf people to politicise sign language as a natural language and human right. Much in the same way that Indigenous rights have become more vocal, Deaf [ADD PEOPLE SEE IT AS ONE OF THEIR] human rights to resist dominant language invasion.

When the tutor wants to ask a question or make a suggestion, rather than a correction, she signals this by starting with the student’s name. These comments may address the order of material, cohesive devices, clarification of unclear passages, inconsistent argument, or requests for further explanation or information. As well as alerting the student to repetitions, disjunctures, or errors which are difficult to track when composing and revising without vision, this exchange gives the student a sense of how a reader is apprehending and responding to her writing, so that over time she has developed skills in turning writer-centred drafts into reader-centred essays. (For a fuller account, see Chanock, 2010).

Observed Outcomes

The student’s grades have risen from low passes to a range including Bs, and her confidence has developed to the point where she is now mentoring other students with disabilities. She has developed the habits of questioning needed to approach an essay (Why this question, in this context? What theory does it relate to, and how?), and she is engaging more closely, and more satisfactorily, with the intent of her assignments.

Implications

Because each student is different, and each discipline is also different, we are cautious about generalising very much from one student’s experience. We think,
however, that it shows the usefulness, at least for students in humanities and social sciences, of establishing a regular time to explore assignments orally ahead of writing, and adoption of our system for commenting on written work might save others a good deal of the trial and error involved in our developing it.

References


About the Authors

Kate Chanock received her B.A degree in Anthropology from Sussex University, her Diploma of Education from La Trobe University and Ph.D. from Sussex University. Her experience includes working in a secondary school in Tanzania, a jail in Texas, and the Home Tutors Scheme in Melbourne before joining La Trobe University as an Academic Language and Learning adviser in 1987. She is currently an Associate Professor in the Humanities Academic Skills Unit. Her research interests include the cultures and discourses of academic disciplines, and studying at university with a disability. She can be reached by e-mail at: c.chanock@latrobe.edu.au.

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Having just received the shocking news that Engel had been in a terrible car accident, Marcus’ minister announced to the congregation, “Marc’s eyes suffered some extensive damage… there’s a strong possibility he may now be blind. Right now, we just have to pray that he lives” (p. 49). From the second the drunk driver hit the car that Marcus Engel and his friends were riding in, Marcus’ life was forever be changed. I initially bought *After This: An Inspirational Journey for all the Wrong Reasons* (2006) because my employer at the time, Texas Tech University, was bringing Engel in as a guest speaker for Disability Awareness Week. Since then, I’ve moved to a school in Georgia, but decided to read it anyway as “light reading” at night. Although this book would not normally be defined as light reading, Engel does allow humor to interject itself into what could otherwise be a very morbid and depressing book. I read *After This* in just two nights and felt more than ever committed to working with students with disabilities.

Before scripting a single word of his memoir, Engel warns the reader, “This story is, if nothing else, real. Reality includes images and pictures that might make you queasy, might make you cry and might make you see the world as senseless. However, read on” (pp. xi). While Engel certainly does not spare the reader the images and pictures of his accident and recovery, his book quickly leads the reader past the grotesque imagery and toward the spirit of Engel. After surviving the accident that could have killed him, Engel details his recovery process; including his speaking ability, return to college as a blind student, and even his training to use his guide dog, Dasher. Throughout the text, Engel provides extremely graphic details of his recovery. Parts of these details include the many pages of notes he wrote for his friends and family during his time without speech. These notes are not edited or censored, which I came to appreciate. Marcus gives the reader more than just a biography of his blindness and recovery; he takes the reader truly through the journey, going so far as to include these very personal notes.

My immediate response to Engel’s book was that all college students should be required to read it as a lesson in goal-setting and overcoming obstacles. After finally being able to communicate with a pencil and paper, Marcus declares, “All of those accumulated memories from the six week stint of college life came flooding back with a vengeance… I wasn’t ready to give up on those things” (p. 116). In addition to providing the disability professional with a very real and personal perspective of the recovery process, I feel that *After This* could also be used in a freshman college introductory course. Engel teaches his readers that circumstances may be just excuses. He chooses to live beyond his disability and accomplished his goals. He writes at the conclusion of his book, “The ‘Goal of All Goals’ had been to take back control of my future” (p. 278). After recovering from his injuries and attending both rehabilitation and seeing-eye dog classes, Marcus returned to college to lead a very normal life, full of girls, parties, and even fraternity membership. As a professional working with students with disabilities every day, I found this book to be more informative and entertaining, in regard to disability information, than any other book I have read thus far, with the exception of Daniel Tammett’s *Born on a Blue Day* (2007). Engel takes what could be, and is at times, a very difficult and emotional story and enables the reader to connect with him through anecdotes and humor.

One bit of information I learned from *After This* was in regard to the responsibilities of guide dogs and
the training required of the people working with them. As a native of New Jersey, one part of this story was extremely surprising to me. Engel writes, “The Seeing Eye, Inc. in Morristown, NJ is the original guide dog training facility in the country. Only dogs that are raised and trained at this school may properly bear the name, Seeing Eye dog” (p. 207). As a disability services professional who lived a few minutes from this town, I was embarrassed to find that this information was new to me. Engel then goes through his work with the dog and then his return to college. Engel’s story as a newly disabled college student is of relevance to disability professionals who rarely get to meet a student returning to college as a blind individual. While he had attended briefly as a seeing person, Engel quickly adapted to his new disability, but he does not exclude from the account his challenges and depression at times.

Upon completion of reading Engel’s After This, I was left with tear stained cheeks and an overwhelming sense of gratitude for all the tiny issues I had once viewed as challenges. I also gained a greater understanding of college from the vantage of a newly blind student and a clearer grasp of the necessity of rehabilitation for these students. Engel’s After This, I firmly believe, should be read and discussed by students and disability service professionals alike. My only regret after reading this book is that I was not able to meet Engel myself. He concludes his book saying, “The direction in which my life moved hadn’t always been straight ahead, but regardless of the detours, I always learned valuable lessons” (p. 279). After This is not only an inspirational journey in writing, as Engel titles the book; it is also a lesson in blindness and the importance of goals.

References

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Rebecca Daly Cofer received her BA degree in English and History from Virginia Tech and MA degree from Virginia Tech. Her experience includes working as an academic counselor for Student Disability Services at Texas Tech and serving liberal arts and nursing students at Abraham Baldwin Agricultural College. She is currently a Student Development Specialist in Enrollment Services at ABAC. Her research interests include professional development for new academic advisors and retention rates for students with disabilities. She can be reached by email at: rcofer@abac.edu
The *Journal of Postsecondary Education and Disability* welcomes submissions of innovative and scholarly manuscripts relevant to the issues and practices of educating students with disabilities in postsecondary educational programs. Manuscripts must be submitted electronically via e-mail to jped@ahead.org

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**Content**
Manuscripts should demonstrate scholarly excellence in at least one of the following categories:

- Research: Reports original quantitative, qualitative, or mixed-method research
- Integration: Integrates research of others in a meaningful way; compares or contrasts theories; critiques results; and/or provides context for future exploration.
- Innovation: Proposes innovation of theory, approach, or process of service delivery based on reviews of the literature and research
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All manuscripts must be prepared according to APA format as described in The Publication Manual *(6th ed.)*, American Psychological Association, 2010. For responses to frequently asked questions about APA style, consult the APA web site at http://www.apastyle.org/faqs.html

- Manuscript length typically ranges between 25 and 35 pages including figures, tables, and references. Exceptions may be made depending upon topic and content.
- Write sentences using active voice.
- Authors should use terminology that emphasizes the individual first and the disability second (see pages 71-76 of the APA Manual). Authors should also avoid the use of sexist language and the generic masculine pronoun.
- Manuscripts should have a title page that provides the names and affiliations of all authors and the address of the principal author.
- Include an abstract that does not exceed 250 words. Abstracts must be double spaced on a separate page, or placed in an e-mail request.
- Provide a cover letter asking that the manuscript be reviewed for publication consideration and that it has not been published or is being reviewed for publication elsewhere.
- Tables and figures must conform to APA standards, and must be in black and white only. All tables and figures should be vertical and fit on the page, no landscape format.

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