COMPUTER-RELATED ASSISTIVE TECHNOLOGY:
SATISFACTION AND EXPERIENCES AMONG USERS WITH DISABILITIES

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Footnotes

We want to acknowledge the participants in this study who shared their knowledge, experience, and comments about computer-related ATD. Thanks go also to the Ann Arbor Center for Independent Living and the Disability Network in Flint, both of Michigan, for their provision of invaluable support through use of facilities and administration. This study was made possible by Grant H133P990014 from the National Institute for Disability Research and Rehabilitation and the Department of Physical Medicine and Rehabilitation in the University of Michigan Health System.
ABSTRACT

Many people with disabilities use assistive technology devices (ATD) for computer access. The specific focus of this exploratory study was 1) to assess the experiences, opinions and satisfaction levels of 24 individuals with disabilities using of computer-related ATD; 2) to investigate their awareness of health risk factors related to computer usage; and 3) to examine the psychosocial impact of computer-related ATD on users. Data were collected via telephone interviews with 24 individuals with physical disabilities who had experience using one or more ATD. The Quebec User Evaluation with Assistive Technology (QUEST) instrument was used to evaluate users’ satisfaction with ATDs in a number of dimensions, including their physical attributes. The Psychosocial Impact of Assistive Devices Scale, (PIADS) measured the psychosocial impact (i.e., independence, competence, and adequacy) of an ATD on users. Additional questions were posed to gather information about user’s opinions and experiences. Training appeared to be an important component for ATD users, many of whom preferred a setting to try out devices rather than group or individual training. Respondents with visual impairments revealed a higher level of adaptability versus those without visual impairments (p=.001). Additional research is needed in developing specific survey items focused on users of computer-related ATDs and the evaluation of the psychosocial impact of ATDs on computer users.

Key words: Computer training, behavior change, accessibility, adaptability.
BACKGROUND

Rapid changes in information technology, better access to computers, more specifically, the Internet, have created many positive opportunities for people with disabilities. These opportunities relate to employment, education, communication, independent living and leisure (Cook, 2002; Fichten, Barile, & Asuncion, 2003; Ritchie & Blanck, 2003). Computer-related ATD are used as a means to an end so that people with disabilities can perform the tasks they want to accomplish (Hoppestad, 2006). Individuals with impaired vision, learning disabilities, limited hand control, and other functional limitations in particular can most likely benefit from computer-related ATDs. More knowledge regarding training, access and other factors from ATD users themselves may shape and enhance services and interventions provided by rehabilitation specialists.

Computer-related AT devices were defined in three categories: 1. Input devices such as keyboards with large keys, adjustable split keyboards, key guards, mouse, sticky keys, and special head or hand pointer sticks; 2. Output devices (such as a screen magnifier that enlarges text) and 3. Software programs such as Jaws, Kurzweil, Dragon Naturally Speaking or other voice activation programs and 4. All other accommodations. This latter group included books on compact disc, a monocular, raised hard drives, special stools and many others. Some of these were not included in the data as the definition of computer-related ATD was made more specific.

In general, it is crucial for providers (e.g., occupational / physical therapists, and rehab engineers) to have an appropriate evaluation tool which can measure a user’s opinion about the technology and their level of satisfaction with its performance. A lack of such instruments can result in a consumer receiving ATDs unsuited to their needs or goals, and even abandonment of a
device. A trial and error approach to ATDs can be time consuming and costly. Among the tested and validated assessment measures for ATDs are the Quebec User Evaluation with Assistive Technology, (QUEST), which measures an individual’s satisfaction with an ATD’s attributes, such as its weight, ease and comfort of use and effectiveness, among others. The Psychosocial Impact of Assistive Devices Scale (PIADS) is another validated tool that measures the psychosocial impact of a device on the user (Jutai, J., & Day, H., 2002).

Regarding computer-related ATDs, less study has been done. Recently, Hoppestad (2006) investigated criteria essential for a comprehensive assessment tool for people with severe disabilities using computer-related ATDs. Thirty three experts in the field (including physical and occupational therapists and speech pathologists) participated in a Delphi process and identified a list of intrinsic and extrinsic elements that should be considered when evaluating a person with a severe disability and computer-related ATDs. The intrinsic elements, however, were mainly focused on a person’s medical issues (impairment level), rather than a person’s functional abilities (e.g. problem-solving, learning, sitting, hand and arm use, reaching, lifting, carrying). The extrinsic elements included levels of support, goals, and certain environmental elements. While useful, the conclusions of this and another study conducted by Derosier and Farber (2005) underscored the need for more research targeting consumer’s levels of satisfaction and experience in this area.

The National Task Force on Technology and Disability (NTFTD 2004), as well as Microsoft Corporation (Forrester Research, 2003) identified certain topics as most relevant and in need of further investigation: consumer awareness of ATDs, health care providers and businesses; effective training and education in ATDs; affordability, and the need for further innovations to enhance ATDs for individuals with physical and cognitive disabilities. Other information from
Lenker (personal communication, 2004) concerning the understudied areas in the field of computer-related ATDs led the authors to construct survey questions regarding user satisfaction, training and health behavior for this exploratory project.

A growing concern reported in the literature for both those with and without disabilities is the potential health impact of computer overuse. Poor posture, long hours of computer use and/or prolonged sitting can lead to negative health consequences either physical (i.e., tendonitis or carpal tunnel syndrome) or psycho-social in nature, including isolation or decreased social participation (Nieuwenhuijzen, 2004, Marcoux, 2000, Kraut et al., 1998).

This study explored the applicability of two standardized survey tools, the PIADS and QUEST in assessing user’s opinions regarding computer-related ATDs. The following research questions were the specific focus of this pilot study. 1) What are the experiences, particularly in terms of training, funding, satisfaction and other characteristics of adults with physical disabilities using computer-related ATDs; 2) What are the health behavior and practices of adults with physical disabilities regarding computer use of and finally 3) What is the psychosocial impact of computer-related ATDs on users in terms of adaptability, competence and self-esteem?

The initial assumption was that individuals with a variety of mobility impairments would participate in the study and would share their experiences with devices such as custom made ATDs (head and/or hand pointers, adjustable split keyboards, etc.) Further, the authors’ hypothesis was that training in computer-related ATDs was important to users and that those who received training would be more likely to engage in healthy behaviors (e.g. be aware of health risk factors due to over-use, and value of proper posture).
METHODS

The methods, recruitment materials and survey instruments were approved by the Institutional Review Board at University of Michigan. The project was carried out in partnership with the Ann Arbor Center for Independent Living in summer, 2004. This study was cross-sectional in design, using a structured telephone interview. Recruitment took place through flyers, e-mail messages, personal contacts, and announcements in consumer newsletters. Interested individuals were invited to contact the principal investigator by e-mail. Each completed a consent form, and a telephone interview was scheduled.

The prerequisite criteria for study participation included being at least 18 years of age, having a physical disability (a sensory or mobility impairment) and experience using a computer-related ATD device for at least six months. In one case, the subject was not able to communicate by phone and a caregiver assisted in communicating questions and answers. Two trained interviewers conducted the telephone surveys after completing a hands-on training session using a training guide (Nieuwenhuijsen & Morefield, 2004). At the completion of the interview each participant received a $15 stipend.

Thirty six people were screened and 24 qualified for the study. Reasons for disqualification included not having six months of experience using an ATD, not using a device that accommodated a disability fitting the definition of computer-related ATD or lacking a disability as defined by a limitation in functioning in terms of body functions, body structure, activities and/or participation restrictions (WHO, 2001).

The 45-minute telephone survey questions consisted of 117 items, presented in five different sections, contained in the Appendix. These sections were 1) general questions on computer-related ATDs (type, purpose, training, funding); 2) health and disability status
(including perceived health status, type of disability, functional abilities and awareness of computer-related health risk factors and health behaviors); 3) level of satisfaction with the ATD (QUEST version 2.0); 4) the psycho-social impact of the ATD (PIADS); and 5) demographic information (including age, race, work status, etc.). Expert input from leaders in the field of ATD, including rehabilitation engineering, assisted in structuring the survey.

The QUEST is a 12-item questionnaire utilized to assess an individual’s level of satisfaction, on a five point scale, with a wide variety of ATDs. The scale ranged from 1 (not satisfied at all) to 5 (very satisfied). The QUEST measures satisfaction with the use of the ATD (comfort, weight, durability, simplicity), the device itself (dimensions, effectiveness, usability, safety) and services received (Brown-Triolo, 2002; Demers, Weiss-Lambrou, & Ska, 2002). According to the literature review, limited applications have utilized the QUEST as a measurement of satisfaction with computer-related ATDs (Derosier and Farber, 2005).

The PIADS was applied earlier as a clinical tool with computer-related ATD users (Lim & Lenker, 2003). For the PIADS, participants were asked to select just one of the most important ATDs they used. The overall goal of the PIADS is to describe the impact of an ATD on a person’s functional independence, well-being and quality of life. The instrument consists of 26 items that fall in three sub-scales: competence (subjective feelings of competence, productivity, usefulness, etc.) adaptability (the subjective willingness to take a chance, try new things, and take advantage of new opportunities), and self-esteem (including security, sense of power and control and self-confidence; Jutai & Day, 2002). The PIADS was designed as a paper and pencil measure which can also be administered by phone and interviewers utilized a script in the PIADS Manual (Jutai & Day, 2002). Possible responses were on a scale ranging from -3 (very much worse) to 0 (no impact) to +3 (much better) concerning each characteristic.
To supplement these instruments, additional questions were posed (See Appendix). These included: the types of computer-related ATDs the participant had used, the importance of training, the frequency of their computer use and health- and functioning-related items. Several open ended questions were asked to elicit opinions; i.e. “What have been the biggest keys to your success (or lack of success) with computer ATDs?” Quantitative and qualitative data were analyzed using SPSS 12.0 and included descriptive, chi-square, one way ANOVA for comparison of means and narrative analysis. The statistics used were those most appropriate for the small size of the sample. Due to the nature of the data, which included nominal, ordinal and open ended questions, restricted statistical analysis was conducted.

PARTICIPANTS

Thirteen women and 11 men participated in this study. All resided in Michigan, with the exception of one person from Ohio. Their ages ranged from 19 to 71, with ten of the sample being 30 years of age or younger, reflecting a large number of university students (see Table 1). Seventeen people identified as Caucasian, four as African-American, two as Asian-American, and one identified as “other.”

Seventeen of 24 study participants had post-high school education and six of those possessed a post-graduate degree. In terms of work status, 11 individuals were working full or part-time, six were college students, six were not employed, three were retired and one was a volunteer.

The disability characteristics of the participants included 12 who had visual impairments, three with musculo-skeletal impairments, seven with nervous system impairments (including cerebral palsy, multiple sclerosis and post-polio syndrome), and two with other impairments.
(including learning disabilities). The age of onset varied; most of those with visual impairments reported the onset took place at less than ten years of age, for others the date varied between birth and 44 years of age. In addition to their primary disability, four respondents reported that they were also diagnosed with repetitive strain injuries.

All but one of the 12 individuals with a visual impairment was using speech recognition software. Other examples of the participants, their disability characteristics and specific ATDs used are illustrated in Table 2.

RESULTS

All participants had experience with one or more computer-related ATD: software programs, including speech recognition and screen readers (n = 17), mouse (n = 8), special keyboards and keyboard alternatives (n = 5), large monitors and closed circuit TV (n=4) and telephone headsets (n = 7). Three participants reported experience with one ATD (software program), all others indicated using more than one ATD.

When asked to select one key ATD for further evaluation prior to the QUEST instrument, seventeen respondents identified software (including JAWS® and speech recognition software) as their ATD to evaluate. The first five questions of the QUEST were not applicable to assessing software, so that a significant portion of the QUEST data was not relevant for these ATD. However, up to six elements of the QUEST can be missing and the tool will still retain validity. (Demers, 2000)

On the question of how easy the identified ATD was to use, software users (n=17) were significantly less satisfied with the ease of using this type of accommodation. One software user’s rating was over 2.5 standard deviations from the mean of the group, so this outlier was
removed. Software users (n=16) had a mean satisfaction rating of 4.1±0.8 while those who used other ATDs(n=7) had a mean of 4.9±0.4, where 1=not satisfied at all and 5=very satisfied when analyzed with ANOVA [p=.02].

When asked about their ATD and feelings regarding productivity, twelve of the seventeen software users indicated that their ATD made them feel much more productive, as did five of the remaining seven who had used other devices.

Overall, participants reported medium to high satisfaction with their ATDs via their QUEST responses (See Table 4), which suggested a measurable improvement in major areas of their lives since acquiring their new computer-related technology. When asked how much their ATD had helped to increase their computer use, 21 of the 24 participants said that it had helped “a lot”, while three other users chose “somewhat” as their response.

Regarding the importance of training in the use of ATDs 12 of 24 users felt training was extremely to somewhat important. One person commented, “I rely on other people knowing about computer function to help me use my ATD.” Five were neutral and the remaining seven believed training was not important at all.

An additional question was asked about the type of training that would work best: one on one training, group training, or having a setting in which they were able to try out different devices. (See Table 3) Choices for responses as to how well a type of training would work were: 1) not very well, 2) somewhat or 3) very well. Participants preferred a setting to try out different devices on their own; 18 of the 24 said that type of training would work “very well”, three believed this would work “somewhat” and three others answered “not very well.” A participant commented on this topic stating: “I am willing to investigate and play with my ATDs, to get
comfortable with them.” Another said, “I got trained with help from a multi-disciplinary university laboratory and used the public library for additional training”.

Buildings on previous work conducted by one of the authors (Nieuwenhuijsen, 2004, 2003) three questions were asked to examine people’s knowledge of potential health risks from computer usage. In her earlier work, Nieuwenhuijsen developed a pattern of health behavior change, and found that a multi-component intervention, over time, did result in about 60% of behavior change in a positive direction among the participants (40 office workers employed in an administrative office in Michigan.) A computer-related health behavior change index score was created by combining three questions: a) “How much are you aware of health-related risk factors while using the computer, such as repetitive strain injury, carpal tunnel syndrome or eyestrain?”; b) “In general, while you are working at the computer, how often do you take a special effort to change your posture?”; and c) “When you are working at your computer, how often do you make a special effort to stretch your muscles?” The internal consistency index score of this new Health Behavior Change (HBC) variable was .80. (Cronbach’s alpha) based on one of the author’s previous work. (Nieuwenhuijsen, 2004)

In this study, the independent-samples t-test comparing the mean HBC scores of those who received and did not receive funding for ATD training revealed a mean of 8.2 among those who received funding (n=14), versus a mean score of 6.4 among those who did not receive funding (n=10). These results, however, are not significantly different (p=.064). However, the small number of respondents precluded meaningful statistical analysis.

In terms of the psychosocial impact of computer-related ATD on consumers (n=24), for the first PIADS subscale related to competence, the mean value and standard deviation for all participants was 2.32 ± 0.6 On the sub-scale regarding adaptability, the mean was 1.77 ± 0.9,
and for participant **self esteem**, 1.67 ± 0.8. A PIADS response of 1 and 3, respectively, stood for “a little better for you” and “much better for you”, with the score of 2 representing a ranking somewhere in between. On the PIADS, the higher the number, the more positively a user rated the ATD’s effect on their quality of life. When comparing the respondents with (n=12) and without visual impairments (n=12), a significant difference in PIAD adaptability was found, with a higher score of 2.29 among those with visual impairments versus a score of 1.15 among those without visual impairments (p=.001) (see Table 4.)

**DISCUSSION**

Among the observations made in this study was the need for increased awareness, training and resources to procure ATDs. 50% of participants felt that training was important and there was a consensus among software users that training in the use of ATDs is important for optimal and consistent use of the device and is a pressing issue. Several interviewees described how training had changed the course of their lives.

When asked how new users should learn more about ATDs, many participants mentioned visiting a CIL or a rehabilitation center. As rehabilitation centers require insurance coverage or other payment for services while CILs have more flexibility regarding costs, the latter could offer ATD-related services. The results of this study suggest that CILs could play an important role educating people with disabilities regarding the availability and use of ATDs. Given sufficient financial resources and staff, CILs would be a logical provider of services including group training on ATDs, a setting where which people could try out ATDs and matching of users to appropriate technology. Other local resources could play a role, such as the library for the blind, public libraries and university-based assistive technology labs. A critical point, however, is
that a person who provides the resources and the training should have expertise in the field of assistive technology.

On the question of “What have been the biggest keys to your success (or lack of success) with computer (ATD), one user commented, “It’s about being ...motivated and self-confident, taking recommendations from other very important folks, and trying new things.”

Training might include not only instruction in general ATD use, specific adaptations of the ATD to an individual user, but also in the safe use of the ATD. The inclusion of health-related questions in ATD assessment tools could influence the respondent’s behavior, or at least could spark the person’s interest in that area, as has been found in behavioral studies (Marcoux et al, 2000). Prevention and early intervention of health problems is critical, in particular among a population already at risk for developing secondary health conditions (DeJong, 1997).

For those who use the computer for prolonged periods of time, a constellation of risk factors emerge that can lead to eyestrain, neck and shoulder pain, and wrist and hand problems, a complication covered in a separate publication (Nieuwenhuijsen, 2003). The participants in this study who appeared most aware of risk factors and applied healthy behaviors were those previously diagnosed with repetitive strain injury, although the relation of these injuries to computer (over)use was unknown.

Throughout the narratives from users, issues of affording, obtaining and learning to use ATDs dominated the focus of the open-ended questions, such that the energies and attention of the sample were directed away from risk factors and healthy computer use. Although the results from this project regarding the extent of computer-related health problems among people with disabilities was very limited, additional survey items about this topic would help identify potentially unhealthy behaviors and enhance overall awareness of risk factors.
Another noteworthy finding concerns the differences in adaptability scores of ATD users who were blind or visually impaired, versus those who were not. Perhaps these individuals, many of whom have had their disability since birth, have learned to create unique strategies for accomplishing daily tasks. Possibly using their ATD enhanced this quality of adaptability. One theory is that people with non-visual (and more recently acquired) impairments are still developing their skills and learning to live with their disability and thus feel less adaptable overall. It would be valuable to learn if these differences in adaptability are found with a larger sample of participants, and if they so, what is the cause of the reported differences in adaptability when using ATDs.

The two instruments used in this study, the QUEST and the PIADS were identified as most applicable based on the review of the literature. The authors anticipated that a much larger number of participants. Due to the exploratory nature of this study, the non-randomized selection of cases, and the small sample size, the findings must be interpreted with caution.

In addition, the initial prediction was that individuals with a variety of mobility impairments (e.g. limited upper extremity function) would volunteer in this study and would have experience using devices such as keyboard and mouse accommodations, and custom-made adaptations (e.g. head or hand pointer), as these types of ATD were more suitable for the QUEST instrument. However, fully half of the volunteers had visual impairments and chose software (JAWS® and others) as their ATD to evaluate as did several individuals who had other disabilities. As a result, several QUEST items were not applicable for software, such as the dimension, weight, safety and durability of the device.

The PIADS, in contrast, was found more useful and most PIADS questions were answered by all respondents. One advantage of this tool is that it concerns the feelings and
attitudes about all computer-related ATDs, while for the QUEST the respondent had to select just one device, even if they were using a combination of devices. One drawback of the PIADS was its length, and not all items are relevant in terms of computer-related ATD.

There appeared to be a modest difference in the user’s ratings for ease of ATD for software versus other products. Again, the nature and size of the group mean that further study is needed to examine this difference. It would be important to see if lowered satisfaction among software users is found in larger samples and if the type of software plays a role. Perhaps voice activation software poses many more difficulties for users than other types of programs.

One comment from a participant regarding using voice activation software in our study was “my ATD doesn’t work well with numbers data”. Software users, as discovered by DeRosier, commented on the length of time it took to “train” the software, its inaccuracy, failure to recognize their voices and other issues. As these aspects of software were not accurately evaluated with the QUEST, additional questions and items specifically focused and designed for computer-related ATD could measure other aspects of such technology.

Many users’ narrative comments emphasized the need for consumers to learn about computer-related ATDs. One said, “More needs to be readily available for people with disabilities to improve our lives. We don’t know ATDs are out there.” Another remarked that there is a lack of knowledge in the workplace about available technology.

RECOMMENDATIONS AND CONCLUSION

Since computer users with disabilities are faced both with general health risks related to computer (over)use, as well as complexities of computer use related to their disabilities, the
measures used to document their experiences with ATDs must reflect a broader spectrum of issues and concerns voiced by this population. Specifically, the results of our pilot study demonstrate that adaptability and availability may most affect optimal use of computer-related ATDs, including the awareness of best user practice and unhealthy computer practices. The instruments used currently to measure issues and concerns about computer-related technologies among the disabled community clearly are inadequate.

PIADS requires the simplification of the “adaptive schema” needed by individuals with disabilities into the assessment of the use of their ATDs, while QUEST assesses one ATD, e.g., the technological availability of the physical computer/hardware by people with disabilities. Yet the QUEST neither accounts in its construct for the full range of adaptations, nor the relevance of nearly half its items for the availability of software and other cybernetic ATDs used by many users with disabilities.

Thus one of the recommendations derived from this pilot study is the need for survey items specifically applicable to computer-related ATD. A revised version of the QUEST may better capture the level of satisfaction or user’s opinions regarding the limitations of computer-related ATDs, in particular software programs. Some examples of these items might include the level of satisfaction with the program, the ease of its installation, effectiveness of the program, ease of learning the applications, and the usefulness of instructional material.

In regard to the PIADS, we agree with Lim and Lenker (2003) that the PIADS could benefit from a more “user friendly” 5-point Likert–style rating scale, instead of the current scale. In conjunction with the overall satisfaction data attained through QUEST, the PIADS measure helped gather quantifiable information that confirms qualitative reports by the ATD users themselves.
The prevalence and awareness of computer-related health conditions needs to be further described, as does education and other factors that lead to healthier behavior and practices.

Effective and practical computer-related ATDs are essential technologies for people with disabilities in order to maximize productivity, enhance quality of life and improve employment, health and social participation outcomes. These researchers conclude that additional investigation is needed in these areas: whether training can change the occurrence of ATD abandonment, which factors affect satisfaction levels with ATDs and how best to enable people to avoid negative health outcomes while using computer ATDs. Studies conducted with much larger numbers of participants who have a variety of disabilities and use a wide range of computer ATDs would be optimal to better understand this area of assistive technology.

SUMMARY

An increasing number of people with disability experience use computers and assistive technology devices (ATDs) to meet their special functional needs. “Computer-related ATD” in this paper was defined as any device that enables a person to access computer input and/or output.

More knowledge in the level of satisfaction with these devices, types of training and other concerns is needed to enhance service delivery and program development. The overall purpose of this study was to interview 24 users for their individual perspectives on ATD issues and concerns, interpret data collected from a telephone interview, and analyze the psycho-social impact of computer-related ATD. More specifically, the goal of this paper was to investigate the experiences of users with disability and computer-related Assistive Technology Devices (ATDs): the type of devices they use, their experiences with training, and the impact of ATD on the users’ quality of life, and to explore the applicability of two standardized questionnaires, the QUEST
and the PIADS. The authors provided a quantitative and qualitative analysis of their findings and recommendations for future research.
REFERENCES


(http:ww.med.umich.edu/pmr/arrtp/Telephone\%20Interviews.pdf)


Table 1. Demographic information. (n=24)

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<td>44-56</td>
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Table 2. Participant’s Impairment and ATDs Utilized.

<table>
<thead>
<tr>
<th>Disability</th>
<th>Examples of computer-related ATD</th>
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<tbody>
<tr>
<td>Visual impairment</td>
<td>Voice recognition software (JAWS and Kurzweil), enlarged monitor, closed circuit television, telephone headset, screen reader, scanner for data input, talking checkbook</td>
</tr>
<tr>
<td>Musculoskeletal impairment</td>
<td>Headset, pointer, sticky keys, voice activating software</td>
</tr>
<tr>
<td>Neuromuscular impairment</td>
<td>Keyboard, headset, pointer, adapted mouse, microphone, enlarged monitor, wireless keyboard, chin stick</td>
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<tr>
<td>Learning Disability</td>
<td>Voice activating software, headset</td>
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Table 3. User’s Preferences for Training.

<table>
<thead>
<tr>
<th>How would these types of training work for you?</th>
<th>Type of Training</th>
<th>One on One Training</th>
<th>Group Training</th>
<th>No training, but access to a setting where I can try out different devices and ask questions</th>
</tr>
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<tbody>
<tr>
<td>Not Very Well</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Somewhat</td>
<td>12</td>
<td>14</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Very Well</td>
<td>8</td>
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<td>18</td>
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<td>Total</td>
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Table 4. Psycho-social Impact of Computer-related ATD among People with Visual Impairments versus other Impairments.

Mean Scores

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<th>Competence</th>
<th>Adaptability</th>
<th>Self -esteem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumers with low vision or are blind</td>
<td>2.49</td>
<td>2.29*</td>
<td>1.68</td>
</tr>
<tr>
<td>Consumers with other impairments</td>
<td>2.17</td>
<td>1.15**</td>
<td>1.66</td>
</tr>
</tbody>
</table>

* sig. (2-tailed) 0.001

** p=0.001