Macrothink Institute™

Journal of Studies in Education
ISSN 2162-6952
2013, Vol. 3, No. 2

Teachers' Knowledge and Use of Assistive Technology for Students with Special Educational Needs

Keetam D. F. Alkahtani,

Dept. of Special Education, King Saud University

PO Box 102275, Riyadh 11675, Kingdom of Saudi Arabia

Tel: 966-5544-72227 E-mail: Kalkahtani@ksu.edu.sa

Received: March 23, 2013 Accepted: March 31, 2013 Published: May 1, 2013

doi:10.5296/jse.v3i2.3424 URL: http://dx.doi.org/10.5296/jse.v3i2.3424

Abstract

Students with disabilities face many challenges in learning and assistive technology can be a potential aid for compensating for their educational needs. The purpose of this research was to gather information about assistive technology knowledge and skills among teachers. Data were collected from one hundred and twenty-seven participants via a self reporting questionnaire. Interviews were also used with three participants to gather data of greater breadth and depth to the analysis of the data gathered from the survey. Results suggested that teachers do not have adequate level of knowledge and skills of using assistive technology. Teachers, then, should have pre-service and in-service training to increase their overall knowledge of implementing assistive technology and using universal design for learning for students with disabilities.

Keywords: Assistive Technology (AT), Special educational needs (SEN), Individualized Education Program (IEP), Students with disability, Universal Design for Learning (UDL).

1. Introduction

Universal Design (UD) emerges with the emergence of other new trends in the field of education which emphasizes that the main objective of the educational process is empowering the learner to have a meaningful learning. Universal Design for Learning (UDL) considers differences in learners' ability and seeks to provide equal access to the information through alternate formats or modes of communication (Rose and Meyer, 2002). Burgstahler state that universal design is "the design of products and environments to be usable by all people, to the greatest extent" (2004, P.2). He also gave an example of using technology to make a building accessible to everyone by replacing a standard door with an automatically opening door (which has sensors that signal the door to open when approached by anyone including young children, elderly people, a person using a walker or wheelchair) (Burgstahler, 2004). Assistive technology allows students with disabilities to increase their accessibility to the curriculum and the quality of learning experience. The importance of using assistive technology is theoretically grounded in the work of Vygotsky in 1978. A focal point of Vygotsky's social constructivist theory is the concept of the Zone of Proximal Development (ZPD). Vygotsky argued that "learning awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with his peers" (Vygotsky, 1978, P.9). According to Vygotsky's ZPD, child's performance is divided into three areas as follows: (a) limited performance which refers to the child's inability to perform even with assistance , (b) mediated performance which could be achieved by guidance or assistance from a skilled adult or a more capable peer, and (c) independent performance which is the child can perform without assistance. Vygotsky identified ZPD as the gap between a child's existing abilities and what s/he might potentially learn from adults and peers. It is the difference between the level of knowledge and skills that can be performed with skilled adults or peers guidance and the level of knowledge and skills that can be independently performed (Vygotsky, 1978). The ZPD notion has been validated and used in active learning theory which calls for the active involvement of learners with their physical and social learning environments. Active learning theory is built on the premise that providing children with opportunities, purposefully designed by adults, to actively explore their environments will promote learning of broad range of knowledge and skills (Bonwell and Eison, 1991). Assistive technology provide children with disabilities with equal opportunities to participate in active environments with predictive activities that are aligned to their abilities. Many assistive technology devices are available to assist teacher in improving the functional capabilities of their students via increasing students' participation in learning opportunities and involvement in activities (Scherer, 2004). The potential value of assistive technologies for enhancing learning opportunities for students with disabilities have been recognized by many countries. The federal government in the United States of America, for example, has legislation that mandates schools to provide students with disabilities with appropriate assistive technologies (National Center for Learning Disabilities, 2007). Unfortunately, teachers are not always in favor of assistive technology, and sometimes they resist the efforts of the school to implement assistive technology (Wessels et al., 2003). Teachers' knowledge and attitudes are essential for effective use of assistive technology in the education of students with special education needs. This study sought to determine the

knowledge and attitudes of the teachers toward using assistive technologies in the classroom to increase students' participation in their education activities and provide greater independence and better access to a variety of environments. With this in mind, then, the purpose of this study is to investigate teachers' knowledge and use of assistive technology for students with special educational needs. The following research questions guided this investigation:

1. Do teachers use or request assistive technology evaluation for their student? Do they consider assistive technology when planning student's IEP? How do they perceive the availability of assistive technology in their schools? What types of assistive technology are available at schools?
2. What is the teachers' current level of knowledge and skills of using assistive technology?
3. Are teachers interested in professional development through workshops or in-services training pertaining to assistive technology? What are the delivery methods for professional development that teachers preferred for learning about assistive technology (e.g., one-on-one individualized instruction, hands-on instruction in group setting, attending workshops or conference sessions, formalized courses)?
4. What is teachers' attitude toward using technology assistive with their students?

2. History of Assistive Technology

Bryant and Bryant suggested three periods of assistive technology chronological development: (a) the Foundation Period, (b) the Establishment Period, and (c) the Empowerment Period (Bryant and Bryant, 2011). The Foundation Period (prior to 1900) began with Stone Age man's first attempt to use a stick as a cane to assist with an injured leg (Bryant and Bryant, 2011). Some pirates, in 1600 and 1700s, used wooden leg and a metal hook that allowed them to maintain their functional capabilities (Cook and Hussey, 1995). In 1829, Braille was introduced as a method of reading and writing through touch, rather than sight for people with blindness or partial sight. Then in 1836, Edison invented the phonograph to help his mother and individuals with hearing loss to listen to recordings (Cook and Hussey, 1995). The Establishment Period (1900 through 1972) characterized in general by establishing laws, policies and litigation (e.g., The Soldier Rehabilitation Act, which established in 1918 and extended to nonveterans in 1920). Many inventions were invented in this period (e.g., the X-frame-folding wheelchair invented in 1937, and the Hoover Cane in 1947). A hallmark of this period was the creation and establishment of many organizations with a mission to support individuals with disabilities and their families (e.g., Council for Exceptional Children-CEC in 1922, and the Learning Disabilities Association-LDA in 1963) (Cook and Hussey, 1995). The Empowerment Period (1973 to present) started with the Education for All Handicapped Children Act – EAHCA in 1974 (also known as the Public Law 94-142), which later became the Individuals with Disabilities Education Act – IDEA. The Technology Related Assistance for Individuals with Disabilities Act (Tech Act) law was presented in 1988. Tech Act established to financially support the implementation of assistive technologies. The Assistive Technology Act (ATA) in 1998 was crucial to increase the availability and access to

assistive technology devices and services that require the professional knowledge and commitment of a multidisciplinary team (Assistive Technology Act, 2004). The manufacturing and demand for assistive technology has grown during this period. International Business Machines (IBM) asserted that "For most people, technology makes things easier. For persons with disabilities, technology makes things possible" (International Business Machines, 1991, p.2). IBM's assertion reflect the empowerment that individuals with disabilities acquired from using assistive technologies.

3. Defining Assistive Technology

The term assistive technology, according to the federal Individuals with Disabilities Education Act (IDEA), refers to "any item, piece of equipment, or product system, whether acquired commercially off-the-shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities" (U. S. Department of Education, 2004). The Convention on the Rights of Persons with Disabilities (CRPD) in 2007 mentioned assistive technology in eight articles (4,9,20,21,24,26,29, and 32). CRPD defines assistive technology as technology designed or adapted to improve the performance and quality of life for individuals with disabilities (United Nation, 2004). Ganschow and colleagues grouped assistive technology devices into three categories: (a) low-tech, (b) mid-tech, and (c) high-tech (Ganschow, Philips, and Schneider, 2001). Low-tech devices are usually non-electronic and easy to use as involve little or no training. Low-tech devices are widely available with low cost and little if any maintenance (e.g., pencil grips, highlighter tape or pens, and adapted furniture). Mid-tech devices are easy to operate electronically with minimal training and require basic maintenance. Mid-tech devices are commercially available and generally moderately priced (e.g., adapted keyboards, electronic dictionaries, and tape or digital recorders). High-tech devices involve complex electronics and usually contain microcomputer components for storage and retrieval of information. High-tech devices are expensive and require ongoing maintenance and extensive training (e.g., word prediction software, talking calculators, and hearing aid and/or assistive listening device). Cook and Hussey stated that "yesterday's high tech is tomorrow's low tech" and also acknowledged that "as the field advances, there will be new considerations that will further stretch our concepts and force new ways of categorizing and describing assistive technology" (Cook and Hussey, 2002, p.9).

4. Consideration of Assistive Technology in the IEP

The Individualized Education Plan (IEP) team members are required to consider assistive technology in the IEP development. Therefore, IEP team members should have sufficient knowledge regarding assistive technology devices and services to inform decision making and practice. There are many models or frameworks available to guide and help IEP teams make decisions on the needs for assistive technology devices and services for students with disabilities. The most notable models or frameworks are listed below.

4.1 Education Tech Point

Developed by Bowser and Reed in 1995 as a tool to assist IEP team discussion about specific points within the IEP process. Consideration of assistive technology should be completed with the guidance of questions relating to six points, as follows: (a) initial referral, (b)

evaluation, (c) extended assessment of AT needs, (d) plan development, (e) implementation, and (f) periodic review (Bowser, and Reed, 1995; Education Tech Points, 2002; Edyburn, 2001).

4.2 The SETT Framework

SETT (stands for Student, Environments, Tasks, Tools) designed by Zabala in 1995 to aid IEP team in the process of gathering information concerning the student's abilities and needs, the environment(s) in which the student learn, the tasks to accomplish, and finally, the tools needed for completing the tasks. The IEP team members ask key questions associated with four elements: the student, the environment, the tasks, and the tools (Edyburn, 2001; Zabala, 1995, 2002).

4.3 Assistive Technology Adaptations Framework

Developed by Bryant and Bryant in1998 for considering the benefit from using assistive technology adaptations. This framework requires IEP team to consider three aspects: (a) setting-specific demands (include tasks and requisite abilities), (b) person-specific demands (include functional capabilities and limitations), and (c) proposed adaptations from simple to complex assistive technology (Bryant and Bryant, 1998).

4.4 WATI Assistive Technology Consideration Guide

WATI (stands for the Wisconsin Assistive Technology Initiative) is four questions guide developed in 2003 to assist IEP teams in considering assistive technology more efficiently and successfully for students with disabilities. The four questions are: (a) What task is it that IEP team wants this student to do, that he or she is unable to do at a level that reflects his/her skills/abilities (writing, reading, communicating, seeing, and hearing)? (b) Is the student currently able to complete tasks with special strategies or accommodations? (c) Is there available assistive technology (either devices, tools, hardware, or software) that could be used to address this task? If any assistive technology tools are currently being used? and (d) Would the use of assistive technology help the student perform skills more easily or efficiently, in the least restrictive environment or perform successfully with less personal assistance? (Wisconsin Assistive Technology Initiatives, 2003).

4.5 Assistive Technology Consideration Checklist of GPAT

This checklist developed by Georgia Project for Assistive Technology (GPAT) in 2004 to support IEP team in considering the potential assistive technology that may be needed by students with disabilities. Using the GPAT's checklist, IEP team members should carefully discuss and consider the following issues: (a) instructional and access areas, (b) required tasks within the instructional and access areas, (c) the use of standard classroom tools which include technology solutions that already available within the general education curriculum and classroom, and (d) determination whether the student's needs are being met or if additional solutions and modifications need to be made (Georgia Project for Assistive Technology, 2004).

4.6 Texas 4-Step Model

Developed in 2004 by the Texas Assistive Technology Network (TATN), Texas Technology Access Project (TTAP), and the Department of Special Education in the College of Education at The University of Texas at Austin. In this model, the IEP team members are guided to consider assistive technology via following four steps: (a) reviewing current levels of performance and evaluation data, (b) developing goals and objectives, (c) determining if any tasks are unachievable or difficult for the student, and (d) deciding whether or not assistive technology devices and services are required and document decisions (Texas Assistive Technology Network, 2004).

The above models or frameworks are widely adopted in the development of the IEP, and have some common features and requirements such as the consideration of three basic but essential aspects (i.e. student, task, and environment) when considering assistive technology, and the use of guiding questions to assist IEP teams in considering assistive technology during the process of IEP development for students with disabilities. It might be worth to mention that the documentation of considering the needs for assistive technology in the IEP has improved with the emergence of independent associations that provide quality indicators for practice. An example of these associations is the Quality Indicators for Assistive Technology (QIAT) Consortium which consists of hundreds of members who focus on finding and creating resources to improve the practice by identifying, disseminating, and implementing a set of descriptive and widely applicable quality indicators for assistive technology services (The QIAT Consortium Leadership Team, 2000; The QIAT Consortium, 2003; The QIAT Consortium, 2008).

5. Method

The study adopted mainly a quantitative approach supplemented with qualitative interviews. The survey methodology (Dillman, 2006; Fowler, 2008) employed to examine teachers' use of and knowledge about Assistive Technology. Survey is a suitable method to gather information on specific topics and allows the investigator to obtain numerical information from particular populations (Fowler, 2008). A self-reporting web-based survey was utilized to maximize the possibility to reach and gather information from a larger population (Dillman, 2006). The participants surveyed in this study are professionals (i.e. general and special education teachers) who usually have computers and Internet access. Combining qualitative and quantitative methods is a legitimate and common practice in educational research (Creswell, 2008). For example, quantitative information gathered from survey participants can be used to select particular participants for in-depth interviews.

5.1 Data Collection

Data were primarily collected through questionnaire survey. A two part self reporting questionnaire was distributed utilizing web-based technology via online survey website (Surveymonkey.com). The questionnaire is divided into two parts (a sample is shown in Appendix 1). The first part of the questionnaire collected participants' demographic information and consisted of six items. The second part consisted of 13 items designed to assess teachers' use and knowledge level of assistive technology. The questionnaire was

developed based on the professional guidelines recommended by the Consortium of Quality Indicators for Assistive Technology (QIAT: Quality Indicators for Assistive Technology Services) and items were adapted from the University of Kentucky Knowledge and Skills Survey (2002) which is one component of the University of Kentucky Assistive Technology (UKAT) Toolkit. Survey participants were asked to indicate whether they would be willing to participate in a telephone interview as part of the study. Interviews were used to gather data of greater breadth and depth to the analysis of the data gathered from survey. Using phone interviews which limited communication to verbal communication may have negatively affect the quality of the qualitative data collected in the study.

5.2 Description of Survey Participants

A total of 127 participants responded to the online survey. Participants were from different geographical region. Demographic information of participants were collected from the first part of the distributed survey. Fifty-three and a half percent (*n*=68) of the participants were in their thirties, thirty-two percent (*n*=41) in their twenties, and fourteen (*n*=18) in their forties. More than four times as many females responded (81.9%, *n*=104) than males. In terms of participants' education, the majority were holding bachelor degree, 96.1% (*n*=122); while only 3.9% (*n*=4) were holding a master degree. The number of respondents from each job position was 44 (34.6%) for general education teachers, and 82 (64.6%) for special education teachers. Of the 127 participants, the largest percentages 85% (n=108) were working in urban areas, while 7.9 % (*n*=10) were working in suburban locations, and 6.3% (*n*=8) were working in schools located in rural settings. About quarter of respondents 25.2% (*n*=32) had less than one year of teaching experiences. Twenty-six and eight-tenths percent (*n*=34) of the participants had one to two years of teaching experiences. Almost thirty percent 29,9% (*n*=38) of the participants reported three to five years of teaching experiences. Nine and four-tenths 9.4% (*n*=12) of the participants had six to ten years of teaching experiences. Eight and seven-tenths 8.7 % (*n*=11) of the participants reported that they had more than eleven years of teaching experiences. Table 1 summarizes the demographics.

Table 1. Demographic frequency summary (N=127)

Variable	Frequency (*n*)	Percentage (%)
Age		
Less than 30 years old.	41	32.3
30-40	68	53.5
41-50	18	14.2
51-60	0	0
More than 60 years old.	0	0
Gender		
Male	23	18.1
Female	104	81.9
Educational Level		
Bachelor degree.	122	96.1
Master degree.	4	3.1
Doctoral degree.	0	0
Educational Role		
General education teacher.	44	34.6
Special education teacher.	82	64.6
School Location		
Rural.	8	6.3
Suburban.	10	7.9
Urban.	108	85.0
Years of Experience		
Less than one year.	32	25.2
1-2 years.	34	26.8
3-5 years.	38	29.9
6-10 years.	12	9.4
More than 11 years.	11	8.7

5. Results and Discussion

Quantitative data gathered from the questionnaire were analyzed using a computer statistical software program, Statistical Package for the Social Sciences (SPSS). Frequencies and descriptive statistics for each of the questions on the questionnaire to describe and present the basic features of the data for research questions. It should be noted that while 127 questionnaires were submitted electronically some respondents did not answer all questions which explains the different sample size in the results. Findings are arranged in the order of the research questions. The outcomes are reported in tables with statements of results and followed by a brief analysis of the answer.

The first research question of this study divided it into the following sub-questions: (a) do teachers use or request assistive technology evaluation for their student? (b) do they consider assistive technology when planning student's IEP? (c) how do they perceive the availability

of assistive technology in their schools? and (d) what types of assistive technology are available at schools? To answer these sub-questions, the respondents' responses to items 1 to 4 in the second part of the questionnaire were given a descriptive analysis and the result is presented in Table 2. Results indicate that the vast majority of responding teachers 93.7% (*n*=119) do not use or request assistive technology evaluation for their student. Nearly 94% (*n*=119) of the participants had not considered assistive technology when planning student's IEP. Ninety-one and three-tenths percent (*n*=116) of the participants reported that assistive technology was not available to be used in their schools. Approximately nine percent (*n*=11) of the participants reported the availability of low-tech devices, while 7.1% (*n*=9) reported the availability of mid-tech devices, and only 3.9% (*n*=5) reported the availability of high-tech devices in their schools.

Table 2. Participants' responses to items 1 to 4 in the second part of the questionnaire (N=127)

Variable	Frequency (*n*)	Percentage (%)
Use or request assistive technology		
Yes	8	6.3
No	119	93.7
Considering AT when planning student's IEP		
Yes	7	5.5
No	119	93.7
Availability of AT in the schools		
Yes	11	8.7
No	116	91.3
Types of AT available at the schools		
Low-tech devices	11	8.7
Mid-tech devices	9	7.1
High-tech devices	5	3.9

The second research question of this study aims to investigate teachers' level of knowledge and skills of using assistive technology. To answer this question, items 5 to 8 in the second part of the questionnaire were used. Mean scores and standard deviations of the items are reported in Table 3 and the frequencies and percentages presented in Table 4. The majority of the respondents reported that they were poorly prepared (75.6%, *n*=96) or not at all prepared (18.1%, *n*=23) to provide assistive technology services for students with disabilities in their schools. There was no teacher who was extremely well prepared, while less than six percent reported that they were somewhat prepared (3.9%, *n*=5) or adequately prepared (1.6%, *n*=2) to provide assistive technology services for students with disabilities in their schools.

Regarding teachers' level of knowledge, most of them reported that they have little knowledge (72.4%, *n*=92) or no knowledge about assistive technology. There was no teacher who have an extensive knowledge, while less than six percent reported that they have some knowledge (3.9%, *n*=5) or good knowledge (1.6%, *n*=2) about assistive technology. The vast majority of the participants (98.4%, *n*=125) reported that they never take a college or graduate level course about assistive technology. Only 1.6% (*n*=2) of the participants took one or two college or graduate level courses about assistive technology. Nearly ninety-three percent (92.9%, *n*=118) of the respondents reported that they never attend workshops or in-services training pertaining specifically to assistive technology. Only 5.5% (*n*=7) of the respondents attend one or two workshops or in-services training pertaining specifically to assistive technology.

Table 3. Mean scores and standard deviations of the items 5 to 8 in the second part of the questionnaire (N=127)

Variable	Mean scores (*M*)	Standard Deviations (*SD*)
Preparation to provide students with AT	1.88	.524
Level of knowledge about AT	1.86	.547
Number of courses about AT	1.02	.124
Number of workshops or training about AT	1.07	.230

Table 4. Participants' responses to items 5 to 8 in the second part of the questionnaire (N=127)

Variable	Frequency (*n*)	Percentage (%)
Preparation to provide students with AT		
Not at all prepared	23	18.1
Poorly prepared	96	75.6
Somewhat prepared	5	3.9
Adequately prepared	2	1.6
Extremely well prepared	0	0
Level of knowledge about AT		
No knowledge	27	21.3
Little knowledge	92	72.4
Some knowledge	5	3.9
Good knowledge	2	1.6
Extensive knowledge	0	0
Number of courses about AT		
None	125	98.4
1-2	2	1.6
3-4	0	0
5 or more	0	0
Number of workshops or training about AT		
None	118	92.9
1-2	7	5.5
3-4	0	0
5 or more	0	0

The third research question of this study concerned teachers' interest in professional development and their preferred method for learning about assistive technology. To answer this question, items 9 and 10 in the second part of the questionnaire were analyzed. Mean scores and standard deviations of the items are reported in Table 5 and the frequencies and percentages presented in Table 6. Eighty-four and three-tenths percent (84.3%, n=107) of the participants reported that they are very interested in receiving training and professional development in the area of assistive technology. Nearly sixteen percent (15.7%, n=20) of the respondents reported that they do not know but will think about receiving training and professional development in the area of assistive technology. However, there was no teacher who was not interested in receiving training and professional development in the area of assistive technology. Regarding teachers' preferred methods for learning about assistive technology, most of the participants (95.3%, n=121) reported that they prefer one-on-one individualized instruction and hands-on instruction in group setting. Attending workshops or conference sessions to learn about assistive technology was preferred by ninety-one percent (n=117) of the teachers, while only 30.7% (n=39) reported that they prefer formalized courses

as a method for learning about assistive technology.

Table 5. Mean scores and standard deviations of the items 9 and 10 in the second part of the questionnaire (N=127)

Variable	Mean scores (*M*)	Standard Deviations (*SD*)
Interested in receiving training about AT	1.16	.365
preferred method for learning about AT		
One-on-one individualized instruction	1.03	.176
Hands-on instruction in group setting	1.04	.195
Attending workshops or conference sessions	1.04	.199
Formalized courses	1.69	.463

Table 6. Participants' responses to items 9 and 10 in the second part of the questionnaire (N=127)

Variable	Frequency (*n*)	Percentage (%)
Interested in receiving training about AT		
Yes, very interested	107	84.3
Do not know, but will think about it	20	15.7
No, not interested at all	0	0
preferred method for learning about AT		
One-on-one individualized instruction	121	95.3
Hands-on instruction in group setting	121	95.3
Attending workshops or conference sessions	117	92.1
Formalized courses	39	30.7

The fourth research question of this study addresses teachers' attitude toward using assistive technology with their students. To answer this question, items 11, 12, and 13 in the second part of the questionnaire were used. Mean scores and standard deviations of the items are reported in Table 7 and the frequencies and percentages presented in Table 8. More than half of the participants (50.4%, *n*=64) held a neutral attitude about the effect of using assistive technology on students' skill development. Thirty-eight and six-tenths percent (38.6%, *n*=49) of the respondents reported that they disagree and nearly five percent (4.7%, *n*=6) strongly disagree with the statement that student need to learn to function without assistive technology as their use of it would negatively affects their skill development. Only five and half percent (5.5%, *n*=7) of the respondents agreed, while no one of the teachers strongly agree that student need to learn to function without assistive technology as their use of it would negatively affects their skill development. More than half of the participants (53.5%, *n*=68) have a neutral attitude toward using assistive technology to enable students to access the

curriculum. Nearly 46% of the participants agreed (36.2%, *n*=46) or strongly agreed (8.7%, *n*=11) that assistive technology enables students to be able to access the curriculum. Most of the participants (70.1%, n=89) held a neutral attitude with respect to the use of assistive technology requires so much extra time and slows the pace of learning for the class. Twelve and six-tenths percent (12.6%, n=16) of the respondents reported that they disagree, but eleven and eight-tenths percent (4.7%, n=6) strongly agree with the statement that using assistive technology requires so much extra time and slows the pace of learning for the class.

Table 7. Mean scores and standard deviations of the items 11, 12, and 13 in the second part of the questionnaire (N=127)

Variable	Mean scores (*M*)	Standard Deviations (*SD*)
Student need to learn to function without AT as their use of it would negatively affects their skill development.	2.5714	.67443
AT enables students to be able to access the curriculum.	3.5440	.65382
Using AT requires so much extra time and slows the pace of learning for the class.	2.9917	.51033

Table 8. Participants' responses to items 11, 12, and 13 in the second part of the questionnaire (N=127)

Variable	Strongly disagree		Disagree		Neutral		Agree		Strongly Agree	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Student need to learn to function without AT as their use of it would negatively affects their skill development.	6	4.7	49	38.6	64	50.4	7	5.5	0	0
AT enables students to be able to access the curriculum.	0	0	0	0	68	53.5	46	36.2	11	8.7
Using AT requires so much extra time and slows the pace of learning for the class.	0	0	16	12.6	89	70.1	15	11.8	0	0

Unfortunately, only three of the one hundred and twenty-seven participants who completed the survey indicated that they would be willing to participate in a telephone interview. To maintain the confidentiality of participants, interviewees were coded with their initials and date of birth. The individual interviews lasted from about 15 to about 20 minutes. The core questions of the interview were structured based on the answers given in the questionnaire survey. Any idea or comment made by more than one interviewee in replies to the question was considered to be a theme. Three major themes emerged and were organized into meaningful segments. Themes emerged were: (1) inadequate level of knowledge and skills of using assistive technology, (2) willingness to receive training and professional development in the area of assistive technology, and (3) equivocal attitude toward using assistive technology. The first theme concerns about teachers' level of knowledge and skills of using assistive technology. One teacher indicated that "I think I have some knowledge but I'm not prepared to provide assistive technology services to my students ". Another teacher stated that "I use very little assistive technology for students with disabilities, I'm still unsure whether it is based on the limit devices available to be use or lack of knowledge. I would like to be more exposed to the devices out there". The second theme was participants' willingness to receive training and professional development in the area of assistive technology. A comment of one of the teachers reflects this, "I need a lot of help in using assistive technology. I think schools should offer workshops and specialized training on assistive technology". The third theme was equivocal attitude toward using assistive technology. The following quotes are representative of the comments made by teachers " I think using assistive technology might affects the students' development in a negative way. It also requires a lot of time to be used which slows the pace of learning for the student with disability and the whole class". Another teacher stated that "I'm still unsure whether to use assistive technology because it could impede further progress of students' skill development, you know students might depend on these devices more and more to perform better, yet they might benefit of using it to access the curriculum". The findings from this study indicate that the lack of knowledge and skills of using assistive technology is a critical issue, with over ninety-three of respondents reporting they were poorly prepared or not at all prepared to provide assistive technology services for students with disabilities in their schools. A similar concern about teachers' attitude toward using assistive technology with their students, unfortunately more than half of the participants held a neutral attitude toward using assistive technology to enable students to access the curriculum. It is a concern not having a positive attitude is a primary barrier to using assistive technology. The results of the study also imply that professional development was needed by more than eighty-four teachers, training might influences their use of assistive technology in the classroom.

5. Conclusion

The effective use of assistive technologies is the difference between experiencing success or failure in the educational setting for students with disabilities. Knowledge of assistive technology and professional development opportunities were consistently identified in the literature as being essential to the successful implementation of assistive technologies (Alper and Raharinirina, 2006; Baek et al., 2008; Hart, 2000; Reed, 1999; Smarkola, 2008; Zabala et

al., 2000). Findings of this study signify that the vast majority of the teachers have an inadequate level of knowledge and skills of using assistive technology. Lack of assistive technology knowledge and skills are not a novel discovery. Previous researchers (Ashton et al, 2005; Bausch and Hasselbring, 2004; Parette et al., 2006; Smith and Kelley, 2007; Wilcox et al, 2006) concluded that teachers were not confident in using assistive technology due to lack of knowledge and training in this area. Knowledge and skills of using assistive technology essential for general education and special education teachers in equal measure.

Teachers' perceptions of the usefulness of receiving training on using assistive technology affect how often it is used. It was encouraging to find that the majority of respondents indicated their interest in professional development in assistive technology. Formalized courses were the least preferred methods for learning about technology for professional development delivery. Face to face methods that involved hands-on opportunities and personal contact were preferred over others. These findings are in line with the information in the literature that supports the use of hands-on learning provides opportunities for collaboration and communication among educators (Birman et al., 2000; Cole et al., 2002; Mouza, 2002; NSDC, 2001; Russell et al., 2003). Professional development methods based on best practices and research is a foundation for sustained change promotes the successful implementation of assistive technology for students with disabilities.

A weakness of the study was that the number of teachers who agreed to be part of the study which makes the findings less generalizable to the general population of teachers. In spite of this, the results of this study has a clear implication that teachers must be provided with adequate opportunities for professional development on the implementation and use of assistive technology.

Acknowledgement

I would like to thank the Deanship of Scientific Research at King Saud University for supporting this research financially.

References

Alper, S., & Raharinirina, S. (2006). Assistive technology for individuals with disabilities: A review and synthesis of literature. *Journal of Special Education Technology, 21*, 47-56.

Ashton, T., Lee, Y., & Vega, L. A. (2005). Assistive technology: Perceived knowledge, attitudes, and challenges of AT use in special education. *Journal of Special Education Technology*, 20, 60-63.

Assistive Technology Act. (2004). *Putting technology into the hands of individuals with disabilities*. [Online] Available: http://republicans.edlabor.house.gov/archive/issues/108th/education/at/billsummary.htm

Baek, Y., Jung, J., & Kim, B. (2008). What makes teachers use technology in the classroom? *Computers and Education, 50*, 224-234. http://dx.doi.org/10.1016/j.compedu.2006.05.002

Bausch, M. E., & Hasselbring, T. S. (2004). Assistive technology: Are the necessary skills

and knowledge being developed at the preservice and inservice levels? *Teacher Education and Special Education* , 27, 97-104. http://dx.doi.org/ 10.1177/088840640402700202

Birman, B. F., Desimore, L., Porter, A. C., & Garet, M. S. (2000). Designing professional development that works. *Educational Leadership*, 57, 28-33.

Bonwell, C., & Eison, A. (1991). Active learning: Creating excitement in the classroom. ASHE-ERIC Higher Education Report No. 1. Washington, D.C.: The George Washington University, School of Education and Human Development. [Online] Available: http://www.oid.ucla.edu/about/units/tatp/old/lounge/pedagogy/downloads/active-learning-eric.pdf

Bowser, G., & Reed, P. (1995). Education TECH points for assistive technology planning. *Journal of Special Education Technology*, 12, 325-338

Bryant, D. P., & Bryant, B. R. (1998). Using assistive technology to include students with learning disabilities in cooperative learning activities. *Journal of Learning Disabilities*, 31, 41-54. http://dx.doi.org/10.1177/002221949803100105

Bryant, D. P., & Bryant, B. R. (2011). *Assistive technology for people with disabilities*. Boston: Allyn and Bacon.

Burgstahler, S. (2004). *Universal design for instruction.* DO-IT. University of Washington. [Online] Available: http://www.washington.edu/doit/Faculty/Strategies/Universal/ (July 28, 2012).

Cole, K., Simkins, M., & Penuel, W. R. (2002). Learning to teach with technology: Strategies for inservice professional development. *Journal of Technology and Teacher Education*, 10, 431-455.

Cook, A. M., & Hussey, S. M. (1995). *Assistive technologies: Principles and practices*. St. Louis, MO: Mosby.

Cook, A. M., & Hussey, S. M. (2002). *Assistive technologies: Principles and practices.* (2nd ed.). Philadelphia, PA: Elsevier Health Sciences.

Creswell, J. (2008). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Upper Saddle River, NJ: Merrill Prentice Hall.

Dillman, D. (2006). *Mail and internet surveys* (2nd ed.). New York, NY: John Wiley & Sons.

Education Tech Points. (2002). [Online] Available: http://www.edtechpoints.org/

Edyburn, D. (2001). Models, theories, and frameworks: Contributions to understanding special education technology. *Special Education Technology Practice*, 4, 16-24.

Fowler, F. (2008). *Survey research methods*. (4th ed.) Thousand Oaks, CA: Sage Publications.

Ganschow, H., Philips, L., and Schneider, D. (2001). Closing the gap: Accommodating students with language learning disabilities in college. *Topics in Language Disorders*, 21, 17-37.

Georgia Project for Assistive Technology. (2004). *Assistive Technology Consideration Checklist*. [Online] Available: http://www.gpat.org/

Georgia Project for Assistive Technology. (2004). *Assistive Technology Consideration Resource Guide*. [Online] Available: http://www.gpat.org/

Hart, D. (2000). *Promising Practices in Technology: Supporting Access to and Progress in the General Curriculum*. Boston: United States Office of Special Education Programs.

International Business Machines. (1991). *Technology and persons with disabilities*. Atlanta, GA: IBM Corporate Support Programs.

Mouza, C. (2002). Learning to teach with new technology: Implications for professional development. *Journal of Research on Technology in Education*, 35, 272-289.

National Center for Educational Statistics (NCES). (2001). *Teacher Preparation and Professional Development: 2000*. Washington, DC: National Center for Educational Statistics.

National Center for Learning Disabilities. (2007). *The Individuals with Disabilities Education Act 2004*. [Online] Available: www.ncld.org/content/view/274/321/ (March 8, 2012).

Parette, H. P., Peterson-Karlan, G. R., Smith, S., Gray, T., & Silver-Pacuilla, H. (2006). The state of assistive technology: Themes from an outcomes summit. *Assistive Technology Outcomes and Benefits, 3*, 15-33. http://research.chem.psu.edu/mallouk/articles/article7.pdf

Reed, P. (1999). *Six Steps to Improved Assistive Technology Services in Schools*. Amherst, WI: Wisconsin Assistive Technology Initiative.

Rose D., & Meyer, A. (2002). *Teaching every student in the Digital Age: Universal design for learning.* Alexandria, VA: Association for Supervision and Curriculum.

Russell, M., Bebell, D., O'Dwyer, L., & O'Connor, K. (2003). Examining teacher technology use: Implications for preservice and in-service teacher preparation. *Journal of Teacher Education, 54*, 297-310. http://dx.doi.org/10.1177/0022487103255985

Scherer, M. (2004). *Connecting to learn: Educational and assistive technology for people with disabilities*. Washington, D. C.: American Psychological Association.

Smarkola, C. (2008). Efficacy of a planned behavior model: Beliefs that contribute to computer usage intentions of student teachers and experienced teachers. *Computers in Human Behavior, 24*, 1196-1215. http://dx.doi.org/10.1016/j.chb.2007.04.005

Smith, D. W., & Kelley, P. (2007). A survey of assistive technology and teacher preparation programs for individuals with visual impairments. *Journal of Visual Impairments & Blindness, 101*, 429-433.

Texas Assistive Technology Network. (2004). *Considering assistive technology in the IEP Process*. [Online] Available: http://www.texasat.net/

The QIAT Consortium Leadership Team. (2000). Quality indicators for assistive technology

services in school settings. *Journal of Special Education Technology*, 15, 25-36.

The QIAT Consortium. (2003). *Quality indicators for assistive technology services*. [Online] Available: http://sweb.uky.edu/~jszaba0/QIAT.html

The QIAT Consortium. (2008). *QIAT: Quality indicators for assistive technology*. [Online] Available: http://natri.uky.edu/assoc_projects/qiat/

Vygotsky, L. (1978). *Mind and society: The development of higher psychological processes*. Cambridge: Harvard University Press.

U. S. Department of Education. (2004). *IDEA*. [Online] Available: www.ed.gov/offices/OSERS/IDEA (July 9, 2012).

United Nation. (2007). Convention on the rights of persons with disabilities (resolution 61/106). http://www.un-documents.net/a61r106.htm (July 9, 2012).

Wessels, R., Dijcks, B., Soede, M., Gelderblom, G. J., & De Witte, L. (2003). Non-use of provided assistive technology devices: A literature overview. *Technology and Disability*, 15, 231-238.

Wilcox, J. M., Guimond, A., Campbell, P. H., & Weintraub Moore, H. (2006). Provider perspectives on the use of assistive technology for infants and toddlers with disabilities. *Topics in Early Childhood Special Education*, 26, 33-49. http://dx.doi.org/10.1177/02711214060260010401

Wisconsin Assistive Technology Initiatives. (2003). *Assistive technology consideration*. [Online] Available: http://www.wati.org/atconsideration.htm

Zabala, J. (1995). *The SETT framework: critical areas to consider when making informed assistive technology decisions*. Eric Document Reproduction Service No.ED381962.

Zabala, J. (2002). *Get SETT for successful inclusion and transition*. [Online] Available: http://www.ldonline.org/ld_indepth/technology/zabalaSETT1.html

Zabala, J., Blunt, M., Carl, D., Davis, S., Deterding, C., & Floss, T. (2000). Quality indicators for assistive technology services in school settings. *Journal of Special Education Technology*, 15, 25-36.

Appendix

Appendix 1. Survey Question for Teachers' Knowledge and Use of Assistive Technology

Part I: Demographic Information

Please complete the information about yourself.

1 – What is your age?
----- Less than 30 years old.
----- 30-40
----- 41-50
----- 51-60
----- More than 60 years old.

2 – What is your gender?
----- Male.
----- Female.

3 – What is the highest level of education you have completed?
----- Bachelor degree.
----- Master degree.
----- Doctoral degree.
----- Other (please specify).

4 – What is your job position?
----- General education teacher.
----- Special education teacher.
----- Other (please specify).

5 – Which of the following best describes the location of the school in which you teach?
----- Rural.
----- Suburban.
----- Urban.

6 – How many years of experience do you have in education?
----- Less than one year.
----- 1-2 years.
----- 3-5 years.
----- 6-10 years.
----- More than 11 years.

Part II: Use and Knowledge of Assistive Technology

Please note that this questionnaire based upon IDEIA 2004 definition of assistive technology which includes high-tech devices (i.e. alternative communication devices), and also includes

items that may not typically be considered “technology” (i.e. pencil grips).

Please answer the following questions by choosing the best answer that most accurately reflects your knowledge, experience, and position.

1 – Have you ever used or requested an assistive technology evaluation for a student?
----- Yes
----- No

2 – Are assistive technology needs considered by the Individualized Education Program (IEP) team in your school?
----- Yes
----- No

3 – Do students at your school have access to assistive technology?
----- Yes
----- No

4 – Which types of assistive technology are available at your school (choose all that apply)?
----- Low-tech devices (light pen to enhances writing area, pencil grips, adaptive desks).
----- Mid-tech devices (Sticky keys, Iris pen, Neo 2 portable keyboard)
----- High-tech devices (hearing aid and/or assistive listening device, word prediction programs, keyboard alternatives).

5 – Are you prepared to provide assistive technology services to your students?
----- Not at all prepared.
----- Poorly prepared.
----- Somewhat prepared.
----- Adequately prepared.
----- Extremely well prepared.

6 – Estimate your level of knowledge about assistive technology.
----- No knowledge.
----- Little knowledge.
----- Some knowledge.
----- Good knowledge.
----- Extensive knowledge.

7 – Estimate the number of college or graduate level courses you have taken in which assistive technology was covered in detail (i.e., more than one class session).
----- None
----- 1-2
----- 3-4
----- 5 or more.

8 – Estimate the number of workshops or in-services training pertaining specifically to assistive technology that you have attended in your career.
----- None
----- 1-2
----- 3-4
----- 5 or more.

9 – Are you interested in receiving training and professional development in the area of assistive technology?
----- Yes, I am very interested.
----- I do not know, I will think about it.
----- No, I am not interested at all.

10 – Thinking about your own learning style and needs please indicate your preferred method for learning about technology assistive (choose all that apply).
----- One-on-one individualized instruction.
----- Hands-on instruction in group setting.
----- Attending workshops or conference sessions.
----- Formalized courses (i.e., for university credit).
----- Other (please specify).

11 – Do you agree that student need to learn to function without assistive technology as their use of it would negatively affects their skill development?
----- Strongly disagree.
----- Disagree.
----- Neutral.
----- Agree.
----- Strongly Agree.

12 – Do you agree that assistive technology enables students to be able to access the curriculum?
----- Strongly disagree.
----- Disagree.
----- Neutral.
----- Agree.
----- Strongly Agree.

13 – Do you agree that using assistive technology requires so much extra time and slows the pace of learning for the class.
----- Strongly disagree.
----- Disagree.
----- Neutral.

----- Agree.
----- Strongly Agree.

14 – Would you like to participate in an additional 15-minute telephone interview about assistive technology?
----- Yes
----- No
If “yes” please enter your phone number and e-mail address in the box below so that you may be contacted if chosen.