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Title:
The Effect of Assistive Technology on Non-visual Learners' Vocabulary Development

Supervisor:
Afsaneh Saeedakhtar, PhD

Advisor:
Reza Abdi, PhD

By:
Nasrin Khodaee

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Family name: khodayi	Name: Nasrin

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Supervisor(s): **Afsaneh Saeedakhtar, PhD**
Advisor(s): **Reza Abdi, PhD**

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Abstract:

Nowdays in digital era technology advances have provided a lot of tools that make teaching and learning practical and give more opportunities for both teachers and learners to have access to information from different sources. One of these tools which is highly used with non-visual learners is assistive technology (AT). AT is a beneficial tool for learning English by all learners. It is also a program, type of support, or piece of technology that improves student learning. When it comes to English language learners (ELLs), AT includes tools that assist the acquisition and comprehension of language learning. Using and mastering AT can build self-esteem in the learners who are able to work more independently and receive immediate feedback. The use of screen reading software which is a kind of AT can be particularly effective as they provide access to almost all written materials. Learners can scan materials or open up electronic documents or even browse the net and can listen to the text which is read loudly by the system. The English vocabulary of most non-visual learners is not sufficiently extensive to deal with the specialized vocabulary used in textbooks. Because of their limited exposure to academic English, learners are often unable to fully comprehend textbooks or actively participate in the class discussions. Repeated exposure to vocabulary in short reading is thought to be one of the best ways for non-visual learners to increase their reading and writing vocabulary. The present study intends to explore this less-attended area and examine the influence of AT on non-visual learners' vocabulary development. The present study investigated the role of assistive technology in improving non-visual learners L2 vocabulary development.

In this study 22 students were divided into two groups; one experimental and one control. A pre-test which included 15 target vocabulary tests was administered to each group. Then, the experimental groups received the treatment for five sessions in the form of using NVDA which is a type of screen reading. But the control group did not receive any treatment. In the last session all groups received a parellal post-test. For the analysis of data a t-test was run. The results showed that the experimental group outperformed the control group in learning vocabulary items. And the questionnaire results indicated that generally learners had positive attitude toward AT.

ACKNOWLEDGMENTS

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CHAPTER ONE

INTRODUCTION

1.1. Preliminary Remarks

Nowdays in digital era technology advances have provided a lot of tools that make teaching and learning practical and give more opportunities for both teachers and learners to have access to information from different sources (Hussin, 2013). One of these tools which is highly used with non-visual learners is assistive technology (AT) which includes hardware options such as alternative keyboards, and screen magnifier, as well as software options including voice recognition, onscreen keyboards, and optical character recognition (Hussin, 2013). According to the United Nation AT is "adapted or specially designed to improve the functioning of people with disabilities" (Borg, Lindstrom, & Larsson, 2009, p. 1863). United States institutes also defines AT as "any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities" (The Assistive Technology Act, 2004, p. 1710). AT also refers to any tool which is used to promote access to the general education curriculum for students with disabilities. For students with visual impairments, AT may include low-technology devices that don't need much training; these devices are not expensive and dont have complex or mechanical features such as walking canes, or high-tech academic tools which refer to the most complex devices that have got electronic components such as computer or print magnification devices, and screen readers (Cox & Dykes, 2001).

AT is a beneficial tool for learning English by all learners. It is also a program, type of support, or piece of technology that improves student learning. When it comes to English language learners (ELLs), AT includes tools that assist the acquisition and comprehension of language and

subject matter. Some forms of AT that can be used specifically for non-visual language learners include text-to-speech software, audio recorders, and pocket translators. Each of them is explained in detail below.

1.1.1. Text-to-Speech Software

Text-to-speech software is a program that converts text into spoken voice output. While it is commonly used for those with visual impairments or reading disabilities, it is also very helpful for ELLs. Here are some points about this type of technology:

- It can be installed on mobile devices (also phones, tablets, laptops, etc.).

- Students can use it in the classroom.

- Students hear the text while reading-aids in word-sound recognition, and pronunciation.

- It increases students' focus on comprehension rather than sounding out words.

- It supports multiple languages and text types.

- Many students can access free digital text-to-speech books.

1.1.2. Audio Recorders

For many ELLs repetition and practice are necessary in the classroom. Audio recorders can be used to record and play back oral explanations of new material taught in the class. Here are some reasons why audio recorders are beneficial AT tools:

- It can be bought individually or installed as an app on mobile devices.

- Students can use it in the classroom.

- It can be used for recording class lessons, important lectures, key content, vocabulary definitions, or even word pronunciation.

- Students can replay and better comprehend the class content.

- Students can record themselves talking to self-check their own pronunciation as they read or speak in English.

1.1.3. Pocket Translators

Pocket translators are electronic devices or mobile apps that translate words or phrases between multiple languages. Vocabulary development should be an essential element in all English language learning classrooms, so students should not be encouraged to rely solely on pocket translators for vocabulary acquisition. With that being said, students still benefit from translators when they get stuck, so here are some reasons why ELLs benefit from this device:

- Its Portable; it can be purchased individually, or as an app for a mobile device.

- It can be used for vocabulary building exercises.

- It allows for quick retrieval of vocabulary, spelling, or pronunciation when stuck.

- It is beneficial for learning when students are out of class and do not have a teacher to provide assistance.

Hussin (2013) maintained that in educational settings, AT refers to any technological instrument or device that assists learners with disabilities to access learning material and perform learning tasks easily. It increases self-reliance to accomplish the tasks (Bryant, 2003), encourages learners to participate in discussions (e.g., Cavalier, Feretti, & Okolo, 1994; Male, 2003), and prepares them for high level education and future occupation (Burgstahler, 2003). The recent studies have indicated that AT devices exert a positive influence on the lives of learners with visual impairments, for example, it makes them motivated (e.g., Cooper & Nichols, 2007; Kapperman, Sticken, & Heinze, 2002; Strobel, Fossa, Arthanat, & Brace, 2006), and it has a positive role in their academic achievements (e.g., Huang & Russell, 2006; Trucano, 2005).

1.2. Statement of the Problem

Wright (2010) stated that non-visual English language learners are one of the fastest growing groups in Iran's colleges, universities, business, and technical schools; Although a few learners are good at English, and/or have passed qualifying tests such as the Test of English as a Foreign Language (TOEFL), many experience difficulty when they come up with comprehending even simple English sentences. Some schools have had programs focusing on teaching some skills such as typing, vocabulary, and phonics for these learner. While this method was helpful, the schools failed to provide the individualized support for every learners. Since English language learners need some extra courses to meet their needs. Most institutions readily acknowledge the need for additional support, but often lack the necessary staff or resources to provide it. The solution for this problem is software named Non Visual Desktop Access (NVDA) which offers a cost-effective and efficient way to provide non-visual language learners with the individual support to successfully pursue their studies. Different AT software can be easily installed on personal computers or made available in computer labs or media centers. Software like NVDA enables students to listen to any kind of digital or scanned printed material and provides a lot of on-line references and study skills tools to strengthen vocabulary development, listening, writing, and reading comprehension.

The use of computers has proven to be beneficial in assisting non-visual learners while acquiring a foreign language. Using and mastering AT can build self-esteem in the learners who are able to work more independently and receive immediate feedback. The use of screen reading software can be particularly effective as they provide access to almost all written materials. Learners can scan materials or open up electronic documents or even browse the net and can listen to the text which is read loudly by the system.

The English vocabulary knowledge of most non-visual learners is not sufficiently extensive to deal with the specialized vocabulary used in textbooks, technical materials, essays, or articles. Because of non- visual learners' limited exposure to academic English, they are often unable to fully comprehend textbooks or actively participate in the class discussions. Many are also hampered in their ability to express themselves in writing. Repeated exposure to vocabulary in short reading is thought to be one of the best ways for non-visual learners to increase their reading and writing vocabulary (Hussin, 2013).

Previous studies (e.g., Allen, 2015; Gierach, 2009) have investigated the role of AT devices in educational setting for learners with autism, emotional disorders, and learning disabilities. But, there is a lack of research accomplished on other disabilities, especially learning English by non-visual or partially non-visual learners. The present study intends to explore this less-attended area and examine the influence of AT on non-visual learners' vocabulary development.

1.3. Significance of the Study

This study is as an initial step to do a research on the influence of screen reader (i.e., a type of AT) on vocabulary learning of Iranian non-visual learners of English. A look into different sources for learning English which are available on the market reveals that non-visual learners have been neglected by material developers and textbook designers. Results of the present study will catch the attention of stakeholders to invest on teaching English to non-visual learners who must not be discriminated in favor of learners with no disabilities and be deprived of learning English as a lingua Franca. Any organization responsible for the non-visual learners or any foreign language institute, learning/teaching center, and any other organization related to language education to the non-visual learners might benefit from the findings of the present research.

1.4. Purpose of the Study

There are several factors like continuing education, benefiting from the Internet and press, traveling, and business which make the English language essential to learn in our life. That's why all people including non-visual learners need to learn English in order to get in touch with their community all around the world. Vocabulary is one of the fundamental components of language learning and improving it has a direct and positive impact on learners' capacity to build up language proficiency as a whole. Nation (1994) stated that vocabulary is not an end in itself. A rich vocabulary repertoire makes the skills of listening, speaking, reading, and writing easier to perform. The aim of this study is to investigate whether screen reader (i.e., NVDA) which is a kind of AT can develop vocabulary knowledge of non-visual learners or not.

1.5. Research Questions

The following two research questions are addressed in the present study:

1- Would assistive technology improve non-visual beginner learners' vocabulary development?

2- What is non-visual learners' attitude toward using assistive technology to improve their vocabulary repertoire?

1.6. Research Hypothesis

The following research hypothesis is formulated:

Assistive technology has no effect on non-visual beginner learners' vocabulary development.

1.7. Definition of Key Terms

The terms used throughout the study are defined here to ensure the clarity of their meaning.

Assistive Technology

Hussin (2013) maintained that in educational settings, AT refers to any technological instrument or device that assists learners with disabilities to access learning material and perform learning tasks easily

Screen Readers

A screen reader is software that translates the contents of the computer screen to either speech output, using a Text to Speech (TTS) engine, or to a Braille display. Screen readers with TTS output read the contents of the screen aloud and make it possible for non-visual users to read and write documents, use the Internet, and send email using only a keyboard. It is an adaptive technology for users with disabilities.

NVDA

NVDA (Non-visual Desktop Access) is a free "screen reader" which enables blind and vision impaired people to use computers. It reads the text on the screen in a computerized voice. People can control what is read to them by moving the cursor to the relevant area of text with a mouse or the arrows on their keyboard. NVDA can also convert the text into braille if the computer user owns a device called a "braille display".

NVDA provides the key to education and employment for many blind people. It also provides access to social networking, online shopping, banking, and news. NVDA works with Microsoft Windows. It can be downloaded in PC, or to a USB stick which can be used with any computer. Normally screen readers are expensive, making them unaffordable for many blind people. NVDA is free. It's been downloaded 70,000 times, in 43 languages.

Brail

Braille Authority of North America (2002) defined Brail as a system of touch reading for the blind which employs embossed dots evenly arranged in quadrangular letter spaces or cells. In each cell, it is possible to place six dots, three high and two wide. By selecting one or several dots in characteristic position or combination, 63 different characters can be formed. To aid in describing these characters by their dot or dots, the six dots of the cell are numbered 1, 2, 3, downward on the left, and 4, 5, 6, downward on the right.

1 **. .** 4

2 **. .** 5

3 **. .** 6

Innovation

"An idea, practice, or object that is perceived as new by an individual" (Roger, 2003, p. 12). For this study, innovation refers to the NVDA.

1.7. Limitations and Delimitations of the Study

Delimitations explain the boundaries the researcher imposes prior to initiating a study and are important to narrow the focus of a study (Creswell, 2003). The delimitations for this study include:

- The scope of this study was limited to the beginner male learners.

- It was just limited to one of Tehran's Non-visuals schools.

Limitation are those which happen within conducting the research including:

- The participants in this study were only 22 language learners, so the generalization of the results

must be treated cautiously.

- Pressure of time made me to limit the treatment sessions to just five.

CHAPTER TWO

LITERATURE REWIEW

2.1. Introduction

The purpose of this quasi experimental study was to explore and understand the experiences of learners of English with visual impairments in using NVDA to assist their vocabulary development. In this chapter the definitions of AT, the benefits of AT, and barriers to the effective use of AT, Non Visual Desktop Access (NVDA), and related studies about different uses of AT by Non-visual users are discussed in detail.

2.2. Assistive Technology

Blackhurst and Lahm (2000) classified devices into mechanical, electronic and microprocessor-based equipment; non-mechanical and non-electronic aids; and specialized instructional materials, services, and strategies that people with disabilities use to: (a) assist learning, (b) make the environment more accessible, (c) compete in the workplace, (d) enhance independence, or (e) improve the quality of life. Bryant and Bryant (2003) grouped AT into seven categories, including positioning and seating, mobility, augmentative and alternative communication, computer access, adaptive toys and games, adaptive environments, and instructional aids. In contrast, Reed and Lahm (2005) classified AT devices into 13 categories based on the task for which each is useful: (a) computer access, (b) motor aspects of writing, (c) composing written material, (d) communication, (e) reading, (f) learning/studying, (g) math, (h) recreation and leisure, (i) electric aids for daily living, (j) mobility, (k) vision, (l) hearing, and (m) vocational. Sharp (2002) considered services for assessment, training, adaptation, and technical assistance as AT.

The other general classification of AT devices includes a spectrum of equipment, from high to low tech that can be applied in writing, reading, access to computers, communication, mobility, and leisure (Wong & Cohen, 2011). The low-tech devices do not require onerous training and are inexpensive. Examples of low-tech devices are handheld magnifiers, large print texts, and canes. In contrast, high-tech devices refer to more sophisticated tools requiring special training to use the devices effectively. The devices are considered more expensive such as voice recognition, electronic organizers, digital hearing aids, and communication devices with voices (Georgia's Assistive Technology, 2011). In educational settings, AT refers to any technological tools or devices that help students with disabilities to access learning materials and perform learning tasks easily. The American Foundation for the Blind classifies the types of AT for students who are blind or low vision into four main categories: Technology for accessing print material, technology for accessing electronic information, technology for written communication, and technology for producing materials in alternative formats (Presley & D' Andrea, 2008).

1. Technology for accessing print material. The devices of this type of technology include: large print, reading stand, acetate overlays, lighting, handheld and stand magnifiers, telescopes, video magnification systems, scanning and optical character recognition (OCR) systems, electronic whiteboards, Braille reading, tactile graphics, digital talking books, e-book readers, talking calculators, and talking dictionaries.

2. Technology for accessing electronic information. The devices used in this type of technology include: large monitor, adjustable monitor arms, cursor enlarging software, screen magnification software, accessible Personal Digital Assistant (PDA), large print, online dictionaries, refreshable Braille displays, touch tablet, screen reader, self-voicing applications, e-book reader, digital voice recorder.

3. Technology for producing written communications. The following devices can be used in this type of technology: felt-tip pen and bold marker, dedicated word processor, imaging software, drawing software, math software and spreadsheets, slate and stylus Braillewriter, electronic Braillewriter, Braille translation software, Braille embosser, and accessible PDA

4. Technology for producing materials in alternate formats. Scanning and optical character recognition (OCR) system, laser print, Braille translation software, Braille embosser, graphics software, fusers and capsule paper, digital and analog audio recording device are the devices which are highly used in this category.

For the purpose of this study, AT refers exclusively to the NVDA, which is designed specifically for non-visual learners to access different materials.

2.3. Benefits of AT

AT devices have become essential tools for students with learning disabilities. AT devices such as NVDA allow learners to: (a) access educational resources (Beard, Carpenter, & Johnston, 2011), (b) maximize self-reliance to do tasks (Bryant & Bryant, 2003), (c) participate in discussions (e.g., Cavalier, Feretti, & Okolo, 1994; Male, 2003), (d) access peer groups (Fisher & Frey, 2002), and (e) prepare for higher education and future careers (Burgstahler, 2003). In an educational setting, the benefit of using AT devices in teaching and learning has been widely studied in recent years (e.g., Hussin, Mohd Nor, & Suhaimi, 2008; Leporini, 2007; Martins, Steil, & Todesco, 2004; Pal, Vallauri, & Tsaran, 2011).

Previous studies showed that AT devices had a positive impact on students with visual impairments' lives, such as motivating students (e.g., Cooper & Nichols, 2007; Kapperman, Sticken, & Heinze, 2002; Strobel, Fossa, Arthanat, & Brace, 2006), and developing positive relationships in their academic achievement (e.g., Huang & Russell, 2006; Trucano, 2005).

A large body of studies (e.g., Bebell & O'Dwyer, 2010; Fleischer, 2012; Zucker & Light, 2009), have been conducted on the effect and usefulness of AT on students with learning disabilities. They found that AT devices have positive impact on non-visual' learning, specifically, by increasing reading speeds and comprehension (e.g., Corn et al., 2002; Howell, 1996; Kennedy, 2002; Merbler, Azar, & Ulman, 1999). However, most of the AT studies have addressed learners with autism **(**Borg, 2009), severe disabilities (Gierach, 2008), learning disabilities (Khasnabis, 2010), emotional behavioral disabilities (Myhill, 2011) as well as learning behavioral (Mitra, 2011**)** and emotional disorders (Raja, 2012). There is a lack of research conducted on other disabilities, especially non-visual and partial non-visual learners.

AT devices are essential for learners with visual impairments to enhance their language learning, cognition, and social development (e.g., Sze, Murphy, Smith, & Yu, 2004; Wong & Cohen, 2011). The devices include Job Access with Speech (JAWS$\rightarrow$), talking calculators, audio books, Braille, tactile maps, magnifying glasses, computer screens, and Screen Reader which have improved access to information. By using these devices, non-visual learners can enhance their learning and gain opportunities for equality in education. For example, screen readers provide opportunities to access current information through the Internet (Coard, 2002), participate in online discussions (Lee & Templeton, 2008), and develop social networks (Gerber, 2003).

Researchers and practitioners (e.g., Hussin, 2013) acknowledge that the use of AT devices such as Braille note-takers, Braille embossers, screen magnification, and scanners with optical character recognition could change the lives of non-visual learners. These devices have a positive impact on educational performance, including helping learners understand three dimensional and non-linear illustrations in math (e.g., Cahill, Linehan, McCarthy, Bormans, & Engelen, 1996), and

helping learners gain access to curriculum materials generated in printed Braille (e.g., Farnsworth & Luckner, 2008; Fitchen, Asuncion, Barile, Ferraro, & Wolforth, 2009; Gerber, 2003; Kelly & Smith, 2011; Roentgen, Gelderblom, Soede, & Witte, 2009).

AT devices are not only important for non-visual learners, but also for the adult sighted population. Jutai, Strong, and Russell-Minda (2009) conducted an exhaustive and meticulous review of 108 studies on vision rehabilitation interventions and AT devices for adults aged 19 and above who were non-visual. They found that non-electronic optical devices, particularly magnifiers, were the most useful and popular devices for the non-visual adults, particularly low vision adults, because these devices are portable and inexpensive.

2.4. Barriers to Effective Use of AT

The barriers to successful and effective use of devices are due to several factors, such as limited financial resources (Fifield & Fifield, 1997), high costs of equipment (Wehmeyer, 1998), a lack of knowledge and support from teachers (e.g., Abner & Lahm, 2002; Alper & Raharinirina, 2006), and eligibility issues for possessing devices (Zhang, 2000).

In the United States, a national survey on abandonment of technology by adults with various disabilities showed that almost one-third of the AT devices were unused due to multiple factors: (a) lack of consideration and willingness to use the devices on the part of the individuals with disability needs; (b) selection technology tools selected by family members, not the users; (c) complicated design; (d) unreliable equipment; (e) insufficient funding for the AT devices; and (f) lack of technical support (e.g., Philips & Broadnax, 1992; Scherer, 1993; Todis, 1996). In another study, Johnson (2011) concluded that the lack of knowledge and awareness among people with disabilities, reluctance to use the devices, poor device performance, changes in needs or priorities, and feelings of stigmatization were the main reasons for underused AT devices.

A study by Kapperman, Sticken, and Heinze (2002), in both elementary schools and high schools in Illinois, showed that between 59 and 71 percent of the students with visual impairments, who had potential to use reading devices, did not have opportunities to adopt the AT devices. The lack of opportunities were due to insufficient provision of AT devices, insufficient time to provide training for students, insufficient funds to purchase the AT devices, and lack of appropriate teacher training.

In other studies (e.g., Hasselbring & Glaser, 2007; Riemer-Reiss & Wacker, 1999) it was reported that the lack of appropriate training among teachers, high cost of the AT devices, insufficient devices produced, and lack of information about the devices were all barriers to effective use of AT in education. These factors also contributed to high rates of abandonment of AT tools among learners.

Copley and Ziviani (2004) identified six barriers to effective use of AT devices among students with multiple disabilities, including: (a) lack of appropriate staff training and support, (b) negative staff attitudes, (c) inadequate assessment and planning processes, (d) insufficient funding, (e) difficulties procuring and managing equipment, and (f) time constraints. In another study by Leporine (2007), students with visual impairments faced problems when using AT in seeking information, which included the lack of context, that screen readers or magnifiers show just small part of content; overload of information that slows down content exploration; and excessive sequencing, such as long tables making reading distracting. As a result, these barriers caused abandonment or rejection of the innovation.

2.5. Screen Readers

Screen reader is a software application which analyzes the user interface and the associated content from an operating system or an application, such as a web browser, and provides its output

via the text-to-speech synthesizer or a refreshable Braille display. In more accurate terms the content and textual representation of the user interface is sent to standard output, whether a video monitor is present or not. Interpretations are then synthesized to the user with text-to-speech, sound icons, or a Braille output device. Screen readers are a form of AT which are essential to people who are blind, as well as useful to people who are visually impaired, illiterate, or have a learning disability. In another words, screen reader is a software application that enables people with severe visual impairments to use a computer. Screen readers work closely with the computer's Operating System (OS) to provide information about icons, menus, dialogue boxes, files, and folders. (Wikipedia, 2017)**.**

Microsoft Windows operating systems have included the Microsoft Narrator screen reader since Windows 2000. Apple Inc.'s macOS, iOS, and tvOS include VoiceOver, a feature-rich screen reader, while Google's Android provided Talkback screen reader since 2009. Similarly, Android-based devices from Amazon provide VoiceView screen reader. The console-based Oralux Linux distribution ships with three console screen-reading environments: Emacspeak, Yasr, and Speakup. BlackBerry 10 devices such as the BlackBerry Z30 include a built-in screen reader. There is also a free screen reader application for older less powerful BlackBerry (BBOS7 and earlier) devices.

There are also popular free and open source screen readers, such as the Orca for Unix-like systems and NonVisual Desktop Access for Windows. The most widely used screen readers are separate commercial products: JAWS from Freedom Scientific, Window-Eyesfrom GW Micro, Dolphin Supernova by Dolphin, System Access from Serotek, and Zoom Text Magnifier/Reader from AiSquared are prominent examples in the English-speaking market. The open source screen reader NVDA is gaining popularity.

The market for screen readers is not considered mainstream. Throughout its history, the driving issues have changed. While speech synthesis technology was not initially aimed at filling a need for non-visual users, extensive research in this field contributed to the development of future screen reader technology.

In evaluating screen reader technology, it is important to look at the broader realm of accessibility. Many within the disabilities community like to say that accessible technology is a market issue. The common opinion is that without improvements in access to technology for disabled users, there is an important consumer market that is neglected. It is estimated that about 1.1 million people in the U.S. are blind and each year 50,000 more will become non-visual. (National Federation of Blind, 2004). However, out of the estimated 295 million people in the U.S. (U.S. Census Bureau) this represents a relatively small market. Hence, conventional market economics has played less role in the development and adoption of screen readers.

While the history of AT and screen readers is quite convoluted, one important factor that has started to and will likely continue to impact the development and adoption of accessible technologies is activism and the enactment of federal regulations. In 1998 Congress amended the Federal Rehabilitation Act to require that Federal agencies' electronic and information technology be accessible to people with disabilities. The law also prohibits federal agencies from developing, buying or using electronic and information technologies that are inaccessible to people with disabilities. This law had important implications for accessible technology in general and in turn might prove to be an economic driving force for the advancement and adoption of screen reader technology.

2.6. Non Visual Desktop Access (NVDA)

Michael Curran and James met each other on a music camp for the non-visual, where they realized that they shared a strong interest in computers. Several years later they decided to help improve the accessibility of computers for non-visual and visually impaired people. To use a computer, non-visual learners need a screen reader which reads the text on the screen in a synthetic voice or with a braille display. But in many cases screen reading software costs more than the computer itself. In the past computers were inaccessible to millions of non-visual people around the world. This is a critical problem, because without computers, access to education and employment is severely limited, such as: everyday functions, online banking, shopping, and news.

In April 2006 Michael began to develop a free screen reader called NVDA with computers running on Windows. He invited James, who had recently completed his IT degree, to develop the software with him. Together these two fully non-visual men founded the not-for-profit organization NV Access to support the development of the NVDA screen reader. They were able to work full-time on the project thanks to a series of corporate grants and individual donations.

NVDA has been translated by volunteers into more than 43 languages, and used by people in more than 120 countries. It has also won multiple awards. NVDA is open source software, which means everyone can use it freely. This enables translators and developers around the world to continually contribute to its expansion and improvement. Through this work, Michael and James gained extensive expertise in software accessibility. They also fostered relationships with companies such as Mozilla, Microsoft, IBM, Adobe and Yahoo! And contributed to the accessibility of their respective products.

2.7. Empirical Studies

A number of research studies (e.g., Bessiere, Ceaparu, Lazar, Robinson, & Shneiderman, 2004; Birdi, & Zapf, 1997; Fernandez, Klein, Picard, & Riseberg, 1998; Jones, Lazar, & Shneiderman, 2006) have examined the frustrations and errors of typical users of AT, either student users or workplace users. The goal of Lazar, Allen, Kleinman, and Malarkey (2007)' study was to expand on the previous research by examining the frustrations of non-visual users who used screen readers to browse the Web. This research study provided a number of contributions to the research including knowing more about the specific causes of frustration on the Web for non-visual users, learning how non-visual users respond to these frustrating situations, and learning how much time is perceived as being lost by non-visual users due to these frustrating situations. From September 2004 through May 2005, 100 non-visual users submitted time diaries. The use of time diaries to track user frustrations has proven to be the most effective method of gaining information (Bessiere et al., 2004). Time diaries allow for a more accurate assessment of the frustrations that computer users face as they surf the Web. The results were not biased by the user's recollection of events; instead they were captured in real time and therefore had higher levels of validity than surveys (Czerwinski, Horvitz, & Wilhite, 2004). Users could record their feelings regarding frustrating events as they occur (Lazar, Meiselwitz, & Norcio, 2004). Time diaries have proven to be more accurate than retrospective time estimates because users record their time lost immediately as the losses occur rather than attempting to remember the information at a later time (Robinson & Godbey, 1997). There were 61 female and 39 male participants who took part in the study. The average age of participants was 43.37 years. The age range was from 18 to 81 years.

The 100 participants submitted information on 308 frustrating experiences. The top causes of frustration were (a) page layout causing confusing screen reader feedback; (b) conflict between the screen reader and application; (c) poorly designed/unlabeled form; (d) no explanation text for

pictures; and (e) inaccessible PDF, and a screen reader. Only in a few instances did the blind users in study report feeling angry at themselves, but they were far more likely to report that they were determined to fix the problem.

In general, participants that took part in this data collection did not report specific problems with screen readers that would lead to improved usability of the screen reader itself. However, participants did report problems with screen reader crashes and conflicts between the screen readers and software applications. In this study, it was discovered that non-visual users waste a smaller percentage of time responding to frustrations than visual users. The key to understanding this is the approach to dealing with the frustrations. In this study, the non-visual users responded very differently to frustration than the visual users in the previous study.

While the use of AT has provided non-visual learners with more opportunity during instruction, making use of AT in large-scale assessment has lagged behind. In an interview by teachers of the visually impaired learners (TVIs) conducted by Johnston and Laitusis (2008), TVIs noted that in the US, assessment practice has not caught up to classroom instructional practice for the use of AT. TVIs also argued that in some states, the only options available to non-visual students are Braille, large print, and regular print tests. The gap between instructional and assessment practice is especially salient in reading content. To date, little is known about the intersection of large-scale assessment, technology, and non-visual learners. Five studies published between 2002 and 2007 examined the use of computer administered tests for students with a variety of disabilities, but the findings were not consisted (Johnstone, Altman, & Thurlow, 2006; Zinesky & Sireci, 2007). Studies indicated that the test validity may be compromised under certain accommodated conditions because of interaction effects for students with some disabilities

(Fletcher et al., 2006) or because accommodations had a positive scoring effect for all students (e.g., Kettler et al., 2005), thus negating the equalizing effect that technology-based accommodations are supposed to produce. There are few models for assessing AT proficiency that can be used for accountability purpose (Watts, O'Brian, & Wojcik, 2004) but the development of standardized tests that examine AT proficiency as it relates to reading may help inform accommodation and test format decision for large-scale assessment in reading and language arts.

Johnstone, Altman, Timmons, Thurlow (2009) conducted a survey study to evaluate the influence of AT on non-visual learners' reading assessment. In their study, the opportunity to learn and practice with different AT devices varied by students. There should be variability because AT is supposed to be individualized to match students' need. Therefore developing a standardized test to assess student AT knowledge may be difficult. The task of this study was to develop a technology-assisted reading assessment.

For this study, they targeted non-visual learners in grades 6–10. They interviewed students in five states—two states in the northeast, one in the southwest, one in the upper Midwest, and one in the south to ensure geographical representation. Students participated in "observational interviews" facilitated by three researchers on the project. Observational interviews were a hybrid between verbal interviews, where respondents describe phenomenon (Bogdan & Biklen, 1992) and cognitive interviews, where interviewees participate in an activity and describe their thoughts and actions (Ericsson & Simon, 1993). During these interviews, students were asked several questions about their use of reading AT in the classroom and home. Afterward, students were asked how they use AT in the reading process, including how to download files, retrieve

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استاداهنما: دکتر سعیداختر		
استادمشاور: دکتر رضا عبدی		
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چکیده :

امروزه در دوران فن آوری دیجیتال، پیشرفت های وسیعی در زمینه ابزار و ابزارهای تدریس و یادگیری عملی ایجاد شده است و فرصت های بیشتری برای معلمان و دانش آموزان برای دسترسی به اطلاعات از منابع مختلف فراهم می کند. یکی از این ابزارهایی است که به شدت مورد استفاده دانشجویان نابینا قرار می گیرد، تکنولوژی کمک (AT) است. AT یک ابزار مفید برای یادگیری زبان انگلیسی توسط تمام زبان آموزان است. همچنین یک برنامه، نوع پشتیبانی یا قطعه ای از فن آوری است که یادگیری دانش آموز را بهبود می بخشد. درمورد زبان آموزان زبان انگلیسی (ELLs) ، AT شامل ابزارهایی است که به یادگیری و یادگیری زبان کمک می کند. استفاده و تسلط بر AT می تواند اعتماد به نفس را در فراگیران ایجاد کند که قادر به کار مستقلتر و بازخورد فوری هستند. استفاده از نرم افزار صفحه خواندن نمایش که یک نوع AT می باشد می تواند به طور خاص موثر باشد زیرا دسترسی به تمامی مطالب نوشته شده را فراهم می کند. یادگیرندگان می توانند مواد را اسکن کنند یا اسناد الکترونیکی را باز کنند یا حتی شبکه را مرور کنند و می توانند به متن گوش فرا دهند که توسط سیستم خوانده می شود. واژگان انگلیسی بسیاری از زبان آموزان نابینا به اندازه کافی گسترده برای مقابله با واژگان تخصصی استفاده شده در کتاب های درسی نیست. به دلیل محدودیت در متن آکادمیک انگلیسی، فراگیران اغلب قادر به درک کامل کتاب های درسی و یا فعالیت در بحث های کلاس نیستند. قرار گرفتن در معرض واژگان به صورت کوتاه در خواندن، به نظر می رسد یکی از بهترین شیوه های یادگیرندگان غیر بصری برای افزایش خواندن و نوشتن واژگان است. این مطالعه قصد دارد تا این ناحیه کم توجه را مورد بررسی قرار دهد و تأثیر AT را در توسعه واژگان زبان آموزان غیر ویژوال بررسی کند.

در این تحقیق، نقش فناوری کمک آموزشی را در بهبود زبان واژگان زبان آموزان نابینا بررسی شده است.

در این مطالعه ۲۲ دانشجو به دو گروه تقسیم شدند: یک گروه آزمایشی و یک گروه کنترل پیش آزمون که شامل ۱۵ آزمون واژگان هدف برای هر گروه بود. سپس گروه تجربی آزمایش را برای پنج جلسه در قالب استفاده از NVDA که یک نوع صفحه خواندن است، دریافت کرد، اما گروه کنترل هیچگونه درمان دریافت نکرد. در جلسه گذشته، همه گروه ها یک آزمون پس آزمون را انجام دادند. برای تجزیه و تحلیل داده ها، آزمون انجام شد. نتایج نشان داد که گروه آزمایش در گروه یادگیري واژگان غیرفعال تر از گروه کنترل بود. نتایج حاصل از پرسشنامه نشان داد که به طور کلی، دانشجویان به آزمایش مثبت نگرش مثبت داشتند.

کلیدواژگان: فناوري كمك آموزشي، صفحه خوان، زبان آموزان نابینا.

دانشکده ادبیات وعلوم انسانی

گروه آموزشی زبان های خارجی

پایان نامه برای دریافت درجه کارشناسی ارشد

در رشته آموزش زبان انگلیسی

عنوان :

تاثیر ابزار کمک آموزشی بر یادگیری لغات زبان انگلیسی نابینایان

استاد راهنما: دکترافسانه سعیداختر

استاد مشاور : دکتررضا عبدی

پژوهشگر:

نسرین خدایی نیار

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