

Effect of two different screen readers' programs on developing using the internet skills of blind middle school students

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Abstract

Research aims to know the effect of two different designs of screen readers' programs on using the internet skills of blind middle school students, and the research sample consisted of (8) students from El-thoghr middle school students (Fousol El-Noor)- Jeddah where the student has been divided into two experimental groups each of (4) students. To conduct this study research experimental design was used. After being sure of the homogeneity of the two groups, one program has been applied on the experimental groups, each one with different design, and then the research tools (Performance observation card) have been applied , The research results reached to that there is a statically significant difference at the level of (0.05) between the average scores of the two experimental groups skill performance (For the benefit of the experimental group that studied the screen reader with the hearing supported design).

Keywords: screen readers, internet skills, blind, Jeddah, performance observation card.

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1. Introduction

The tremendous technological progress in all fields of our recent time has a huge effect on the Educational field in the educational materials, teaching methods and general objectives of the educational process that has been called later Educational technology concept.

Education technology has organized the Education principles and theories and applied them and made them activated at learning fields(Marzouk, 2010) and it also helped the learner to adapt and achieve in the field of activities of daily living (Al-Azza, 2010) and that's where Education technology doesn't rely only on the ordinary people, it also came to introduce technology of high techniques to the people with special needs whose needs either mental or physical needs, and this has been called Assistive Technology.

In 2005, according to the latest counting, the department of statics and general information at Kingdom of Saudia Arabia estimated that the number of disabled people with about 124,596 of both males and females.

Assistive technology is defined as the set of principles, styles and inventions that helps the disabled in rehabilitation and training to reach independence , joining work, and continuing at through production and its returns(El-Azza, 2010).

Khater, Mobarez and Hamoda (2010) mentioned that Assistive technology is any element, means or ready, improved, detailed or adapted open trade according to the personal needs and it is used to increase, keep or improving the functional or performance capacities for the disabled persons or a service that helps some disabled one to try, have and use assistive technology.

A study about the assistive technology for the visually impaired people has reached to the importance of providing the assistive technology for everybody especially at the Developing countries because of its need for more development and creation and that technology's high cost (Arbor, 2011b).

The blind student as well as the ordinary student needs to learn, read and reach to the new information, and to be able to get the information he should search about in the different sources. The internet is considered one of the most important resources to get the information, so it was important for the students, especially the blind ones, to master using the internet, The internet has introduced many services , the most important are; (El-Gazzar, 2007).

- Helping at the educational field.
- Improving Education quality.
- Watching the last researches and periodicals that are related to special education technology.
- Reaching the data bases, magazines and articles.

And for the blind to be able to benefit from the internet, there should be some kind of technology to help him browse through internet browser, move between the sites, uploading, downloading files, filling out forms, and connecting with the others via Social networking platforms.

The companies, which produce the assistive technologies for the visually disabled produced the screen readers to make them able to use the internet. The screen readers convert the printed text into Audio by audio pronouncing machines with in built-speaking programs works with Windows operating system or works through prominent signals within the electronic lines, which have special programs to work with. In the first case, the blind student depends on hearing at receiving information, while, in the second case, the student depends on touching to receive information,

and from the most popular screen readers: Ibsar program, Nvda program, Virgo program , HAL program , JAWS program.

Screen readers helped blind people and visually impaired people to overcome the barrier of using computer fear. This technique was able to make a quantum leap in the world of the blind because it enables them from using the internet, knowing its secrets and flying at the spaces of the internet that became very important for the blind students as a means of connection in all fields of life (El-Gazzar, Suidan & Abdul, 2007), Where the internet isn't only a way for browsing but also a place for entertainment, shopping, teaching and training.

Screen readers supported individual learning, which is considered from characteristics and attributes of special education. Besides, it activated learning for the quality of the used program, increased the productivity of the student, and moved him towards the positive direction.

We shouldn't forget a very important side about screen readers that they will stop at some complicated things which may frustrate the learner through using the internet, so we should train the learner on getting to know the strategies that screen reader work with to overcome the challenges and barriers (Borodin et al., 2010)

A research study about (evaluating the pronouncing programs that the blind in the Arabic area use from the point of view of the users themselves by Abdullah Bin Hejab Elkah, reached to the importance of making more researches that relates to the blind using for the pronouncing programs at the educational system (El-Kahtany, 2008).

The study of Kuber about surfing the internet via touching for the blind people also proved that the students are able to deal with the internet by touching (Kuber, Yu & Modhrain, 2010). In fact, touching usually comes at the second place after hearing for the blind (Helmy, 2011), but when the sounds disappear, the touching is entirely employed (Khudair & El-Beblawi, 2014).

2. Research Problem

The use of the internet is an urgent need at our age for educating and learning processes. So that, the blind student has to master the internet skills to improve and help in his learning process and to be able to reach the new knowledge. In order to, make it easy for the blind student to master these skills there are two ways of connecting, either through touching or through hearing, and then the student will be able to connect with the computer via screen reader programs that depends either on touching or on hearing, o reach to the effect of the two designs on the internet skills of the blind people we should answer this question:

What is the effect of two different Designs of screen readers' programs on developing using the internet skills of blind middle school students at Jeddah?

3. Research questions

This research tries to answer the following basic request:

What is the effect of two different Designs of screen readers' programs (Screen reader depends on touching –screen reader depends on hearing) on developing using the internet skills of blind middle school students at Jeddah. And this request has the following sub-questions:

- What is the effect of the Designs of screen reader program based on hearing on developing using the internet skills of blind middle school students?

- What is the effect of the Designs of screen reader program based on touching on developing using the internet skills of blind middle school students?

4. The Research Objectives

- Defining the internet skills that we want to give to the students.
- Knowing the effect of the Designs of screen reader program based on hearing on developing using the internet skills of blind middle school students.
- Knowing the effect of the Designs of screen reader program based on touching on developing using the internet skills of blind middle school students

5. The Research importance

The importance of this research comes from:

- The study treats the difference between senses at connection and which one the blind person prefers.
- Introducing a scientific study for the government institutions and the private sector about the best way for the blind to get experiences and skills.
- The existence of a previous study that proves that learning through hearing is better than learning through touching at using the internet.

6. The Research Limits

- 6-1Objective Limits: the research is limited to only using the internet skills by the pronouncing program (Nvda) through hearing and touching.
- 6-2Time Limits: Second semester – 2014.
- 6-3Place Limits: El-Thoghr middle school (the students of El-Noor classes) – Jeddah.
- 6-4Research Hypothesis:

There is a statistically significant difference at the level of ($\alpha \leq 0.05$) between the average of the performance of the first group after using a screen reader design based on hearing and the second group after using a screen reader design based on touching on improving using the internet skills for the blind students.

7. Research Sample

The research sample consists of blind students from the middle school. The sample has been chosen randomly. The total sample consists of (8) students divided into two groups; each one consists of (4) students;

The first group: the skill is applied on it using screen reader program depends on touching.

The second group: the skill is applied on it using screen reader program depends on healing.

8. Research Methods

This research uses a Semi experimental method: to indicate the effect of the independent variable (Screen reader programs “depends on hearing /touching”) on the following variable (skill performance).

8.1. Method of research designing:

The research used the semi experimental method which depends on two experimental groups as it is indicated at the table (1) of experimental design

Table 1. The experimental design of the research

Display style		
Internet skills	The screen reader program by touching	The screen reader program by hearing
Skill side	Group (1)	Group(2)

8.2. Research Variables:

This research includes the following variables:

Firstly, the independent variables:

- Designing a research reader program depends on hearing.
- Designing a research reader program depends on touching.

Secondly, the following variable the skill performance of using the internet.

8.3. The research Tools

The researchers used an observation card for using the internet skills.

8.4. The research Terms

8.4.1. **Screen Readers:** It is an applicable program that depends on reading the displayed text on the screen and that is by trying to distinguish the contents that are displayed on the screen and the movement of the sound. It depends on techniques of assistive technologies that contain compactable and identical applications and own devices of a rehabilitation service for the blind in addition to containing a specialist treatment to define places and the possibility of choosing and these features make the user perform all those tasks himself (El-Mubarak,1430 AH).

8.4.2. **The Blind:** The blind medically is known as the individual which has a vision for the strongest eye of his eyes of 20/200 feet or less after using the strongest possible lenses or narrowing of the field of vision, that he can only see the light rays which can accommodate in a cone

angle optical head 20 degrees (Abdullah, Hamuda, El-Rashidi, El-Mohammady & El-Naggar, 2009).

On the other hand, it is educationally defined as the individual who has a reduced visual acuity or suffers from vision defect to the extent that it is imperative for the individual to learn using Braille language or through hearing or through Using other methods that do not rely on sight (Abdullah et al., 2009).

8.5. *The research theoretical frame work*

The first axis: screen readers' programs for the blind

The needs of the blind persons differ from one person to another. Some needs Braille, others need speech, others the magnifying copies and others may use more than one way at the same time, and this returns to the degree of severity of disability (Isa & Khalifa,2008). In order to identify the screen reader programs, it is important to know pronunciation machines and assistive devices which the blind deal with and sources of learning and cognition in some detail.

8.6. *The definition of the pronunciation machines*

(Obaid, 2001) defined the pronounced language saying that it refers to that linguistic system that is designed according to the computer system which is quite similar to the normal natural language.

Origins and history:

The project started to work in 1975 at Michigan state university, the American owner of a franchise in a spoken language using the computer. The devise reads the written text in a spoken-heard language by converting the printed materials to pronounced materials; and from the most famous devices Kurzweil and Alersabrai (Obaid, 2001)

8.6.1. *Pronunciation devices and how they work*

Because of the literal knowledge represents a basic tool which the individuals compete with unlike other skills (Isa & Khalifa, 2008).

Because of the blind need for mastering this skill, the pronunciation machines represented practical objectives, where it simulates the human voice by analyzing the pronounced and grammatical text, in addition to the ability of Teaching letters and numbers to be read when executing the software requirement. This technology has enabled the existence of speaking watches and apparatus for measuring pressure, diabetes and calculating machines as used in elevators and other uses (Marzouk, 2010).

(Marzouk, 2010) divided the pronunciation machines into:

- First: Hardware Synthesizer: Internal or external Tools related to the computer, pronounce the incoming texts and releasing them using screen reader programs.
- Second: Software Synthesizers: They are programs that can be installed on the computer or the mobile phone then be emerged within screen readers.

And till the simulated sound reach the blind person it passes with 4 internal processes (Marzouk, 2010):

- The first process: The process of pre-treatment of the text and in this process the software will convert the symbols and abbreviations and numbers to against which the natural human language written by the occasion.
- The second process: the Process of audio coding which simulate natural text with like function of phonetic symbols that refers to it.
- The third process: The activated partition of the text into linguistic and integrated audio units meaning; sentences, phrases and independent linguistic structures.
- The Fourth process: Automatic pronunciation that results from converting the aforementioned language codes to simulate the sounds of the human voice.

8.7. Sources of perception among blind students

Botros (2010) considers that from the sources of perception; the Tactile perception and auditory perception. The tactile perception: is considered very important for the blind because it is an intermediate for the perceptions that the sight performs at the ordinary circumstances, and it is a basic source of information within the scope of the blind touch. The auditory perception: there is no significant evidence that the blind could distinguish the sounds more than the ordinary persons. But the blind depend on the sounds rottenly.

8.7.1. The blind sources of learning

The visual disabilities affected the way through which the blind get the information about the environment around them. This disability also limits there chances of learning and this means that they need to learn some special skills from the teachers and these skills contain:(Botros,2010)

- Efficiencies in the use of computers.
- Reading and writing in Braille skills.

Lindsey (2002) says that the visually disabled became able to interact with computers either through converting the text into speech or through sensible appeared marks of Braille. Hussein (2010) mentioned that the blind could learn through different sources of learning such as; sources depend, on touching and sources depend on hearing.

8.7.2. Designing screen readers for the blind

Screen reader programs differs according to the manufacturer and the existing needs for manufacturing them, but they all agree in that they convert the printed text to a spoken language with taking care of clarity and craft in pronouncing sounds and from the most famous screen reader' programs (Abu-Oun, 2007);

8.8. Research Procedures

8.8.1. First: Identifying the research method, variables, community and sample: The research method:

This research uses a Semi experimental method: to indicate the effect of the independent variable (Two different screen reader programs designs) on the following variable (Internet skill performance).

8.8.1.1. The research variables

This research includes the following variables:

Firstly, the independent variable: It is the effective variable of the study (Abdulhamid, 2008). It is represented in;

- Designing a research reader program depends on hearing.
- Designing a research reader program depends on touching.

Secondly, the following variable: It is the variable which is affected by the independent variable and it is the skill performance of using the internet.

8.8.1.2. The research community and sample

The community: contains all the blind students in the middle school at Jeddah. The research sample has been chosen randomly. The total sample consists of (8) students divided into two groups; each one consists of (4) students as we can see at the table (2);

Table 2. indicates the students separation on the two groups

The Group	The Number of the students
The first group	4
The Second group	4
Total	8

8.8.2. Design

Because the researchers couldn't find a special design for the blind, so chose (ADDIE)(General model for the design of education), because it could be used for any kind of Education Kinds and the easiness of using it in addition to its clarity. The main steps in the model are the following steps:

- The First Phase: Analysis.
- The second phase: Designing.
- The Third phase: Development.
- The Fourth phase: Implementation.

- The Fifth phase: Evaluation.

1. *The First Phase: The Analysis*

Analyzing the content: The researchers analyzed the content of the educational material (the Internet).

2. *The Second Phase: The design*

- *Educational Objectives:*

That the learner recognizes the browser interface.

- The learner be able to control the browser.
- The learner be able to sail in a web site.
- The learner creates an E-mail.
- The learner be able to send a message
- The learner be able to deal with incoming mail.

3. *The Third Phase: Development*

The researchers chose (Nvda) Screen reader to deal with the computer screen for the following considerations:

- The adoption of the program of the Ministry of Education.
- The program is available and free.
- It is Easy to use and apply the program.
- Ease of training learners to use the program.
- The integration of the program with Braille devices.

4. *The Fourth Phase: Implementation*

The researchers downloaded the software on computers, and has been tested by how much the learners have been trained to use the software and learn about the techniques and quoting them in full.

5. *The Fifth Phase: Evaluation*

The researchers in this phase applied the program on an experimental sample of five students to make sure of the validity of the program and its agreement with the Internet. The researchers took the opinions of specialists who previously dealt with the program over the possibility of program compatibility, tools and accessories with the Internet.

8.8.3. Preparing the research tools

An observation card was used. , developed by researchers, it contained (7) main skills and (34) Sub-skills and they were logically arranged while the designing as in table (3).

Table 3. Distributing the paragraphs of the observation card

The main skill	The sub-skill	Paragraphs distribution	Relative Distribution
Identify the browser interface	3	1-3	9%
Controlling and surfing in the browser	4	4-7	12%
Browsing internet sites	6	8-13	18%
E-mail	1	14	1,5%
Create e-mail (Fill in the form)	8	15-22	23,5%
Dealing with e-mail sender	6	23-28	8%
Dealing with incoming mail	6	29-34	18%
The total	34		100%

The Quantification has been used for the observation card that contained three options (mastered the skill- master the skill with help – not mastered the skill) as in table (4).

Table 4. For evaluating the students' degrees at the observation card

The skill	Mastered the skill	Mastered the skill with help	Not mastered the skill
	2	1	0

The observation card has been provided with a key that indicates the meaning of each level by ticking (v) under the suitable level as following:

- Mastered the skill: The student applied the skill by himself.
- Mastered the skill with help: The student applied the skill with the help of the teacher.
- Not mastered the skill: the student couldn't apply the skill.

At the end of the examination the students' degrees at the observation card would be calculated and be judged according to the degrees.

The greatest degree at the card $34 \times 2 = 68$ degrees.

- *verify the sincerity of the observation card:*

The observation card has been offered on a group of experts and specialist educators, the agreement on the card has exceeded the proportion of 80% in each axis of the axes of the card was a small amendments did not go beyond the linguistic spelling errors.

- *The stability of the observation card:*

The researchers used the method of multiple observers per student to measure the reliability coefficient of the observation card has been the applied through the experiment on a sample of students from third grade unlike the main from Ibn Kathir middle school in Jeddah and which fall within the scope of the research community and its students have the same characteristics of the students of the basic sample where the three observers observing the performance of three students each student individually using the equation Cooper.

Agreement coefficient = $((\text{number of times of the agreement} \div (\text{the number of times of the agreement} + \text{the number of times of the differences}))) \times 100$

Table 5. The agreement between the observers

Percentage of the first student	$30 \div (30+4) \times 100$	88%
Percentage of the second student	$27 \div (27+7) \times 100$	79%
Percentage of the third student	$31 \div (31+3) \times 100$	91%
The total percentage	$(88+79+91) \div 3$	86%

The table (4) indicates the agreement percentage between the observers for each student in addition to the total agreement percentage between the observers, since the overall percentage is (86%) means that there is a high percentage of stability.

- *The final image of the observation card*

After making sure of the reliability and validity of observation card has become in its final form consisting amendments proposed by the arbitrators on the card that became consisting of (34) skills;(7) basic skills branched into (34) skill subset and with performance levels which are (mastered the skill) and takes quantification (2) and (mastered the skill with the help)and takes quantification (1) and (not mastered the skill) and takes quantification (0) and thus be final grade (68) degrees.

Steps of research application:

The researchers made many steps to implement the study:

- obtaining administrative approvals for the implementation of the experimental study of the research:
- El-thoghr middle school has been chosen to apply the main study at the third grade students, and the study has been approved from the school administration without the need for official correspondence.
- The pre-implementation of the research tools

Table 6. The test examination

Test	Value
Mann-Whitney- U Test	7,5
Z-test	-0,147
The level of significance (test with two tails)	0,883
The level of significance for the viewer (test with two tails)	0,886

We can notice that from table (3-6) that the level of significance for the viewer equals 0,886 and it is more than ,05 and this refers to that there are no statically significant differences between the students of the two groups at the pre-implementation of the observation card and this refers to Homogeneity and equality of the two groups of research before the experiment.

- The post implementation for the research tools

After the completion of training students in the skills to use the Internet, the researchers measured the impact of training on the two groups using the search tool (observation card) that he applied on the students the following day.

8.9. The research results

8.9.1. First: Testing the validity of research hypothesis

Examining the validity of the following hypothesis:

“There is a statistically significant difference at the level of ($\alpha \leq 0.05$) between the average of the performance of the first group after using a screen reader design based on hearing and the second group after using a screen reader design based on touching on improving using the internet skills for the blind students.”

Where the researchers used Mann-Whitney- U Test for the two small independent groups as in Table (7):

Tabel 7. Independent groups

The Group	Number	Average	Total
First	4	6,50	26
Second	4	2,50	10

Table 8. Mann-Whitney- U Test

Test	Value
Mann-Whitney- U Test	0
Z-test	-2,352
The level of significance (test with two tails)	0,019
The level of significance for the viewer (test with two tails)	0,029

From table (8) that the viewer's level of significance equals 0,029 which is less than ,05 and this refers to that there are statically significant differences between the students of the first group

who use hearing-defendant (Nvda) and the students of the second group who use the touching devices.

8.9.2. Secondly: Results discussion and Interpretation

From the research results, the researchers noticed that there is a statically significant difference at the level of (0.05) between the average degrees of the two groups at using the internet skills for the benefit of the first group that used screen reader program which depends on hearing, and the researchers thinks that this result can be attributed to the main speakers (Speaker Headset) completely isolate students from the surrounding environment and reduce the dispersion process and increase in focus and therefore the results of the study demonstrate the ineffectiveness of touch devices due to the following reasons:

- Focus on the educational process for students to listen and neglect accustom students to the process of writing and reading Braille.
- Provide innovations of modern technology has led to large palaces in the process of reading and writing for the blind, where the spread of such a device (iPhone), for example, limiting it to them.
- Enormous development in the technology of digital audio accessories and brushed their own students towards it.
- Lack of focus on the training of children at an early age to develop the sense of touch and the use of Braille.

This result agreed with the principles of the theory of "information processing", which indicated that education is important to note, attention and cognition, which tightens the learner and reduces dispersion and this is what happened with the sense of hearing.

8.9.3. Thirdly: Recommendations and proposals

- Based on the findings of the current research, we can offer the following recommendations:
- Development of computerized programs for the blind in various fields, which produce them an opportunity to learn and acquire skills that will qualify them to work in various fields of life.
- Development of special Internet sites for the blind and be presented in an easy and suitable way for them.
- Provide the curriculum to a digital copy of the blind could be used by the computer.
- Support training needs centres to provide training opportunities for the blind.
- Distribution of the computer with a spoken program per blind by the state and private sector institutions.

8.9.4. Fourthly: Suggestions

The Study referred to some points that need more search and study That are summarized as following:

- More studies about the effectiveness of hearing and touching upon the blind.
- More studies on the feasibility of the hardware and the development of tactile sense of touch to the blind.
- The effect of specially designed sites for the blind on their attitudes and their education and skills development.

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