Dirasat: *Educational Sciences*, Volume 50, No. 1, 2023

Deanship of Scientific Research

Obstacles to Using Assistive Technology for Students with Visual Impairments in Jordan

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Received: 4/5/2021
Revised: 4/7/2021
Accepted: 27/10/2021
Published: 15/3/2023

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Citation: Alananbeh, N. ., & Asha, E. (2023). Obstacles to Using Assistive Technology for Students with Visual Impairments in Jordan. *Dirasat: Educational Sciences*, *50*(1), 92–101. https://doi.org/10.35516/edu.v50i1.4507

Abstract

Objectives: The study aimed to know the major obstacles that face students with visual impairment when assistive technology is implemented in the Jordanian environment.

Methods: The study sample was chosen randomly from the visually impaired students from Abdullah bin Umm Maktoum School in Jordan, whose number was (50) male and female students. In this study, a quantitative approach was used, where a questionnaire of 21 items was used as the main tool of the study. A validation and reliability check was conducted on the tool. The questionnaire was distributed to the study sample. Subsequently, the Statistical Package for Social Sciences System was used to gather and evaluate the data (SPSS, ver.20).

Results: The results indicated that the obstacle level is medium and that the most important obstacle facing students is time lacking when using assistive devices in the classroom. Other factors play an important role, including parents' poor knowledge of ICT as well as the family's economic situation to purchase such devices.

Conclusion: The study recommended the necessity of communication and coordination between the Ministry of Education regarding training programs offered to families, students, and teachers.

Keywords: Students with visual impairment, assistive technology, obstacles to the use of assistive technology.

معوقات استخدام التكنولوجيا المساعدة للطلبة ذوي الإعاقة البصرية في الأردن

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ملخّص

الأهداف: هدفت هذه الدراسة التعرف إلى أهم معوقات استخدام التكنولوجيا المساعدة للطلبة ذوي الإعاقة البصرية من وجهة نظرهم في الأردن.

المنهجية: تم اختيار العينة بشكل عشوائي من الطلبة ذوي الإعاقة البصرية في مدرسة عبد الله بن أم مكتوم في الأردن ، وبلغ عددهم (50) طالبا وطالبة، تم اعتماد المنهج الكمي حيث تم استخدام استبيان مكون من 21 فقرة كأداة رئيسة للدراسة، وتم التحقق من الصدق والثبات للأداة.. تم توزيع الاستبيان على عينة الدراسة. تم استخدام الحزمة الإحصائية لنظام العلوم الاجتماعية لجمع وتقييم البيانات (سبس ، نسخة.20) .

النتائج: أظهرت النتائج أن مستوى المعيقات كان متوسطا، وأن أهم المعوقات التي تواجه الطلبة تتعلق بقصور الوقت عند استخدام الأجهزة المساعدة في الفصل الدراسي، كما أن هنالك عوامل أخرى تلعب دورًا مهمًا بما في ذلك ضعف معرفة الوالدين بتكنولوجيا المعلومات والاتصالات، وكذلك الوضع الاقتصادي للأسرة لشراء مثل هذه الأجهزة.

خلاصة الدراسة: أوصت الدراسة بضرورة التواصل والتنسيق بين وزارة التربية والتعليم فيما يتعلق بالبرامج التدريبية المقدمة للأسر، والطلبة، والمعلمين.

الكلمات الدالة :الطلبة ذوي الإعاقة البصرية، التكنولوجيا المساعدة، معوقات استخدام التكنولوجيا المساعدة.

Introduction

Life is witnessing rapid development and advancement in assistive technology in all life aspects that have an impact on how individuals perform various tasks in their daily lives, also individuals' future success and achieving the desired independence may depend on their ability to use assistive technology.

Disability is considered a global health concern regardless of the affected individuals' age. People with disabilities are generally denied their rights to education, employment, and participation in social and cultural events or are neglected. The World Health Report on Disability (2011) identifies assistive technology as an important intervention to improve job performance, independent life, and life quality for people with disabilities. (World Health Organization, 2011). At the global level, there are about (285) million people with visual impairment in the world, and more than 70% of these live-in developing countries (World Health Organization, 2014)

More than (1) billion people with disabilities need assistive technology, but only (10%) have access to assistive technology. To address the gap between needs and provision; The World Health Organization launched the Global Cooperation on Assistive Technology (GATE) in (2014) and identified (50) priority assistive products (WHO, 2016).

Fuglerud (2011) emphasized that the ability to use technology; can make a huge difference in the lives of individuals with visual impairment, improve educational and work opportunities, enhance social life, and facilitate independence.

Unfortunately, schools and public institutions nationwide may not provide access to the curriculum required for students with visual impairment to succeed, although assistive technology must be considered by the Individualized Education Program (IEP) team for all students with disabilities under the Individuals with Disabilities Education Act (IDEA), also it should be provided and supported by educational institutions when necessary; To ensure that students with disabilities have the necessary tools to access and participate fully in the curriculum, with the greatest possible independence level (Tebo, n.d.).

Additionally, many students with visual impairment have not yet benefited from assistive technology use even though the assistive technology market is booming with devices and software that make the visual world more accessible to individuals with visual impairment. A survey of assistive technology use by visual impairment primary and secondary school students in Illinois showed that these students do not receive the expertise they need with assistive technology (Kell, 2009).

Despite assistive technology benefits, there is evidence that developing countries children are not able to access it, and students with disabilities success in assistive technology are directly related to special education teachers' knowledge, skills, and attitudes (Michaels & McDermott, 2003 P: 29). Also, teacher's knowledge lack about assistive technology is a barrier to its availability, and students with disabilities who can use assistive technology cannot realize the benefits unless teachers can integrate assistive technology into their educational practices. Teachers must be aware of assistive technology use devices and the benefits that can be provided. Research indicates that teachers have limited opportunities at pre-service and in-service levels to gain the needed knowledge to train students on assistive technology for students with disabilities (Bausch, Ault, Evmenova & Behrmann, 2008).

One of the obstacles facing people with visual impairment is that the assistive technology device or service is incorrect or when there is no incentive to use assistive technology (Scherer & Craddock, 2002). Assistive technology effectiveness combined with the rapid explosion of assistive technology devices is an obstructive to assistive technology's effective use by students with disabilities (Jacobsen, 2012).

Previously, we found that there are a set of obstacles and challenges that face students with visual impairment.

Although Jordan was one of the first countries to ratify the Convention on Rights of Persons with Disabilities (CRPD) Where the Jordanian Law(31) was issued on persons with disabilities rights, which recognizes the need to access assistive technology as a human right, this law application is complicated because of cultural, family, social and political forces in Jordan, also assistive technology use as an ethical practice is particularly important; Because it represents a recent trend in Jordanian education, but many obstacles prevent this technology from being used effectively, such as the current practice in teacher training, low levels of awareness, and economic conditions (Al-Zboon, 2017, 2019; UN, 2017), therefore, it is important to obtain information about most important obstacles to assistive technology use for students with visual impairments in the Jordanian environment.

Study Objective

Knowing the most important obstacles that face students with visual impairment when assistive technology use in the Jordanian environment through the following research question: What are the most important obstacles when assistive technology use for students with visual impairment in the Jordan?

Terminology

Students with visual impairment: The students who have lost the ability to use the sense of sight effectively, which negatively affects their performance and growth, and they need special education because of their visual problems, which requires special modifications to teaching methods and curricula to be able to succeed educationally (ALHadidi, 2015)

Procedurally: the students who have lost their visual ability or who have great difficulties in seeing and rely on other senses to obtain information as evidenced in their medical file and enrolled in Abdullah bin Umm Maktoum School of the Ministry of Education in Jordan.

An assistive technology device is any piece of equipment or product system, whether obtained commercially, modified, or customized. Which are used to increase, maintain, or improve the functional capabilities of individuals with disabilities. Assistive technology service includes any service that directly assists a child with a disability in selecting, acquiring, or using an assistive technology device (Hume, 2011).

Assistive technology is defined procedurally by the degree that students with visual impairment obtain as a result of their responses to the items on the scale of the level of obstacles to using assistive technology.

General Background

Technology is being developed at an amazingly fast pace in the world today and it has created many opportunities for its users. Students with disabilities are one of user's groups taking advantage of the opportunities provided by this technological explosion (Jacobsen, 2012). An assistive technology device is any piece of equipment or product system, whether obtained commercially, modified, or customized. Which are used to increase, maintain, or improve the functional capabilities of individuals with disabilities. Assistive technology service includes any service that directly assists a child with a disability in selecting, acquiring, or using an assistive technology device (Hume, 2011).

Technology goal is to improve human lives. Visually impaired people are no different and need to use assistive technology (AT) to compensate for their vision loss (Smith, Gemschat, & Huebner. 2004)

Students with visual impairment are considered a vulnerable group that needs assistive techniques to compensate for their functional limitations in order to gain independence (Inico & Prabakaran, 2018)

Current assistive technologies such as electronic braille note-taking software and screen readers such as JAWS for Windows have greatly supported students with visual impairments to overcoming their disabilities, integrating into regular school, and achieving better educational performance (Reiser & Dempsey, 2012; Erdem, 2017)

For many students with disabilities, assistive technology use is a necessary condition (DePountis, Pogrund, Griffin-Shirley, & Lan, 2015). Especially that some of the technology that people with visual impairment use consists of hardware and software including screen readers, screen amplifiers, closed circuit televisions, electronic amplifiers, scanners, refresh-able handheld optical character reader, braille displays, digital and electronic data, digital readers, and cell phones that can be accessed. Regardless of devices diversity, assistive technology power as an enabler in students with disabilities lives is unambiguously mentioned in the literature (Abner & Lahm, 2002; Alper & Raharinirina, 2006; Wong & Tan, 2012)

In (2004) the Technology Assistance Act (1988) was re-approved with promoting awareness and access to assistive technology use aims (Okolo & Diedrich, 2014. As a result of the Technology Assistance to Persons with Disabilities Act passage, the general education curriculum has become available to students with disabilities, where technology law has been critical for students with disabilities; because it provided the first definitions of assistive technology devices and services that are still in legislation today. These definitions and funding provided in the Technology Act gave students with disabilities opportunities to use assistive technology devices and services that lead to students' accessibility, inclusion, independence, academic skills, and life quality (Jacobsen, 2012).

Also, law provisions on technology were also enshrined in the passage of Individuals with Disabilities Education

Improvement Act (IDEIA) (2004). Which requires all public schools to provide all students with special education and related services, also assistive technology incorporation into individualized education has enabled IEP programs to enable students with disabilities to overcome limitations in the classroom in order to gain independence, assistive technologies available in the school system for all grades K-12 (Reiser & Dempsey, 2012; Okolo & Diedrich, 2014). Despite this statute, students with visual impairment cannot access the various assistive technologies available in Braille or large print (Inico & Prabakaran, 2018).

Despite of these assistive technologies' availability and their potential impact on students with visual impairment, research findings indicates that students with visual impairment do not have access to assistive technologies needed for their educational needs and that assistive technology is underutilized and poorly integrated into individual education plans (Inico & Prabakaran, 2018; Okolo & Diedrich, 2014). In addition, lack of school resources, access to service, support and collaboration networks often affects access to assistive technology in the classroom (DePountis, Pogrund, Griffin-Shirley, & Lan, 2015).

In Jordan, most students with visual impairment are registered in special day schools, where national curriculum is taught alongside complementary curricula including orientation and mobility, reading and writing in Braille, visual devices use, and self-management. According to the Jordanian Department of Statistics (2015), about 6% (6.4% of males, 5.6% of females) of the population over (5) years age suffer from visual impairment, which is the highest percentage among disabilities. Jordan faces many barriers in improving programs for students with visual impairment including ineffective supervision, insufficient funding, curriculum and teaching materials lack, assessment tools, and lack of strong partnerships with families (Al-Rousan, 2013).

The current vision for Jordanian education was published by the Jordanian Ministry of Education in (2008) and led to an educational reform program launch based on the effective application of modern technology (Ministry of Education, 2013). However, there are still some challenges to be faced in putting the program into practice.

Few studies have dealt with the assistive technology use by people with visual impairment, as many have written on this topic; Most agree that assistive technology is essential for the visually impaired to be full participants in a technology community, and many barriers obstruct access to equipment and training (Lewis & Edwards, 1998).

In Al-Zboon (2020) study, which examined perceptions of assistive technology from the point of view of students with visual impairment teachers, the results indicated that there are a set of challenges that teachers faced in assistive technology use with their students such as computer use, a child's willingness to use a particular device, lack of both technologies and training in schools and at home, community situations, family support and funding.

Adzei-Stonnes (2019) study examined assistive technology use obstacles for students with visual impairment in teaching process. The results indicated that there is a lack in teacher's practical training on assistive technology tools before and during service, and that there is a need for professional development, as well as funding lack for students with visual impairment schools.

Pradhan (2018) study also indicated that there are schools teach visually impaired students in West Bengal that have faced obstacles in assistive technology use such as: lack of assistive technology funding and qualified faculty members to train on it, in addition, students with visual impairment did not receive adequate training in the use of assistive technology.

As Segers (2014) indicated in his study, which examined the effects of in-service teacher training on the assistive technology use for students with visual impairment with their students' access level and use of assistive technology. As its results indicated that one of the important obstacles is that teachers are not confident enough of their skills in assistive technology use, and therefor they do not promote its use with their visually impaired students.

Wong & Cohen (2011) investigated the obstacles and challenges facing the assistive technologies used by students with visual impairments in Singapore in private school context. Results concluded content limited knowledge among teachers in assistive technology leading to inconsistencies and insufficient educational progress.

The results of Al-Khatib's study (2010) conducted in the Kingdom of Saudi Arabia and examined the most prominent difficulties facing the assistive technology use for students with visual impairment indicated that these devices high cost,

the difficulty in obtaining them, and their maintenance, in addition to financial allocations lack are the most important obstacles to assistive technology use.

As for Abu Hawash (2008), he discussed the most important obstacles that students with disabilities face in assistive technology use in Jordan from the teachers' point of view. It was found that there is a necessary funding lack, as well as a training shortage for families in assistive technology use.

In the Lewis and Edwards Study of Assistive Technology Use in Florida, the purpose of which was to determine assistive technology use level among students with visual impairment (K-12) in (Illinois), more than half of students with visual impairment teachers who participated mentioned that they found pre-service courses in assistive technology useful and admitted that they were not familiar with many of the devices mentioned in the survey and had difficulty obtaining necessary training to teach students to use the devices (Lewis & Edwards. 1998)

In light of above, the two researchers see that most important thing that distinguishes this study from previous studies is that it investigated most important obstacles of assistive technology use facing students with visual impairment from themselves viewpoint, which is important to know because these students who will face these obstacles and they will challenge them, so it was necessary to identify most important obstacles from their point of view. However, previous studies examined these obstacles only from teachers 'point of view.

Methodology

The two researchers used the descriptive approach to scale obstacles level of assistive technology use from students with visual impairment viewpoint.

Study population

The study population was determined from students with visual impairment attending Abdullah bin Umm Maktoum School, which is affiliated with the Ministry of Education in Jordan which their number is (310) male and female students, (113) males and (197) females from basic education stage to secondary stage in the academic year 2020/2021.

Study Sample:

Study sample consisted of (50) male and female students with visual impairment enrolled in Abdullah bin Umm Maktoum School in the Hashemite Kingdom of Jordan, who ranged in age from 14 years and to 17 years, and who were randomly selected from primary, upper, and secondary stages. The following table (1) indicated to the sample members.

Table 1: Sample individuals' distribution (Students with visual impairment)

Males	20
Females	30
Total	50

Procedure

Several steps were taken to conduct this study. First, the necessary permissions were obtained to conduct the study. Second, the study population was identified as male and female students with visual impairment enrolled in Abdullah bin Umm Maktoum School in the Hashemite Kingdom of Jordan. Third, the questionnaire was prepared, and its validity and reliability were extracted. Fourth, the questionnaire was personally distributed to the study sample; 50 questionnaires were returned, which is valid for statistical analysis. Fifth, the data were collected and analyzed using the Statistical Package for Social Sciences System (SPSS, ver.20). Finally, the results of the study were extracted and discussed, and a set of recommendations were proposed.

Instruments

Scale of Assistive Technology Use Obstacles

The researchers developed a scale to know the level of assistive technology use obstacles from students with visual impairment viewpoint, the tool was based on a number of scales and theoretical literature in (Abu Hawash, 2008), (Adzei-Stonnes, 2019) and (Sejan, Foster & Bsearan, 2020).

Virtual Honesty Signs

Scale Virtual validity and dimensions were verified; by presenting it to a (10) arbitrators' group with experience and competence in the special education field in several Arab universities, in order to express their views on scale content accuracy and correctness in terms of: paragraphs clarity, linguistic wording, their relevance to scale what they were set for, and adding, modifying or deleting what they deem appropriate on the paragraph's dimensions. In light of their observations, some paragraphs linguistic wording has been modified.

Structure Validity Indicators:

In order to verify structure validity indicators, the scale was applied on an exploratory sample of Abdullah bin Umm Maktoum School students from outside target study sample. Structure validity indicators were calculated using Pearson correlation coefficient. To find paragraph correlation coefficient values with scale total degree, and this is shown in Table (2)

Table 2: correlation coefficients values between scale paragraphs of assistive technology use obstacles

1	0.40 *
2	0.52*
3	0.39*
4	0.47*
5	0.56*
6	0.43*
7	0.52*
8	0.54*
9	0.53*
10	0.44*
11	0.48*
12	0.51*
13	0.48*
14	0.57*
15	0.51*
16	0.61*
17	0.53*
18	0.57*
19	0.61*
20	0.51*
21	0.44*

*Statistical function at (0.05) Level.

Table (2) indicated that paragraphs correlation coefficients values (0.39 - 0.61) with the scale total score. All these items were statistically significant at (0.05) level, as noted from previous structure validity indicators; that all the items had a correlation coefficient with the scale overall score higher than (0.30), a criterion was adopted to accept the paragraph that its correlation coefficient is not less than (0.30), and thus all the scale paragraphs were accepted.

Stability scale of assistive technology use obstacles

To assess the internal consistency stability of the scale of assistive technology use obstacles level, it was calculated using Cronbach's Alpha equation on the first application data of the survey sample of 15 male and female students with visual impairment outside the study sample, In order to verify the return stability of the scale and its dimensions; The scale was re-applied on the previous sample, using Test-Retest method, with two weeks' time difference between first and

second applications, then it was calculated using Pearson correlation coefficient between first and second applications on the sample, as indicated in Table (3).

Table 3: Pearson Correlation Coefficient Values and stability coefficients values of internal consistency (Cronbach alpha).

The dimension	Pearson Correlation Coefficient	Value of Cronbach stability coefficient-alpha
Assistive technology use obstacles	0.80	0.87

Table (3) indicated that correlation coefficients values between first and second application of overall scale is (0.80). When the stability coefficient value of internal consistency of overall scale of assistive technology use obstacles of sons was (0.87). As these values are a good indication of dimensions consistency and scale as a whole.

Scale Correction

The scale consists of (21) items according to Likert's five-point scale, including the following alternatives: (Very obstructive, when scale correcting, it is given 4 degrees, obstructive given 3 degrees, medium obstructive given two degrees, small obstructive given a degree, and not obstructive, given a zero score). To determine obstacles level of technology use in the study sample; their responses are categorized into three levels, as follows in table 4.

Table 4: Scale correction

Obstructive Level	Means category
Less than 2	Low
From 2-3	Medium
Greater than 3	High

Results and disscusion

Findings related to the study question "What are the most important obstacles to assistive technology use for students with visual impairment in the Jordanian environment?" To answer the question means were calculated, as Table (5) indicated.

Table 5: Means of Assistive Technology Use Obstacles for Students with Visual Impairment

Rank	Number	Paragraph	Mean	Level
1	**8**	No enough time to use utilities in the classroom	2.74	Medium
2	**18**	My parents don't have the basics of assistive devices use	2.72	Medium
3	**21**	My family cannot purchase assistive devices for my own use	2.66	Medium
4	**20**	The school has assistive devices but cannot access them	2.60	Medium
5	**9**	Training programs lack sufficient expertise in assistive technology	2.58	Medium
6	**10**	Lack of specialized equipment training to meet my needs	2.56	Medium
7	**7**	The duration of hands-on training in assistive technology program is insufficient	2.48	Medium
8	**5**	Not carrying out a technology evaluation for me to determine which technological tools would suit my need	2.26	Medium
9	**11**	I lack responsibility in learning how to use assistive devices	2.26	Medium
10	**3**	The teacher has little time to teach me assistive technology use	2.20	Medium
11	**2**	The teacher does not have confidence and effectiveness in assistive technology use	2.16	Medium
12	**14**	Assistive devices that meet my needs are not available in the school	1.96	Low
13	**1**	Teachers' knowledge lack of assistive technology use	1.92	Low

Rank	Number	Paragraph	Mean	Level
14	**13**	Assistive devices that meet my needs are not available at home	1.86	Low
15	**6**	The school hasn't various training programs on how to use assistive technology	1.84	Low
16	**4**	The teacher is not up to date with developments in assistive technology field	1.82	Low
17	**12**	I feel shy to use assistive devices	1.64	Low
18	**17**	My parents are not followed up my progress in assistive devices use	1.64	Low
19	**15**	My family does not encourage me to use assistive devices	1.62	Low
20	**19**	I feel fear and discomfort when using assistive devices	1.30	Low
21	**16**	My family is not helping me keep assistive devices in a safe place	1.28	Low
Overall mean		2.10		Medium

The results indicate that obstacles level as a whole was medium. And most important obstacles were time insufficiency when using assistive devices in their classroom which ranked first. Followed by parents' lack of basics knowledge of using assistive devices in second place, and family does not have the ability to purchase assistive devices for private use ranked third.

Conclusion

The results indicated that the level of the obstacles in general was medium. The greatest challenge was the insufficient time to use assistive devices in the classroom, which ranked first. The researchers believe that the teacher adheres to the time allotted to him by the school authorities, and the Ministry of Education's instructions to finish the curriculum in a specific time, so students need more time allocated. Therefore, students need more time.

As for the paragraph "Parents not knowing the basics of using assistive devices," which was ranked second, in addition to paragraph "the family does not have the ability to purchase assistive devices for private use" was ranked third. The researchers believe that this result agrees with the study of Al-Zboon (2020) and Abu Hawash (2008) and Al-Khatib (2010), which discussed assistive technology use obstacles from teachers' point of view. This result is logical and can be explained by the contextual conditions in Jordan, where the economy is weakening due to the global crisis, political instability in other countries in the region and the refugee influx. The economic situation affects educational programs financing, especially special education programs, which are included in the training of students with disabilities families. This is also confirmed by Al-Zboon's (2020) study that there is a lack of training at home, which may in turn affect assistive technology use in Jordan, note that the main requirement for assistive technology use in schools is sufficient tools for every student. This is what Al-Rousan (2013) emphasized in his reference to the obstacles that prevent students with visual impairment from assistive technology use in terms of ineffective supervision, insufficient funding, lack of curricula and educational materials, evaluation tools, and strong partnerships with families lack.

The results of previous studies (Adzei-Stonnes, 2019; Pradhan, 2018; Segers, 2014 Wong & Cohen, 2011; Lewis & Edwards's, 1998) indicated that the most important obstacles facing visually impaired people to use assistive technology from the teachers' point of view, is teacher's lack of knowledge in assistive technology use. This study was limited to Abdullah bin Maktoum School students in the capital, Amman. Students with visual impairment may be able to gain a better understanding of assistive technology use by expanding the search nationwide. The study recommend communication and coordination necessity between The Ministry of Education regarding the training programs provided to families, students, and teachers. Additionally, preparing research and proposals for using technology to develop students' performance. Moreover, increasing practical training quotas for the assistive technology use by the Ministry of Education for students with visual impairment.

The present study can act as a baseline for future studies on assistive technology for students with visual impairments, which could examine the different findings of this study such as exposure to bullying, abuse, and extremism; and family support for assistive technology training via self-reported tools or becoming addicted to an assistive technology device**.**

Conflict of interests

The authors declare that they have no conflict of interest

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

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