Influence of Assistive Technology on the Educational Achievements of Students with Visual Impairment in Post-secondary education

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Abstract

This study explored the influence of technology designed for the assistance of students with visual disabilities on their educational journey in post-secondary education. The research used a quantitative research approach, gathering information on forty students with VI who engaged in tertiary-level studies, collected through a convenience sample. The data was illustrated by a Likert-scale survey reviewed by two researchers for construct validity. The findings showed statistically significant support for the key role of technology designed for the assistance of individuals with disabilities in regard to areas related to their educational journeys, including: performance; confidence; access to digital reading materials and involvement in both academic and non-academic co-curriculars. Students reported challenges they faced with the educational experiences, however, with regards to: difficulty with studying independently; inconsistency with institutional accommodations and post-secondary education systems unique to post-secondary education; and barriers for effectively using technology designed for the assistance of individuals with disabilities. Overall, the research findings indicate that technology designed for the assistance of individuals with visual disabilities are necessary not only for consideration for educational processes but also as impetus for improved institutional supports and access practices in post-secondary education.

Introduction

AT is now a fundamental part of an inclusive educational experience in post-secondary education, especially for students with VI who may face barriers to accessing instructional content. As more postsecondary institutions adopt online learning platforms, the availability and use of reliable AT supports, including screen readers, Braille displays, magnification, audio books, and navigational technologies, will all help to shape the students' academic experience. Academic success in post-secondary education includes unique and measurable learning outcomes in learning environments based on grades, assessments, course-based activity completion, and student overall progress through a program of study. Conversely, AT can be described as any device, software, or system that enhances a person's functional capacity and promotes independent learning for people with disabilities.

The impact of AT on academic success becomes more meaningful for the postsecondary student with visual impairment, especially in post-secondary education contexts, because of the required cognizance of reading extensively, conducting research independently, and becoming digit literate. If appropriately utilized, assistive technologies can lessen barriers associated with information access, promote comprehension, and allow students to fully partake in the experiences of classroom interaction. Comparing students who do fairly obtain access to AT tools and those who do not fair access to assistive tools, some research states that students with access to proper assistive tools stimulate more confidence, manage time effectively, and achieve at a higher academic level than their peers without assistive tools. However, the variation in the institution training of the student, availability of the assistive tools and support from the institution can impact the degree that the assistive tools contribute to academic outcomes.

This is important for educators, policymakers, and support disability services that have a vested interest in creating equity in learning environments to understand. In our effort to understand how AT contributes to the educational achievements of students with visual disabilities, we understand the educational contribution of it; we also understand that a bigger institutional commitment exists that is necessary to enable and foster accessibility and inclusion.

AT is necessary for the academic progress of any student as well as student with visual impairment. Students with VI learn more by using AT and improve their educational achievements at any academic level especially at post-secondary education level. They require appropriate guidance from their educators in the utilization of assistive technologies for their academic endeavors. It is predicated on the perceptions of students with VI toward AT. The purpose of the study is to inspect the role of AT in the educational achievements of students with VI at the post-secondary education level. AT allow student to develop skills, engage them in learning environment and help them to function independently.

Literature Review

Students with VI who are successful in post-secondary education must overcome a significant number of challenges and obstacles in their academic and social lives throughout their lives. As a result of overcoming various challenges, kids acquire the abilities essential to satisfy the academic and social requirements. For example, pupils will obtain textual material in an accessible language, as stated by VIion & Cole-Hamilton (2000) and Oppenheim & Harris (2003).

As to RNIB (2002), pupils who are visually impaired constitute 47% of the student population that does not obtain materials in this manner. Conventional schools typically segregate impaired kids from their peers, prompting parents of children with disabilities to enroll them in institutions tailored for special needs education. Research indicates that those who are blind or visually challenged who attend traditional institutions often experience marginalization rather than empowerment.

When talking about education, "successfully completing a level" means that the student has accomplished all of the learning goals for that level, which is often recognized by the evaluation of the student's gained knowledge, abilities, and competences. The quantity of knowledge that has been gained by a student is measured in terms of their "attainment" as well as "achievement," which are both terms that are often employed by instructors. When making a judgment, it is often required to determine the degree of abilities possessed at a certain moment in time. The performance of the pupils is assessed by the teachers in order to determine whether or not they have, in fact, achieved the appropriate skill levels. People are likely to become confused as a result of the substantial amount of overlap that exists between the concepts of accomplishment and attainment, which in turn leads to the two concepts being used synonymously.

A student's overall academic performance may be deduced nearly exclusively from their grades (either by course or assignment) and grade point average. This should not come as a surprise given that grades and grade point averages are the measurements that are the most easily accessible for institutions that statisticians use to refer to an individual's highest level of education that they have finished. To be successful in school requires a variety of abilities, including organization, time management, prioritizing, attention, and motivation.

AT refers to any equipment, gadget, or instrument employed to augment, sustain, or increase the functioning skills of individuals with impairments. AT, commonly referred to as AT, significantly facilitates the learning process for those requiring support (WHO, 2022).

According to Bales and Sangra (2011), one of the most significant obstacles that stands in the way of creative applications of technology in post-secondary education is the widespread absence of a comprehensive strategy for the development of technological infrastructure. Even while administrators and faculty construct a broad strategy for using technology in instructional or administrative work, they often do not concentrate on ensuring that the organisation has the fundamental infrastructure necessary to employ the technology. This may be problematic for the organization.

An individual with a visual impairment can do a task with the assistance of AT, while a person without a disability may complete the work with greater ease thanks to technological advancements. Our educational institutions have been put to the test by the rising number of students with disabilities enrolling in their programmes. These students need chances to engage in post-secondary education and must have access to AT as well as teaching that is universally intended. The obligation of ensuring that accessible learning environments are provided lies not only with disability services but also with information technology and the teaching staff. Students in post-secondary education often find themselves in settings where they are subjected to unfavorable attitudes and are required to be their own advocates for essential support services in order to ensure access to educational opportunities. Recent developments, such as universal design in teaching, mandatory online accessibility, numerous technologies for universal accessibility of learning tools, e-learning, and chances for professional development of teachers and staff, show promise for reducing these hurdles (Bales & Sangra, 2011).

Study Objectives

The study was undertaken to accomplish the below objectives.

1. To examine the challenges encountered by students with VI in post-secondary education.
2. To acknowledge the significance of AT in the education of students with VI at the tertiary level.
3. To examine the barriers to students with VI during their education when using AT.
4. To investigate the educators perspective of AT in the education of post-secondary education students with VI.

Research Questions

1. What challenges do students with VI face in post-secondary education?
2. What is the importance of AT in the education of students with VI in post-secondary education?
3. What type of barriers do students with VI face while using AT in the learning experience?
4. What is the educator's perspective of AT in the education of post-secondary education students with VI?

Research Methodology

The research design utilized was quantitative in methodology and data collection was done through a questionnaire. Questionnaires were used by the researchers. The population consisted of both female and male students that had visual impairment and were enrolled in higher learning institutions in the Punjab province. The sample contained 40 students with visual disabilities and who were enrolled in higher institutions of learning in the Punjab province. A sampling method was used to collect data. The instrument was developed as a self-made questionnaire. The instrument was composed of 22 items. The instrument contained two sections. The first section of the instrument contained demographic information including the name of the participant, their age, gender, college or institution, degree program, and level of

their disability. The questionnaire contained several items related to AT and influence on educational achievement of students who were visually impaired in post-secondary education. The Likert-type scale was composed of five responses: strongly agree, agree, neutral, disagree, and strongly disagree. The researchers afterward utilized the research tool to collect relevant data from 40 students with VI who are studying at post-secondary educational institutions in the province of Punjab, to investigate the role of AT in the educational outcomes of tertiary students with VI. Prior to administering the research tool, the researchers consulted two field specialists to explore the content validity of the research tool. Both-degree specialists deemed the self-designed questionnaire research tool appropriate and a valid tool for the purpose of the study. Data was collected using a survey with students with VI who study at post-secondary educational institutions in the Punjab Province. The participants' responses were converted to a numerical data set using version 21 of the Statistical Package for the Social Sciences (SPSS); furthermore, the response data was displayed in percentage format as well as in table format. A descriptive data analysis was completed for the data analysis.

Data Analysis

The study results included really mean values, independent t-tests, standard deviations, frequencies, and percentages to investigate the effect of AT on the educational outcomes of the post-secondary education students with VI. The results offer the data reported after conducting the statistical analyses utilizing SPSS version 21.0.

Table 1

Frequency and percentage of respondent by gender

Gender	F	%	CP
Male	22	55 %	53 %
Female	18	45 %	100 %
Total	40	100%	

Table no 1 showed that 55 % sample belong to male and 45 % sample of female of person with low vision and totally blind.

Table 2

Frequency and percentage of respondent by age

Age	F	%	CP
20-25	28	70 %	70%
26-30	12	30%	100%
Total	40	100%	

Table no 2 showed that 70% sample belongs to age group 20-25 and 30% sample belong to age group 26-30.

Table 3

Frequency and percentage of respondent by Graduate, Master and M Phil with visually impaired Males and females.

Grade	F	%	CP
Graduate	18	45	45
Master/BS	16	40	85
M. Phil	6	15	100
Total	50	100	

Table of 3 showed that 45% sample of Graduate and 40 % sample of Master/BS and 15% sample of MPhil.

Table 4

Frequency and percentage of respondent by level of impairment of low vision and totally blind.

Level of Impairment	F	%	CP
Low Vision	21	52.5	52.5
Totally Blind	19	47.5	100
Total	40	100	

Table 4 showed that 52.5% sample of our research both males and females belongs to low vision, 47.5% sample of our research males and females belongs to totally blind.

Table no. 5

Frequency and percentage of students regarding item: Do you think that AT is helpful in improving academic achievement of students with VI at post-secondary education level?

Responses	F	%	CP
Strongly disagree	1	2.5	2.5
Disagree	3	7.5	10
Neutral	2	5	15
Agree	12	30	45
Strongly Agree	22	55	100
Total	40	100	

Table 5 showed that 2.5 % respondents strongly disagree on that statement AT is helpful in improving academic achievement of students with VI at post-secondary education level. 7.5 % respondents disagree on that statement, 5% respondent remains neutral about that statement, 30% respondent agree on that statement, 55% respondent are strongly agree on that statement.

Table 6

Frequency and percentage of students regarding item: Do you agree IT based AT make the websites and E-text accessible for students with VI?

Responses	F	%	CP

Disagree	3	7.5	7.5
Neutral	7	17.5	25
Agree	23	57.5	82.5
Strongly Agree	7	17.5	100
Total	40	100	

Table 6 showed that 7.5 % respondents disagree with this point of view that IT based AT make the websites and E-text accessible for students with VI. 17.5% respondents remains neutral about that statement and 57.5% respondents agree on that statement, 17.5% respondents are strongly agree on that statement.

Table 7

Frequency and percentage of respondents regarding item: Do you think that you can study independently by using AT?

Responses	F	%	CP
Disagree	3	36	36
Neutral	7	2	92
Agree	21	6	98
Strongly agree	9	2	100
Total	40	100	

Table 7 showed that 36% respondents are disagree with this point of view you can study independently by using AT, 2 % respondent remains neutral about that statement, 6% respondents agree on that statement, 2% respondents are strongly agree on that statement.

Table 8

Frequency and percentage of respondents regarding item: Can you make your assignments easily and independently on laptop/desktop?

Responses	F	%	CP
Strongly disagree	1	2.5	2.5
Disagree	5	12.5	15
Neutral	4	10	25
Agree	21	52.5	77.5
Strongly agree	9	22.5	100
Total	40	100	

Table 8 showed that 2.5% respondents are strongly disagree on that statement making your Assignments easily and independently on laptop/desktop , 12.5 % respondent disagree on that statement, 10 % respondents remain neutral about that statement, 52.5% respondents are agree on that statement and 22.5% respondents are strongly agree on that statement.

Table 9

Frequency and percentage of respondents regarding item: In your opinion that AT make you more confident while learning?

Responses	F	%	CP
Disagree	1	2.5	2.5
Neutral	3	7.5	10
Agree	24	60	70
Strongly agree	12	30	100
Total	40	100	

This table showed that 2.5% respondents are disagree with this statement AT make you more confident while learning. 7.5% respondents are remains neutral about that statement, 60% respondents are agree on that statement, 12% respondents are strongly agree on that statement.

Table 10

Frequency and percentage of students regarding item: Are you satisfied with educational facilities and assistive devices which are available for you in your post-secondary educational institutes?

Responses	F	%	CP
Strongly disagree	6	15	15
Disagree	11	27.5	42.5
Neutral	8	20	62.5
Agree	10	25	87.5
Strongly agree	5	12.5	100
Total	40	100	

Table 10 showed that 15% respondents are strongly disagree with that statement educational facilities and assistive devices which are available for you in your post-secondary educational institutes , 27.5% respondents are disagree on that statement, 20% respondents are remain neutral , and 25% respondents are agree on that statement, 12.5% respondent are strongly agree on that statement.

Table 11

Frequency and percentage of students regarding item: Do you think that AT is helpful for academic assessment of students with VI at post-secondary education level?

Responses	F	%	CP
Disagree	3	7.5	7.5
Neutral	6	15	25.5
Agree	24	60	82.5
Strongly agree	7	17.5	100
Total	40	100	

Table 11 showed that 7.5% students are disagree with that statement AT is helpful for academic assessment of students with VI at post-secondary education level, 15% students are remains neutral about that statement, 60% students are agree and 17.5% students are strongly agree on that statement.

Table 12

Frequency and percentage of students regarding item: Do you think that you can attempt your paper on laptop easily and independently?

Responses	F	%	CP
Strongly disagree	1	2.5	2.5
Disagree	5	12.5	15
Neutral	7	17.5	32.5
Agree	16	40	72.5
Strongly agree	11	27.5	100
Total	40	100	

Table 12 showed that 2.5% respondents are strongly disagree with this point of view you can attempt your paper on laptop easily and independently , 12.5% students are disagree on that statement, 17.5% students are remains neutral about that statement, 40% students are agree on that statement and 27.5% students are strongly disagree on that statement.

Table 13

Frequency and percentage of students regarding item: Do agree that students with VI need extra time during attempting test/ paper on laptop?

Responses	F	%	CP
Strongly disagree	1	2.5	2.5
Disagree	3	7.5	10
Neutral	4	10	20
Agree	14	35	55
Strongly agree	18	45	100
Total	40	100	

Table 13 showed that 2.5% respondents are strongly disagree with this point of view students with VI need extra time during attempting test/ paper on laptop ,7.5% students are disagree and 10% students are remain neutral about that statement, 35% respondent are agree on that statement, 45% respondent are strongly agree on that statement.

Table 14

Frequency and percentage of students regarding item: Do you think that AT is helpful in curriculum adaptation for higher classes?

Responses	F	%	CP
Strongly disagree	1	2.5	2.5
Disagree	1	2.5	5
Neutral	3	7.5	12.5
Agree	27	67.5	80
Strongly agree	8	20	100
Total	40	100	

Table 14 showed that 2.5% respondents are strongly disagree on that statement AT is helpful in curriculum adaptation for higher classes, 2.5% students are disagree on that statement, 7.5% students are remains neutral about that statement and 67.5% students are strongly agree on that statement, 20% students are strongly agree on that statement.

Table 15

Frequency and percentage of students regarding item: In your opinion that AT facilitate you in co-curricular activities at post-secondary education level?

Responses	F	%	CP
Strongly disagree	2	5	5
Disagree	5	12.5	17.5
Neutral	6	15	32.5
Agree	22	55	87.5
Strongly agree	5	12.5	100%
Total	40	100	

Table 15 showed that 5% respondents are strongly disagree on that statement AT facilitate you in co-curricular activities at post-secondary education level, 12.5% students are disagree ,15% students are remain neutral about that statement and 55% students are agree on that statement, 12.5% respondent are strongly agree on that statement.

Table 16

Frequency and percentage of students regarding item: Do you think that AT is helpful in improving social and communicational skills of students with VI?

Responses	F	%	CP
Neutral	3	7.5	7.5
Agree	24	60	67.5
Strongly agree	13	32.5	100
Total	40	100	

Table 16 showed that 7.5% respondents are remains neutral about that statement AT is helpful in improving social and communicational skills of students with VI, 60% students are agree ,32.5% students are strongly agree on that statement.

Findings

The study's findings indicated that most respondents acknowledged the beneficial influence of AT on improving the educational experience for students with VI in post-secondary education. Approximately 85% concurred that AT enhances academic performance, whereas 75% felt that IT-based tools increase the accessibility of websites and e-texts. Similarly, 75% of respondents indicated that AT makes it easier to complete assignments independently while 90% agreed that it increases their confidence in learning. In addition, 78% felt it was beneficial for assessment in an academic setting, while 88% stated it supported their curriculum level modification. Moreover, 68% stated they can use a laptop and work with the papers independently, while 80% pointed out the need for more time for examinations. In addition, 68% agreed it promotes

co-curricular participation, and 93% agreed it improved social and communication skills. However, a few challenges were noted, with 36% disagreed about AT promoting study independently, and 43% disputed that they were satisfied with educational accommodations and assistive devices when attending post-secondary education institutions.

Conclusions

To summarize, the previously mentioned research studies demonstrate the favorable role of AT on the educational accomplishment of students with VI in post-secondary education. It also contributes to improvements in the social and communicative skills of students with VI. AT allows students with VI to engage in their independent study. When a student who is visually impaired is trained in AT, they can complete their assignments with a great deal of comfort and independence and accomplish their other educational goals as well. Educators must teach the use of AT to students with VI because it truly influences their educational achievements.

Recommendations

It is vital that educators are trained on how to use AT, and students should be taught how to use the AT. EBooks for students with VI should be available in post-secondary education libraries. Students with VI should use assistive devices in post-secondary education. Educators have a variety of ways of assessing the academic achievement of students with VI in post-secondary education.

Discussion

The study revealed that AT has a strong and positive impact on the academic lives of students with VI in post-secondary education settings. Participants in the study similarly indicated that assistive technologies and other educational tools aided in improving their academic performance, and access to learning materials, echoing earlier studies (Al-Azawei & Serenelli, 2018). For instance, it seems reasonable to argue that the high percentage of majority agreement (85%) who improved academically provide evidence that AT reduces barriers in learning and develops independence in succeeding with academic tasks. Similarly, the only 75% of participants indicated that IT-based tools were helpful for accessing websites and e-texts, and the literature highlights digital accessibility as an important part of inclusive education (Kelly & Smith, 2020).

The study also reported more broadly beneficial educational experiences, such as increased confidence (90%), active participation in the curriculum (88%), improved experience during assessments (78%), and better communication and social skills (93%). These findings correspond with the existing literature which argued that AT contributes educationally, but also benefits the emotional well-being and level of participation during the campus experience (Sánchez et al., 2020). Finally, the positive benefits to co-curricular participation (68%) added another dimension, whereby the use of AT assists in holistic inclusion beyond the classroom (or learning environment).

Despite these advantages, key challenges remain that mirror study's first and third aims. A majority of respondents (36%) thought AT does not promote independent study, citing issues with training, usability, and/or support from the institution in this setting. Furthermore, 43% of respondents were dissatisfied with the educational accommodations that the institution of post-secondary education offered. This aligns with the evidence highlighting that many colleges and universities still do not have the trained staff, resources, or policies to accommodate the accessibility needs of a student to a necessary level (Mhaidat, 2021). These challenges reveal that educators need to be better prepared, faculty need to have access to continual technical support and institutions need to make a stronger commitment to inclusive education. In addition, the fact that 68% of students can use laptops and complete the task independently is positive, but the rate of 80% of students who require additional time on an exam, reinforces an ability difference created by a structural barrier in the assessment system. This barrier aligns with educators' concerns with only limited flexibility in the assessment practices colleges of education employ for students using AT (Owuor & Larkin, 2022). Educational professionals often espouse a general valuing of AT but for a myriad of reasons, often lack the training and therefore autonomy to use it with fidelity.

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