International Journal of Future Generation Communication and Networking
Vol. 13, No. 1, (2020), pp.703 -715

TECHNOLOGICAL SCAFFOLD AND VISUAL CHALLENGES: DEMANDS AND INADEQUACIES AS PERCEIVED BY SENIOR SECONDARY SCHOOL STUDENTS WITH VISUAL IMPAIRMENT

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Abstract

Technology has been used widely in the educational settings, and technology enhanced learning environments support learners by enhancing their regulative skills and reflection (see de Jong et al., 2012; Pedaste & Sarapuu, 2006, 2012). Technology-enhanced learning environments have been widely used to apply inquiry learning in science education and are seen as instructional systems through which students acquire skills or knowledge with the help of teachers or facilitators, learning support tools, and technological resources (Aleven, Stahl, Schworm, Fischer, & Wallace, 2003; Shapiro, Roskos, & Philip, 1995; Wang & Hannafin, 2005). Studies shows that, technology could be used to support reflection and effective classroom interactions (e.g., Chen, Kinshuk, Wei, & Liu, 2011; Chen et al., 2009; Hsieh, Jang, Hwang, & Chen, 2011; Leijen et al., 2012). In classrooms disabled persons are need different technology to pay costs for the limitation imposed, compared to the average or normal person. Over the past decade, technology such as Screen Reading Software, Text Reading Machines, Drawing Boards, Talking mobile phone, Cassette Recorder or a Digital Recorder, Geometric Kit, etc., are played a vital role in to change the life of visually impaired people. There are a lot of problem now a days visually impaired persons face due to lack of availability, affordability, awareness, language.

This paper is a meaningful effort to address the concerns of students with visual impairment in relation to the access and exposure to the technology. The objectives of the paper are-to examine the existing provisions (technological and assistive) for visually challenged students of higher secondary schools of Kerala, and to identify the further demands of visually challenged students in the institutions of higher education in Kerala. The study was carried out among 65 students with visual problems. Sampling technique used was systematic sampling. A semi-structured interview schedule was employed to collect relevant data from the participants.

The study reveals that majority of the higher secondary visually impaired students did not have access to assistive technology at schools/hostels (48.5%). Majority of visually impaired students did not have access talking computer (87.9%). This study also shows that, maximum number of visually impaired students didn't have kindle device or any software based device at higher secondary level (90.9%). Similarly, 40.9% of visually impaired students replied that, they are comfortable with the technological support provided by school.

Keywords: *Disability, Visual Impairment, Technology for Inclusion, Assistive Technology*

Introduction

Early researches on learners with visual impairment had focused mainly on teaching and learning issues (Holloway 2001; Ryan 2005; Goode 2007; Fuller, et al. 2009). Technology related factors are also to be focused along with support based issues. Goode (2007) found that despite the implementation of a disability action plan at a British university, students were still actively

ISSN: 2233-7857 IJFGCN

'managing' their disabilities and identities and struggling with issues such as disclosure and the tensions associated with highlighting their particular needs. Notable point is that they are availing many schemes from the government. But the case of India is totally different in many respects and needs serious concern over the facilities and technological support being provided to disabled, especially visually challenged. Visually impaired people usually access the web using screen-reader software that processes web pages sequentially from top to bottom and reads their content out in computer synthesized speech. This sequential access imposes numerous challenges on visually impaired users (Andronico, et al., 2006).

Visually challenged should be given more care and support to lead a satisfactory life, access the sources, learn using multi-media and all. The institutions as well as the teachers need to be focused here. To achieve these results, research indicates that high quality instruction (i.e., instruction that has strong research support for significantly improving academic outcomes for students) should be more intensive than instruction that is typically offered in general education classrooms (Gersten, et al., 2009). There are many technology tools available like the Kindle which was touted to feature text to speech or spoken text technology that could read textbooks aloud (Foley & Ferri, 2012).

Though there are many legislations and policies to take care the disabled, the higher education including higher secondary education is being neglected. The condition of disabled, especially visually challenged is not up to the mark in the institutions of higher learning. What is missing? And what we have to incorporate? Which area should be given more care to uplift the visually challenged? Are they getting proper technology to enhance their learning? What are the lacunas behind the implementation of the schemes in a full-fledged manner? Do we have a techno-friendly policy? Is it fruitful the given assistive technology? This study is a sincere attempt to accumulate the perspectives of visually challenged post graduate students regarding various aspects of provisions of technology for them at higher secondary level of education.

Objectives

The study has been planned with the objective of examining the existing provisions (technological and assistive) for visually challenged students of higher secondary schools of Kerala

Design and Method

Initially a detailed survey was carried out all over the state (Kerala). A representative sample (systematic random) was drawn from the population. Their perception, access to technology and concerns and impediments were collected. The method of the study in the second stage is in-depth interview. Though the participants were interviewed personally using a structured interview schedule; their valuable suggestions and opinions were taken into account for the individualized tailoring of needs (for giving proposals).

Measures

The following tools were used in data collection

- **A data blank** to collect relevant socio-demographic information about the participants.
- **Structured interview schedule:** The schedule consists of questions related to various dimensions of the study- facilities of the institution, and technological support.

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Results

Table: 1

Assistive Technology-available/accessible

SI. No	Concern/facility	Yes Fully	No	Yes, Somewhat
1	Access to assistive technology at school or at hostel	18 (27.3 %)	32 (48.5%)	15 (22.7%)
2	Talking computer/ access to talking computer	6 (9.1%)	58 (87.9%)	1 (1.5%)
3	Screen reader/ access to a screen reader	4 (6.1%)	56 (84.8%)	3 (4.5%)
4	Kindle device or any such software based device	1 (1.5 %)	60 (90.9%)	4 (6.1%)
5	Specially designed electronic canes	7 (10.6%)	57 (86.4%)	0 (0%)
6	Device to wear on head to facilitate your movement	1(1.5%)	61 (92.4%)	2 (3.0%)
7	Access to any movement friendly cycle or wheel chair	3 (4.5%)	61(92.4%)	0 (0%)
8	Access to any technology that facilitates typing in the computer	5 (7.6%)	54 (81.8%)	5 (7.6%)
9	Ramps at schools	12(18.2%)	45 (68.2%)	7 (10.6%)
10	Lifts at schools	0 (0%)	64(97%)	0(0%)
11	Disabled friendly toilets at school	13(19.7%)	45(68.2%)	5(7.6%)
12	Comfort with the technological support provided by school	27 (40.9%)	9 (13.6%)	29 (43.9%)

Access and Exposure to Assistive Technology

27.3 % of higher secondary visually impaired students have access assistive technology at higher secondary school/hostel. At the same time, majority of the higher secondary visually impaired students reported that, they did not have access to assistive technology at schools/hostels (48.5%). On the other hand, 22.7% of higher secondary visually impaired students have partially access assistive technology access at school/hostel.

Very few visually impaired higher secondary school students said that, they have fully access talking computer at schools (9.1%), majority of higher secondary visually impaired students complained, they did not have access talking computer (87.9%), a small number of secondary school visually impaired students have partially talking computer at schools (1.5%). On the other hand, only 7.6% of visually impaired students have fully access of technology facilitate typing in the computer at the higher secondary level, but majority of visually impaired students reported they don't have access

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of technology facilitate typing in the computer at higher secondary level(81.8%). At the same time, a few number of visually impaired students have partially access of technology facilitate typing in the computer at higher secondary level (7.6%).

A few number of visually impaired students reported they have access to screen reader at higher secondary level (6.1%), visually impaired students complain that, they didn't have access to screen reader at higher secondary level (84.8%). Comparatively, 4.5% of students had least access to screen reader at higher secondary level.

A very few number of visually impaired students accept that, they have access of kindle device or any software based device at higher secondary level (1.5%). This study shows that, maximum number of visually impaired students didn't have kindle device or any software based device at higher secondary level (90.9%), but few number of visually impaired students have partially access of kindle device or any software based device at higher secondary level (6.1%).

Very few of visually impaired students have electronic canes at higher secondary level (10.6%). On the other hand, a large number of visually impaired students didn't have electronic canes at higher secondary school (86.4%).

Among the higher secondary school students, 1.5% of visually impaired students replied that, they used certain device to wear on head to facilitate their movement. But, 92.4% of visually impaired students stated that they never use certain device to wear on head to facilitate their movement. At the same time, 3.0% of visually impaired students stated that they used certain device to wear on head to facilitate their movement to somewhat extent.

Only 4.5% of selected visually impaired students have access of moment friendly cycle or wheel chair at higher secondary level. At the same time, 92.4% of selected visually impaired students said that, they didn't have access of moment friendly cycle or wheel chair at higher secondary level, 0 (0%). 18.2% of visually impaired students answered that, they have ramps at school, and (68.2%) of visually impaired students said that, they didn't have ramps at school. But, 10.6% of visually impaired students stated that, they have access of ramps at schools to some what extent. 0 (0%) Selected visually impaired students reported that, they didn't have lifts at schools t97%), and 0(0%).

Among the selected visually impaired students (19.7%) have disabled friendly toilets at schools. Majority of visually impaired students stated that, they didn't have disabled friendly toilets at schools (68.2%), but 7.6% of visually impaired students have partially access of disabled friendly toilets at schools.

40.9% of visually impaired students of higher secondary school replied that, they are comfortable with the technological support provided by school, and 13.6% students respond that, they are not comfortable with the technological support provided by school. At the same time, majority of selected visually impaired students stated that, they are comfortable with the technological support provided by school at somewhat extent (43.9%).

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Table: 2

Access to learning technology and facilities

SI. No	Concern/Facility	Yes Fully	No	Yes, Somewhat
23	Access to IT oriented teaching at school	35 (53.0%)	7 (10.6%)	20 (30.3%)
24	Enough software available at school that support your learning	20 (30.3%)	24(36.4%)	19(28.8%)
25	Smart Classroom that is well maintained with headphones and effect modulations for you like people	13 (19.7%)	23 (34.8%)	25(37.9%)
26	3D theatre at school	1 (1.5%)	32 (93.9%)	0(0%)
27	Teachers teach using multi-media that is not excluding you from the other learners	33 (50.0%)	20 (30.3%)	9(13.6%)
28	Teachers suggest various websites meaningful and having potential use for the people like you	9 (13.6%)	21 (31.8%)	32 (48.5%)
29	Knowledge about MOOC and Moodle platforms	0(0%)	58 (87.9%)	4 (6.1%)
30	Know about NIOS and its MOOC Services for school students from	0(0%)	50(75.8%)	11(16.7%)
31	Braille library at school	15 (22.7%)	47 (71.2%)	0
32	Teaching aids at school that is specially designed for you like people	4 (6.1%)	41(62.1%)	16(24.2%)

Learning technology and exposure to learning technology

Majority of selected visually impaired students replied that, they have access to IT oriented teaching at school (53.0%), and 30.3% of visually impaired students have partial access to IT oriented teaching at school. At the same time, 10.6% of visually impaired student's states that they didn't have access to IT oriented teaching at school.

30.3% of visually impaired higher secondary school students agreed that, they have enough software available at school which are support their learning. At the same time, 36.4% of visually impaired higher secondary school students complained that, they didn't have enough software available at school which are support their learning but 28.8% visually impaired higher secondary school students agreed that, they have enough software available at school which are support their learning at somewhat extent.

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Among the selected visually impaired higher secondary school students, 19.7% respond that, they have Smart Classroom which is well maintained with headphones and sufficient effect modulations, but 34.8% of visually impaired higher secondary school students stated that, they didn't have Smart Classroom which is well maintained with headphones and sufficient effect modulations. Obviously 37.9% selected visually impaired higher secondary school students have Smart Classroom that is well maintained with headphones and sufficient effect modulation.

1.5% of visually impaired selected higher secondary school students have 3D theatre at school, majority of selected visually impaired higher secondary school students didn't have 3D theatre at school (93.9%).

Majority of selected higher secondary visually impaired students agreed that, teachers are teach using multi-media that is not excluding from the other learners (50.0%), but 30.3% of selected higher secondary visually impaired students agreed that, the teachers are teach using multi-media that is excluding from the other learners. Among them 13.6% of selected higher secondary visually impaired student agreed that, teachers are teach using multi-media that is not excluding from the other learners at somewhat extent.

Obviously 13.6% of visually impaired higher secondary school students agreed that, their teachers suggest various websites meaningful and having potential use for their learning, and 31.8% selected visually impaired higher secondary school students complained that, their teachers didn't suggest various websites meaningful and having potential use for their learning. At the same time, 48.5% respondents agreed that, their teachers suggest various websites meaningful and having potential use for their learning at some what extent.

Among the selected visually impaired higher secondary school students, 87.9% replied that, they don't know about MOOC and Moodle platforms, but 6.1% of visually impaired higher secondary school students respond that, they know about MOOC and Moodle platforms at some what extent.

Majority of selected visually impaired higher secondary school students replied that they didn't know about NIOS and MOOC services for school students. 50(75.8%), at the same time 16.7% of respondents replied that they know about the NIOS and MOOC services for school students at somewhat extent.

From the selected visually impaired higher secondary school students 22.7% have braille library at school, and 71.2% of visually impaired higher secondary school students states that, they didn't have braille library at school.

6.1% of visually impaired students of higher secondary school replied that , they have teaching aids at school which is specially designed for them, but majority of visually impaired higher secondary school students didn't have teaching aids at school which is specially designed for them 62.1%). At the same time, remaining 24.2% of visually impaired students have teaching aids at school which is specially designed for them at some what extent.

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Table: 3

Teaching through technology-perception of learners

SI. No	Concern/Facility	Yes Fully	No	Yes, Somewhat
33	Proper and sufficient audio materials at school and teachers use it during the teaching activity	18 (27.3%)	8 (12.1%)	35 (53.0%)
34	Teachers are techno friendly and that helps me in my learning	25 (37.9%)	0(0%)	35(53.0%)
35	Following the class of your teacher it is delivered with simple Power Point Presentation	36 (54.5%)	5 (7.6%)	20 (30.3%)
36	Access to and are you able to use common technology like desktop, used by other students at school	29 (43.9%)	12 (18.2%)	19(28.8%)
37	Filed trip as a part of school activities and will it be helpful to you	29(43.9%)	22(33.3%)	9(13.6%)
38	Lab at school related to your subject of specialization	25(37.9%)	18 (27.3%)	17 (25.8%)
39	Comfortable in using labs just like other students	18(27.3%)	15(22.7%)	27(40.9%)

Teaching through Technology

27.3% of visually impaired students replied that, they have proper and sufficient audio materials at school and teachers are use it during the teaching activity, but 12.1% selected visually impaired higher secondary school students respond they didn't have proper and sufficient audio materials at school and teachers are use it during the teaching activity. At the same time, 53.0% of visually impaired higher secondary school students have proper and sufficient audio materials at school and teachers are use it during the teaching activity at some what extent.

Among the selected visually impaired higher secondary school students 37.9% are replied that, the teachers are techno friendly in the classroom, which is helps to them learning, but 53.0% of visually impaired higher secondary school students are states that, the teachers are techno friendly in the classroom, which is helps to them learning at some what extent.

Majority of selected visually impaired higher secondary school students replied that, they can follow the class of their teachers which delivered by power point presentations (54.5%), but 7.6% of visually impaired higher secondary school students can't follow the class of their teachers which delivered by power point presentations. At the same time, 30.3% of responds give reply that they can follow the class of their teachers which delivered by power point presentations at some what extent.

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43.9% of visually impaired higher secondary school students have access and can able to use common technology like desktop used by other students at school. Among them 18.2% of selected visually impaired higher secondary school students states that, they didn't have access and can't able to use common technology like desktop used by other students at school. But, 28.8% 43.9% of visually impaired higher secondary school students have access and can able to use common technology like desktop used by other students at school at some what extent.

Majority of selected visually impaired students states that, they have filed trip as a part of school activities and it is very helpful to them (43.9%). Among the selected visually impaired higher secondary school students 33.3% didn't have filed trip as a part of their school activities and it is not helpful to them, but 13.6% of visually impaired higher secondary school students replied that, they have filed trip as a part of school activities and it is helpful to them at some what extent.

37.9% of visually impaired higher secondary school students have lab at school related to their subject of specialization, but 27.3% of selected visually impaired higher secondary school students didn't have lab at school related to their subject of specialization. Remaining 25.8% of visually impaired higher secondary school students states that, they lab at school related to their subject of specialization at some what extent.

Among the selected visually impaired higher secondary school students 27.3% replied that, they are very comfortable in using labs just like other students and 22.7% are not comfortable in using labs just like other students. But, majority of selected visually impaired higher secondary school students are comfortable in using labs just like other students at some what extent (40.9%).

Discussion and Conclusion

Management of visual challenges in the classrooms is an evergreen discussion in the research spectrum of disability studies. It is concluded that 80% of the child's ability to understand the relationships, to establish the perceptual experience occurs through the visual senses of the child (Padula, 1983). The term visual impairment includes both low vision and blindness. American Medical Association states that "A person shall be considered blind whose central visual acuity does not exceeds 20/200 in the better eye with correcting lenses or whose visual acuity, if better than 20/200 has a limit in the central field of vision to such a degree that its widest diameter subtends an angle of no greater than twenty degrees."(Mubarak Singh; 2009). Visual impairment including blindness "means an impairment in vision that even with correction , adversely affects a child's educational performance". Here it includes both partial sight and blindness. (IDEA act,1997).

Person with Disabilities act, 1995 defined low vision as "People with low vision" means a person with impairment of visual functioning even after treatment or standard refractive correction but uses or is potentially capable of using vision for the planning or execution of a task with appropriative assistive device" (Visual impairment, Rehabilitation council of India). According to the CDC and the WHO the classification of visual acuity and impairment includes:- Low visual acuity means vision between 20/70 and 20/400 with best possible correction, or a visual field of 20 degrees or less. Similarly, Blindness is defined as visual acuity more than 20/400 with the possible correction , or a visual field of 10 degrees or less (CMLD, Satyapalan , 2017).

Visually impaired students face a lot of challenges in their life at various levels. Language Challenges (Camen.W,2019): There are language problems in students w Children with visual impairment and blindness also shows delay in the development of pre-verbal, verbal and non-verbal languages (Brodsley,2010;Perez-Pereira and Conti Ramsden 1999).The learning of these skills is mainly by

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observation and imitation as they are lacking this quality they instead uses the sense of hearing. They usually show less body and facial languages and show delay in emotion.

The study reveals that majority of the higher secondary visually impaired students did not have access to assistive technology at schools/hostels (48.5%). Majority of visually impaired students did not have access talking computer (87.9%). This study also shows that, maximum number of visually impaired students didn't have kindle device or any software based device at higher secondary level (90.9%). Similarly, 40.9% of visually impaired students replied that, they are comfortable with the technological support provided by school.

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