

Effectiveness of Technology in Learning Process of Visually Impaired Students

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ABSTRACT: A visual impairment is an undesirable any visual condition having impact on an individual's ability to successfully complete the activities of everyday life. Students with visual impairments are infants, toddlers, children and youths who usually experience impairments in the visual system that affect their ability to learn. To implement appropriate classroom accommodations for students with visual impairment, teachers do use different types of aids and technology. They can develop learning ability through using aids and assistive technology. This study focuses on use of aids and technological materials which help to learning process of visually impaired students and effect on building their learning ability. The study seeks to explore the effectiveness of level of technology in learning of visually impaired students. It shows the comparison between upper primary and higher secondary level students on effectiveness of technology. The study comprises of 40 samples which are collected from both upper primary level and higher secondary level students. Data tools included general information and opinionnaire. Descriptive method and statistical techniques are used for this study. The study shows that the most used technical aids are audio recorder and computer and other special aids and the most important reading aid is brail. The study also shows that the most effective technical aids are recorder and chart and model. It is derived that the level of effectiveness is medium.

KEYWORDS: Visually impairment, Technical aid, Learning ability, Opinionnaire, Reading aid.

I. INTRODUCTION

Visual impairment is a learning disability of the students. The experts of the education usually classify the visually impaired as follows - legally blind, an individual must have visual acuity of 20/200 or less, or have a field of vision restricted to 20 degrees or less at the widest point. To implement appropriate classroom accommodations for students with visual impairment, these students are also classified according to their level of functional vision such as low vision, totally blind etc. Classroom accommodations would be varied and should be individualized according to the specific needs of the student. However, there are some basic best practices that can guide the development of the most effective adaptations.

A technical aid is a tool used by teachers to help learners to improve the language skills, illustrate or reinforce a skill, fact, idea, relative anxiety, fear or boredom. A teacher can make the experience of learning interesting and memorable for learners by using teaching aids. There are so many types of learning aids such as Braille, Large Print, Magnifying devices, Charts and Models.

The use of computers is particularly important to students with visual impairments, as their ability to use written communication may be enhanced and access to information may be improved. A computer system for a student with blindness will include a computer or laptop with the following components. Screen Reader/Speech Synthesizer (JAWS, Screen Reader/DOS), Voice Access).

Tactile Strategies:

It is a specific strategy to support instruction of students who have severe and multiple visual disabilities and who do not learn visually. When students with severe disabilities are unable to use their vision effectively for obtaining information, they require tactile information that is accessible to their hands or other parts of their body.

Assistive Technology:

In order to access print information, students with visual impairments must be trained in the use of a number of adaptive devices, methods, and equipment that are collectively referred to as assistive technology. Some of this technology allows access to information presented on a computer while others devices are to be used independently.

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Computer hardware and software are continuously advancing, allowing for more access to information than ever before.

Objectives of the study:

The study aims

- To identify teaching learning materials which are useful for learning of visually impaired students.
- To specify the aids both conventional and modern.
- To judge the effectiveness level of students.
- To find out the differences in effectiveness between upper primary level and higher secondary students.

II. RELATED WORK

Muttayya and Puttaraj, 2009 have tried to explore the views and concerns about to achieve the goals of inclusive education in the Indian higher education system. It may be achieved through the computer and assistive technologies of a 'Learning Resource Centre for the Visually Impaired Students. It also enumerated the salient features, special services, special resources, assistive/adaptive technologies and futuristic plans of a state-of-the-art 'Learning Resource Centre for the Visually Impaired Students' to foster inclusive education.

Adetoro, 2010 studied that information materials can only become usable to persons with visual impairment when they are transcribed into alternative formats. As per Adetoro, secondary school respondents had high reading interest in art subjects, reference materials, manuals and animal story materials. The secondary school respondents preferred talking books/audio recordings (55%). Transcription and provision of information materials for the visually impaired through libraries should be based on knowledge of their reading interest and information needs.

Ojha, 2014 studied that education for the visually impaired is made available through the medium of touch and sound. The intention was to make the textbooks accessible to these students and by converting the printed textbooks into audio books. An effort was made in this to investigate the perception of visually impaired students of these audio books. The work was focused on upper primary to higher secondary level students.

Mohamed and Syamili, 2014 studied the use of Information and communication technology (ICT) by the visually impaired students in Calicut University, Kerala. The study found that a large majority of the students are computer literates and use mobile phones frequently. A good number of them use screen readers in their mobile phones. However, the foreign accent of screen reading programs is a challenge for the students. The support of friends and family members is very helpful for the students to acquire the skills of ICT. Microsoft Office and Jaws screen reader supported by Windows operating system are the most popular software among the students. Use of internet by the students is very less and most widely used internet service is www followed by e-mail. It is found that a majority of the students need training in word processing and Internet. This study provides useful information about the use of ICT by visually impaired students in India.

III. RESEARCH METHODOLOGY

Research design:

The descriptive survey research design was used in the study. As indicated by Cohen, Manion and Morrison (2007), the descriptive design identifies the opinions of visually impaired students about effectiveness of teaching aids. In this study, the use of teaching aids was identified and this study revealed the level of effectiveness of teaching aids.

Research Instrument:

The instrument used for data collection was surveyors structured questionnaire titled "Effectiveness of Technology in Learning Process of Visually Impaired students". There are three parts in the instrument, viz Section A, B and C. Part-A is on personal data of the students while Part B, which has seven questions, is on use of aids and Part C is on effectiveness of teaching aids and contains six questions. Sections B and C were on Yes, Sometimes, and No. There are 16 items in all.

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Sampling:

The Authors used purposive and stratified sampling and samples are collected from the Upper primary level and Higher secondary level students in Narendrapur Blind Boys Academy, located in Narendrapur Ramakrishna Mission, district South 24 Parganas, West Bengal state, India.

Data Collection:

The Trainee visited the institution on 3rd December, 2014 and 16th March, 2015. The total respondent of the institution is 43. Out of 40 the Trainee selected only samples from the respondent. Out of 40 respondents 18 samples are drawn from Higher secondary level students and 22 samples are drawn from Upper primary level students.

Hypothesis:

$H_0 - 1$: There is no effectiveness of teaching aids among the visually impaired children.

$H_0 - 2$: There is no significant difference between effectiveness of teaching aids on learning of Upper primary and higher secondary visually impaired students.

Data Analysis Techniques:

In this study two types of data analysis techniques have been used. These are Item analysis and Hypothetical test. For item analysis Microsoft Excel software was used. For hypothetical test Univariate chi-square test and Independent t test were used. Microsoft Excel and Gnumeric online statistic software were used for these two tests.

Determination range of level:

The items were weighted 1-3 in which case 1 = 'No' for negative, 2 = 'Sometimes' and 3 = 'Yes' for the positive statements. A summative approach was used in which case a respondent who scored 3 in all the 6 items would have a total score of 18 while one who scored 1 in all the 6 items would have a total score of 6. The final highest score for every respondent was resulting into an interval awareness scale ranging from 6 to 18 as described as low (6-10), medium (10.1-14.1) and high (14.2-18).

IV. RESULT AND DISCUSSION

The data collected were analysed and the summaries of the analyses were presented in tables and figures to highlight the findings. Statistical procedures are applied. These were presented in tables to highlight the findings. Some data were presented with figure. Total 40 respondents were interviewed face to face in the survey. Among them 22 respondents were Upper primary students and 18 were Higher Secondary students. Results and findings are as follows.

Demographic Information:

The survey was done on two categories of students, such as upper primary students and higher secondary students. Average age of upper primary students is 14 and average age of H.S students is 18. All of the students are residential. There are two types of visual impairment identified, such as congenital and adventitious. The first one is at birth and second is after birth.

Use of Teaching Learning Material:

In the institution so many teaching learning materials and technical instruments are used for visually impaired students. During the conversation, teacher told the investigator, there are audio aids, visual aids, audio visual aids, computer software, recorder, screen reader, JAWS(Job Access With Speech), chart, models. Low visions students use CCTV, large print, ink pen etc. They used subject wise different TLMs. These are depicted in the following table.

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Table 1: Subject wise Teaching Learning Materials and technology for visual impaired students

Subject	Teaching Learning Material
Language	Flash card, Braille, Screen Reader, JAWS software etc.
Science	3D Models, Human body model, Skeleton model, CCTV, Lance, Type Board etc.
Social Science	Map, Chart, Models etc.

Use of technology and learning aids:

When teachers and students were asked about the use of their visual aids, 32 % students responded ‘yes’ and 20% ‘sometimes’ used and 48% students responded ‘no’ option. So, it can be considered that there almost 50% students are blind and 50% students are low vision category.

The visual aids are sufficiently available in the institution said by both teacher and students. Fifty percent of respondent students are opted ‘yes’ and 70 percent student answered ‘sometimes’ and rest of the students are disagreed with the availability. So, in reference to these responses it can be considered that visual aids are available in the institution.

It has been found through the conversation with visually impaired students that the most used aids are audio recorder, computer and other special aids (eg. Tactile Model), because 67%, 67% and 60% students have agreed respectively.

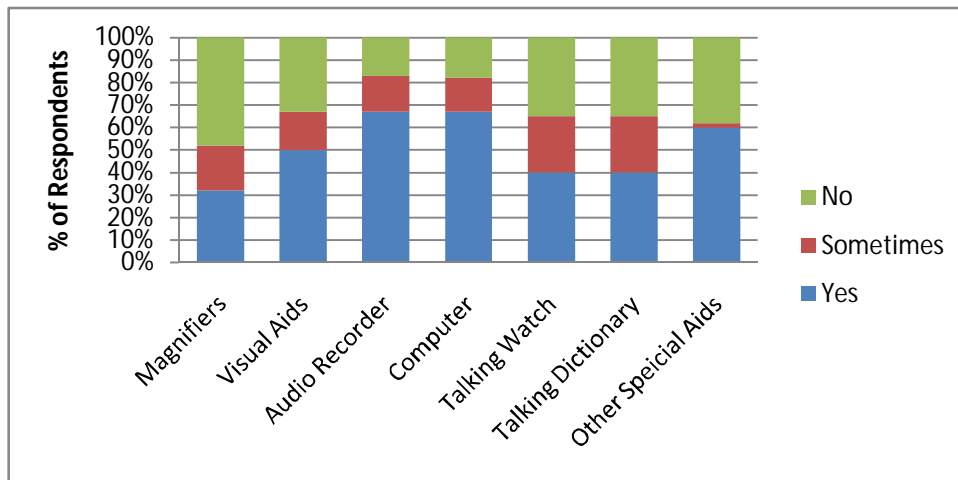


Figure 1: Use of Teaching Aids on learning of visually impaired students

In this study two types of student usually read by different aids. The result shows Braille is the most important teaching aids. Maximum students in both Upper primary and Higher Secondary level are agreed with Braille. Next important aids are Regular Print and then large print and Cassette Tape respectively.

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Vol. 6, Issue 8, August 2017

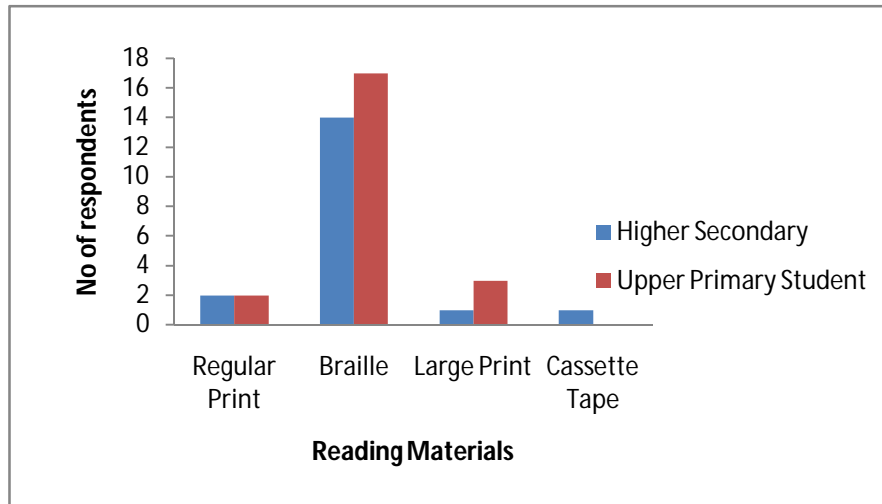


Figure 2: Use of reading aids

Effectiveness of aids and technology:

The study revealed that the most effective aids and technology are Braille, Record player and Model and Charts. Moderately effective teaching aids are large print and computer. More than 80 % of students have agreed with Record player and Braille about effectiveness. So Braille and Record Player are most effective on learning process of visually impaired students.

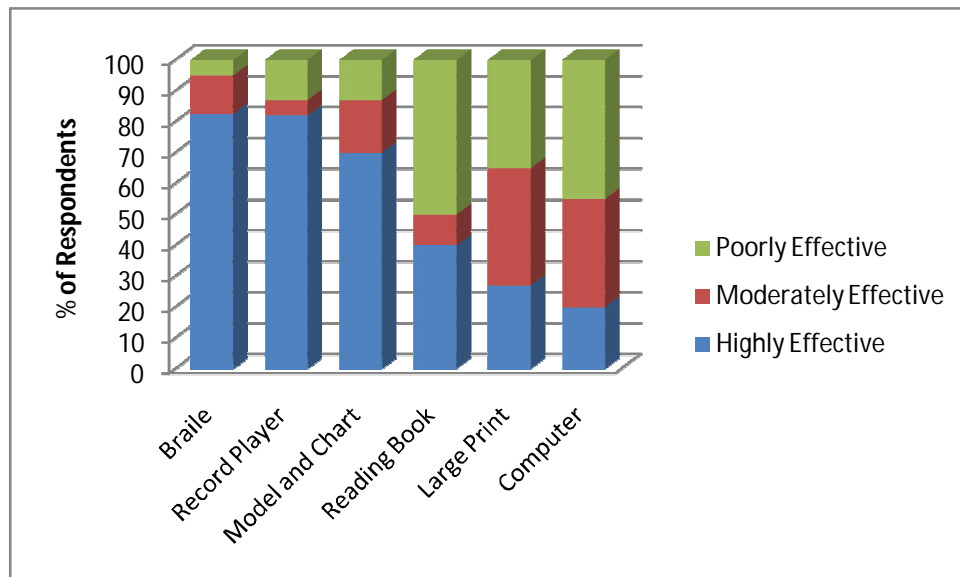


Figure 3: Important effective aids and technology

Hypothesis 1:

The level of effectiveness was assessed based on responses to Likert Scale statements. The items were weighted 1-3 in which case 1 = Strongly Disagree and 3 = Strongly Agree for the positive statements. A summative approach was used in which case a respondent who scored 3 in all the 6 items would have a total score of 18 while one who scored 1 in all the 6 items would have a total score of 6. The final highest score for every respondent was resulting into an interval awareness scale ranging from 6 to 18 as described below (Table 1).

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Vol. 6, Issue 8, August 2017

Table 2: Effectiveness of aids and technology on learning process

Variables	n	%	df	χ^2	p
Low	2	5	2	10.56*	0.00
Medium	23	57.5			
High	15	37.5			

*Significant at 0.05 level. df = 2, critical χ^2 value = 5.991

Using level of effectiveness as the only variable, a univariate chi-square test was used to test the hypothesis that the level of effectiveness of aids and technology among visually impaired students is not significantly low. The above results of the study show that null hypothesis is rejected. The respondents recorded a medium level of effectiveness of aids and technology.

Hypothesis 2:

There is no significant difference between effectiveness of aids and technology on learning of Upper Primary and Higher secondary visually impaired students. The independent variable is student's class type. Independent t-test statistical analysis is used to compare the mean scores of effectiveness of teaching aids on different level students. A summary of the result is presented in Table 3.

Table 3: Independent t-test analysis

Variables	N	\bar{x}	SD	SEM	t-value
Upper Primary	22	13.630	1.989	0.424	0.1106*
Higher Secondary	18	13.705	2.300	0.542	

*Not significant at 0.05 level. df = 38, critical t-value = 2.0244

The above result shows null hypothesis is accepted. So there is no significant difference between effectiveness of aids and technology on learning of visually impaired students.

Discussion:

Effectiveness of aids and technology is a conception, perception dependence of students. The study revealed the effectiveness of aids and technology on visually impaired students. It is identified by student's responses. How much they able to use the aids? How much it affects on their learning? These questions are creating to find out the effectiveness of aids and technology. The effectiveness of technology varies from class to class, student to student. It also depends on level of blindness. In this study the result shows the effectiveness of aids and technology is medium level. The result shows 5% students belong to low effectiveness, while 57.5 % students belong to medium level and 37.5% students belong to high level.

Table 4: Level of effectiveness of teaching aids

Level	Range of frequency	Frequency	%
High	6-10	2	5
Medium	10.1-14.1	23	57.5
Low	14.2-18	15	37.5

In spite of this medium level of effectiveness some gaps have been found. If we go through the result, it has been observed that there is lack of effect of Computer Talking watch, Talking Dictionary, Large Print, Regular Print. According to result it is found that maximum students used computer for their study purpose, but it is not effective in their learning. It may be point out that they can't able to use computer in particular and exact purpose. Probably it may cause to medium level of effectiveness. If it would be fulfilling the effectiveness of aids and technology would be high level.

Another cause can be the lack of use of modern technology. In this institution both teacher and students are agreed to use of more and more technology. Although students are using now I-pod as a record player. They can also use type writer. They can access JWAS software for language learning. It is developed their speech delivery. They can use screen reader. In their science class CCTV is used for better learning of science. The use of I-pod as record player is shown in following picture.

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Vol. 6, Issue 8, August 2017

There are important findings that there is no difference of effectiveness of aids and technology among upper primary student and higher secondary students, because there are no differences in use of aids.

V. CONCLUSION

The findings show that the effectiveness of teaching aids is not significantly low. There is there is medium level of effectiveness of teaching aids on learning of visually impaired children. For this result item analysis, chi-square test has been used. To compare the effectiveness of teaching aids between two different levels of student's independent t-test is used. And the result shows that there is no difference.

Based on the result the conclusion is that there is medium level of effectiveness of teaching aids. But there are some gaps. To improve this type of effectiveness to more high modern technologies are required.

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