



Problems in Learning of Mathematics: A Case of Visually Impaired Students

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Abstract- The study was aimed to explore the problems faced by visual impaired students in learning of Mathematics at secondary level in Rawalpindi and Islamabad-Pakistan. Qualitative research approach was used to explore the problems of students. Research design adopted was case study of visually impaired secondary school students. Semi structured interviews were conducted from the participants i.e. 14 secondary school students of Rawalpindi and Islamabad. The Interviews were audio recorded. Data analysis was done in stages. Firstly, data were transcribed, and next coding was done. It was found that visual impaired students (VIS) are facing diversified problems in learning of Mathematics such as Fatigue, lack of interest and motivation, behavior of teachers and administration, lack of skilled professional Mathematics teachers, and lack of equipment and resources for studying. It was recommended that institutions may provide the visually impaired students with appropriate hardware and software facilities, also, teachers should be skilled in managing such visually impaired students.

Keywords: Problems, Visual Impaired, Learning of Mathematics, Pakistan

I. INTRODUCTION

Special education is considered as an important sub-component among the whole education system. This sub-component of the education system not only provides a strong base for the rehabilitation of the special persons but also play its role in the basic framework of the economy (Iqbal, Nawaz, & Shams, 2015). Variety of special need children are studying in different special education institutions in Pakistan for example hearing impaired, visual impaired, physically handicapped, Mentally retarded, Cerebral palsy, Spinal Bifida, Muscular Dystrophy etc. They generally studied different subjects in the school according to their needs and some of them are studying all school subjects like mathematics, general science etc. Many of them having multiple disabilities can only learn basic life skills.

Pakistan is facing a big challenge related to integration of visual impaired students in schools. The visual impaired students (VIS) have problems in their learning, so the specific curricular and co-curricular activities are needed to be planned. These programs should start from diagnosis of such students and move toward assessment and evaluation. Different proposals and research studies are already available which emphasize the importance of the care of students having special needs especially teaching of science and mathematics to visual related students. It demands for the provision of learning environment and activities equally to all students as mathematics is also taught at all levels. Helping students in achieving learning outcomes of mathematics is one of the core objectives of school educators (Iqbal, Mirza, & Shams, 2017).

Mathematics is an important subject for the development of reasoning faculties of the human mind (Mirza&Iqbal, 2014). It is a basic subject that provides foundations for the study of other science subjects (e.g. Physics, Chemistry) (Iqbal& Shams, 2018a). Difficulty in mathematics learning is being faced by many students (Iqbal& Shams, 2018b) especially visually impaired students face many problems in learning its concepts. It can be made interesting to make it a joy able experience for them. Teachers around the world followed many teaching methods when bringing their courses into practice, each of which was based on different sets of rules according to which contact, and interaction were used in the classroom (Iqbal, Shams, & Nazir, 2020).

The first thing in learning of mathematics is to learn numbers and simple addition and subtraction. The sequence of teaching and learning the mathematical facts remains the same for both normal and visually impaired students. It is expected that these students will get the concepts of numbers, calculations, size, direction and distance. The teachers dealing with visually impaired students use instructional aids like blocks, cubes, beads, relief graphs, abacus and shapes. The purpose is to give the blind students with information related to algebra, geometry and simple graphs. The visually impaired students need more time and effort for understanding mathematical skills. The sequential nature of mathematics demands much more from visual impaired students to learn the concepts. The needs of visual impaired students is somehow different from blind students. They usually need prints of pages in large sizes to learn Mathematics and on the other hand blind students generally need machines and software to learn sequence in mathematical concepts and problems.

Usually visual impairment (VI) is associated with prematurity, and neural network defect, atrophy and related tissue syndrome. The VIS also have slow growth. The problems which the visually impaired students face at all grades should be taken into considerations irrespective of the schooling system, i.e. regular schools and special schools. Many research studies have been conducted to see the effect of different teaching methods like Barder (2006) stated that visually impaired students can be taught using senses like touching and hearing. The hearing sense can be utilized in role playing, problem solving, brainstorming, talking calculators, mathematical poetry or songs and conversion of touched images to symbols through Braille. The problems related to interpretation of blind tables and communicating digital data was explored by Alkhashrami in 2009. Similarly, in another study (Aldemerdash, 2003) the role of tangible materials in learning the concepts of mathematics was explored for visually impaired students. A test was developed in Braille form about achievement in algebra and quantities. It was found that the manual aids in tangible form positively affected the achievement of VI students. In 2012, Mertin, Brenda and Michele also studied the role of using specific activities to enhance the academic achievement of visually impaired students. The found that they were just 3 years of age behind than the students having clear vision. Carole and Penny (2018) use iPads to teach blind students and found that it made the mathematics interesting for them by motivating and making it easier for them to learn. Less emphasize had placed on the exploration of problems faced by VIS in learning Mathematics. General problems faced by special need children have been explored e.g. Iqbal, Khan, and Ullah (2015) but not specifically related to learning of Mathematics. Literature highlights the use of abacus, tactile method, concrete materials and braille for teaching of mathematics to visually impaired students. The teachers teaching to visually impaired students are needed to get the relevant training to make effective use of such methods for learning of mathematics. Keeping in view the importance of Mathematics and versatility of visually impaired children the main purpose of this study was to explore the personal, academic, and administrative problems of VIS at secondary level.

Research Questions

The study explored the answer to the following research questions.

1. What are the personal problems faced by VIS in learning of mathematics'?
2. What are the academic problems faced by VIS in learning of mathematics'?
3. What are the administrative problems faced by VIS in learning of mathematics'?
4. How to overcome the problems faced by VIS in learning of Mathematics'?

II. METHODOLOGY

Qualitative research approach was used to explore the problems of students. Research design adopted was case study of visually 14 impaired secondary school students. According to Fraenkel and Wallen (2006) as cited in (Shams, Sanfratello, Iqbal, 2020) it is an approach used to better understand the situations and events from the viewpoint of participants. It is based on words from small sample to get understanding of the respondents' views (Creswell, 2002 as cited in Shams, Sanfratello, Iqbal, 2020). Semi-structured interview protocol was developed to collect qualitative data to explore the problems faced by visual impaired students at secondary level. The interview questions were developed by the researchers in light of literature review. The interview protocol was validated through expert opinion. Data were collected from the participants i.e.

14 secondary school students of Rawalpindi and Islamabad. The Interviews were audio recorded. Data analysis was done in stages. Firstly, data were transcribed, and next segregated into minor codes using descriptive coding technique.

III. RESULTS

The results of the study were presented in the following four major categories.

- Personal Problems
- Problems related to Academic
- Problems related to Administrative

Table 1
Personal Problems

Minor Codes	Percentages
Fatigue	43.4
Illness	56.5
Lack of motivation	65.2
Lack of self-efficacy	52.1
Lack of interest	56.5
Lack of communication	73.9
Lack of attention	43.4

Table 1 showed the frequencies and percentages of the personal problems of visually impaired students in learning mathematics. It was found that most of the visually impaired students said that they have lack of communication and motivation in learning of mathematics i.e. 73.9 and 65.2 percent respectively. Lack of interest and illness was found to be having equal percentages, i.e., 56.5. In the same line it was found that fatigue and lack of attention was found in 43.4 percent of the participating visually impaired students. When the researcher asked about the personal problems from visual impaired students, one of the respondents said that *“There is sequence in Mathematical problems to understand it thoroughly. I feel there is a big communication gap between the teachers teaching to blind and visually impaired students in Pakistan. He added that they most of time do not understand our problems in real sense and problems in learning mathematical sequence persist.”* Another student said *“I had problems in learning mathematics because I don’t like this subject and also that I feel that I have no need of it”* One said that *“I feel that being visually impaired student I can’t be better in performing better in mathematics”* Similarly, one student said that *“I used to be ill that was a major reason which used to demotivate me in giving attention to learn mathematics”* Other said *“ Mathematics had order and sequence and it made me tired in doing this using braille”*. The detail of the above table is given in figure 1 below.

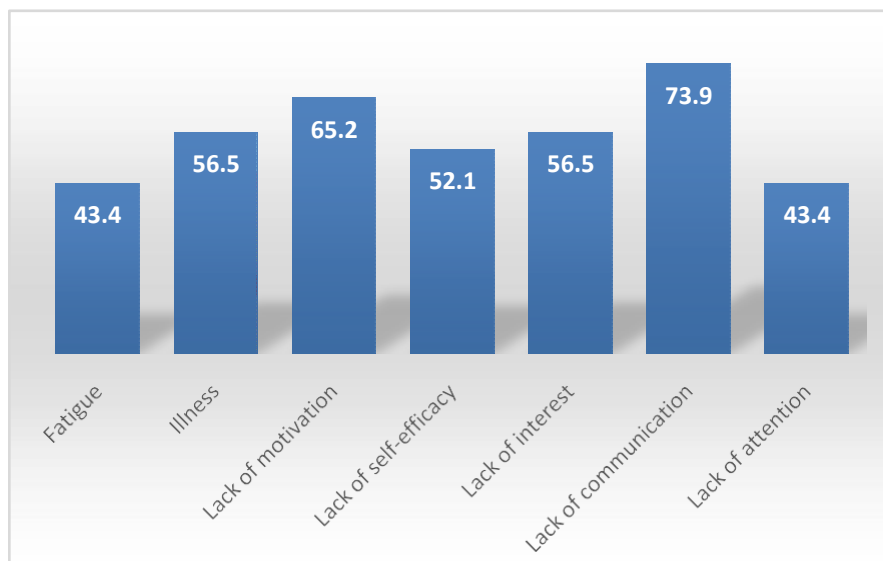


Figure 1. Personal problems of visual impaired students in percentages

Table 2

Academic Related Problems

Minor Codes	Percentage
Curricula is not interesting	73.9
Curricula is not according to their needs	86.9
Negative behaviors of teachers	47.8
Lack of Human resources (Teaching& supporting staff)	60.8
Lack of professional skills of educators	52.1

Table 2 showed that majority of the students stated that their curricula is not according to their needs and that curricula is not interesting. The same number of students said that teachers have negative behaviors and there are lacking in professional skills. *One of the students said that "I think that the content of mathematics is not according to my needs so I made me reluctant to do effort in learning mathematics and taking interest in it" One VI student said that "sometimes the teachers used to behave in odd manners and sometimes the supporting staff was non cooperative" Other said that " teachers themselves were not trained enough to teach mathematics to special needs students like us and that mathematics sequential nature demands extra support to be provide to VI students but it was not available to us".* The detail of the above table is given in figure 2 below.

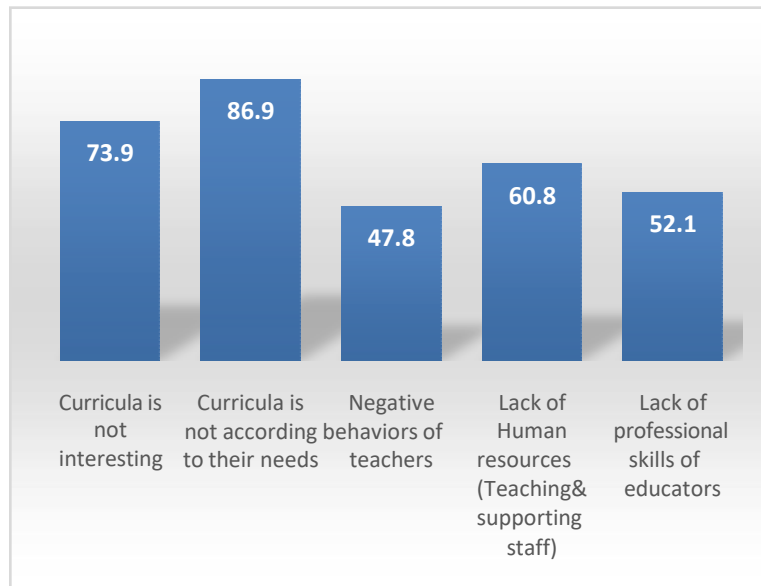


Figure 2. Academic related problems of visual impaired students in percentages

Table 3

Administrative Problems

Minor Codes	Percentages
Not providing Least restrictive environment	43.4
Inappropriate furniture	43.4
Lack of equipment and resources	87.4
Lack of supporting staff	73.5
Administration negative behaviors	30.2
Lack of training of teachers	60.3

The results in table 3 showed that 87.4 percent of the visually impaired students said that there was lack of equipment and resources in their schools. Lack of supporting staff was found to be a problem faced by most of the VI students i.e. 73.5 percent. Equal number of students said that furniture is inappropriate and unavailability of least restricted environment i.e. 43.4 percent. One of VI students said that “*there were only two braille for us and one of them was not in working conditions, so we have to manage with that one, it made the mathematics a challenging subject to be learn*”. One VI student said that “*we (VI students) need least restrictive environment that was not very much available and also the supporting staff was not providing the support up to level of our needs*”. Similarly, one student that negative behaviors of a few persons’ in administration and unavailability of resources made the mathematics a difficult subject to be learn. Especially when the there are untrained teachers to teach visually impaired and blind students.

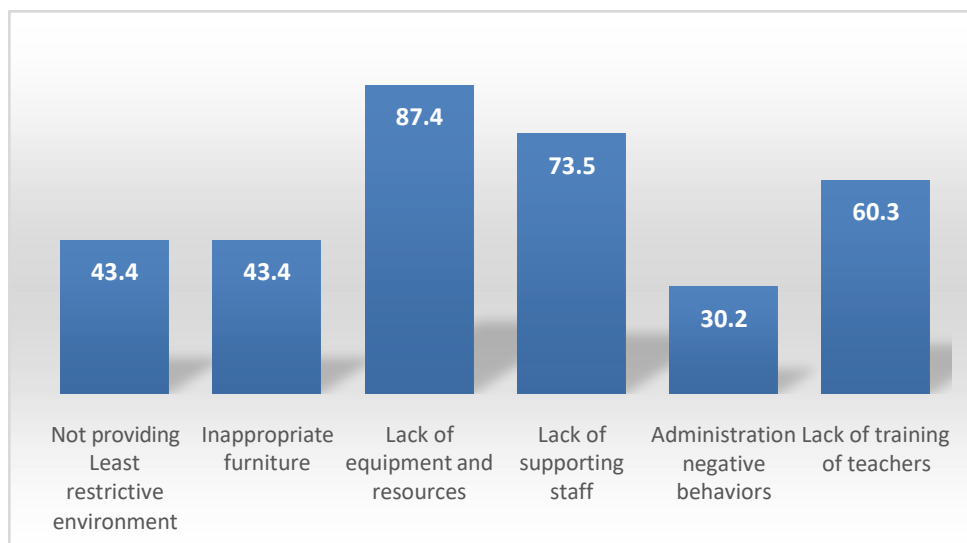


Figure 3. Administrative related problems in percentages

IV. DISCUSSION

Mathematics is very important subject to develop reasoning and decision making. VIS are facing problems in learning Mathematical concepts. A qualitative inquiry was done in the study to explore VIS personal, academic, and administrative problems in Mathematics learning. The study found that they were facing diversified problems in learning of Mathematics such as Fatigue, lack of interest and motivation, behavior of teachers and administration, lack of skilled professional Mathematics teachers, and lack of equipment and resources for studying that were aligned with the previous research findings of (Iqbal, Khan, & Ullah, 2015). In literature general problems of special needs children were explored but not specifically related to learning of Mathematics.

V. RECOMMENDATIONS

Following recommendations were given.

- The institutions may provide the visually impaired students with appropriate hardware and software facilities, and least restrictive environment.
 - Parents, relatives, sighted guides and teachers should be skilled in managing such visually impaired students.
 - The family members may provide emotional and social support to such student to make it easy for them to cope up with their personal problems
 - Special programs and manuals may be developed on teaching visually impaired students
 - The curricula may be developed with special focus on fundamental concepts and their application

REFERENCES

1. Aldemerdash, M. (2003). The Role of Practical Instructional Materials in Raising the Achievement of Students with Disabilities Optical Visualization in Mathematics (Unpublished master thesis). Mansoura University, Damietta, Egypt.
2. Alkhashrami, S. (2009). Activate modern technology in transforming digital tables and image formats

into descriptive information for people with visual disabilities (Unpublished master thesis). King Saud University, Riyadh, Saudi Arabia.

3. Ashiq, U., Abbas, N. ., &Obaid, A. (2020). The prospects threats of substance use and role of social and economic factors among youth: The case of higher education institutions. *Competitive Social Science Research Journal*, 1(2), 10–18. Retrieved from <https://cssrjournal.com/ojs/index.php/cssrjournal/article/view/15>
4. Abbas, F. &Iqbal, Z. (2018). Language Attitude of the Pakistani Youth towards English, Urdu and Punjabi: A Comparative Study. *Pakistan Journal of Distance and Online Learning*, 4 (1), 199-214.
5. Abbas, F., Jalil, M. K., Zaki, H. N. &Irfan, F. (2020). Implicit measure of language attitude: study of Punjabi native speakers by using matched guise technique. *International Journal of Innovation, Creativity and Change*, 13 (1), 194-206.
6. Bader, M. (2006).The modern attitudes in teaching mathematics for learning disabilities. Retrieved from http://www5.domaindlx.com/mibadr/research_review.doc
7. Bhatti, A.M., Abbas, F. &Rana, A.M.K. (2020). An Empirical study of learning styles used by undergraduate English learners in public sector colleges in Pakistan. *Elementary Education Online*, 19 (3), 1864-1875.
8. Carole, R., & Penny, I., (2018), Evaluation of the Effectiveness of a Tablet Computer Application (App) in Helping Students with Visual Impairments Solve Mathematics Problems. *Journal of Visual Impairment & Blindness*, 112(1), 5-19. <https://doi.org/10.1177/0145482X1811200102>
9. Creswell, W. J. (2002). *Research design: qualitative, quantitative, and mix methods approaches* (4th ed.). New York, USA: Pearson Education, Inc.
10. Fraenkel, R. J. &Wallen, E. N. (2006).*How to design and evaluate research in education*. NY, USA: Mc- Graw Hill.
11. Iqbal, M. Z. & Shams, J. A. (2018). Co-teaching Effectiveness: Students' Achievement in Mathematical Proficiencies and Content Strands. *Pakistan Journal of Education*, 35 (3), 39-58.
12. Iqbal, M. Z., & Shams, J. A. (2018). Effectiveness and Transformation in Students' Beliefs: A Case of Collaborative Teaching. *Journal of Elementary Education*. 29 (1), 121-128.
13. Iqbal, M. Z., Khan, S., &Ullah, M. Z. (2015). Gaps and Hinderances in Launching Inclusive Education in Punjab.*Educational Research International*, 5(1).
14. Iqbal, M. Z., Mirza, M. S., & Shams, J. A. (2017). Changes in Students' Beliefs: A Case of Mathematics. *Bulletin of Education and Research*. 39(3), 93-103.
15. Iqbal, M. Z., Nawaz, S., & Shams, J. A. (2015). Identification of Problems Faced by the Heads of the Special Education Institutions. *Journal of educational Sciences & Research*, 2 (2).
16. Iqbal, M. Z., Shams, J. A., &Nazir, M. (2020).Effect of Using Mathematics Manipulatives on the Student's Academic Achievement.*Journal of Science Education*.2(1).1-15.
17. Martin, J., Brenda, S., & Michele, C. (2012). Academic superiors, cognitive disability and mathematical achievement for visually impaired youth: A multi modeling approach. *International journal of special education*, 27(1), 17-27.
18. Mirza, M. S. &Iqbal, M. Z. (2014).Impact of Collaborative Teaching (CT) on Mathematics Students' Achievement in Pakistan.*Journal of Research and Reflections in Education*.8(1), 13 -21.
19. Shams, J. A., Sanfratello, A., &Iqbal, M. Z. (2020). PhD. Scholars' Problems: A Systematic Comparison of the US and Pakistan. *Journal of Research and Reflections in Education*.14(1).126-138.
20. Tasleem, Z. (2020). Does education eliminate the rural poverty in Pakistan?. *Competitive Social Science Research Journal*, 1(3), 21–31. Retrieved from <https://cssrjournal.com/ojs/index.php/cssrjournal/article/view/26>