

Learning Styles and Logical-Mathematical Abilities among Children with Visually Impairment and Sight

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Abstract: *“Learning mathematics is a highly sequential process, ” says Dr Albrecht¹. “If you don’t grasp a certain concept, fact, or procedure, you can never hope to grasp others that come later, which depend upon it. Training in logical thinking encourages learners to think for themselves, to question hypotheses, to develop alternative hypotheses, and to test those hypotheses against known facts. Hence mathematics as a subject is playing an important role in society and in the school curriculum. Majority of the school students’ school feel it as an abstract subject and difficult to understand and concept development. It is found that compare to sighted children, there is a poor achievement in mathematics among students who are visually impaired². Then the question arises why such a difference in achievement appears when the school provides more or less uniform instructional and environmental facilities? Does this difference depend upon their style of learning, thinking? The main objective of this study is to examine the relationship between the logical and mathematical abilities of children with respect to their Learning Styles in sighted and visually impaired children. For studying the cognitive behaviour of children the researcher has selected, and administered the tool: The Barsch Learning style Inventory which could be equally suitable to both visually challenged and children with sight is administered to collect data. The study reveals that, in case of visually impaired children concept development and perception mostly occur through auditory and tactile –kinaesthetic learning styles Hence it may be suggested that mathematics becomes accessible for all learners at all levels only if their learning styles and needs are not neglected.*

Keywords: Learning styles, visually challenged children, logical and mathematical abilities

1. Introduction

The world is more mathematically inclined, mathematics as a subject plays an important role in society and the school curriculum. Majority of the students in school feel it as more abstract. It is found that even though teacher uses modern educational technological devices and more advanced effective methods of teaching, there is a poor performance of the students in the mathematics. Then the question arises why such a difference in achievement appears when the school provides more or less uniform instructional and environmental facilities? Is this difference due to certain factors? Does this difference depend upon their style of learning thinking?

It is found that there is a poor achievement in mathematics among students who are visually impaired .There is a slow or less Cognitive concepts development in visually challenged children due to the lack of vision or decrease the quantity and quality of visual experience which act indirectly on the feeling of insecurity, fear the independent exploration of the environment³.

The main reason for this is that a student who is visually impaired will understand the concept in pieces and then perceived as a whole. Descriptions such as direction, quantity, shape etc in mathematics is very visual in nature can be best explained visually. Also understanding of spatial, directional concepts, concepts of conservation of mass and volume is often delayed in visually impaired children. A major reason is that teachers of visually impaired students often lack skill and knowledge in the area of mathematics instruction. Many teachers lack confidence in their ability to teach the reading and writing of braille symbols in mathematics this becomes a neglected area of instruction .All these factors taken

together combine to result generally in poor achievement among students who are visually impaired.

It is found that learning style is one of the cognitive domains which influence mathematical abilities in children. In visually impaired students a new specific learning style is developed. The visually impaired student has a concrete concept of the world. These students’ unique perception of the world is exhibited in the difference between abstract and concrete conceptualization. They have a concept of objects that they can tactually explored and identify will have meaning and concept in mind. A picture of the same object will be difficult to identify. The learning style of visually impaired students is the time consuming because they have to collect and process information through tactual to explore all parts of the object and audible methods which require accurate description to obtain a clear understanding.

In the article, ‘Effects of learning style strategies on special education students’, describes the effects of research concerned with identifying the learning styles of Special Education students and then teaching them globally, tactually, and / or kinaesthetically with instructional resources that complement their perceptual strengths. It documents statistically higher achievement and attitude-test scores as well as behavioural and lateness improvements when such treatments are provided⁴.

2. Objective of this Study

To examine the relationship between the logical and mathematical abilities of children with respect to their Learning Styles in sighted and visually impaired children.

Hypotheses:

1. There is an association between the learning styles and the logical and mathematical abilities of children with visual impairment.
2. There is a significant correlation between the learning styles and the logical and mathematical abilities of children with visual impairment.
3. There is an association between the learning styles and the logical and mathematical abilities of children with sight.
4. There is a significant correlation between the learning styles and the logical and mathematical abilities of children with sight.

Research Procedures:**Population, Sample:**

Two different independent normally distributed populations with respect to the variables are selected for this study. To understand and examine the above hypotheses, visually impaired children and sighted children of class IX in Hyderabad are considered as the Populations. While selecting the school a few variables like, physical facilities, medium of instruction, learning resources, residential facilities, enrolment and willingness to conduct the study are considered.

The researcher after a through field survey and wide consultations with the head of the institutions has identified 8 schools of sighted children and 3 residential schools catering to the educational needs of the visually impaired children that are willing to conduct the study. From these schools by adopting random sampling technique the Devnar school for Blind, Mayur Marg, Begampet, Hyderabad-500016 and Raghunatha Model High School, Chaitanapuri, Hyderabad -500060 are finally selected.

By random stratified sampling technique the researcher selected total 64 children from IX standard. Out of which 32 children are visually impaired who were selected from Devanar blind school and 32 sighted children from Raghunatha model high school for the present study.

Tools, Tool design, Development:

For studying the cognitive behaviour of children especially for the visually impaired, the researcher did extensive survey of the research literature and consulted various experts in the field to identify appropriate the tool which could be equally suitable to both visually challenged and sighted children. **The Barsch Learning style Inventory** tools used to collect data.

The Barsch Learning style Inventory

The scale is administered, as a part of a more comprehensive questionnaire to the visually impaired and sighted children to understand the different Learning styles. They are required to indicate the extent to which each statement applies to them. The Barsch Inventory is

one of the quick assessments of learning style. It try to answer the questions basing on the answers on which actual learning preference is based and not areas in which you would like to have as strengths. The inventory has 24 statements which are assigned values and these values are used in the scoring process. Three learning styles will be defined once the test is complete: Visual (sight), Auditory (sound), and Tactile/Kinaesthetic (small/large motor movements).

Children select their agreement with the items from a 5 point Likert scale (often, 5 points sometimes, 3 points seldom, 1 point). From which scoring procedure is down. Total the score for each section. A score of 21 points or more in a modality indicates strength in that area. The highest of the 3 scores indicates the most efficient method of information intake. The second highest score indicates the modality which boosts the primary strength. For example, a score of 23 in visual modality indicates a strong visual learner. Such a learner benefits from the text, from filmstrips, charts, graphs, etc. If the second highest score is auditory, then the individual would benefit from audio tapes, lectures, etc. If we are strong kinaesthetically, then taking notes and rewriting class notes will reinforce information.

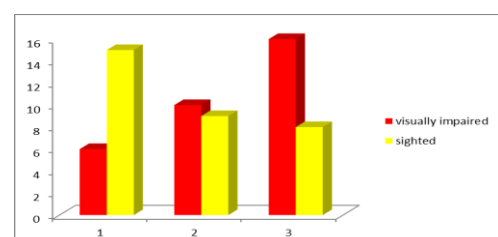
3. Data Analysis and Interpretation

The researcher has adopted quantitative research techniques for the purpose of data representation, classification and interpretation. Inferential statistical technique, chi-square and correlation are adopted for the purpose of testing the hypotheses. Interpretations are drawn on the basis of parametric and non-parametric statistical techniques.

One of the objectives of this research work is to examine the relationship between the logical and mathematical abilities of children with respect to their Learning Styles. Relevant tools were administered and the responses of children were collected, analysed and presented below.

Association between Learning styles Vs Logical-Mathematical awareness of the children.

Learning styles	Logical and Mathematical Abilities					Total
	Learning style	Poor	Fair	Good	Very Good	
Visually impaired	Visual	2	0	4	0	6
	Auditory	0	0	10	0	10
	Kinaesthetic	0	0	15	1	16
Sighted children	Visual	2	2	11	0	15
	Auditory	0	0	9	0	9
	Kinaesthetic	0	0	8	0	8



X- axis - Learning Style

Y- axis-. Logical-Mathematical Abilities

From the above table it is clear that majority of visually impaired children. 15 out of 32 are found in the kinaesthetic learning style and 10 children out of 32 are found in the auditory learning style . And with respect to their logical mathematical abilities they are found in the category, " Good". By and large the visually impaired children who are good at logical mathematical abilities have Auditory and Kinaesthetic style of learning.

In order to test the hypotheses 1 &2 they were translated into null form and appropriate statistical test Chi square was used to test the association between Learning styles and Logical- Mathematical Abilities of children with visually impaired and sight. From the statistical results inferences are drawn and presented below.

		Value	df	Asymp.sig(2-sides)
Visually impaired	Pearson Chi-Square	10.161(a)	4	.038
	Likelihood Ratio	8.612	4	.072
	Linear-by-Linear Association	6.614	1	.010
	N of Valid Cases	32		
Sighted Children	Pearson Chi-Square	1.964(a)	4	.742
	Likelihood Ratio	2.790	4	.593
	Linear-by-Linear Association	1.397	1	.237
	N of Valid Cases	32		

In case of visually impaired children the above table indicates that the calculated value of chi-square for visually impaired children is 10.161 at 4 degrees freedom and .038 probability value. In other words the calculated value is significant at 0.05 level of significance. And in case of sighted children the above table indicates that the calculated value of chi-square for children with sight is 1.964 at 4 degrees freedom and 0.742 probability value. In other words the calculated value is significant at 0.05 level of significance. In order to test the hypotheses 3 &4 they were translated into null form and appropriate statistical test – Pearson Correlation Test was used to test the correlation between Learning styles and Logical-Mathematical Abilities of the both categories of children. From the statistical results inferences are drawn and presented below.

		Learning styles	Logical-Mathematical Abilities
For visually Impaired children	Learning styles	1	0.494
	Logical-Mathematical Abilities	0.494	1
For sighted children	Learning styles	1	0.412
	Logical-Mathematical Abilities	0.412	1

There is a positive co relation between logical mathematical abilities and learning styles and the correlation value is 0.494 and significant at 0.05. This result indicates that children’s learning styles and logical-mathematical abilities of visually impaired children are significantly associated. Hence, the null hypothesis is rejected. There is a positive co relation between logical mathematical abilities and learning styles and the correlation value is 0.412 and significant at 0.05. This result indicates that children’s learning styles and logical-mathematical abilities of children with sight are significantly associated.

4. Conclusion

The above study reveals that, in case of visually impaired children concept development and perception mostly occur through auditory and tactile –kinaesthetic learning styles which is also supported by⁵. According to them, visually impaired students are tactile and kinaesthetic wherein they need to touch to learn the content.

In case of the sighted children they use all three learning styles in their concept formation. However, “Learning is the process whereby knowledge is created through the transformation of experience”⁶. And the term learning style is individual specialized effective learning system differing according to the mode of instruction and personal study⁷. The individual differences in ability and thinking style affect the learning styles of students⁸.

If the materials to be learned are reached to the learner through the preferred stylistic pattern for which the learner is predisposed, learning at that situation will be highly effective. Hence, it is recommended that teachers has to identify the student’s preferred style of learning and take them into consideration when designing instruction and administer to provide training about learning style⁹.

It may be suggested that mathematics becomes accessible for all learners at all levels only if their learning styles and needs are not neglected. It is suggested that identification of the learning style preferences will be helpful for a teacher to design very day classroom transactions¹⁰. One the learner’s style of learning is identified; teaching strategies can be adjusted in accordance with the stylistic modalities of the learner. Mathematics teachers should be prepared to anticipate challenges in their classrooms with students of different needs and differentiate their instruction according to the learning styles, aspirations, and expectations of their students¹¹.

Visually impaired students are tactile and kinaesthetic learners hence they need to touch and illustrate the concepts in their minds¹². The learning styles of the visually impaired students present a need (or a challenge) to alter the type of mathematics teaching ¹³. It is impossible to teach visual or abstract notions of mathematics to visually impaired students unless their different learning styles are not considered. Therefore it is an established fact that all students, including the visually impaired ones, can learn mathematical content and can be successful in mathematics if their needs are addressed ¹⁴.

Deprivation of learning experiences may result in poor academic performance. Children with low vision may sometimes need systematic instruction to overcome deprivation resulting from partial sight. Systematic development of cognitive functions should involve facilitating the child to learn by making use of the other senses effectively. When right learning styles, right method of teaching and a positive attitude of teacher and students towards goal of teaching and learning will enhance the logical and mathematical abilities in visually impaired children. This indirectly can help them to be a productive fully functioning independent member of society.

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