

Logical-Mathematical Abilities and Self-Efficacy Among Children with Visually Impairment and Sight.

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Abstract

The purpose of present study was to examine the relationship between self-efficacy and logical - mathematical abilities in visually challenged children of higher secondary schools. Self-efficacy is an important concept in social cognitive theory, which has been widely recognized as one of the most prominent theories about human learning¹. First developed by², self-efficacy refers to learners' beliefs about their ability to accomplish certain tasks. In this study the schools were randomly selected from Hyderabad district of Telengana State, India. To understand the association and correlation between the self-efficacy and the logical and mathematical abilities of children with visual impairment and sight, two different independent normally distributed populations were selected. By random stratified sampling technique total 64 children from IX standard were selected. Out of which 32 children are visually impaired and 32 children sighted children. In the above study it was found that both sighted children and visually impaired children show a positive correlation and association between logical-mathematical abilities and self efficacy.

Keywords: self-efficacy, logical-mathematical abilities, structural model.

Introduction

Learning mathematics is important in every one's life; including children .The main goal of mathematics education in schools is to develop values like precision, objectivity, symbolic representation, abstract conceptualization through mathematical imagination in children. Clarity of thought and pursuing assumptions to logical conclusions is central to the mathematical enterprise. The kind of thinking one learns in mathematics is an ability to handle

abstractions, and an approach to problem solving³.

For visually challenged children, ability to learn mathematics has been the concern of researchers for many years, as mathematics is symbolic in nature and it poses many challenges. Achievement in mathematics by visually impaired students tends to be poor, in fact extra ordinarily low when compared to the performance in other academic subjects⁴. Many researchers have discussed the possibility of delay in development of cognitive abilities in visually challenged children.

Development of cognitive skills is different in visually challenged children when compared to children with sight. This is because, the child with visual impairment must build up concepts of the world based on other senses and experiences.

We observe that some students understand subject very easily and ready to accept new challenges and show high level of confidence in their abilities, effective and good results in schooling learning. More over a student will have more success in mathematics when his/her previous achievement is good. To understand the above difference in learning in mathematics, there is an important concept in social cognitive theory, self-efficacy¹. Self-efficacy is a person's self-confidence about their ability to accomplish a task. It is one of the most consistently defined motivational constructs⁵, which determine an individual's judgment about being able to perform a particular activity.

Self-efficacy is first introduced by². Self-efficacy refers to learners' beliefs about their ability to accomplish certain tasks. Many researchers, including have demonstrated that self-efficacy affects human motivation, persistence, efforts, action, behaviour, and achievement^{2, 6}. Researchers have indicated that higher self-efficacy is predictive of higher performance⁷. From research studies it is inferred that many factors affect the mathematics achievement and negative math attitude of visually challenged students leads to less self-efficacy and poor performance in

mathematics. Visually impaired students face many difficulties when dealing with math problems such as, they do not know how to get the information of problems, cannot draw the schemata of math problems, cannot provide the instrument for solving math problems and also lack of learning resources like, math books, learning material and aids, etc. A student may have positive attitude towards mathematics with low self-efficacy when he/she believe that mathematics is important but he/she cannot solve a math problem. On the contrary, if they believe that mathematics is important and they develop persistence toward mathematics learning has higher self-efficacy. Comparatively there was a deficiency of research in examining the relationship between mathematics self-efficacy and mathematics achievement⁸. Mathematics self-efficacy significantly contribute to career choices⁹.

Objective of this study

To examine is there any association and correlation between the self-efficacy and the logical and mathematical abilities of children with visual impairment and sight.

Hypotheses:

1. There is an association between the self-efficacy and the logical and mathematical abilities of children with visual impairment.
2. There is a significant correlation between the self-efficacy and the logical and mathematical abilities of children with visual impairment.

3. There is an association between the self-efficacy and the logical and mathematical abilities of children with sight.
4. There is a significant correlation between the self-efficacy and the logical and mathematical abilities of children with sight.

Research Procedures:

Population and 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: Design &Development

For studying the self efficacy 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 **Generalised Self –efficacy scale** and also develop a tool to measure logical and mathematical abilities which could be equally suitable to both visually challenged and sighted children.

Generalised Self –efficacy scale is a German version developed in 1979 by Matthias Jerusalem and Ralf Schwarzer, and later revised and adapted in 26 other languages by various co-authors¹⁰. The scale was created to assess a general sense of perceived self- efficacy with the aim in mind to predict coping with daily hassles as well as adaptation after experiencing all kinds of stressful life events. The scale is designed for the general adult population, including adolescents.

The construct of Perceived Self-Efficacy reflects an optimistic self- belief¹¹. This is the belief that one can perform a novel or difficult tasks, or cope with adversity—in various domain of human functioning. Perceived self-efficacy facilitates goal setting, effort investment, persistence in face of barriers and recovery from setbacks.

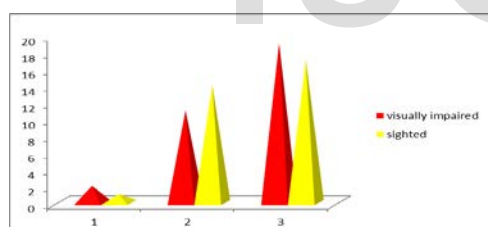
It can be regarded as a positive resistance resource factor. Ten items are designed to tap this construct. Each item refers to successful coping and implies an internal-stable attribution of success. Perceived self – efficacy is an operative constructive it is related to subsequent behaviour and, therefore, is relevant for clinical practice and behaviour change. The scale is administered, as a part of a more comprehensive questionnaire to the above visually impaired and sighted children. It takes two to three

minutes to complete. Visually impaired and sighted children are required to indicate the extent to which each statement applies to them.

Data Analysis and Interpretation

The researcher has adopted quantitative research techniques for the purpose of data representation, classification and interpretation. Inferential statistical Association between Self Efficacy Vs Logical- Mathematical Abilities of the children.

Children	Logical -Mathematical Abilities					Total
	Self-efficacy	Poor	Fair	Good	Very Good	
Visually impaired	Low	2	0	0	0	2
	Medium	0	0	10	1	11
	High	0	0	19	0	19
Sighted children	Low	0	0	1	0	1
	Medium	0	1	13	0	14
	High	2	1	14	0	17



X- axis : Self-efficacy

Y- axis: Logical-Mathematical Abilities

From the above table it is clear that majority of visually impaired children (19 out of 32) are found in the higher side of the scale of self –efficacy. And with respect to their logical mathematical abilities they are found in the category,” Good”. By and large most of the visually impaired and sighted children are found in

technique ,chi-square and correlation are adopted for the purpose of testing the hypotheses. Interpretations are drawn on this 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 and their self-efficacy.

the category of medium and high self-efficacy.

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 self efficacy and Logical- Mathematical Abilities of the both categories of children.

From the statistical results inferences are drawn and presented below.

		Value	df	Asymp.sig(2-sides)
Visually impaired	Pearson Chi-Square	33.906(a)	4	.000
	Likelihood Ratio	17.029	4	.002
	Linear-by-Linear Association	9.295	1	.002
	N of Valid Cases	32		
Sighted Children	Pearson Chi-Square	1.964(a)	4	.000
	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 is 33.906 at 4 degrees freedom and 0.000 probability value. In other words the calculated value is significant at 0.05 level of significance.And in the case of sighted children the above

table indicates that the calculated value of chi-square is 1.964 at 4 degrees freedom and 0.000 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 Self efficacy and Logical- Mathematical Abilities of the both categories of children. From the statistical results inferences are drawn and presented below.

For visu Impair childre		Self-effi	Logical-Mathemati
	Self-efficacy	1	0.643
	Logical-Mathematic	0.643	1
	Abilities		
For sigl children		Self-effi	Logical-Mathemati
	Self-efficacy	1	0.612
	Logical-Mathematic	0.612	1
	Abilities		

There is a positive correlation between logical mathematical abilities and self – efficacy and the correlation value is 0.643 and it is significant at 0.05. This result indicates that children's self-efficacy and logical-mathematical abilities are significantly correlated in visually impaired children. In the case of sighted children there is a positive correlation between logical mathematical abilities and self – efficacy and the correlation value is 0.612 and it is significant at 0.05 level. This result indicates that children's self-efficacy and logical-mathematical abilities are significantly correlated in children with visual impairment and sight.

Discussion

Understanding self efficacy and logical and mathematical abilities of children is very important for policy makers because it gives right direction in designing educational and

rehabilitation programs. In the above study it is found that both sighted children and visually impaired children show a positive correlation and association between logical-mathematical abilities and self efficacy.

There are very few studies that compare visually impaired children with sighted children and it has not been tested whether both groups benefit from self-efficacy beliefs to the same extent. Self-efficacy beliefs may only promote success in life and psychological adjustment as long as goals are attainable and realistic. Some goals are more difficult for visually impaired children to attain than for sighted children¹². The Goals become a cause of decrease in self efficacy if they are not easily attainable and success is not self-evident¹³.

There are many factors and reasons that contribute to reduced self-efficacy beliefs of students with visual impairment. Public misconceptions about blindness as well as low expectations and over assisting behaviour others may limit the development of skills that would be needed to succeed and to compete with the sighted peer¹⁴. However, It is found that general self-efficacy scores of young people with visual impairment were similar to scores from the normal sample¹⁵. Similarly, in another study no significant differences between adults with and without visual impairment were found¹⁶. Nonetheless, It is found that higher level of visual impairment were associated with lower self-efficacy of older adults¹⁷. It is observed that differences in level of self-efficacy between adults with and without disability increases with age¹⁸. This study revealed that logical-mathematical abilities can be developed through enhancing self-efficacy among school children, including visually impaired and sighted. Hence

teachers and institutions of learning must focus on developing children's self-efficacy.

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