Vol. 2 No. 4 April 2015 ISSN: 2321 – 788X

PROBLEM SOLVING ABILITY AND ACADEMIC ACHIEVEMENT IN SCIENCE OF SECONDARY SCHOOL STUDENTS IN COIMBATORE DISTRICT

D.Mahalakshmi
Research scholar, Research and Development Centre, B00harathiar University, Coimbatore-641046

Dr.N.Pugalenthy
Associate professor, Department of Biology, SRKV College of Education, Periyanaickenpalayam, Coimbatore.641026

Abstract

The present study is to investigate the significant relationship between problem solving ability and academic achievement in science of secondary school students with reference to the background variables. Survey method was employed. The tools are used in this study namely problem solving ability questionnaire. The investigator used Dr.Dubey problem solving ability questionnaire. For the Academic achievement the investigator obtained half yearly science examination marks of 9th STD students. The marks were pooled together, added and then percentages found in order to obtain academic achievement index scores of boys and girls. The significant difference between the means of each pair of group is computed using Standard Deviation,'t 'test, and Pearson's Co-efficient Correlation. The findings are established and tabulated from the analyzed data. The finding shows that there is significant difference between the problem solving ability and academic achievement science of higher secondary school students. Finally, Interpretations, Recommendations are given by the investigator based on the findings.

***Keywords**: Problem solving ability, Academic Achievement, Secondary school Students.*

Introduction

Problem solving is a common and normal activity of living and can be an important strength in coping with all kinds of demands, from daily hassles to major traumatic life events. Each individual student since the age of normal infant has the potential and talent that can be expanded and enhanced. They have been exposed earlier to various sources of information. This phenomenon to some extent can have a significant impact in the development and physical growth, cognitive, psychomotor and emotional, especially among those who are known as students Salina Bint (2014). Problem solving has been learned from childhood, and problem solving skills are developed in school years (Miller & Nunn, 2003). Problem Solving Ability is one kind of test of the student's intelligence. In day to day life, a person faces many problems and tries to solve them. It can be done only by right thinking and proper reasoning which depends upon the level of intelligence of the person. Problem Solving Ability is a mental process and is part of larger problem that includes problem finding and problem shaping. Skinner (1984) states that the term "problem-solving" is defined as the frame work or pattern within which creative thinking and learning takes place. It is a process of overcoming difficulties that appear to interfere with the attainment of a goal. Polya (1945) defines problem-solving as the process used to solve a problem that does not have an obvious solution. Bay (2000) explains teaching about problem-solving is

the teaching of strategies, or heuristics, in order to solve problems. One of the major responsibilities of education is to develop the ability of problem solving and creativity. The success, efficiency and happiness in life to a large extent depend upon these abilities. The responsibility of school becomes increasingly important to develop scientific attitudes in student so that they may solve their problems independently for better adjustment in future complex society. Generally our daily life activities are followed in routine and individual does not face any problem to perform routine duties but it is not always so, some time individual is confronted with a problem situation. Where individual has to think and find out solution to reach the goal. Problem situation occurs when there is an obstacle to reach the goal. The obstacle may be physical, social or economical which may hinder the progress of individual towards the goal. One of the major responsibilities of education is to develop the ability of problem solving. The success, efficiency and happiness in life to a large extent depend upon this ability. Achild is not born with this ability but has to develop this ability in course of his life time with the help of his parents, teachers and society at large. Therefore it is very important for the parents and teachers to understand the psychology of problem solving. Anil KumarAgnihotri (2015)

Science accounts to one of the important subjects in school education. . Apart from knowing of facts the subject is expected to develop science process skills where children observe, measure, classify, process information, interpret, think on solving problems, formulate conclusions, etc. Many researches have shown the effectiveness of problem-solving ability in science learning and process skills. Academic achievement has always been an index of one's personality which is result of social and psychological influence. The term 'Achievement' in the present study signifies the scholastic achievement of the child. Rightly or wrongly, academic achievement defined as the percentage of marks obtained in a qualifying examination forms an index of a person skill and attainment. Achievement signifies accomplishment or gain or performance, carried out successfully by an individual or group on the completion of a task, whether it is academic, manual, personal and social. Problem solving plays a crucial role in the science curriculum and instruction in most countries (Lorenzo, 2005). It is a much amented fact that students often do not succeed in applying knowledge which they have acquired in lessons given in school or in everyday contexts. This circumstance seems to apply especially to science lessons (Friege & Lind, 2006). As a consequence, improving students' problem solving skills continues to be a major goal of science teachers and science education researchers. In order to improve pupils' ability to solve problems in science, special attention should be paid to two main issues (Lee *et al.*, 2001): to develop in students problem solving skills through science education, and to look at the difficulties faced by students in this area and find ways to help them overcome these difficulties.

Review of Literature

Darchingpuli (1989) conducted astudy on science achievement, science attitude and problem solving ability among the secondary schoolstudents in Aizawl and major findings were (a) the study indicated significant relationship between scoreson scientific attitude and achievement in science, (b) significant sex differences in achievement in scienceand problem solving ability existed.

Shaffi (2000) conducted a study of problem solving activities for senior secondary biology students. Major findings of the study were: The human mind uses both the hemisphere for processing of information. The left one does it in a convergent fashion, where as the right one utilizes it as a divergent mode, scientific problem solving, however needs convergent thinking. The author had tried to demonstration how these two modes of thinking can be promoted through biology content material.

Behra (2009) conducted a study on problem solving skills in mathematics learning. His major findings were: there was no significant difference between the mean of performance of boys and girls within each ability group in any of the component skills.

Significance of the Study

Problem solving ability is the important aspect of an individual. A large part of an individuals life is spent in a struggle to find effective solution to his problems. A student having good problem solving ability will be properly adjusted in the class as well as at home. The need of problem solving behaviour is to create the power of thinking which helps to find out the solution of the problem. The main objective of problem solving is to go through the physical, psychological, social and environmental factors which hinder the progress of an individual to attain certain goals. Students with high problem solving ability become well adjusted in the society as well as in the school. However, the students who have low problem solving ability become recessive, withdrawn, nervous and prone to anxiety, which ultimately is not desirable for their sufficient positive growth. It is the duty of teachers to provide congenial atmosphere to such students in order to ensure their development of good study habits and performing academically better. When the parents are educated they guide their children properly. Such children will have higher level of aspiration and they will also perform better in the examination as compared to other children whose parents are illiterate and maladjusted. Keeping in view the importance of the study, the present problem was undertaken by the investigator.

Objectives of the Study

To find out the relationship among the secondary school students with respect to their demographic variables such as Gender, Locality, Family Occupation and Educational Qualification of Parents.

Hypotheses of the Study

1. There is no significant difference between secondary school students towards problem solving ability with respect to their Gender.
2. There is no significant difference between secondary school students towards problem solving ability with respect to their Locality.
3. There is no significant difference between secondary school students towards problem solving ability with respect to their medium of instruction.
4. There is no significant difference between secondary school students towards problem solving ability with respect to their Family type.
5. There is no significant difference between secondary school students towards problem solving ability with respect to their Parents qualification.
6. There is no significant difference between secondary school students towards academic achievement in science with respect to their Gender.
7. There is no significant difference between secondary school students towards academic achievement in science with respect to their Locality.
8. There is no significant difference between secondary school students towards academic achievement in science with respect to their medium of instruction.
9. There is no significant difference between secondary school students towards with respect to their Family type.
10. There is no significant difference between secondary school students towards academic achievement in science with respect to their Parents qualification.
11. There is no significant relationship between problem solving ability and academic achievement in science of secondary school students

Methodology

Sampling

The investigator has adopted survey method for this study. Population for this study was secondary school students studying in 9^{th} standard at coimbatore

Tools Used

Problem Solving Ability Test

In the present study, the tool employed for the collection of data was Problem Solving Ability Test prepared and standardized by Dr. L.N. Dubey, Professor in the Department of Psychology, University of Agra. This test contains 20 unsolved questions. Every question has four given responses out of which only one answer is correct. If the pupil ticks the correct answer then he/she is given one mark and if he/she ticks a wrong answer zero is given. At the end all the marks are added. The maximum marks are 20. The high the score earned on this test, the high is the problem solving ability.

Academic Achievement

Regarding the academic achievement, the investigator consulted the examination in charge of each selected school and enquired about the marks obtained by 9th class students in half yearly science examination. The examination in charge teacher was kind enough to assist the investigator. The marks were pooled together, added and then percentages found in order to obtain academic achievement index scores of boys and girls.

Data Analysis

Mean, SD and 't' test were computed to know the significant difference between the means of the different sub-groups in terms of Gender , Locality , medium of instruction, Family type and Parents Educational Qualification.

Table 1
Difference in problem solving ability of secondary school students based on demographic variables

Variables	Sub variables	N	Mean	SD	't'	Result
Gender	Male	37	15.25	1.79	6.97	S
	Female	23	17.69	0.97		
Locality	Urban	31	17.03	1.60	4.01	S
	Rural	29	15.27	1.84		
Medium of Instruction	Tamil	25	15.92	2.03	0.9	NS
	English	35	16.37	1.84		
Type of family	Nuclear	42	15.47	1.79	2.31	S
	Joint	18	17.83	0.98		
Parents Qualification	Illiterate	13	14.61	1.89	6.06	S
	Literate	47	16.61	1.71		

From the above table-1, it is found that there is significant difference in problem solving ability of Secondary school students based on Gender, Locality and Type of family and Parents Qualification. It has been also found that there is no significant difference in the problem solving ability of secondary school students based on the medium of instruction. The mean attitude score of students whose parents are literate are higher than whose parents are illiterate.

Table 2
Difference in academic achievement in science of secondary school students based on demographic variables

Variables	Sub variables	N	Mean	SD	't'	Result
Gender	Male	37	64.51	3.10	12.41	S
	Female	23	79.91	5.46		
Locality	Urban	31	64.54	3.02	7.54	S
	Rural	29	76.68	8.20		
Medium of Instruction	Tamil	25	64.68	3.28	5.99	S
	English	35	74.51	8.90		
Type of family	Nuclear	42	65.64	4.60	13.04	S
	Joint	18	81.55	4.25		
Parents Qualification	Illiterate	13	64.01	2.48	5.60	S
	literate	47	72.19	8.86		

From the above table-2, it is found that there is significant difference in academic achievement in science of Secondary school students based on Gender, Locality and Type of family and Parents Qualification. . The mean attitude score of students of joint family are much higher than the students from nuclear family.

Table 3
Relationship between problem solving ability and academic achievement in science of secondary school students

Variable	N	Mean Level	'r' Value	Level of Significance at 0.05 level
PROBLEM SOLVING ABILITY	60	16.18	0.578	0.2542
ACADEMIC ACHIEVEMENT IN SCIENCE	60	70.41		

From the above table-3, it is found that the calculated 'r' value is higher than the table value, so there is significant relationship between problem solving ability and academic achievement in science of Secondary school students. This means that problem solving ability is positively related with academic achievement in science.

Findings

1. There is significant difference between secondary school students towards problem solving ability with respect to their Gender.

2. There is significant difference between secondary school students towards problem solving ability with respect to their Locality.
3. There is no significant difference between secondary school students towards problem solving ability with respect to their medium of instruction.
4. There is significant difference between secondary school students towards problem solving ability with respect to their Family type.
5. There is significant difference between secondary school students towards problem solving ability with respect to their Parents qualification.
6. There is significant difference between secondary school students towards academic achievement in science with respect to their Gender.
7. There is significant difference between secondary school students towards academic achievement in science with respect to their Locality.
8. There is significant difference between secondary school students towards academic achievement in science with respect to their medium of instruction.
9. There is significant difference between secondary school students towards with respect to their Family type.
10. There is significant difference between secondary school students towards academic achievement in science with respect to their Parents qualification
11. There is significant relationship between problem solving ability and academic achievement in science of secondary school students.

Discussion

The result of the study indicates that there is significant relationship between problem solving ability and academic achievement in science of Secondary school students based on Gender, Locality, Medium of instruction , Type of Family and Parents educational qualification. There is a quite strong positive correlation between students' attitude towards science and their problem solving skills. The problem solving ability academic achievement in science of female students higher than male students since they have more chance of experience than male students in our society; frequency of facing negative and positive events; parents contribute their problem solving skills development. This can be interpreted as a result of developing more effective attitudes toward problems in the life process the problem solving ability of urban students higher than rural students. The Urban students have frequent interaction with educated people and thus gets motivated for education in contrast to the students of rural areas where they are mostly engaged with parents in farming and other jobs and thus do not get much time for study. The reason behind is that the parents of urban students provide more facilities and opportunities to their children in developing their problem solving ability through seminars, discussions and other play-way techniques. They motivate and help their children to excel in various fields and this develops high problem solving ability among them where as the parents of rural students are mostly illiterate and economically poor and hence they do not help their wards

in developing high problem solving ability. They do not know how to develop problem solving ability among their children, which is of utmost importance. They do not take interest in how their children learn or develop problem solving ability in comparison to urban students. Therefore, the development of students' abilities should be of great importance as it shows a high and positive significance in problem solving which also relates to the effective learning which will return result in higher level of achievement to the individual, society and the nation at large.

Educational Implications

In order to increase the problem solving ability of the secondary school students , congenial home environment need to be created by the parents for their desirable sufficient positive growth. The parents should pay special attention to them. They should encourage their children to solve their day to day problems by using their cognitive abilities. . It is the responsibility of the teachers to identify the students who have low problem solving abilities and try to modify their learning and thinking power through various audio-visual aids. In order to increase the problem solving ability and academic achievement of the students, qualified and well-trained teachers should be appointed in the schools so that they may understand the difficulties faced by the students and help them in developing their cognitive abilities. The teachers should inform the parents regarding the poor academic achievement of their children. Parents should help their children in solving their problems independently at their own pace. They should engage their children in specially designed problem solving activities to increase their problem solving ability. It is desirable to organize problem solving contexts and competitions in the society especially for these students. The students should be encouraged to participate in these contexts which will definitely increase their problem solving activities.

Conclusion

Problem solving is the key to success and has been regarded as the most significant aspect of human behavior. One of the major aims of education is to develop the ability to attain better performance. No two individuals are alike. There are individual differences in the problem solving ability. Some individuals can handle a situation, but others cannot. A large part of an individual's life is spent in a struggle to find effective solution to his problems. A student having good problem solving ability will be properly adjusted in the class as well as at home. Educators can play an instrumental role in fostering an environment of teaching and learning by presenting topics in an activity oriented manner to mitigate or prevent science anxiety. Various types of co-curricular activities can be organized frequently to promote qualities such as cooperation, tolerance, open-mindedness and sharing of responsibilities to enhance their Problem Solving Ability

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