

**A STUDY OF EFFECT OF COGNITIVE ENCOURAGEMENT ON  
ACADEMIC ACHIEVEMENT OF UNDERACHIEVERS IN SCIENCE**

Umesh Chandra Kapri

Associate Professor, Gold Field College of Education, Faridabad

**Abstract :-** *The students who score below their potential on achievement test in science are labeled as underachievers in science. Such underachievers in science may underachieve in a particular subject particularly in science. However, opinions are divided among educationists regarding the definition and causes of underachievement. This paper addresses how cognitive encouragement is associated with underachievement in science subject. The rationale for the study was to identify the effect of cognitive encouragement of school environment on academic achievement of underachievers in science and to find out the ways through which their level of achievement can be improved particularly in science subject. The study was carried out on a randomly selected sample of 400 underachievers in science belonging to class 9<sup>th</sup>, selected from 16 Government and Government-Aided secondary schools of Faridabad district of Haryana. Achievement test in science prepared and standardized by the investigator was used to assess achievement of class 9<sup>th</sup> underachievers in science. RPM was used to measure the intelligence of underachievers in science. Descriptive statistics, t- test and Pearson's correlation were used to analyze the data and to test the hypothesis. The results revealed that there is significant correlation between academic achievement and cognitive encouragement dimension of school environment of underachievers in science. A significant difference was found between the means of cognitive encouragement of underachievers in science belonging to Government and Government-Aided school, which revealed that the underachievers in science of Government-Aided schools were more cognitively encouraged in comparison to their counterpart the underachievers in science studying in Government Schools.*

**Keywords:** Underachiever in Science; Cognitive encouragement; Intelligence.

**INTRODUCTION**

There has been a general concern in recent times in the educational arena regarding the academic performance of underachieving underachievers in science. Barbara (2005) concluded that the processes of defining underachievement, identifying gifted underachieving students, explaining underachievement, and suggesting appropriate interventions remain controversial issues. Aside from school or family influence, Gallagher (1991) contended that personal and psychological factors could also cause underachievement. The present work therefore focuses on relation and effect of cognitive encouragement dimension of school environment on scholastic achievement in science of secondary schools' underachievers in science. In light of this, it is revealed that the condition of underachievers in science can be improved by encouraging them cognitively.

**SCHOOL ENVIRONMENT**

School is the second most important place after home that provides an enormous area of interaction in which personality of students is clearly expressed and shaped. School plays an important role in moulding the personality of children because a significant part of child's life is spent in school between the ages of 6 and 18 years. In schools children continue the process of liking and disliking, conforming and rebelling, acquiring a conception of the world. Here the teacher substitutes the parents. His behaviour plays significant role for the child's development. The school poses new problems to be solved, new taboos to be accepted into the superego and new models for imitation and identification, all of which contribute their share in moulding personality. There are several dimensions of school environment. Cognitive encouragement is one of them. It refers to "teacher's behaviour to stimulate cognitive development of student by encouraging his/her actions or behaviours". In recent years educators have explored links between classroom teaching and emerging theories about how students learn. Exciting discoveries in neuroscience and continued developments in cognitive psychology have presented new ways of thinking about the brain and the human neurological structure and the attendant perceptions and emotions that contribute to learning. Scientists caution that the brain is complex. Brain research provides rich possibilities for education and reports of studies from this field have become popular topics in some educational journals.

**UNDERACHIEVEMENT AND ITS CAUSES**

Educationalists have found it difficult to proffer a universal definition of underachievement. A research carried out with underachieving students in China, it was revealed that underachievement involves a marked discrepancy between expected and actual performance (Kit-Ling Lau and Chan 2001). According to Delisle and Berg, underachievement is content and situation specific. Those who may not be successful at school, for example, are often successful in outside

activities such as sports, music or after-school jobs. A student may be underachieving in mathematics or science but may not be in other subjects such as language, social studies etc. It can be concluded that underachievers include those students who;

1. do not perform according to expectations in a particular subject area.
2. do not show interest/do not do well in their studies.
3. do have the necessary intellectual ability yet underachieve.

Sousa (2003) observed that a combination of factors both in the home and at school can cause underachievement. Underachievement in any academic area can be identified: (1) their inadequate understanding of how to select, adapt, and monitor strategies for learning; and (2) their insufficient motivation to apply actively the understanding they have. Ryan (1989) stressed that reading plays an important role in achievement. If pupils do not learn how to read effectively early on in school, they may have difficulty at later stages and underachieve. A few factors mentioned below can be the cause of underachievement in school children, viz. Lack of motivation, Parental influence, Lack of nurturing of intellectual potential, Conflict of values, Disabilities or poor health condition, Brain damage, cerebral dysfunction or neurological impairment. The student-centred counselling approach seems to be promising in improving the condition of underachievers. Within the context of the student-centred approach, relationships are a key issue in learning (Rogers 1961). Underachieving students need someone to value them and show interest in them. Teachers can help the underachievers this way as;

1. Teachers should act as facilitators who can create an environment that is conducive for learning and engagement.
2. Teachers should not put up a professional or personal façade when dealing with underachieving students.
3. Teachers also need to empathize with the students.

Rogers (1961) also encouraged teachers to engage their students with task. Tasks can be enriched to increase the interest and engagement of underachievers, providing an opportunity for them to have a sense of choice and ownership of activities that provoke curiosity and the personalization of learning.

### **UNDERACHIEVEMENT IN SCIENCE**

Science is a process as well as a product. The understanding of science is possible only when the individual will get thorough knowledge about the skills involved in scientific process. Without the understanding of skills, one cannot follow or study about the scientific process. The purpose of teaching and learning Science is specifically to produce Scientists and engineers who will continue the research and development that is central to the economic growth of our country. On the other hand to produce technological proficient workers who are capable of dealing with the demands of a science-based high technology workforce. Underachievement can be defined as an inability or failure to perform appropriately for one's age or talents, i.e. unfulfilled potential. The students who underachieve in a particular subject such as in science subject are known as topical underachievement. If the students achieve below their potential in science subject, this is called as underachievement in science. Quantitatively, underachievement in science refers to the difference of one standard score between the scores of achievement test in science and intelligence test. More precisely, all those students who scored at least one standard less marks in science subject in comparison to the marks obtained in intelligence test were considered as underachievers in science.

### **NEED AND SIGNIFICANCE OF THE STUDY**

In spite of much research in the area of underachievement, it appears that not much has been done to provide lasting solutions to the problem of underachievement at school, especially in subject wise in various subjects of secondary schools. Also many studies have centred on gifted underachievers at the expense of considering other areas such as gender and culture (Muir-Broadbent 1995, Peterson and Colangelo 1996, Barbara 2005). The present study identifies the effect of cognitive encouragement school environment on academic achievement of secondary schools' underachievers in science. The study defines and identifies the effect of cognitive encouragement school environment on academic achievement on science subject and suggests possible ways in which academic success particularly in science can be enhanced. Achievement is the end product of all educational endeavours (Balsubramanian, 1997). In fact, it appears as if the, whole system of education revolves round the academic achievement of students. Thus a lot of time and effort of the schools are used for helping students to achieve better in their scholastic endeavours. Science education increases students' critical thinking and problem-solving skills and provides rational explanations of "why things work the way they do". To a developing country like India, achievement in science is of great significance as it involves producing scientists, engineers and technically efficient personals. Therefore, it has to be encountered with profound care lest it should shake the very roots of nation's economic and social structure. Thus, the need for exploring scientifically the effect of cognitive encouragement school environment on academic achievement in science of underachievers in science is imperative.

### **STATEMENT OF THE PROBLEM**

The research work is entitled as, "A Study of Effect of Cognitive Encouragement on Academic Achievement of Underachievers in Science".

### **OBJECTIVES OF THE STUDY**

The following objectives were framed for the study;

1. To find out the number of underachievers in science experiencing at various levels of cognitive encouragement dimension of school environment.
2. To study the relationship between cognitive encouragement school environment of and academic achievement of underachievers in science.
3. To study the significance of difference between cognitive encouragement school environment of male and female underachievers in science of secondary schools.
4. To study the significance of difference between cognitive encouragement school environment of Government and Government aided secondary schools' underachievers in science.

### HYPOTHESES

The following research hypotheses were formulated;

1. There is no significant correlation between academic achievement and cognitive encouragement school environment of secondary schools' underachievers in science.
2. There is no significant difference in cognitive encouragement school environment between the male and female underachievers in science of secondary schools.
3. There is no significant difference between underachievers in science of Government and Government- Aided Secondary schools with respect to their cognitive encouragement school environment.

### OPERATIONAL DEFINITION OF THE KEY TERMS

**Underachievers in Science:** Underachievers in science refers to those secondary school students who scored at least 18 (one standard) less marks in achievement test in science in comparison to the marks obtained in intelligence test.

**School environment:** It refers to the psycho-social climate of school as perceived by the pupils. It includes the quality and quantity of the cognitive, emotional and social support that has been available to the underachievers in science during their school life.

**Cognitive encouragement:** It refers to "teacher's behaviour to stimulate cognitive development of student by encouraging his/her actions or behaviours".

### METHODOLOGY

A sample of 400 underachievers in science of IX standard, 200 from government schools and 200 from government - aided schools was taken through stratified random sampling technique from a population of 1684 students of 9th standard selected randomly from 18 secondary schools of Faridabad district of Haryana. At first Achievement Test in science was administered on Class IX underachievers in science of selected secondary schools of Faridabad district to assess their achievement in science. Thereafter Advanced Raven Progressive Matrices was administered on the same population to measure their intelligence. The raw scores of achievement test in science and intelligence test were converted into standard scores. The difference of standard scores of achievement test in science and intelligence test was calculated. Those students of class 9<sup>th</sup> who scored at least 18 less marks in achievement test in science in comparison to the marks obtained in intelligence test were taken as sample for the study. The data for cognitive encouragement school environment were collected by applying School Environment Inventory (SEI) developed by K.S.Mishra (2002).

### ANALYSIS AND INTERPRETATION OF DATA

The data were analyzed by using descriptive statistics, t- test and Pearson's correlation. The hypothesis was tested at 0.01 and 0.05 level of significance.

Table1: School Cognitive Encouragement Statistics							
Norms	Boys	0-24	25-36	Above 36	Total	Mean	S.D.
	Girls	0-26	27-34	Above 34			
Level		Low	Average	High			
Boys of Govt.-Aided Schools	Number	35	64	1	100		
	Percent	35	64	1	100	26.33	5.84
Girls of Govt.-Aided Schools	Number	55	41	4	100	25.26	6.25
	Percent	55	41	4	100		
Boys of Govt. Schools	Number	73	27	0	100	21.62	4.86
	Percent	73	27	0	100		
Girls of Govt. Schools	Number	92	5	3	100	20.11	5.08
	Percent	92	5	3	100		
Grand Total	Number	255	137	8	400	23.33	6.09
	Percent	63.75	34.25	2	100		

As shown in table 1, it is revealed that a vast majority of underachievers in science i.e. 255 (63.75%) were found under low level of cognitive encouragement, 137 (34.25%) under average level and only 8 underachievers in science i.e. 2% were found to be experiencing high level of cognitive encouragement school environment. School wise analysis shows that the mean of cognitive encouragement of boys of government-aided schools was highest i.e. 26.33 with standard deviation 5.84 among four categories of schools while girls of government schools recorded the lowest level of cognitive encouragement with mean 20.11. The mean of cognitive encouragement dimension of girls of government –aided schools and boys of government schools were calculated to be 25.26 and 21.62 respectively. Mean for all underachievers in science in terms of cognitive encouragement dimension of school environment was found to be 23.33 with standard deviation 6.09. Thus more congenial cognitive encouragement school environment is provided by government-aided schools. It may be interpreted that government schools should try to raise the level of cognitive encouragement school environment.

**Pearson's Coefficient of Correlation between Cognitive Encouragement Dimension of School Environment and Achievement in Science:**

<b>Table -2: Correlation between Cognitive Encouragement and Achievement in Science</b>				
<b>Categories of Schools</b>	<b>Variables</b>	<b>Number</b>	<b>Correlation Coefficient</b>	<b>Remarks</b>
<b>Male Underachievers in science</b>	Cognitive Encouragement	400	0.806	Significant at both 0.05 and 0.01 levels
	Achievement in Science	400		
<b>Female Underachievers in science</b>	Cognitive Encouragement	400	0.862	Significant at both (0.05 and 0.01) levels
	Achievement in Science	400		
<b>Underachievers in science of Government Secondary Schools</b>	Cognitive Encouragement	400	0.895	Significant at both 0.05 and 0.01 levels
	Achievement in Science	400		
<b>Underachievers in science of Government-Aided Secondary Schools</b>	Cognitive Encouragement	400	0.864	Significant at 0.05 and at 0.01 levels
	Achievement in Science	400		

The Pearson's correlation coefficient between Cognitive Encouragement dimension of school environment and Achievement in Science of secondary school male underachievers in science was found to be 0.806, for females it was 0.862, for underachievers in science of Government secondary schools, it was found to be 0.895, for underachievers in science of Government – Aided schools the correlation coefficient was calculated to be 0.864 which is significant at both (0.05 and 0.01) levels of significance. So, it can be concluded that there is significant correlation between cognitive encouragement and achievement in science of underachievers in science of secondary schools.

**Comparison of Cognitive Encouragement of School Environment between Male and Female Underachievers in Science:**

<b>Table 3: Comparison between Male and Female Underachievers in Science on Cognitive Encouragement of School Environment</b>					
<b>Gender</b>	<b>Male N=200</b>		<b>Female N=200</b>		<b>t-ratio</b>
	<b>Mean</b>	<b>S.D.</b>	<b>Mean</b>	<b>S.D.</b>	
<b>Cognitive Encouragement</b>	23.97	5.86	22.68	6.25	2.129
					Significant at 0.05 and not significant at 0.01 level

The overall mean as is seen in the Table 3 for male underachievers in science with respect to cognitive encouragement was computed to be 23.97 with standard deviation 5.86, while for female, it was 22.68 with standard deviation 6.25. On an average both male and female underachievers in science were almost equally cognitively encouraged. The obtained t-ratio between male and female underachievers in science in term of cognitive encouragement school environment was found to be 2.129, which is not significant at 0.01 level and it is significant at 0.05 level of significance.

**Comparison of Cognitive Encouragement School Environment between Underachievers in Science of Government and Government-Aided Secondary Schools:**

Table 4: Comparison of Cognitive Encouragement between Underachievers in Science of Government and Government-Aided Secondary Schools						
Schools	Govt.- Aided (N=200)		Government (N=200)		t-ratio	Remarks
	Mean	S.D.	Mean	S.D.		
Cognitive Encouragement	25.79	6.07	20.86	5.03	8.844	Significant at both 0.05 and 0.01 levels

The mean score of cognitive encouragement school environment of underachievers in science of government-aided school was calculated to be 25.79 while for underachievers in science of government schools, it was 20.86. The obtained t-ratio of cognitive encouragement school environment between underachievers in science of government-aided and government schools was calculated 8.844, which is significant at 0.01 and 0.05 levels of significance. Hence, it is concluded that the underachievers in science of government-aided schools were experiencing better cognitive encouragement school environment in comparison to the underachievers in science of government schools.

### MAIN FINDINGS OF THE STUDY

The important findings are given below:

1. A significant correlation was found between cognitive encouragement dimension of school environment and achievement in science of underachievers in science of secondary schools.
2. There was no significant difference of cognitive encouragement dimension of school environment between male and female underachievers in science of secondary schools.
3. The Government-Aided schools provide better cognitive encouragement school environment in comparison to the Government Schools.

### CONCLUSION

There is significant correlation between cognitive encouragement school environment and academic achievement of underachievers in science of secondary schools. Thus school environment affects academic achievement in science of the underachievers in science. It means providing better cognitive encouragement school environment enhances achievement in science. Teachers can encourage underachievers in science providing better learning which will give them feedback on their better performance in science. Encouraging the underachievers in science for better handling and better use of scientific process, scientific apparatus and instrument can provide insights into the problem and reveal promising intervention strategies for the remediation of the situation. Underachievers in science can achieve better if they are provided with the appropriate help and encouragement.

### SUGGESTIONS FOR TEACHERS

Given below are some initiatives that teachers may take to encourage their underachievers in science cognitively;

1. Teachers can promote real cooperative activity by encouraging collaboration during the activity-planning stage.
2. One effective approach for maximizing the child's intrinsic interest is to involve children in activities in which they can determine their own objectives.
3. Through acting on objects and observing the effects, children receive feedback, which helps them adapt their differing perspectives when working cooperatively.
4. Encourage children to interact with each other. This conveys the importance of each child's perspective and encourages children to come up with their own goals.
5. A teacher can play a vital role by encouraging them clarify their goal before they attempt to solve the problem. Teachers can verbalize the objective for the children.
6. Involve children who are unlikely to initiate. Quieter children are less likely than more assertive children to become involved or state their ideas.
7. Teaching strategies should be appropriate. It is not appropriate to demonstrate solutions or solve a problem for them. Research suggests that arriving at the correct answer is less important for children's cognitive development than the process of struggling with the problem cooperatively.

### REFERENCES

1. Aggarwal, J.C (2006), *Psychology of learning and development*, Shift Publication, Delhi.
2. Arthur, T.J.(1963), *The psychology of Adolescence*. Macmillan Publication, London.
3. Balasubramaniyam, P.S. (1997). Correlates of Achievement. In *Fifth Survey of Educational Research 1988-92, Trend Reports*. New Delhi: NCERT.



4. Best, J.W. and Kahn, J.V. (2003). *Research in Education*. New Delhi: Prentice-Hall of India Pvt. Ltd.
5. Mishra, K.S. (2002). *School Environment Inventory*. Ankur Psychological Agency, Lucknow.
6. Safaya, 1963, *Gender Analysis of Academic Achievement among High School Underachievers in science*.
7. Tannenbaum, A.J. (1993) "Gifted Children: *Psychological and Educational Perspectives*" Macmillan Publishing Company, New York.