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CONTENTS

EDITORIAL	3
RESEARCH PAPERS	
A Comparative Study of Creativity among Boys and Girls of Class VII SAIMA SIDDIQI	5
Assessment of Sarva Shiksha Abhiyan in Sarvodaya Schools of Delhi SAKSHI JAIN AND MEENAKSHI MITAL	15
Perspectives in Learning and Cognition from History of Epistemology JYOTI RAINA	30
Remediation of Perceptual Deficit Among Learning Disabled: Effect of Intervention PREETI VERMA	41
An Investigation into the Awareness, Knowledge and Attitude of Student Teachers towards Climate Change JYOTIRMAYEE NAYAK	54
Educational Development in India at Elementary Level— <i>An Interstate Perspective</i> B.M.K. RAJU AND AVTAR SINGH	64
Influence of School and Students Factors on Mathematics Achievement SADIA MAHMOOD AND TAHIRA KHATOON	80
Responsible Environmental Behaviour of Secondary School Students in Relation to their Locus of Control and Achievement Motivation SUKHWANT BAJWA AND SHALU GOYAL	99

Vocational Interests and Academic Achievement of Secondary School Students at Different Levels of Creative Thinking Ability- <i>A Comparative Study</i> MOHAMMAD IQBAL MATTOO	117
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BOOK REVIEWS

Remaking Higher Education <i>Essays in Dissent</i> SHARAD SINHA	130
Career Growth and Joy at Work N.K. GUPTA	131

EDITORIAL

Education remains relevant as long as it maintains the dynamic character. Research, innovations and assessment activities not only enrich the knowledge but also are prerequisite to dynamism. Educational settings are changing, the learner's profile and expectations are changing too. What should be considered knowledge in educational settings, how much and how the knowledge needs to be imparted in such settings, how effectiveness of the teaching learning process can be enhanced, how learners with different capabilities can be offered inclusive settings are the questions of constant exploration and discussion. No less important is the dissemination of the findings at appropriate levels so that these be suitably incorporated in practice. DERPP, NCERT provides a forum for this through its various publications, the Indian Educational Review is one of them. The latest issue of the IER is in your hands to read and reflect and get back to us with your contributions and suggestions so that it maintains its quality and relevance.

Even the cursory look at the present issue of the journal will convince you about its quality of research papers, research notes and the book reviews that it contains. The researchers in their contribution have probed and reflected upon a variety of issues of contemporary concern and interest. These include the study of creativity, assessment of SSA, Historical perspective of learning and cognition, remediation of perceptual deficit among learning disabled, influence of school and student related variables, student's achievement in mathematics, responsible environmental behaviour, study on vocational interest and academic achievement, educational development in Elementary Education in India etc. The studies have tried to investigate the relevant variables and their implications, The issue also contains two book reviews on recent publications in the field of Higher Education and Career Growth and Joy at Work.

POONAM AGRAWAL
Academic Editor

Indian Educational Review

Indian Educational Review aims to enhance the theory and practice of research in education. It is a journal of opinion and research in the field of education. Contributions may comprise scholarly discussion of new issues, reports of research, reviews of researches in particular field, reports of developments, and debate on educational research generally or on specific issues. Contributions are also invited reporting all kinds of empirical research in education, whether sociological, psychological, economic or organisational. The journal is intended to cover a wide range, including interdisciplinary studies.

In addition, the purpose of this journal is to provide a medium for dissemination of educational research and exchange of experiences among research workers, scholars, teacher educators, teachers and others interested in educational research and related fields and professions.

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A Comparative Study of Creativity among Boys and Girls of Class VII

SAIMA SIDDIQI*

ABSTRACT

The purpose of this study was to investigate differences for boys and girls in terms of the relation between different aspects of creativity. A sample of 50 boys and 50 girls' studying in two secondary schools of Aligarh city was randomly selected. The investigator had personally met the participants and administered the tool. Torrance Test of Creative thinking (Verbal Form A) designed by E. P. Torrance (1968) was used. Mean S.D.S and T-test were calculated to analyse the data. The findings reveal that boys do not differ significantly in all the variables of verbal creativity, except the measures of originality from the girls.

Introduction

“Creativity is thinking and responding process that involves connecting with our previous experience, responding to stimuli (objects, symbols, ideas, people, and situations) and generally to at least one unique combination.”

Parnes (1963:5)

“A nation's progress, greatness depends not only on its material achievements but also upon its great thinkers, artists and scholars that are regarded as creative genius. And in fact, historical records provide evidence that cultures have collapsed because of failure to utilise, intelligent and imagination methods for solving their problem.”

Torrance (1962)

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Guilford (1966) has pointed out that, "Creativity is the key to education in its fullest sense and to the solution of mankind's most serious problems."

Creativity and Sex Differences

Many investigations conducted in India and abroad have revealed inconsistent results on sex differences in the test scores of creativity. Torrance (1963) while investigating on sex differences in creativity of the students from first grade to fourth grade has found that boys become increasingly superior on most of the measures of creative thinking, up to third grade. By fourth grade boys begin to lose their battle against conformity to behavioural norms showing a sharp measured decrement in most of these abilities (originality and flexibility). Torrance and Alotti (1969) found that girls were better than boys on the measure of creativity. Richmond (1971) has concluded that females scored higher than males. Flaherty (1992) investigated on the effects of a multimodal programme on self concept and cognitive and affective creativity on students in third grade and found that the girls in the experimental group made significant gains over the boys. In another study conducted by Boling and Boling (1993) found that first born males and later born females demonstrated the greatest creativity.

With younger students prior to grade three, Kogan (1974) and Tegano and Moran (1989) found a tendency of girls to score higher than boys. However boys scored higher on originality in grade three. Coon (1969) and Warren, Luria (1972) found higher scores for girls in early adolescence on figural creativity. Torrance (1983) found that gender differences in divergent thinking ability have changed over time. In the 1950s and 1960s boys outperformed girls on measures of originality, whereas girls surpassed boys on elaboration and most measures of verbal creativity. Torrance (1962, 1965) and Harold's (1968) results indicated that there are significant sex differences on several creativity variables, with males being stronger than the females. Raina (1969) found that boys excelled on all the figural measures of creative thinking as well as some of the verbal measures. Nayana (1981) found that males excelled females on measures of verbal flexibility, figural originality and figural elaboration.

Singh (1982) made an extensive study and found that boys achieved significantly higher mean scores than the girls on the measure of creative thinking. Lau and Li (1996) also found that boys were more creative than girls.

Statement of the problem

The present work is thus a comparative study of Creativity among boys and girls of Class VII.

Methodology

Sample: A sample of 50 boys and 50 girls studying in two secondary schools of Aligarh city was selected on random basis for the study. The sample was equal on age and socio-economic status.

Design of the study: In the present study descriptive survey method was used.

Instrument of the study: Torrance Test of Creative Thinking (Verbal TTCT: Thinking Creatively with Words Form A) designed by E.P. Torrance (1968) was used. The test is appropriate for the kindergarten level (age 6) through the graduate level and beyond, and can be individual or group administered. It requires 30 to 45 minutes of working time. Translated into over 35 languages, the Torrance Test of Creative Thinking is a test in which anyone could respond to—regardless of previous experience. This test is recommended as the best standardised measure to use because of the preponderance of evidence of reliability and validity over time and in different cultures. The TTCT is the most widely used and studied creativity tests (Treffinger, 1985; Swartz, 1988; Johnson and Fishkin, 1999). These tests can be used not only for identifying the gifted, but also for discovering and encouraging everyday life creativity in the general population. The atmosphere in which the TTCT is administered is important. Torrance (1966) recommended the creation of a light atmosphere such as thinking or problem-solving to avoid the threatening situation associated with testing. His intent was to set the tone so that examinees would enjoy the activities. Examinees should be encouraged to have fun and should experience a psychological climate that is as comfortable and stimulating as possible (Ball and Torrance, 1984). The verbal forms of the test incorporate tasks which require the use of language. The subjects are required to provide written responses to the questions put to them. The verbal activities are of the following types:

1. Asking question type
2. Guess causes type
3. Guess Consequences type
4. Product-improvement type

5. Unusual uses type
6. Just suppose type

Activity 1, Ask question consist of asking questions about the picture. **Activity 2**, Guess causes consist of guessing causes of the action in picture. **Activity 3**, Guess Consequences, consist of guessing consequences, immediate or long term, about the picture. Subjects are allowed five minutes to complete each of these activities. **Activity 4**, Product Improvement consists of showing an item, such as a stuffed animal, and asking for suggestions to improve it. **Activity 5**, Unusual Uses, consists of thinking of alternative uses for a common object, such as cardboard boxes, or tin cans. Uses of the part of the object are acceptable. Fantastic or impossible uses beyond all possible reality are not counted. **Activity 6**, Just Suppose Hypotheses consist of thinking about an improbable situation. For instance, suppose we could transport ourselves anywhere we want with just a twitch of the nose or blink of the eye. What would be some problems, benefits, etc. of this situation?

All these activities are evaluated in terms of the creative abilities such as:

Fluency (the ability to produce a large number of relevant ideas);
Flexibility (the ability to produce large number of unrepeated responses, or the variety of ideas); and

Originality (the ability to produce ideas that are unusual).

To be original, a response must be given by fewer than 5 or 10 people out of every 100 who take the test. Fluency is the number of different responses. Flexibility is generally measured by the number of different categories of responses.

The Manual for Scoring and Interpreting results for the Verbal TTCT provides an easy to use scoring method for both beginners and experienced scorers. It includes national norms, standard scores and national percentiles within the grade for each score area, as well as national percentiles for average standard scores.

The Verbal TTCT Norms Technical Manual includes norm tables with standard scores and national percentiles by grade and age for each score area.

Reliability of the TTCT-Verbal

Scoring Reliability

Rosenthal, DeMers, Stillwell, Graybeal, and Zins (1983) reported interrater reliability of 0.90 or higher scoring TTCT-Verbal tests of

125 gifted and 428 non-gifted elementary school children. Torrance (2000) reported inter rater reliability of 0.95 for flexibility to 0.99 for fluency between scores of TTCT-Verbal.

Test-retest Reliability

The test-retest reliability coefficients of the TTCT-Verbal and figural ranged from 0.59 to 0.97 (Torrance, 2000). Torrance believed that the creative thinking abilities including those measured by TTCT are susceptible to development through educational experience. In addition, emotional, physical, motivational and mental health factors also affect creative functioning and development and may contribute to a lowering of test, retest reliability. Treffinger (1985) concluded that given the complexity of creative thinking the TTCT can be seen as having reasonable reliability for group and research applications.

Validity of the TTCT-Verbal

Predictive Validity

Any creativity measurement is useless unless it has a known ability to predict performance. Preliminary studies established the validity of the TTCT and thereafter its ease of use fostered research on the TTCT (Swartz, 1988). Thus the TTCT is more researched and analysed than any other creativity instrument (Treffinger, 1985; Swartz, 1988; Johnson and Fish kin, 1999). The TTCT has over 25 years of extensive development and evaluation (Millar, 2002). TTCT has shown high predictive validity ($r > 0.57$) for future career image and for academic and creative achievements.

Torrance and Safter (1989) conducted a 22 year longitudinal study on the predictive validity of this measure, which compared scores from various forms of the TTCT with later life creative achievements. Torrance (1990) states that the inter rater reliability among the scorers was greater than 0.90. Two decades of research establish the validity and reliability of the TTCT and demonstrate the appropriateness of including divergent measures in a multifaceted approach to assessing creativity (Kim, 2006). More than 1500 studies in 16 countries used these tests (Torrance, 1996) and tests have been translated into more than 35 languages since 1966 (Millar, 2002). Statistical studies concerning the language equivalency, reliability and validity of adapting test into Turkish have been developed by Asian (1999). Inter scorer correlation coefficient for subscales (0.95 to 1.00) demonstrated that TTCT could be implemented in Turkish culture as well (Yontar, 1992).

Statistical techniques used: Mean, S.D.S. and t-test were calculated to analyse the data.

Results and discussion: The significance of the difference between the mean scores of the boys and that of the girls of Class VII was examined for each of the four measures of verbal creativity: fluency, flexibility, originality and total creativity. The analysis of the results are given in Table 1.

Table 1

Variables	Boys N = 50		Girls N = 50		t' Value	Level of significance
	Mean	S.D.S.	Mean	S.D.S.		
Fluency	37.57	10.55	37.32	12.83	0.14	N.S.
Flexibility	32.65	6.89	31.67	7.90	0.58	N.S.
Originality	6.84	8.01	5.07	6.32	2.14	0.01
TotalCreativity	72.53	21.22	71.94	25.52	0.17	N.S.

As can be seen from Table 1 the mean scores of the boys and the girls on the measure of fluency were found to be 37.57 and 37.32 and their corresponding S.D.S. were found to be 10.55 and 12.83 respectively. The 't' value was found to be 0.14 which is insignificant. The result thus clearly shows that there was no significant difference between the boys and girls on the measure of fluency.

On flexibility the mean score of the boys was 32.65 and of girls 31.67 while their S.D.S were 6.89 and 7.90 respectively. The difference between the two means was insignificant as the *t* value was 0.58. It may be concluded that boys and girls were similar on flexibility once again.

Comparison between boys and girls on originality shows significant difference between the two groups. The mean scores of boys and girls were 6.84 and 5.07 and S.D.S. were 8.01 and 6.32 respectively. The 't' value was 2.14 which is significant at 0.01 levels. As such, it may be concluded that boys with their significantly higher mean score possessed significantly greater originality than girls.

As can be seen from Table 1 on the measure of total creativity, the mean scores of boys and girls were 72.53 and 71.94 and their respective S.D.S was 21.22 and 25.52. When the 't' value was calculated to find out the significance of difference between the mean scores of the two groups, the 't' value was found to be 0.17 which is insignificant. The result thus clearly shows that there was no

significant difference between the boys and the girls on the measure of total creativity.

Conclusion

The findings reveal that boys do not differ significantly in all the variables of verbal creativity, except the measures of originality, from the girls. The results of the present study are in agreement with the findings of Torrance (1963), Razik (1967), Raina (1969), Torrance and Aliotti (1969), Richmond (1971), Singh (1982), Tegano and Moran (1989), Lau and Li (1996), who found the existence of significant sex differences between boys and girls in the test scores of creative thinking ability on which boys scored significantly higher scores than girls.

However, the findings may be logically reasoned in that girls in our society have been encouraged to conform, whereas boys are expected to be active and dominant risk takers (Block 1983). Furthermore, Davis and Rimm (1989) acknowledge that most boys are provided with toys such as trucks, Logos and models that enhance their visual-spatial abilities. While Lever (1976) notes that the games of girls are often highly structured requiring turn-taking and rules.

Suggestions

Additional studies are necessary to investigate gender differences in creativity across all grade levels. Furthermore, the impact of interventions or specialised programmes to enhance creativity needs to be integrated.

At a time when there is an emphasis on the basic skills of literacy and numeric it is crucial to remind ourselves of the importance of creativity and imagination in their own right and in the contribution they make to other areas of learning. We need to resist any attempt to curtail or limit the development of creativity and imagination in the early years and beyond. If we do not ensure plenty of opportunities for learning that are first hand, that encourage children to think for themselves; to play and to take risks, we will raise a generation who, to quote Oscar Wilde, "Know the price of everything and the value of nothing" (Wilde 1969 *Lady Windermere's Fan*, Act III).

Through a curriculum rich in creative and imaginative opportunities young children have the opportunity to develop skills, attitudes and knowledge that will benefit all the areas of their learning and development. If our wishes for the children are to become reality

we must plan provision for young children that encourages and develops creativity and imagination. We need to find ways to promote what we value and make our beliefs real.

Creativity and imagination come from the human ability to play and civilisation rests on this ability. It is essential that we foster the human capacity for creativity and play, if we do not we will be left copying old ideas. Involvement in creative and imaginative experiences should be essential for the life.

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A Comparative Study of Creativity among...

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Assessment of 'Sarva Shiksha Abhiyan' in Sarvodaya Schools of Delhi

SAKSHI JAIN* AND MEENAKSHI MITAL**

ABSTRACT

The paper examines the effectiveness of Sarva Shiksha Abhiyan (SSA) and focuses on assessing the awareness and satisfaction level of different stakeholders regarding selected programme components. The study revealed that despite some loopholes that were found in the programme, the programme had been very effective in mainstreaming out of school children and reducing dropouts. Some areas that need to be looked into to improve the efficacy of the programme were awareness level about the programme, allocation of funds for teaching-learning material (TLM) and providing NGO's who are partners in the programme with better funding and timely dispersal of the funds for their smooth functioning.

Introduction

Children are very important part of our society. Any lacunae in early education of a child can have long-term consequences. Not to be educated, not to acquire basic literacy and numeracy is a serious

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disability, both for the child and for coming generations. Every child in our country has a right to education. Commitment to provide basic education for all is a goal enshrined in the Indian constitution, which guarantees universal compulsory education as a fundamental right for every child in the age group 6–14 years. Successive development policies and plans have pursued this goal for the last six decades. With the population of more than one billion, which is still growing, it has been an uphill task to keep pace with the expanding demand for basic education. India is a vast country comprising 35 States and Union Territories with diverse socio-cultural histories, spread over widely varying geographical conditions. Correspondingly, progress in education has been uneven, though the overall progress made has been quite impressive. From a mere 18 per cent literacy rate in 1951, the country progressed to around 65 per cent literacy by 2001. While three out of four children in the age group 6-14 years were unenrolled 60 years ago, only 6–7 per cent of 210 million children remain unenrolled today. This progress is the result of the implementation of a wide array of programmes across the country for total literacy, universal and quality elementary education for all (National University of Educational Planning and Administration [NUEPA], 2008).

Universal Elementary Education or Education for All means providing universal enrollment, universal retention, equity and universal achievement of children (Zachariach, 2005). India's goal of universal elementary education of quality points to three main challenges: expanding access, raising learning achievement and reducing gaps in education outcomes.

In 2002, the Government of India legislated universal elementary education. As a result, every Indian child between the age group of 6–14 years has been given the fundamental right to receive a minimum of eight years of elementary education. A national programme known as the Sarva Shiksha Abhiyan (SSA) was started in the year 2002 which supports this legislation. The programme was launched with the aim of providing useful and relevant elementary education for all children in the 6–14 age group by 2010, and to bridge social, regional and gender gaps with the active participation of the community in the management of schools.

Table 1.1
Allocations to Sarva Shiksha Abhiyan in the Department of Education from
the year 1999-2010

Year	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
SSA (₹ Cr.)	300	500	1512	1951	3057	7156	10,041	10,671	13,100	13,100	15,000

The programme also seeks to open new schools in habitations, which do not have schooling facilities and strengthen existing school infrastructure through provision of additional classrooms, toilets and drinking water. Sarva Shiksha Abhiyan covers the entire country, with a special focus on educational needs of the girls, Schedule caste and Schedule tribe and other children in difficult circumstances (Singh, 2005). Sarva Shiksha Abhiyan has been built upon the experience of several primary education programmes that preceded it, including the District Primary Education Programme (DPEP), Shiksha Karmi Project (SKP) and the Lok Jumbish Project (LJP). It is a partnership project between the Central and State Governments, which seek to improve the performance of the school through a community-owned approach, with specific focus on the provision of quality education.

In spite of this huge allocation, there is paucity of data about the performance of the programme. The present study therefore assumes importance as it has endeavoured to find out the perception and satisfaction level of stakeholders at large and students and parents in particular. Also, the government is pumping more and more money in the SSA in every five year plan in order to achieve the goal of universalisation of elementary education; hence it is imperative to assess its functioning from the point of view of different stakeholders.

II. Significance of the study

For better development and growth of child, quality education is most important aspect. Every child should have the opportunity to make a better life for himself. Unfortunately, too many children in the world today grow up without this chance, because they are deprived of their basic right to even attend primary schools. **Education is central to development.** It empowers people and strengthens nations. It is a powerful 'equaliser', opening the doors to all to lift themselves out of poverty. It is critical to the world's attainment of the Millennium Development Goals (MDGs).

The Government of India in its Five Year Plans has realised this and large amount of money have been allocated for education. During

the Tenth Plan, an allocation of ₹ 17,000 crore has been made for SSA. In the year 2010-2011, ₹ 15,000 crores has been allocated for SSA. Such huge allocation of money for education clearly reveals that education is an area that has been given a lot of importance. Review of literature revealed that though there has been research done in the area of education but it was mainly centred on the performance of various educational programmes launched by government at different points of time focusing on parameters like enrollment rate, student-teacher ratio, dropout rate, etc. However, it was seen that there were no researches to assess awareness and satisfaction level of different stakeholders regarding different programme components. The study was carried out to fill this lacuna.

In addition, it was seen that most of the previous researches done to assess programme performance had been undertaken by the government. It was therefore felt that an assessment from a source, which is not itself the implementing agency should be done for it to be free from any bias. Therefore, it became pertinent to take up this study and ascertain implementation of various programme components. Further, the study is significant as it makes an attempt to assess the programme from the user's perspective. The objectives of the study were:

- To ascertain the awareness and satisfaction level of the following stakeholders regarding selected programme components.
 - Students
 - Teachers
 - Principals.
- To ascertain participation of NGO's in the programme and perception of NGO functionaries towards provisions made for NGO's.

Selected Programme components included pupil to teacher ratio, boys Vs girls ratio, provision of money for teaching-learning material, refresher course for teachers.

III. Methodology

The study was conducted in Delhi, which is the largest metropolis in terms of area and the second largest metropolis next to Mumbai in terms of population in India. As per Census 2001, literacy rate of Delhi is 82 per cent (<http://des.delhigovt.nic.in/glance.htm>). The study was carried out in poor urban neighbourhoods as a large percentage of population here uses Government and Government-aided schools. The study was carried out in South West Zone of Delhi.

From this particular zone, five Government Sarvodaya co-education schools and slum clusters surrounding these schools were selected. Sarvodaya schools are schools under the aegis of the government of India meant specifically for students belonging to low income group families.

Five Sarvodaya co-education schools were randomly selected from southwest zone of Delhi. Only Sarvodaya schools were taken since they were co-educational schools and had children in the age range needed for the study. Since the researcher wanted to study the components such as boys Vs girls ratio therefore co-education schools were needed to be taken. From the selected schools, two schools were randomly selected for gathering detailed data from the principals, teachers and students. From the remaining three schools only the principals were interviewed.

The sample consisted of

- Forty-eight students, i.e. twenty-four from each of the two schools aged 12–14 years.
- Twelve teachers, six each from the two schools.
- Five principals, one each from five schools.
- Five NGO functionaries, one from each NGO.

Details of the selection of sample in each of above listed category

Sarva Shiksha Abhiyan (SSA) is implemented for the students in the age group of 6–14 years but for this study students from Class VI to Class VIII were taken as children below that age would be too small to respond to the questions.

Forty-eight students, twenty-four each from the two schools were taken. Out of these students, eight students were taken from Class VI, VII and VIII, respectively. This was done so that the students of different ages get represented in the sample. From each class one section was randomly selected. From the selected section, attendance register was procured and separate list for boys and girls was prepared. From the prepared list, boys and girls were selected using systematic random sampling. From each class, four boys and four girls were taken, thereby making a sample of eight students per class. Equal number of boys and girls were taken in order to avoid gender bias. Only those students were taken who were between 12–14 years of age and had been studying in that school for at least two years so that they could answer the questions such as pupil to teacher ratio, boys Vs girls ratio, number of students who have dropped out in last two years and so on.

From each of the two schools, six teachers were interviewed thereby making a total of 12 teachers. The six teachers interviewed from each school included three class teachers, one each from Class VI to class VIII. This was done so that the teachers could answer questions such as pupil to teacher ratio, boys Vs girls ratio, number of students who have dropped out in last two years, timely provision of textbooks to students and so on. Out of the other three teachers, one was the teacher incharge looking after the programme funds and coordinating activities related to SSA and other two teachers were not necessarily class teachers but teachers who were teaching classes from VI to VIII. Only those teachers were taken for the sample that were teaching in that particular school for at least two years so that they could answer all aspects of the programme and its functioning over the years.

Five principals one from each of the five schools were interviewed to have a wider perspective about the performance of the programme. Five NGO functionaries, one from each NGO was interviewed to understand the kind of role they were playing in furthering the programme, in networking and in mainstreaming out of school children.

For the present study, interview schedule was used to ascertain the awareness and satisfaction level of different stakeholders regarding selected programme components and to elicit detailed and accurate information. Both open and close-ended questions were included. Group discussions and informal talks were also held in small groups so that the respondents felt comfortable.

For assessing the satisfaction level of different stakeholders regarding selected programme components, a five-point scale ranging from highly satisfied to highly dissatisfied was prepared. The inventory required the stakeholders to select the option that best described their level of satisfaction regarding different components of the programme. If the option selected was anywhere between 1-2, the reason for their dissatisfaction was subsequently asked in the next question. Similarly, if they choose the option 4-5, reasons for satisfaction were investigated.

IV. Results and Discussion

For assessing the awareness and satisfaction level of different stakeholders, the study covered several programme components. However, for this particular paper only some of the components have been included. This particular section deals with awareness and satisfaction level of the stakeholders namely the students, teachers and principals regarding awareness about the programme and

provisions made under it, pupil to teacher ratio, boys Vs girls ratio and provision and usefulness of teaching learning material.

Awareness about the programme and provisions under it

In spite of the fact that government has been allocating huge amount of money for the programme in every five year plan, still awareness about the programme was found to be very low. It was seen that none of the students were aware of the SSA. Thus showing lack of awareness among them regarding the programme. Table 4.1 below clearly reveals that as many as 83 per cent of the teachers were aware of the ongoing SSA but only 50 per cent of them had some idea about the objectives of the programme and could cite at least one objective which included providing free and compulsory education to all that is all children to complete 8 years of elementary education by 2010. The remaining had no idea about its objectives. All the teachers however were aware of the provisions that were being made for them. All of them quoted that they were being provided with refresher course, money for purchasing teaching learning material (TLM). Even though the teachers were aware of the provisions that were being made for them but as many as 75 per cent of them did not know that these provisions were being provided under the aegis of SSA. When teachers were asked about the provisions under SSA, only 25 per cent of them had complete knowledge about the same.

All the principals interviewed were aware of the ongoing programme Sarva Shiksha Abhiyan but majority (60 per cent) of them had only some idea about the objectives of the programme. They could cite just 1-2 objectives of the programme such as providing free and compulsory education to all and mainstreaming out of school children. When asked about the provisions under SSA, it was found that only three of the principals had complete knowledge regarding the same. The remaining were aware of most of the provisions except for the provisions that were made for disabled children under SSA.

Table 4.1
Awareness level of teachers regarding SSA

<i>Awareness about SSA</i>	<i>Total (N = 12)</i>	
	<i>n</i>	<i>%</i>
Yes	10	83.3
No	2	16.7
Total	12	100

Awareness regarding the objectives of SSA

<i>Awareness regarding the objectives of SSA</i>	<i>Total (N = 10)</i>	
	<i>n</i>	<i>%</i>
All children complete 8 years of elementary education by 2010	1	10
Providing free and compulsory education to all	3	30
No one should be educated	1	10
Don't know	5	50
Total	10	100

Knowledge regarding provisions under SSA

<i>Knowledge regarding provisions under SSA</i>	<i>Total (N = 12)</i>	
	<i>n</i>	<i>%</i>
Complete knowledge*	3	25
Average knowledge**	2	16.7
Poor knowledge***	5	41.6
Not applicable****	2	16.7
Total	12	100

*- Knew 5-6 provisions

*** - Knew 1-2 provisions

** - Knew 3-4 provisions

**** - Teachers who were not aware of SSA

Pupil to teacher ratio

- As per the norm under SSA, teacher to pupil ratio in a class should be 1:40 but, when asked about the class sizes, 66 per cent of the students reported class sizes of larger than 40. Students were dissatisfied with the same as they faced difficulty in understanding whatever was taught to them in the class and also reported that it was too difficult for the teachers to handle such large groups of students.
- When asked about the class strength, 50 per cent of the teachers were dissatisfied with the pupil to teacher ratio and reported that it was too difficult for them to handle such a large group of students and also checking their notebooks was tedious. Remaining half of the teachers were satisfied with the pupil to teacher ratio as they had maximum of 38-40 students in their class, which was quite manageable for them.
- Majority of the principals reported that the pupil to teacher ratio in their school was not complying with the provision in the SSA and stated that because of too many students taking admission

in their school, it was difficult to maintain that ratio. Further after Class V, students from feeder schools were also merged in these schools in addition to the existing ones and they could not deny admission to them. This distorted the student teacher ratio further in middle classes.

Boys Vs girls

There is no such norm for boys Vs girls under SSA. But since the programme gives priority to girls education and accords high priority to girls, therefore it became imperative to study boys Vs girls ratio in schools to see if any efforts were taken to improve the enrollment of girls in schools.

- When asked about boys Vs girls ratio, 62 per cent of the students stated that the number of boys were more in comparison to girls in their class. In majority of the classes the percentage of girls was less in comparison to boys. Of the students who reported more number of boys in their classes in comparison to girls, majority said that the ratio of girls was less because the parents did not want their girls to study in a co-educational school.
- When teachers were asked about the ratio of boys Vs girls in their class in the present year, as many as 42 per cent of them reported a ratio of 60:40 in their class. Thirty three per cent of the teachers said that the number of boys and girls in their class was equal. When asked to recall the ratio of boys to girls in their class last year, majority (67%) of the teachers reported a ratio of 60:40, whereas 58 per cent of them reported a ratio of 60:40 two years before that. Thus showing that the number of girls enrolling in schools had not changed much in comparison to boys over the years.
- When asked about the boys to girls ratio in their school, majority of the principals reported a ratio of 60:40 (60 boys and 40 girls) in their school. Two principals reported a ratio of 70:30 and 50:50 in their respective schools. Therefore it can be said that in majority of the schools the percentage of the girls was less in comparison to boys. It was seen that the norm under SSA, which says that girl education is given priority, was under question as no special efforts were being made to improve enrollment of girls in schools. All of them reported that the ratio had not changed after the implementation of the programme.

Provision for Teaching Learning Material (TLM)

- Under the programme, teachers are to be provided with money for the purchase of Teaching Learning Material (TLM), which helps them in classroom teaching. When asked about this provision, all the TGT's and assistant teachers reported that they were being provided with a sum of ₹ 500/year per teacher for the purchase of teaching learning material (TLM). Fifty per cent of them were dissatisfied with the amount of money that they were getting for TLM and felt that the money was too less to purchase. They added that rather than a meager amount being given every year, teachers should be provided with a lump sum amount of money at an interval of three years so that they could buy good quality material rather than buying cheap stuff. All the teachers reported that they had full freedom in purchase of teaching learning material (TLM) as per their need and requirement. Even though all of them were satisfied with the freedom that was being given to them, some of the teachers showed dissatisfaction with the additional burden for the purchase of TLM.
- Majority of the students interviewed reported that teachers were using teaching aids during their classes and further added that the aids helped them in better understanding of the subjects. As many as 88 per cent of the students said that they were able to understand whatever was taught to them in the class and were satisfied with the teaching methodology of the teachers.
- All the principals reported that the teachers were purchasing TLM on their own as per their need and requirement and said that the teachers knew the best as to what kind of aids they required that would help students understand and would make learning easy for them.

Usefulness of the refresher courses

- One of the provisions under SSA is refresher courses for teachers. All the teachers interviewed, had attended the refresher course at least once but as many as 75 per cent of them did not know that this training was being given to them under SSA. Sixty seven per cent of the teachers and principals said that the refresher courses that were conducted for the teachers were beneficial as they updated their knowledge, clarified some of their doubts, taught them better teaching methodology that helped make their

students grasp the subject matter easily and made subject matter interesting. Additionally, the principals also said that the teacher's interaction with outside faculty made them aware about different views and opinions which boosted their confidence.

- On the contrary, according to some of the principals (40%) and teachers (33%), refresher courses were a complete waste of time and resources and strongly felt that they were not of much use. This was so as the resource persons who came had poor knowledge of their subjects and the same resource persons were being sent every time which did not help in getting new view points. Some of the principals also stated that the subject seminars that were held were a complete waste of time as they were being held during the working days and teachers had to attend the seminar after the school timings, which was very tiring for them.

V. Participation of NGO's in the programme and perception of NGO functionaries towards provisions made for NGO's.

All the NGO functionaries were aware of the ongoing Sarva Shiksha Abhiyan. Majority (80%) of them could just site two to three objectives of the programme such as providing free and compulsory education to all and mainstreaming out of school children. However, they were not aware of the other objectives which included focus on elementary education of satisfactory quality with emphasis on education for life and completion of 8 years of elementary education by 2010 and so on. Only one of them could site as many as five objectives of the SSA thus depicting low awareness and knowledge about the programme among the functionaries.

As far as the provisions for students were concerned, all the NGO functionaries reported that they were getting ₹ 845/- per student per annum from which they were paying the salary to the teachers, giving rent for the learning centers, salary to the maids who were looking after the children and were also purchasing copies and other necessities for the students. All the NGO functionaries were highly dissatisfied with the amount of money that they were getting and stated that the money was too less.

When asked about the provisions for the teachers, all of them reported that the teachers of the learning center were provided with a 10-day workshop. According to the functionaries the workshop was very beneficial for the teachers and taught them many things like dealing with children of different age groups within the same class, using limited material for all students, using waste materials

effectively and also taught them some playful methods of teaching. Even though all of the functionaries were satisfied with the workshops that were organised for the teachers but at the same time they were highly dissatisfied with the salary of the teachers, which was just ₹ 1000/- per month. All the functionaries reported that the teacher to pupil ratio in their learning centers was 1:40, which was as per the norms under Sarva Shiksha Abhiyan.

As far as the out of school children were concerned, which is a major concern for SSA, all the functionaries reported that some of the main reasons for children not attending school were sibling care, poverty, lack of value for education by parents and employment of children. All of them reported that they were conducting household surveys for locating out of school children as well as drop out children which was in line with SSA objectives. All the NGO functionaries reported drop out cases in their locality and stated lack of inclination towards studies and sibling care as reasons for the same. At the same time the NGO functionaries also reported that there had been a reduction in the number of drop out children with the implementation of the SSA. When the NGO functionaries were asked to rate their level of satisfaction regarding the effectiveness of the programme with respect to mainstreaming out of school children, all of them were highly satisfied with the same.

VI. Road Ahead

The study has comprehensively assessed the SSA and has shown that in some aspects the programme has done well in working towards its objectives. However, some loopholes have been identified, which are negatively affecting its efficacy. These are:

Low awareness level about the objectives and provisions under the programme

Since so much of money is being pumped into the programme it is suggested that awareness should be created among the people regarding the programme. At first, the principals of the schools should be made aware of all the objectives of the programme as well as the provisions that are made under it, so that the principals could disseminate the same information among the teacher and students. Also awareness campaigns need to be launched at the community level to make the people aware about SSA. Even though this being done through mass media, it needs to be reinforced through localised campaigns and door-to-door visits.

Pupil to teacher ratio

It was seen that the norm under SSA, which says teacher to pupil ratio should be 1:40, was not being followed in schools completely and measures should be taken to reduce the size of the classes. Pupil to teacher ratio was found to be more in most of the schools since after Class V students from feeder schools were also merged in these schools in addition to the existing ones and schools could not deny admission to them. This further distorted the student teacher ratio further in middle classes. Therefore, measures should be taken to reduce the number of students that are merged from the feeder schools in order to maintain the proper ratio.

Boys Vs Girls ratio

The norm under SSA, which says that girl education is given priority, was under question since most of the girls were still out of the school because of poverty, sibling care, early marriage, no inclination towards studies and so on. No special efforts were taken to improve the enrollment of the girls in schools; hence it is recommended that special schemes should be launched for enrolling the girl child.

Increasing allocation for Teaching Learning Material

Even though it was seen that TLM has by and large improved teaching in schools and has been quite helpful in making students understand the subject easily, quickly and with greater clarity, it is suggested that the amount of money given for the purchase of teaching learning material should be increased so that the teachers can purchase good quality material.

Appointing well qualified teachers for Refresher courses

It is important that the resource persons appointed for the refresher courses should be well qualified and trained and should have complete knowledge and information regarding the issues discussed. Moreover, the venue for refresher courses should be in vicinity of the school so that the teachers do not have to waste their time in travelling long distances.

Provisions for NGO's

As far as the NGO's were concerned, they need to be provided with better funding and dispersal of funds should be timely. The salary of the teachers should be increased, the NGO's should be provided with a place for running their learning centers and the method of reporting

should be simplified so that the NGO's can work effectively. NGO's were playing a major role in the programme in terms of community outreach and hence the learning centres run by NGO's should be allowed to function as before to attain programme objectives of mainstreaming out of school children.

Thus the Sarva Shiksha Abhiyan has touched upon various important aspects of elementary and middle school education with its broad based objectives and provisions. However, some loopholes as shown by the study need to be looked into, which are negatively affecting the efficacy of the programme. These are low awareness level about the objectives and provisions under the programme among the students, teachers, parents and principals; insufficient allocation for purchase of teaching-learning material and not appointing well qualified teachers for refresher courses. Special schemes need to be launched for enrolling the girl child who still remain out of school for social and familial reasons. As far as NGO's were concerned they need to be provided with better funding and timely dispersal of funds so that they can work effectively. Despite some loopholes, the programme has by and large been very effective in mainstreaming out of school children and dropouts, the teaching learning materials were found to be very effective and helped students in better understanding of the subjects, the refresher courses that were conducted were beneficial for the teachers and helped them update their knowledge and taught them better teaching methodology thus making the teaching learning experience for students more rewarding and interesting. However, with better planning, regular monitoring and frequent evaluation, the programme can be further improved.

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Perspectives in Learning and Cognition from History of Epistemology

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ABSTRACT

When perspectives in learning and cognition are articulated, their epistemological and ontological assumptions are not made explicit. Even if they are explicated they are not sufficiently detailed.

This theoretical essay seeks to establish such links between learning and its epistemological roots. It addresses the under asked question: How do current learning and cognition theories relate to the history of epistemology? It examines some of the modern theories in learning and cognition with reference to the epistemological underpinnings derived from Plato's theory of knowledge. A case is made that the label Platonism may or may not apply meaningfully to a learning theory.

Learning and Epistemology

I typically commence a course in learning and cognition for an undergraduate programme of education that I teach with the topic history of epistemology. The students always snap back: What does learning theory have to do with epistemology more so with its history? They promptly point out that neither the recommended readings nor the standard texts of the field have even a chapter devoted to such a topic.

This is sardonic as the relationship between epistemology and education is a direct and unambiguous one. A theory of knowledge is the distinctive component of any educational theory. That there is a

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close relationship between an educator's preferred epistemology and educational theory (and practice) is an established idea (Descartes, 1971; Cornwall, 1991). Any educational philosophy is an endeavour to achieve certain epistemological goals. From what an educator believes about knowledge certain things follow about the nature and goals of education (Cornwall, 1991; Glaserfeld, 1995).

Enquiry into the nature and source of knowledge has concerned philosophers since ancient times and the history of epistemology is almost as aged as the history of human civilisation. The nature of human knowledge has continued to draw a rich variety of conceptualisation chronologically by philosophers, psychologists and educators. With the evolution of modern psychology, philosophy of the mind developed as an important area of philosophical psychology. It asked the question: How does knowledge become possible? What is its source? What is the role played by the mind in this process?

Be that as it may be as is mentioned in the opening paragraph of this paper that when perspectives in learning and cognition are articulated their epistemological and ontological assumptions are not made much explicit. If they are explicated they are not sufficiently detailed. The trifling epistemological debate that exists in the field of learning and cognition is inadequately located on the rationalism-empiricism or objectivism-constructivism continuum. The rationalism versus empiricism framework has been adopted in the chapterisation of some popular texts in the field (Hergenhahn and Olson, 2008; Schunk, 2007; Lefrancois 2006; Bower and Hilgard, 1986). Some works culminate on the objectivist-constructivist continuum (Driscoll, 2000; Jonassen, 1991). Others employ an endogenic-exogenenic dichotomy (Glaserfeld, E. 1995). The epistemological considerations underlying only the dominant approaches in learning theory—classical behavioural, early cognitivist and piagetian—are examined by and large. The underlying epistemology of most major positions of twentieth century learning theory and the newer sociocultural perspectives is not illuminated. It is for this reason that the present paper is weakened by very few references if any to previous work in this area.

The goal of this theoretical essay is to establish such links between psychological theories of learning and its epistemological roots. It addresses the under asked question: How do current learning and cognition theories relate to the history of epistemology?

According to the twentieth century philosopher A.N. Whitehead the entire western philosophy can be written as a series of footnotes to

Plato. In this paper Plato's¹ philosophical position about knowledge, in particular his theory of forms is analysed and its application to some of the relatively current theories, practice and issues in learning and cognition is presented. It is beyond the scope of a single work to take into account in historical perspective the epistemological, pedagogical and curricular issues pertaining to older and newer theoretical models of learning and cognition. However this paper attempts to put forth a perspective from the vantage point of history of epistemology. This can offer meaningful possibilities regarding further theorisation and research for psychological studies in education.

Plato's theory of forms

An important concern of Plato's time (427–348 B.C.) was the relationship between that which is eternal, immutable reality and the one that 'flows' and is thus ephemeral. Plato distinguished between these two arguing for two orders of reality. The first order being the one that is perceived by the senses. All the things in this were non-permanent and flowed. In this region were the things that come to be for a while and then pass away. The other order which he regards as the ultimate reality is the realm of forms, the world of ideas. This cannot be perceived by the senses but has eternal, immutable, immaterial, abstract entities. It contained the changeless patterns behind the various phenomena's taking place in nature. According to him ultimate reality consisted of these immaterial abstract ideas rather than their physically discernible counterparts. He uses the terms *the intelligible* and *the visible* for these two ontological orders (Plato, 1987, 474–478).¹

His conception of the nature of man was characterised by a similar dualism. Man was regarded as having a body and a soul. The body corresponded to the region of reality that 'flowed' and was circumscribed to the sensory world while the soul which was immutable corresponded to the region of reality that was eternal. The body was regarded as the instrument of sensory experience. The soul housed the superlative human faculty, reason and could thus survey the world of ideas.

His epistemological tenets parallel his ontological assumptions and those about the nature of man. To him true knowledge was not

¹ The version of *The Republic* consulted is the translation of the oxford text by Desmond Lee. It is customary to cite Plato's works by reference to the page numbers of an earlier Stephanus edition of 1578. The page numbers in this paper refer to the former.

imaginable of anything that was ephemeral. Since the world of senses comprised this dimension of reality it could not be perfectly known. The metaphor of the soap bubble which bursts before one has even had five seconds to study it in depth and therefore it cannot be known about illustrates this imperfection. The physically existent soap bubble was thus an imperfect copy of the real one which is an abstraction existing in the knower's mind. The empirically observable physical entities are impecunious copies of the true reality namely the forms. Only imperfect knowledge of such things is possible.

Plato did not even regard such knowledge as knowledge but merely opinion. He suggested four divisions along a line of pure knowledge, reason, belief and illusion. Of these he classes the first two as knowledge, situating them in the world of reality while the latter two namely belief and illusion are grouped as opinion and situated in the visible world of becoming. The two-fold order of reality is isomorphised to knowledge and opinion respectively (Ibid, 534). The sensory world and its experience had no role to play in the origin or development of knowledge since the true reality underlying the sensory world was ideas which were eternal. Plato did not necessarily negate the sensory reality of what he called the visible but accorded it a low ontological status. It was capable of giving rise to mere opinion and not knowledge. Thus knowledge could be only of things that can be understood through reason. He explains, "You see, there are some perceptions which don't call for any further exercise of thought, because sensation can judge them adequately, but others which demand the exercise of thought because sensation cannot give a trustworthy result" (Ibid, 523).

Plato broadly prioritised reason as the fundamental reality located in the mind rather than in material objects. In his theory of knowledge, reason is superior to experience as a source of knowledge we know by reason alone. A Platonic form is metaphysically superior as it is autonomous of the senses, perfect, eternal, unchanging and a higher degree of being (Carruthers, 1992). In Plato's own words "When the mind's eye is fixed on objects illuminated by truth and reality, it knows them...but when it is fixed on the twilight word of change... it can only have opinions." (Plato, 1987, 308).

Learning as apprehending 'forms': A Platonism

Plato (Ibid, 532) writes

"So when one tries to get at what each thing is in itself by the exercise of the dialectic, relying on reason without any aid from the senses,

and refuses to give up until one has grasped by pure thought what the good is in itself, one is at the summit of the intellectual realm, as the man who has looked at the sun was of the visual realm.”

The forms are the abstractions underlying the objects in the physical world. It is through his general theory of forms that the distinction in the metaphorical line between knowledge and reason as opposed to belief and illusion is made. The form can be appropriated through reason alone as it belongs to the realm of pure rationality. If viewed in this light—What is learning? It is getting to know the forms. The purpose of learning includes provoking the mind to thought and uncovering this beauty of reason on having received the forms.

What is the content of such learning? It is carefully chosen works like mathematics, logic, dialectics, poetry and the arts that need to form the content of learning. They cause a training of doing proper enquiry into the abstract ‘forms’ or ideas. This is the knowledge with reason as its source and the forms as the content.

Plato considered mathematics especially consequential as it was the eternal truth, the real realm of ideas that never changed. An example of the mathematical state is the idea of number which is eternal, immaterial, abstract entity. It can be apprehended by reason, and reason alone. Subjects like mathematics were the tool for the cultivation of reason and knowledge. Learning of such ‘knowledge’ reorients the mind from the twilight of mundane empiricity to the brilliant daylight of true reason.

Platonism and Cognitivism

An early example of Platonism in a modern cognitive position is Gestalt theory (Kohler, 1929; Wertheimer, 1959). The Gestalt principles of organisation explain psychological phenomenon like learning and cognition in terms of the mind, its functioning and its perceptual properties. As an example consider the Gestalt law of proximity. This law states that objects that are close together will be perceived as a group. A learner naturally tends to perceive six dots as three groups of two dots rather than as six unrelated dots. The three groups of dots so perceived are a formation of the mind. They are the abstraction (form) underlying the physical world of six unrelated dots. Thinking, insight and problem-solving are the attributes of the mind which make the knowledge possible without sensory experience.

Another striking influence of Platonism in modern cognitive theory is evident in the seminal information processing views of learning (Newell and Simon, 1972) especially its complexity (Carruthers, 1992).

The view assumes man to be a composite mental system analogous to a complex computer. Akin to Platonic innatism it emphasises human thought processes specifically the intellectual process by which knowledge becomes possible from sensory data. Though the mind is considered to take in information from the outside world, there are control processes which determine how and when the information will flow through them. These include encoding which involves apart from taking in information, organising it in relation to what you know. They also include storage which is holding on to this information, 'forms' of the mind. The processes are quite complex with many intervening variables in between. When information is entered into the mental computer (learner) it gets stored in various categories. It is then moved around according to the rules.

According to the information processing approach, knowledge (forms that the knower has already appropriated) plays a vital role in learning. It determines what we attend to, perceive, learn, remember and forget. The knower brings his previous knowledge into the new situation. Learning is influenced by elaboration, which is to add meaning by connecting new information to existing knowledge. It is also influenced by organisation and context. These involve ordering the networks of information and associating a physical/ emotional/ some other backdrop with it.

Both Gestalt theory and the information processing approach to learning are among the major influences leading up to what was in later days called the cognitive revolution. This revolution was a trend of emphasising cognition rather than the classical conceptualisation of learning with its emphasis on external observable behaviour. Both look back at Platonism as it is by the mind's 'knowing of forms' that the learner makes sense of the world.

In so far as the innatist element in cognitivism comes from Plato's theory of forms Platonism is in a part of all the modern cognitive theories of learning. These theories argue that knowledge becomes possible principally through reason. This may not necessarily require sensory experience. Such a position has been a continuing influence upon the field of learning and cognition incorporated in the epistemological tenet underlying later day constructivism as well.

Though separated by several centuries the underlying thought pattern in Plato and Immanuel Kant (1724 –1804) is somewhat similar. Rationality is the essential aspect of human nature to both. So is rationalistic endeavour as the ideal epistemic enterprise (Navneet, Rekha; 2009). Like the former, Kant too advocated a strong dualism.

He was also interested in the issue of origin of knowledge. He propounded that there were innate categories of knowledge which were fixed, permanent and a priori. These include space, time, classes, causality and relations. He builds these various constructs (schema) into the human mind. Kantian schemas are a kind of structuralism. They represent a conceptual frame that the mind imposes on experience. With the ascent of constructivism as an intellectual position in educational theory such substance dualisms are not necessarily tenable as concepts and constructs are seen as cultural products as well.

Psychologist and educator Jean Piaget (1896–1980) was influenced by the Kantian notion of basic categories of knowledge but didn't agree that these were innate. According to him children came to understand concepts increasingly deeply through infancy, childhood and adolescence. The development of these concepts is basic intellectual acquisition. Like Plato he has accorded a significant place to mathematics in the comity of disciplines. He distinguishes between three types of knowledge—physical, logico-mathematical and social-arbitrary knowledge. Physical knowledge is located in the external world and can be constructed by the action upon objects and observation of their reactions. Akin to Plato, he argues that logico-mathematical knowledge has a different nature. It is not located in the external world. Also it is abstract in nature and cannot become known by any kind of observation in the real world. It develops as a result of reflective mental actions on objects (DeVries, 2000, pp. 203). While the origin of physical knowledge is in the processes of empirical abstraction, logico-mathematical knowledge develops by reflective abstraction. It is only through association with other mathematicians that mathematical knowledge can be acquired (Kamii, 1982). A common example that is given to explain the nature of logico-mathematical knowledge is that of number. Number is not a property of any group of objects but is a system of relationships created by the knower. Its source is the constructive process of the knower (DeVries, 2000; Kamii and DeVries, 1993).

Classical learning theory with its focus on external observable behaviour (Watson, 1919, 1924; Skinner, 1954, 1974) admits no 'forms'. There is no thought or reason in it either. Perusal of the mind by thought of forms (or mental ideas) is not considered as an explanation of learning. Internal mental activity is not supposed to be taking place as there is no place such as the mind in classical behaviourism, where it could possibly occur.

Plato's pedagogy

Plato's epistemology also informs his preferred pedagogy. Dialectics is the method by which learning occurred. It involves seeking the truth of the forms by discussion. Since the forms constitute any field of knowledge, and they are abstract, and can be known through thought/reason; then a lecture or even a demonstration could not lead to their discovery. It is the dialectical method of teaching in which the knower postulates general hypothesis/principles, and then examines them by looking for evidences in it's favour and disfavour. It involves dialogue between the knower and the seeker. During this dialogue there is a search for counter examples and illustrations, or even unacceptable logical consequences. It teaches the knower how to incline favourably to well reasoned arguments and unfavourably to bad ones (Ackrill, 2001). Plato's pedagogy of dialectical inquiry equips the learners with analytical tools-logic and reasoning with which to examine ideas and worldviews.

Perspectives in learning and cognition from history of epistemology

Behaviourism became a dominant position in educational psychology especially learning theory beginning from early twentieth century under the influence of psychologists like Watson (1924), Hull (1951) and Skinner (1974). Embracing empiricist epistemology it studies overt phenomenon that can be quantitatively observed, measured and analysed; rather than inner psychological functions or mental phenomenon. It seeks to formulate lawlike generalisations about these phenomenon in a typically positivist fashion. Regarding man as a responding entity whose acts can be described as causal chains (Nodding, 1997) somewhat similar to a machine, whose internal mental life if any is largely irrelevant to learning. It dismisses the idea of mind, thought or cognition. It rejects the autonomous existence of the knower organism who is no more than a unique byproduct of environmental reinforcement contingencies. Intellectual activity or thought is not required on part of the knower subject in order to acquire knowledge. It examines the observable behaviour of human organisms in response to stimuli and formulates the principles and laws governing the two. It is wholly non Platonism. Contrastingly Plato's doctrine of forms can be considered as a basis of cognitivism in learning theory as it roots knowledge primarily in the knower's cognition. Central to cognitivism is the notion of 'thought'

which is regarded as symbolic and internal to the individual as it is situated in the mind. It does not as such dismiss the ontological reality as expressed in the objective world but regards it as a basis for representations. Thought and mind's symbolic activities are taking place in and consist of these representations. Representationalism is regarded as among the essential features of cognitivism (Winch and Gingell, 1999). Knowledge becomes possible because objective reality is represented in the mind by the knower. So it is in the individual intellect, reason or mind; that the origin and source of knowledge is located.

The appeal of cognitivism as a psychology of education has ascended among educators in the last few decades because it betroths Rousseauian progressivism with the values of modern science (Winch and Gingell, 1999). Rousseau founded the doctrine of inherent educability of children in his time. This was in violation of the then prevailing conception about child nature being a byproduct of original sin and continuously needing correction through education. The ideal of child permissiveness meant that the child was to be permitted to be on his own. Endowed with human reason he could be trusted to discover knowledge by his own solitary exploration of the world. Not only was the knower child capable of coming to know like a solitary scientist rather than that was how learning and cognition best occurred. The outlook of modern science accentuates the Platonic view of the essence of man being this reason. It is through reason and rationality that man has not only uncovered truth and knowledge but made unprecedented strides in it.

The perspectives of behaviourism and cognitivism being founded on contrasting epistemologies described in this paper are generally considered as two orthogonal accounts of how knowledge, learning and cognition occur. They make alternative assumptions about the nature of the knower, the nature of knowledge and the process of knowing. In the former the knower is an animate machine who is manipulated by the environmental inputs and outputs almost like a puppet by the strings. The process of learning is one of the external operation and control upon the passive knower. The latter bestows intrinsic capacity for intellectual activity upon him. Learning consists of symbolic representation in the knower's active mind.

In the words of Botterill and Carrothers (1999, pp.50), "One of the major insights of cognitive science has been the extent to which we depend upon a natural cognitive endowment which assigns processing tasks to modular structures with quite specific and restricted domains and inputs."

Though influential in history of epistemology Aristotle's views have not been discussed in this paper. Well known British empiricists John Locke and David Hume who hold epistemologies different from Aristotle's have also not been discussed. These thinkers articulate a position that is complementary or rather contrasting to Platonism. This can present another perspective on learning theory from history of epistemology. Also the relatively recent constructivist and social constructivist views of learning have not been discussed. All of these merit a full discussion which is beyond the scope of the present paper.

At the end of the course my students were asking for the myriad of theories studied — Thorndike's trial and error, Pavlov's classical conditioning, Skinner's operant conditioning, Hull's systematic behaviour, Tolman's sign learning, Newell and Simon's general problem solver, Atkinson's memory model et al. In which camp does a theory fall ? Plato or not Plato? Where all is he in the given theory?

Platonism provides a valuable underpinning to the modern field of learning and cognition.

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Remediation of Perceptual Deficit Among Learning Disabled: Effect of Intervention

PREETI VERMA*

ABSTRACT

Learning disabled (N = 36) were identified from among the 160 discrepant achievers, screened from 1140 male students belonging to 3rd, 4th and 5th grade levels of three English medium schools located in western sub-urban of Mumbai.

Standard scores and regression methods were used to compute aptitude-achievement discrepancy. The discrepant achievers were subjected to rating, on BCSLD, by their teachers; those scoring at or above 75th percentile were further administered WISC III. Of these, who scored P > V at least by 12 to 15 points was designated learning disabled (L D).

LD (N = 36) were randomly assigned, to experimental and control groups (N = 18, each group). The experimental group was exposed to treatment whereas the control group received none. But they did take pre-test and all the post-tests. First round of treatment was given for 15 days followed by post-test (O₁). Quite a few did not reach the criterion. Hence a second course of treatment was given followed by post-test (O₂). A third post-test (O₃) was done after a blank period of next 15 days, to test persistence of gain scores.

2 × 4 repeated measures ANOVA and paired t test revealed that CBM based strategy training did not prove effective in remediating perceptual deficit of auditory and visual discrimination among LD sample. But the time input in treating figure-ground deficit was observed to be partially beneficial.

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Introduction

Learning disabilities is a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the mastery of one or more of the following: listening, speaking, reading, writing, reasoning, mathematical and other skills (Rourke and DelDotto, 1994). Physical, mental or emotional handicaps are excluded. Underachievement (ability-achievement discrepancy) is another important feature of learning disability. As a causative factor its exclusive role is neither convincing nor acceptable, because a child may underachieve due to host of factors not related to learning disability. Cognitive deficits are also reported central to academic and other problems of children with learning disability.

One of the most prominent characteristics of the field of learning disabilities has been its overriding concern with perceptual abilities (Reid and Hersko, 1981). Mckinney, Short and Feagan (1985) reported perceptual deficit among Learning Disabled (LD) children. They have significantly greater perceptual problem than the non-learning disabled peers (Verma, 2006). The two most common areas of difficulty associated with learning disability are auditory and visual perception. These two areas of perceptual deficits have been studied by Estes and Kurzinger, 1970; Heath and Early, 1975).

Auditory perceptual difficulties characterise LDs (Flynn and Bryne, 1970). They have some difficulty in auditory discrimination or remembering the correct order of letters in a word. They are unable to distinguish between the sounds of different words or syllables or even to identify certain environmental sounds'. Learning disabilities result from deficits in visual perceptual process (Benton, 1975; Hallahan and Cruickshank, 1973; Torgesen, 1975). LD children, as a group, are reported to perform poorly on tasks designed to assess visual perceptual abilities (Hallahan, 1975). Frostig (1968) maintained that deficit in visual perception would limit children's learning. LDs are also reported to suffer direction confusion (Hermann, 1959), figure-ground difficulties (Birch, 1962; Bender, 1967), inadequate visual synthesis and analysis (Birch, 1962).

Evidence from available research pool suggests that despite its need, importance and being crucial to knowledge base related to learning disability, research to understand the nature of deficit—why they exist and what to do about them, has been addressed minimally. The field, in Indian context, still lacks an empirically sound theoretical focus to guide intervention. Significant and wide gaps exist in our knowledge about specific intervention strategies and their

effectiveness in remediating deficits among LD children. This paper seeks to devise cognitive behaviour modification (CBM) based training strategy for remediating perceptual deficits (auditory and visual discrimination as well as figure ground) and tries to observe whether or not deficit prone experimental group subjects respond to treatment in a positive way.

METHOD

Sample

Learning disabled (N = 36) were identified from N = 1140 male students belonging to III, IV and V grade levels of three English medium schools located in Western sub-urban of Mumbai. They were 380 from each grade level in the age bracket 8.5 years to 10.9 years (Mean age 9.5 years; S.D. 1.33 years).

Measures Used

A. Screening Measures (For computing aptitude-achievement discrepancy).

- Raven's Coloured Progressive Matrices (CPM, 1962).
- First Terminal Marks (English, Hindi, Mathematics and Social Studies).

B. Measures to Identify Children with Learning Disability.

- Wechsler's Intelligence Scale for Children (WISC III, 1991)
- Swarup and Mehta: Behavioural Check list for screening the Learning Disabled (BCSLD, 1991).

C. CBM based Strategy Training for remediating perceptual deficit

- Remediation Testing Exercises for Auditory discrimination, Visual discrimination and Figure-ground perception.

D. Swaup and Verma: Measures of Cognitive Process (1997)

Identification of Learning Disabled Sample

Discrepant achievers (N = 160) were screened using standard scores and regression methods. Their scores on CPM (potential) and achievement measure, first terminal examination marks in four school subjects (English, Hindi, Mathematics and Social Studies) were converted into Z score with a mean of 100 and S.D. of 20. The Z scores in English, Hindi, Mathematics and Social Studies for grades

III, IV and V were subtracted from CPMZ scores. Those whose difference score fell between -10 and -100 and whose Z score fell at least 1 Std. Error of estimate below their predicted scores, commonly at least in two school subjects were designated as discrepant achievers. Their teachers rated them on BCSLD. Those who scored at or above 75th percentile were marked 'at risk' and further administered WISC III. Those who scored $P > V$ by 12 to 15 points were considered LD.

Remediation Testing Exercises

Auditory Discrimination

Exercise I. It aimed at auditory perception of sound. The subject (S) was told that he would be blindfolded and the experimenter (E) will name a few objects and produce sounds associated with them. But the objects and the sounds produced by them would not be in matching order. The 'S' was required to tell in 'Yes' or 'No' if the word spoken out and the sound produced matched.

Exercise II. Sounds of some familiar objects were played, one by one, on a tape recorder. The 'S' was asked to close his eyes and listen to the sound carefully and identify the object, which produced that sound.

Exercise III. The subject was presented some sounds one by one, which were produced by the 'E' using body parts (hands, fingers, foot...). The 'S' was required to tell (sans visual input) with which body parts 'E' produced the sound.

Exercise IV. Aimed at auditory discrimination. The 'S' was asked to listen carefully to words presented orally. He had to demonstrate whether the word represented an object, which could fly.

Exercise V. The 'S' was required to listen to the words presented in pairs. Some pairs were meaning fully correct, e.g. boat-river, whereas some other pairs were incorrect. 'S' had to respond whether the pair was right or wrong.

Exercise VI. The 'S' was required to listen carefully to what 'E' said, and act as required, e.g. 'Put the book under the desk'; touch your left ear' 'E' observed how the 'S' reacted to instruction.

Exercise VII. The 'S' was asked to close his eyes The 'E' read a few sentences with different speed and modulation. After each sentence the 'S' had to tell the 'E' how it was read—softly, loudly, slowly, happily or sadly. The 'S' was asked to verbalise the sentence in the same tone to get the correct emotion.

II. Visual Perception

Remediation of deficit in visual discrimination was attempted using seven exercises.

Exercise I. Focused on visual discrimination. Out of 4 sets of pictures the task was to find the 'odd' figure out. The subject 'S' had to compare all pictures and then mark one that was different.

Exercise II. Consisted of 4 sets of pictures. The stimulus picture was put in column (Col.) 'A.' In Col. 'B' only one of the picture was similar to stimulus picture in Col. A. The 'S' was to check mark the picture, which was same as stimulus picture. The exercise sought to help identifying similarities between two pictures and difference from others.

Exercise III. Aimed at improving visual matching ability of the subjects. Five pairs of letters were used as the stimulus. Against each stimulus there was a row of four pairs of letters. Each of the five rows had different combinations of one stimulus letter facing the row. Only one of the four combinations matched with the two-letter stimulus pair. The subject was asked to scan all pairs of letters in each row and identify the one that was same as the stimulus pair of two letters against the row.

Exercise IV. Presented a stimulus picture of a square with a star on top of it. Below it was also three rows of squares but the star was not there on every square. The S was to scan all squares and mark only that square which had a star on top of it and matched with the stimulus picture. This exercise concerned visual memory.

Exercise V. Five stimulus words were put in column 'A'. Against each stimulus word four alternatives were given including the stimulus word in Col. 'A'. The 'S' was required to match the spellings of stimulus word in Col. 'A' with words given in Col. 'B'; check marking the correct one.

Exercise VI. was a repeat of exercise V with seven words in Col. 'A' and four in Col. 'B'. Words in Col. 'B' were spelt differently but sounded very similar to stimulus word. The task required the 'S' to match the spelling of the stimulus word with one in Col. 'B'. Different visual aspects of the configuration of the words were brought to the notice of the 'S' to enable him to observe the similarities and differences in the stimulus and response eliciting words.

Exercise VII. In this exercise a stimulus picture of a Robot was presented. Below the stimulus picture, three incomplete drawing of the Robot were drawn. The 'S' was required to scan holistically and

by parts the stimulus picture carefully and then complete the incomplete picture of the Robot. After completing the first incomplete Robot, the 'S' was encouraged to complete the rest two also. The exercise aimed at visual closure.

Figure Ground

Exercise I concerned figure ground perception. It presented a drawing of the toy train. Below it, outline of various shapes, representing some aspect of toy train—having specific colours were given. The 'S' had to identify one shape at a time in the drawing of a train and outline it with specified colour. The 'S' was required to see only particular shape at a time (figure) from the rest of the shapes (ground).

(Criterion for the completion of remedial exercises, post treatment, was 80% correct responding and number of trials taken. The subject was required to continue till mastery was attained.)

Intervention Procedure

The intervention procedure, based on the Cognitive Behaviour Modification (CBM) approach was adopted to remediate perceptual deficits among experimental group subjects. Cognitive strategies were developed for auditory, visual and figure ground perception. The steps of each strategy were reduced to an acronym to make it easier for the learner to acquire it. The subjects were first trained to learn and master the acronym denoting a particular strategy; with rehearsal and practice it was ensured that the subjects were ready to use the strategy.

CBM Approach Based Strategy-Training

Auditory Perception

Cognitive Behaviour Modification (CBM) based strategy was used to provide remediation in the area of Auditory Perception the ability to receive and understand sound and words. The generic strategy used for all exercises was LARA; 'LARA' contains the following steps.

- L: Listen carefully
- A: Associate Visually
- R: Remember the association
- A: Attempt the task

The strategy, was first modelled by the researcher ('R') using a relatively simple task to show the effectiveness of 'LARA' strategy in Auditory Perception. Seven exercises were designed and used for remediation of deficit in auditory perception.

Design and Analysis

In the two groups pre-and post-test design, four sets of data—pretest, post-tests O_1 , O_2 and O_3 were treated using 2×4 repeated measures ANOVA and paired t test.

Result and Discussion

Auditory Discrimination

Table 1
Analysis of variance summary – 2×4 repeated measures design
(Between Subject Effects)

Source of variation	Sum of squares	DF	Mean Square	F	Significance of F
Within Cells	943.03	54	27.74		
Constant	36992.11	1	36992.11	1333.72	<.001
Group	17.36	1	17.36	.63	.434

(*Time' within- Subject Effect)

Source of variation	Sum of squares	DF	Mean Square	F	Significance of F
Within Cells	211.19	102	2.07		
Time	172.94	3	57.65	27.84	<.001
Group by Time	3.36	3	1.12	.54	.655

Table 1: presented the summary of 2×4 repeated measures ANOVA. Between-subject effect showed that within cell value was unexplained residual while constant was cumulative effect of all the four observations (pretest and three post-tests). Except for the effect of constant—a cumulative aggregate of all treatments, none of the F ratios were found significant. Neither between-subject effect nor time within-subject effect contributed to altering the deficit prone status of subjects in the experimental group who had been subjected to treatment for remediation of auditory discrimination deficit.

In order to probe further the dynamics of intervention in respect of experimental group subjects paired t test had been run. It had been observed that pre-test Mean score (14.833) accentuated with subjects' exposure to treatment. Post-test I (O_1) (Mean = 16.500); post-test II (O_2) (Mean = 17.83); and post-test III (O_3) (Mean = 16.333); when compared with experimental group's pre-test Mean score, the resultant t values were found significant. ($t=3.39$, between pre-test

and O_1 ; $t = 7.91$, pretest and O_2 ; and $t = 5.33$ pretest and O_3). 'Within the group' the experimental group subjects recorded a change in their baseline status, but in between—group comparison they failed to distinguish themselves significantly from the control group subjects. Non-significant t comparisons rendered the 'within-group' gain look no better than a cosmetic change confirming the repeated measures' ANOVA result. The intervention, CBM based strategy training, did not seem to be effective in remediating the auditory processing disorder. The ability of experimental and control group subjects to analyse or make sense of information taken through the ears, ability to identify words and sounds that are similar and those which are different were observed to remain about equal.

Visual Discrimination

Table 2
Analysis-of-variance Summary— 2×4 repeated measures design
Between subjects Effects

Source of variation	Sum of squares	DF	Mean Square	F	Significance of F
Within Cells	1717.11	34	50.50		
Constant	194187.11	1	194187.11	3845.04	<.001
Group	21.78	1	21.78	.43	.516

('Time' within Subject Effect)

Source of variation	Sum of squares	DF	Mean Square	F	Significance of F
Within Cells	216.89	102	213		
Time	208.50	3	69.50	32.68	<.001
Group by Time	61	3	20	10	.962

Table 2: Pattern of results for visual discrimination, were not different than those found for auditory discrimination. Except for the effect of constant-cumulative aggregate of all treatments, none of the between-subjects effect was observed significant. The univariate F-test revealed that (experimental and control) groups did not differ when pre-test and post-test I (O_1) scores, after first fifteen days of treatment, were compared. No difference was observed when O_1 and O_2 combined together were compared to O_3 . Even pre-test, O_1 and O_2 jointly did not differ from O_3 . All F ratios were non-significant.

Paired *t* tests comparing experimental group's pretest scores (Mean = 35.00) with the post-test O₁ (Mean = 7.944), O₂ (Mean = 38.056) and O₃ (Mean = 37.444), revealed that obtained *t* values of 8.05 (pretest and O₁); *t* = 8.35 (pre-test and O₂) and *t* = 8.02 (pretest and O₃) were significant. Experimental group subjects registered an increasing trend in the mean scores during O₁ and O₂ whereas O₃ showed an erosion effect, suggesting improvement in their base line status, as a result of strategy training, minus stability in gain. Further, when post-test, O₁, O₂ and O₃ of experimental and control groups were compared the apparent gain waned out, being hardly skin deep. All the three *t* comparisons (*t*=1.579); (*t*=1.877) and (*t*=1.613) were observed non-significant. Control group received no strategy training but attended regular classes in the school with the experimental group subjects.

Figure-Ground

Table 3
Analysis-of-variance Summary—2 × 4 repeated measures design
Between Subjects Effects

Source of variation	Sum of squares	DF	Mean Square	F	Significance of F
Within Cells	1001.18	34	52.98		
Constant	285423.06	1	285423.06	5387.79	<.001
Group	9.51	1	9.51	.18	.675

(‘Time’ within Subject Effect)

Source of variation	Sum of squares	DF	Mean Square	F	Significance of F
Within Cells	300.21	102	2.94		
Time	567.74	3	189.25	64.34	<.001
Group by Time	33.30	3	11.10	3.77	.013

Table 3: Except for constant no significant treatment effect was observed in respect of figure-ground. Between subjects effect as also that of group was observed non-significant. ‘Time’ within-Subject analysis revealed that ‘Time’ and Group by time’ effect were significant. It implied that two blocks of time (each of fifteen days duration), invested in administering treatment, and a third one (for next fifteen days during which no treatment was given) to test stability

of gain, returned some dividend in the form of remediating figure-ground deficit at least partially.

Again, going to paired t test it was observed that experimental group's pretest mean score = 42.78, when compared with post-test mean scores ($O_1 = 44.000$, $O_2 = 47.000$ and $O_3 = 45.833$) yielded t values = 6.48, 9.26 and 4.33 respectively for each set of comparison. The t values were significant. But when the posttests O_1 , O_2 and O_3 of experimental and control groups (which received no treatment) were compared, the obtained t values were non-significant. The observed differences in mean scores could be attributed to chance only. The result suggested that treatment effect was meaningful in the limited sense, confined to time input. But this aspect also suffered slight abrasion when upward trend in the gain score from O_1 to O_2 faced a partial eclipse during O_3 (decrease in mean score).

The ability to distinguish an object from the surrounding background or ability to attend to one aspect of the visual field while perceiving it in relation to the rest of the field is not distinguished in absolute terms. Time has a role in remediating figure-ground deficit to an extent.

Many undetermined factors could have intervened to account for the obtained results. They, although not much encouraging point to the need for exploring alternative approaches of remediation using strategies of training, appropriate to meet individual child's patterns of strength and weaknesses.

Results lead to the inference that CBM based strategy training did not provide remediation of the perceptual deficit among experimental group subjects in a meaningfully significant way. The apparent gain seemed to be no better than a chance product. Experimental and control groups continue to have difficulty in tasks requiring visual discrimination of geometrical designs, pictures, letters and words. They also measured equal in recognising and interpreting information taken through the sense of sight.

Conclusion

CBM based strategy training did not prove effective in remediation of perceptual deficit (auditory and visual discrimination) among learning disabled children's sample. But the treatments time, in the intervention process, did help in remediation of figure-ground deficit, partially.

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An Investigation into the Awareness, Knowledge and Attitude of Student Teachers towards Climate Change

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ABSTRACT

The purpose of the study was to understand the level of awareness, knowledge and attitude of student teachers towards climate change. Descriptive survey method was used to carry out the research study by taking sample from B.Ed. colleges of Mumbai and Navi-Mumbai region. The study revealed that though the student teachers of different stream i.e., Science, Commerce and Arts are aware of the problem of the climate change but they lack in having sufficient knowledge of climate change with regards to its causes and consequences. Also the study revealed that there is no significant difference in the knowledge of climate change of Science and Commerce student teachers. However, a significant difference was found between the student teachers of Science and Arts stream and also between Commerce and Arts stream. Further, the study reveals that there lies difference in the level of awareness, knowledge and attitude between the student teachers of Mumbai and Navi-Mumbai.

Introduction

Climate change refers to the statistically significant change in the average weather that a given region experiences. GHG (Green House Gas) are the gases present in the earth's atmosphere which warm near-surface global temperatures through the greenhouse effect. While greenhouse effect is necessary for human inhabitation, an excess of GHG can raise the temperature of our planet to a level

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which would adversely affect human habitation. This is termed as global warming which is the major cause of climate change.

The Environmental Protection Agency report dated 17th January 2009 in New York, United States had clearly warned the potential effects of sea-level rise on the Nations coast due to global warming. As per the report the sea-level rise is accelerating due to run off from melting inland glaciers and ice sheets and warmer water occupying more space. The report states that the Middle Atlantic States are particularly vulnerable because the rates of rise are “moderately high” there, the region is subject to storms, it is densely populated and much of its infrastructure is in low lying areas. The predictions of the report such as flooding of coastal cities and extreme food shortages in the years to come due to climate change has been accepted by all the countries and the climate change has become a matter of great concern for the whole Universe.

The Inter governmental panel on climate change, a United Nations climate effort estimated in its report on 17th January 2009 that sea level might rise by about as much as 2 feet by 2100. The report issued by Environmental Protection Agency, the United States geographical survey and other agencies says that in the 20th century the rates of erosion in the region of Middle Atlantic States varied from 2.4 mm to 4.4 mm a year, or about a foot over 100 years. The report states that coastal headlands, spits and barrier islands will erode faster than they have in the past.

Climate researcher Susan Solomon defines “irreversible damage from climate change” as change that would remain for 1,000 years even if humans stopped adding carbon dioxide to the atmosphere immediately. According to her, climate change is slow, but it is “unstoppable”—all the more reason to act quickly so that the long term situation does not get even worse. In her paper presented in the International panel on climate change she concludes that if carbon dioxide is allowed to peak at 450-600 ppm level the results would include persistent decreases in dry season rainfall that are comparable to the 1930’s North American Dust Bowl in zones including southern Europe, Northern Africa, South Western North America, Southern Africa and Western Australia.

According to Hashem Akbari, a physicist with the Lawrence Berkeley National Laboratory in his report to California’s annual Climate Change Research Conference in Sacramento on 12th September 2008, a 1,000-square foot roof—the average size on an American home—offsets 10 metric tonnes of planet heating carbon

dioxide emissions in the atmosphere if dark coloured shingles or coatings are replaced with white materials.

R.K.Pachauri, chief of the noble prize winning United Nation climate change panel in his study suggested that the best and easiest way of stemming climate change is not to eat meat at least one day each week. The emissions arise due to the way land is cleared and feed for animals are grown. He further stated that the livestock emit methane, when it belches or farts, which is 23 times stronger as a climate changing agent than carbon dioxide. He has stated that the calculation by Food and Agriculture Organisation shows that meat production accounts for nearly a fifth of global green house gas emissions.

Anne Marie Idrac, the French Minister of State for Foreign Trade said that more and more countries have joined global efforts for a low carbon economy. The initiative will not only protect the planet but will also generate growth, drive innovation and create highly skilled jobs. In the current economic down turn it could help to stimulate recovery. The global crisis is not an excuse to turn back on this vital challenge.

Aquatic ecologist Katey Walter explains the complex science of Arctic methane—released due to the thawing of permafrost—which is one of the factors accelerating climate change. This phenomenon can be termed as “METHANE TIME BOMB”. The Arctic is warming faster than any area of the globe, and its average air temperature may rise as much as 10.8 degrees Fahrenheit this century. As reflective ice and snow cover shrink, the ocean ice cap melts and permafrost soil thaws, releasing methane, a potent heat trapping gas which is ominous. Methane has at least 20 times the heat-trapping effect of an equivalent amount of carbon dioxide. As warmer air thaws Arctic soils, as much as 50 billion metric tonnes of methane could be released from beneath Siberian lakes alone, according to Walter’s research. That would amount to 10 times the amount currently in the atmosphere.

Causes and consequences of climate change

Climate always varies due to natural processes. However, human activities are constantly increasing from manual to mechanised mode. As a result of this they release some gases such as chlorofluoro carbon, halons, methane, nitrous oxide, carbon dioxide etc. (majority is CO₂) in to the atmosphere. These gases tend to warm the earth surface. It is quite evident that both natural and human systems are vulnerable

to climate change because of their limited adaptive capacity. This vulnerability varies with geographic location, time and social, economic and environmental conditions. The earth's climate has changed over the last century. There is new and stronger evidence that most of the warming observed in the last 50 years is attributable to human activities. Evolving computer models predicts that, as a result of greenhouse gas emissions, temperatures will continue to rise over the twenty first century, impacting nature and mankind both positively and negatively.

Human activities include, (i) burning of fossil fuels (coal, oil and gas) and deforestation leading to higher carbon dioxide concentrations. Land use change (mainly deforestation in the tropics) account for up to one third of total anthropogenic CO₂ emissions, (ii) livestock enteric fermentation and manure management, paddy rice farming, land use and wetland changes, pipeline losses, and covered vented landfill emissions leading to higher methane atmospheric concentrations. Many of the newer style fully vented septic systems that enhance and target the fermentation process also are sources of atmospheric methane, (iii) use of CFCs in refrigeration systems, and halons in fire suppression systems (iv) agricultural activities, including the use of fertilisers, that lead to higher nitrous oxide concentrations, etc.

Need of the study

Most people in our society are still unconcerned and ignorant about the issue of climate change. The student and the teachers are the guardian of our future generations and they are going to be the architects of our society. There is a need to bring out awareness among the future teachers on what is climate change? How it affects our life, our economic prosperity and health and other welfare. How all of us together can save the environment for the benefit of present and future generations and achieve the ultimate objective of stabilising the atmosphere by way of bringing awareness among the children.

The International community is in serious discussion to tackle the most complex issue of the process of climate change and to take necessary action due to its threat to the fate of human race. The fact is that, unless timely measures are taken by the countries to put in place an effective mechanism for limiting emission of CO₂ and check its level of concentration in the atmosphere; it would be difficult to protect the mankind and wildlife.

Domestically, India has blazed a trail by drawing up an ambitious National Action Plan (NAP) for mitigation. Key elements of the plan

are to boost solar energy, promote research and development into renewable energies and enhance energy efficiency. The plan foresees effective adaptation measures, such as helping farmers by boosting the development of drought and pest-resistance crop varieties. Now, the road ahead is for an effective and efficient implementation of the ambitious plan.

It is everyone's responsibility to educate, sensitise and train the future citizens of the world on the issue of global warming and climate change. Possibility of advancing in the right direction in the controlling of climate change is possible if the enduring and responsible effort of the student teachers and teachers are channelled sensibly by providing the knowledge of climate change to pupils. The teachers and the student teachers can do so if they themselves are aware of the problem and consequences of climate change and global warming.

In the present study an attempt is made to find out the extent of awareness, knowledge and attitude of student teachers towards climate change.

Objectives of the study

1. To study the level of awareness, knowledge and attitude of student teachers (B.Ed.) towards climate change.
2. To study the awareness of climate change among student teachers possessing Science, Arts and Commerce as major subjects in graduation.
3. To study the knowledge of climate change among student teachers possessing Science, Arts and Commerce as major subjects in graduation.
4. To study the attitude of student-teachers possessing Science, Arts and Commerce as major subjects in their graduation towards climate change.
5. To study the awareness, knowledge and attitude of students and teachers of Mumbai and Navi Mumbai region.

Hypotheses

1. There is no difference among the students and the teachers in the level of awareness, level of knowledge and level of attitude towards climate change.

2. There is no significant difference in the awareness of climate change among the student and teachers possessing Science, Arts and Commerce as major subjects in graduation.
3. There is no significant difference in the knowledge of climate change among the student and teachers possessing Science, Arts and Commerce as major subjects in graduation.
4. There is no significant difference in the attitude of student teachers possessing Science, Arts and Commerce as major subjects in graduation towards climate change.
5. There is no significant difference between the student teachers of Mumbai and Navi Mumbai in the awareness, knowledge and attitude towards climate change.

Methodology

The descriptive survey method has been used in this study.

Sample

A sample of 180 student teachers was selected from various B.Ed. colleges located in Mumbai and Navi Mumbai.

Tool Used

A questionnaire was prepared by the researcher to find out the awareness, knowledge and attitude of student and teachers towards climate change. The questionnaire consists of a list of statements related to the awareness, knowledge and attitude of prospective teachers towards climate change. The tool consists of 50 items under three dimensions- awareness, knowledge and attitude. The reliability and validity of the questionnaire were established. The content validity of the questionnaire was ensured through consultation with experts from Mumbai University. The table-1, shows the no of questions and its reliability under the dimensions of awareness, knowledge and attitude of student and teachers towards climate change.

Table 1: Reliability coefficient of questionnaire under various dimensions

<i>Dimension</i>	<i>No. of Questions</i>	<i>Reliability coefficient</i>
Awareness	20	0.77
Knowledge	16	0.94
Attitude	14	0.71

Results and Discussion

Table 2 : The means and standard deviations of the level of awareness, knowledge and attitude of student teachers towards climate change

<i>Dimensions</i>	<i>Mean</i>	<i>SD</i>
Level of awareness	14.933	2.63
Level of knowledge	11.111	2.38
Level of attitude	12.289	1.57

TABLE-2 depicts that the mean of the level of knowledge is lower than the mean of the level of awareness and the level of attitude. The standard deviations of the level of awareness, knowledge and attitude are 2.63, 2.38 and 1.57 respectively.

Table 3 : Result of ANOVA on the Awareness, Knowledge and Attitude of student teachers towards climate change possessing Science, Commerce and Arts as major subjects in graduation

<i>Dimensions</i>	<i>Sources of Variance</i>	<i>Sum of Squares</i>	<i>df</i>	<i>Mean of Squares</i>	<i>F Value</i>	<i>Result at 0.05 level</i>
Awareness	Between	13.6	2	6.8	0.34	NS
	Within		1726.4	87	19.8	
Knowledge	Between	57.86	2	28.93	5.26	Sig.
	Within		478.74	87	5.5	
Attitude	Between	10.69	2	5.345	2.507	NS
	Within		185.54	87	2.132	

From Table 3, it is evident that there is no significant difference in the awareness and attitude on climate change among the student teachers possessing Science, Commerce and Arts as major subjects in graduation. Hence, the second and fourth hypotheses are to be accepted. Whereas, there is significant difference in the knowledge of climate change among the student teachers possessing Science, Commerce and Arts as major subjects in graduation, hence the third hypothesis is to be rejected.

Table 4 : Differences in the knowledge of climate change among student teachers possessing Science, Commerce and Arts as major subjects in graduation

<i>Sr. No.</i>	<i>Categories</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>t</i>	<i>Significance at 0.05 level</i>
1.	Science	30	11.46	2.012	3.19	Sig.
	Arts	30	9.8	2.018		
2.	Science	30	11.46	2.012	0.127	NS
	Commerce	30	11.53	2.236		
3.	Arts	30	9.8	2.018	3.145	Sig.
	Commerce	30	11.53	2.236		

Table 4 indicates that there lies significant difference in the knowledge of climate change between student and teachers having Science and Arts as major subjects in graduation, whereas there is no significant difference in the knowledge of climate change between student and teachers having Science and Commerce as major subjects in graduation. It is also evident that there lies significant difference in the knowledge of climate change between student and teachers having Arts and Commerce as major subjects in the graduation.

Table 5 : Differences in the awareness, knowledge and attitude towards climate change between the student teachers of Mumbai and Navi Mumbai

Dimensions	Mumbai		Navi Mumbai		t	Significance at 0.05 level
	Mean	SD	Mean	SD		
Awareness	15.53	2.33	14.33	2.79	3.13	Sig.
Knowledge	11.87	1.97	10.36	2.52	4.48	Sig.
Attitude	12.64	1.49	11.94	1.58	3.06	Sig.

Table 5 shows that the differences between the student teachers of Mumbai and Navi Mumbai in their levels of awareness, knowledge and attitude towards climate change are significant. Therefore, the hypothesis no. 5 is to be rejected.

Conclusion

Climate change is the most serious threat facing mankind in the twenty first century. It has been linked to human activities and the impacts of the global climate change will persevere for the years to come. No one can deny the measures required to be taken for the improvement of climate for peaceful survival of mankind on this earth. In the day-to-day activities people ignore the changes of the weather and in the event of any natural calamities only; they realise the problem and its consequences. The study revealed that though the student teachers are aware of the problem of climate change, they lack in having sufficient knowledge of climate change with regard to its causes and consequences. Further, the study revealed that, although the student teachers are aware of the problem of climate change their level of knowledge and attitude towards climate change are inadequate.

It is desirable for the future teachers of the society are imparted with adequate knowledge to address the problems associated with climate change. In order to increase public awareness and knowledge of climate change our future teachers need to be re-focused on encouraging people to act voluntarily on their attitudes, values and beliefs.

Recommendations

- (i) Subjects related to protection of the Environment, Global climate change are to be made compulsory in the teacher training syllabus. The syllabus should be designed in such a way that the student teachers will be well equipped with the knowledge of climate change, they become aware of its causes and consequences and develop a positive attitude to mitigate the climate change.
- (ii) Student teachers should be encouraged to undertake various research projects to find out solutions of the climate change problems.
- (iii) Various co-curricular programmes on climate change should be arranged and organised by the student teachers.
- (iv) Incentives in the form of awarding extra marks to those student teachers who undertake project work on climate change may also be considered.
- (v) Climate change campaigning could be conducted by the student teachers in association with environment protection agencies in various schools and public places.
- (vi) Further study can be undertaken to determine awareness, knowledge and attitude of rural and urban people towards climate change.
- (vii) Further study can also be undertaken to find out the significant difference in awareness, knowledge and attitude of male and female student teachers towards climate change.

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Educational Development in India at Elementary Level—An Interstate Perspective

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ABSTRACT

Educational development is a multidimensional process. As a result, its impact cannot be fully captured by any single indicator. Educational development in different dimensions measured with the help of a number of indicators when analysed individually do not provide an integrated and easily comprehensible picture of reality. Such situation calls for using appropriate composite index, which can optimally combine development in different dimensions. Another issue is identification of indicators that are independent and collectively measure the educational prosperity of a State/UT. Broadly seven dimensions have been identified for this purpose. Some sub-components, which together reflect the main component/dimension, are also identified. The data of 7th All India School Education Survey (7th AISES) conducted by NCERT with reference date of 30th September 2002 has been used in this study. As the reference date coincides with the initiation of implementation of SSA interventions in many states, this work may serve as a baseline for assessment of SSA interventions. Data on the aspects which were not covered under the 7th AISES are taken from SSA, DISE and Achievement Surveys conducted by NCERT. A composite index is given by Narain et. al. while measuring socio-economic development of states

The study was conducted during the year 2007-08 while the first author was working as Lecturer, Department of Educational Surveys and Data Processing, National Council of Educational Research and Training, New Delhi 110 016. The views expressed in this paper are purely of authors' and not to be attributed to either NCERT or ICAR.

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in India was used in this study. On the basis of this index, various States and UTs were compared with respect to systemic quality in the field of elementary education. Kerala stands at No. 1 position when elementary education as a whole is considered. Though, Tamil Nadu is on top position at primary level education, very strong upper primary level education of Kerala pushes the state to fore front at elementary level. The states which are lagging behind at elementary level are Bihar, Jharkhand and Nagaland. The dimensions where these states are lagging behind are identified so that administrators put focused efforts in those weak areas.

1. Introduction

Developmental programmes in various fields were taken up in the country in a planned way through various Five-Year Plans with the main objective of enhancing the quality of life of general masses by providing basic necessities of life as well as effecting improvement in their social and economic well-being. It is an established fact that education is a principal plank to all-round human development. In accordance with the Constitutional commitment to ensure free and compulsory education for all children up to the age of 14 years, provision of universal elementary education has been a salient feature of national policy since independence. This resolve has been spelt out emphatically in National Policy of Education (NPE), 1986 and the Programme of Action (POA), 1992. The 86th Constitutional Amendment Act, 2002 made education a Fundamental Right for all children in the age group of 6-14 years.

The Government of India launched a programme, Sarva Shiksha Abhiyan (SSA) in 2000, a holistic and convergent programme to achieve the long cherished goal of Universalisation of Elementary Education of Satisfactory Quality by 2010. The SSA is an effort to recognise the need for improving the performance of school system and to provide community-owned quality elementary education in a mission mode. It also envisages bridging of gender and social gaps among children.

SSA envisions (1) all children enrol in School, Education Guarantee Centre, Alternative School, Back to School Camps by 2003, (2) all children complete 5 years of primary schooling by 2007 and 8 years of elementary schooling by 2010, (3) elementary education of satisfactory quality with the emphasis on "Education for Life", (4) bridging of all gender and social category gaps at elementary by 2010, and (5) universal retention by 2010.

How far we have achieved various goals of an intervention is a matter of investigation at regular intervals. With a view to keep tracking and monitoring of the interventions, progress of educational development in various facets needs quantification and the resulting statistics be updated periodically to evaluate the current situation and to plan corrective measures, if any, needed. It gives the direction in which further expansion is needed and guides in identifying the emerging thrust areas. If we put it in abstract way it enables the states to formulate policies and plan of action needed to further the development process. India, being a federal country, there has been a wide inter state disparity in pursuing the goals the SSA on account of diversity in geography, culture, linguistics etc. prevailing in the states. Any such effort of monitoring should obviously consider cross-sectional (spatial) analysis taking State/UT as a unit of analysis.

As development is a multidimensional process its impact cannot be fully captured by any single indicator. Statistical measurement of educational development in different spheres is important. But a number of indicators when analysed individually do not provide an integrated and easily comprehensible picture of reality. Hence there is a need for building up of a composite index of systemic quality / educational development based on various indicators. On the basis of this index various States and UTs can be compared to know where they stand in terms of systemic quality/educational prosperity in comparison to other states and UTs.

In view of this background a need is felt to compare various State/UTs with respect to their educational prosperity using an appropriate composite index. The data of 7th All India School Education Survey (7th AISES) conducted by NCERT with reference date of 30th September 2002 works as baseline for assessment SSA interventions. Data on the aspects which were not covered under the 7th AISES are taken from SSA, DISE and Achievement Surveys conducted by NCERT.

2. Component Indicators

Obviously, before measuring the development in school education, it is necessary to identify the indicators that are independent and collectively measure the educational prosperity of a State/UT. Broadly seven dimensions have been identified for this purpose. Some sub-components, which together reflect the main component/dimension, are also identified. These sub-components too are measured at primary and upper primary levels separately.

2.1 Access to school within a walkable distance (1km for primary level and 3km for upper primary level)

Access to school within a walkable distance is measured by Percentage population of habitations having access to primary stage within 1 km and Percentage population of habitations having access to upper primary stage within 3 km at the primary and upper primary levels respectively. The relevant data was culled from 7th All India School Education Survey (7th AISES) conducted by NCERT (2007a) with reference date as September 30, 2002.

2.2 Enrolment Ratio

Enrolment Ratio, being a measure of participation of children in school education, has been considered to be a component indicator of the model to be developed. It has been measured by Gross Enrolment Ratio (GER) at the primary and upper primary levels. The relevant data have been taken from the 7th All India School Education Survey (AISES) of NCERT (2007b).

2.3 Equity in Educational Opportunities

The sub-components that together represent the main component 'Equity in Educational Opportunities' are i) Gender equity, ii) Social equity, and iii) Equity with regard to Children with special needs.

Gender equity is measured by Percentage of girls in enrolment at the primary and upper primary levels. Classes I-V and Classes VI-VIII are considered as the primary and upper primary levels respectively for this indicator. The data have been taken from the 7th All India School Education Survey (AISES) of NCERT (2007b).

Social equity can not be measured by Percentage of Scheduled Castes/Scheduled Tribes children in enrolment at the primary and upper primary levels as their prevalence varies from State to State. Unlike the gender of a child it is not a naturally determined phenomenon. Hence Gross Enrolment Ratio (GER) is considered in this study. The data of these indicators have been taken from Selected Education Statistics—2002-03 of MHRD (2004). It is worth mentioning at this juncture that GER is more than 100 in case of certain State/UTs on account of over age and under age children enrolled at a stage. For practical purposes GER is taken as 100 for those State/UTs. The social equity, finally, is measured by simple average of GER of SC children and GER of ST children at the primary and upper primary levels separately. In case of State/UTs not having

SC population (Nagaland), the GER for ST is considered. Similarly for the State/UTs not having ST population (Punjab), the GER for SC is considered.

By the third sub-component, i.e. Equity with regard to Children with special needs, we mean by equity in educational opportunities for disabled children. Being a natural phenomenon, the State-to-State variation in prevalence of disabled children is not expected to be significant; the sub-component can be measured by Percentage of disabled children in the total enrolment, of course, at primary and upper primary levels separately. Data for this indicator is taken from the 7th AISES of NCERT (2007c).

2.4 Infrastructure available in the school

Comfortable physical environment surely complements the quality of learning. That is why physical infrastructure available in the school is considered a crucial input in schooling. Many indicators are available from educational surveys conducted by various agencies that can help in measuring this dimension. It is very important to see that double or triple accounting is not done by including all such indicators. It is to be ensured that the subcomponents identified should together reflect the main dimension. Inclusion of a number of indicators measuring the same subcomponent calls for re-measuring the same thing. Care has been taken while locating the subcomponents that they are independent. Various sub-components considered under this main component are as under.

- (i) Percentage of schools with pucca/partly pucca building
- (ii) Percentage of schools with separate lavatory for girls
- (iii) Percentage of schools with drinking water facility
- (iv) Percentage of schools with adequate furniture for students
- (v) Percentage of schools with play ground facility
- (vi) Percentage of schools having electric connection
- (vii) Percentage of schools providing health services as measured by average of percentage of schools arranging for annual medical checkup of students and percentage of schools arranging for annual vaccination/inoculation of students

The data for the above indicators is taken from the database of 7th AISES of NCERT (2007d) or various published reports of 7th AISES for the primary and upper primary levels separately.

2.5 Quality Educational Inputs

Physical infrastructure available in the school augments the quality of learning where as quality of educational inputs offered to children

will have a direct bearing on learning process. The subcomponents identified under this main component are as following.

- (i) Average Pupil Teacher Ratio
- (ii) Curriculum and Teaching Learning Material: At the primary level it is measured by average of Textbook, Workbook, Handbook and Teaching aids availability indices. The data for these indicators is obtained from NCERT (2006) Survey of Baseline Assessment of Learning Achievement at the end of Class V conducted in 2002. At the upper primary level it is measured by simple average of standardised indicators, namely, average number of instructional days and percentage of schools (with upper primary stage) having received TLM grant as available from DISE-2002-03 data.
- (iii) Percentage of female teachers
- (iv) Percentage of trained teachers
- (v) Community Participation (village education committee/school development and monitoring committee) as measured by percentage of villages where village education committee (VEC) met atleast twice to the total villages existing. This indicator will remain same for the primary and upper primary levels.

The data for the above indicators except for (ii) are obtained from the data of 7th AISES of NCERT.

2.6 Efficiency of School System

System efficiency is an important factor in determining the educational development of a State/UT. It may be measured by combining the following subcomponents.

- (i) Dropout: Measured by percentage children dropout between beginning class of stage under study and beginning class of the succeeding stage. Dropout at the primary stage (I-V) is taken from Selected Educational Statistics - 2002-03 of MHRD (2004), which used the true cohort of 1997-98. Dropout at the upper primary stage is derived from Dropout reported for elementary level (I-VIII) by Selected Educational Statistics - 2002-03 of MHRD (2004), which used the true cohort of 1994-95. Dropout at the upper primary stage is derived by subtracting the dropout at the primary level from dropout at the elementary level. If the resultant value due to this subtraction is negative, dropout at the upper primary stage is considered as zero (for practical purposes).

- (ii) Average repetition rate of the component classes (of stage under study): Class-wise repetition rates as published by NUEPA (2005) and Mehta (2004) (based on DISE 2003-04 data using DISE 2002-03 as cohort) are used to compute the average repetition rate at the primary and the upper primary levels separately.
- (iii) Transition rate at terminal class of a stage: Transition rate between terminal class of primary stage and beginning class of upper primary stage is taken from NUEPA (2005) and Mehta (2004) (based on DISE 2003-04 data using DISE 2002-03 as cohort). Due to non-availability of data, transition rate between terminal class of upper primary stage and beginning class of secondary stage is derived from enrollment data of 7th AISES of NCERT. This computation assumes that change in absolute value of enrolment in the beginning class of secondary stage between 2002 and 2003 is negligible. Enrolment in 2002 in terminal class of upper primary stage is considered as cohort. Enrolment in the beginning class of secondary stage in 2002 is taken as Enrolment in the beginning class of secondary stage in 2003. It is now a straight forward method to compute transition rate.
- (iv) Average students attendance (as percentage of working days): The data for this indicator is obtained from NCERT (2006) Survey of Baseline Assessment of Learning Achievement at the end of Class V for primary stage. Students attendance data as reported by EDCIL (2007) in a research study under SSA has been used in case of the upper primary level.

2.7 Achievement level

This is an outcome indicator that can be used to monitor whether all the inputs given above are causing improvement in the level of learning in elementary education. The data for the indicator is obtained from NCERT (2006) Survey of Baseline Assessment of Learning Achievement at the end of Class V for primary stage. Examination results conducted by schools is considered to depict the level of Learning Achievement at the end of upper primary stage (class VII/VIII). Two indicators are presented in DISE 2002-03 report, (i) Percentage of passed children to total enrolment in the class, and (ii) Percentage of children passed with 60 per cent and above. For these two indicators average has been taken over boys and girls values. Final indicator has been derived by taking simple average of these two indicators after doing standardisation.

3. Methodology

Mehta (2007) described a procedure for building educational development index which is similar to the method used for computing HDI. In this procedure each indicator was first normalised by using the following formula.

$$NV_{ij} = 1 - [(best X_i - observed X_{ij}) / (best X_i - worst X_i)]$$

Principal component analysis was used to obtain weights of the component indicators. DISE 2005 data has been used for evaluating the educational development of various state/UTs.

To get normalised value, the method uses range, which is very sensitive to outlier states. As a result, there can be a leverage effect. For eliminating subjectivity, PCA method is being used while deriving weights to be used in building EDI. The method derives weights on the basis of correlations of component indicators with the underlying PCA axes. Correlation coefficient being a measure of only linear relationship, reliability of the weights derived becomes limited. Further some of the correlations entering the factor analysis may be spurious. Considering the limitations of the method this study has considered a different method which less sensitive. The method is delineated as under.

Narain et.al. (1991) proposed a method to develop a composite index to measure socio-economic development for each state. They further examined the statistical significance of change in development indices over two periods. The states have been considered as the unit of analysis. The study utilised the data on various types of socio-economic indicators. The method of analysis given by them is as under.

Let a set of n points represent states $1, 2, \dots, n$ for a group of k indicators $1, 2, \dots, k$. As the development indicators are in different units of measurement and the objective is to arrive at a single composite index, there is a need for standardisation of the indicators.

Let $[Z_{ij}]$ denote the matrix of standardised indicators, where $i=1,2,\dots,n$ and $j=1,2,\dots,k$. The best state for each indicator (with maximum/minimum standardised value depending upon the direction of the indicator) is identified and from this the deviations of the value for each state are taken. This procedure is to be adopted for all the indicators under study. They defined

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Educational Development in India at...

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$$C_i = \left\{ \sum_{j=1}^k (Z_{ij} - Z_{0j})^2 \right\}^{1/2}$$

Where Z_{0j} is the standardised value of the j th indicator of the best state and C_i denotes the pattern of development of i th state. The composite index of development is now computed for each state using the following formula.

$$D_i = \frac{C_i}{C}$$

Where

$$C = \bar{C} + 2S$$

Where \bar{C} is Mean of C_i

is Standard Deviation of

The value of composite index is non-negative and it lies between 0 and 1. The value of index closer to zero indicates the high level of development while the value of index closer to one indicates the lower level of development.

4. Inter State evaluation of educational development

Certain states were not covered under DISE-2002, Achievement Survey of NCERT and SSA study. As a result, the data set was having some missing cells for certain indicators. Analysis was carried out by substituting the indicator value of India for the states for which data are not available.

Inter state evaluation of educational development has been done at the primary and upper primary levels separately. Average rank of a state over the primary and upper primary levels has been used to depict the situation at elementary level. The corresponding results are presented in Table 1. Ranking of states with regard to educational development at the elementary level shows that Kerala is at first position followed by Tamil Nadu. Karnataka is standing in third position. Next two positions are taken by UTs Andaman and Nicobar Islands (4th) and Puducherry (5th). Maharashtra is at 6th place. The other state/UTs in which elementary education is well developed is Delhi (7), Lakshadweep (8), Chandigarh (9), Goa (10) and Dadra and

Nagar Haveli (10). These state/UTs may be considered as developed states. The states whose ranks are in the range of 11 to 20 may be considered as developing states. The states falling in this group are Andhra Pradesh (12), Uttaranchal (12), Himachal Pradesh (14), Daman and Diu (14), Haryana (16), Sikkim (17), Gujarat (18), Madhya Pradesh (19) and Rajasthan (19). The remaining states may be considered to possess under developed elementary education. Educational development at the elementary level is utterly poor in Bihar followed by Jharkhand (33) and Nagaland (33). The other states which are showing dismally low development in Elementary education are Arunachal Pradesh (32) and Odisha (31).

At the primary level Tamil Nadu is showing the highest level of educational development followed by Kerala. Andman and Nicobar Islands is at 3rd position. Karnataka and Maharashtra are standing at 4th and 5th places. The other states having well developed primary education system are Puducherry, Uttaranchal, Lakshadweep, Delhi and Dadra and Nagar Haveli. The states which are in middle range are Madhya Pradesh, Andhra Pradesh, Goa, Haryana, Chandigarh, Sikkim, Daman and Diu, Punjab, Rajasthan and Uttar Pradesh. The remaining states may be considered as under developed in primary education sector. Of these Bihar, Jharkhand, Nagaland, Arunachal Pradesh and Tripura are to go a long way to reach reasonable standards.

At the upper primary level Tamil Nadu has moved to 3rd position where as Kerala stands at No. 1 position followed by Karnataka. Fourth, fifth and sixth positions are taken by UTs, Andaman and Nicobar Islands, Puducherry and Chandigarh. The other states flourished at the upper primary level are Himachal Pradesh, Delhi, Maharashtra and Goa. The states which are having developing upper primary level of education are Lakshadweep, Daman and Diu, Dadra and Nagar Haveli, Andhra Pradesh, Gujarat, Haryana, Sikkim, Rajasthan, Uttaranchal and Punjab. The remaining states are struggling with upper primary level of education. Of these Bihar, Odisha, Nagaland, Jharkhand and Arunachal Pradesh are dismally under developed at the upper primary level.

Ranking of states with respect to educational development at the primary and upper primary levels, to a large extent, looks similar. The exception states are Himachal Pradesh, Madhya Pradesh, Odisha, Uttaranchal and Chandigarh. The performance of Madhya Pradesh, Odisha and Uttaranchal is better at the primary level as compared to the upper primary level. On the other hand Himachal Pradesh

and Chandigarh are showing better development at the upper primary level as compared to primary level.

Further, analysis of States with respect to development in different dimensions of school education may provide some insight. This kind of analysis may prove to be eye opening for policy planning as it brings out the individual dimensions at which the under developed states are lagging behind. The dimensions at which the developed states are prospered may be useful in setting potential targets for development. The corresponding results at the Primary and Upper primary levels are presented in Tables 2 and 3 respectively.

Table 2 shows that Lakshadweep is at No. 1 position with regard to providing access to primary stage within 1 km followed by Andhra Pradesh. Arunachal Pradesh, of course with its geographical constraints, lagging behind all the State/UTs in this dimension. Gross enrolment ratio (CER) is 100 or more for 21 State/UTs, assigning rank 1 for all of these State/UTs. It implies that the country would have achieved universalisation of primary education in 2007. However Punjab has to be prepared for a long journey to reach the cherished goal as it stands at bottom point with a GER of 68.33. In the dimension of equity in educational opportunities, Mizoram takes the first rank followed by Himachal Pradesh (2) and Andhra Pradesh (3). Bihar is at the bottom. As far as infrastructure dimension is concerned, Chandigarh (1) and Delhi (2) are ahead of all the State/UTs. Infrastructure is very poor in Meghalaya (35) followed by Jharkhand (34). Tamil Nadu is standing at No. 1 position with regard to providing quality educational inputs to children at the primary level. On the other hand Tripura is at last position followed by Bihar (34) in this dimension. With regard to efficiency of school system, southern part of the country is ahead with Kerala at first, Karnataka at 2nd and Tamil Nadu at 3rd positions. In this dimension too Bihar is at last position. Manipur is at No. 1 position with respect to achievement level followed by Tamil Nadu (2). Unlike in other dimensions, Bihar is at 3rd position in this dimension. Achievement level of students of States, Goa (35) and Himachal Pradesh is found very low.

The results in Table 2 can be seen from another perspective also. Identify the states whose rank is very high at the primary level from Table 1. Now locate the dimensions in which these states are lagging behind from table 2. These states have to concentrate on those weak spots and formulate the appropriate policies. It is apparent from Table 1 that Bihar is lagging behind all other state/UTs in providing quality primary education. The weak spots for Bihar are identified

under the GER, equity, efficiency, quality of inputs and infrastructure. The policy issues emanating for Bihar are to strictly implement free and compulsory education to age group 6-14 years, steps towards reducing gender and social equity gaps, investing in building infrastructure and improving quality of inputs. These steps, to a great extent, improve the efficiency automatically. Jharkhand is weak in access besides the weak areas of Bihar. So, the state has to think for opening new schools with primary stage. Nagaland has to concentrate on almost all components in a holistic manner except access. Arunachal Pradesh is having inherent geographical barriers to provide better access. The other weak spots to be focused are equity and quality inputs. Tripura has to focus on access, equity, infrastructure and quality inputs.

It is clear from Table 3 that four out of the five states lagging behind at the primary level (with rank more than 30) are lagging behind at the upper primary level too. These are Bihar, Jharkhand, Arunachal Pradesh and Nagaland. This implies that these states need to make efforts to overhaul the complete elementary education system in their states. In the case of upper primary stage too, the systemic quality is least in Bihar. The state which is not alarmingly poor at the primary level but is so at the upper primary level is Odisha. The factors that pushed Odisha to bottom line at the upper primary level are infrastructure, GER, equity and achievement level. So, Odisha has some reasons to worry about the upper primary stage education and needs to take steps to correct the situation. Nagaland is one of the weakest states in almost all components except achievement level. Jharkhand is weak in access, GER, equity and infrastructure. Arunachal Pradesh is lagging behind in access, equity and quality inputs*.

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Table 1: Educational Development at the Elementary level — An Inter State Perspective

Sl. No.	State/U.T.	Primary level		Upper Primary level		Elementary level	
		D_i	Rank	D_i	Rank	Avg. Rank	Rank
1.	Andhra Pradesh	0.699	12	0.701	14	13.0	12
2.	Arunachal Pradesh	0.928	32	0.907	31	31.5	32
3.	Assam	0.874	30	0.884	28	29.0	28
4.	Bihar	1.084	35	1.037	35	35.0	35
5.	Chhattisgarh	0.777	24	0.907	30	27.0	27
6.	Goa	0.711	13	0.665	10	11.5	10
7.	Gujarat	0.756	21	0.718	15	18.0	18
8.	Haryana	0.712	14	0.720	16	15.0	16
9.	Himachal Pradesh	0.765	22	0.645	7	14.5	14
10.	Jammu & Kashmir	0.840	27	0.787	21	24.0	24
11.	Jharkhand	0.960	34	0.908	32	33.0	33
12.	Karnataka	0.566	4	0.548	2	3.0	3
13.	Kerala	0.542	2	0.529	1	1.5	1
14.	Madhya Pradesh	0.695	11	0.847	26	18.5	19
15.	Maharashtra	0.571	5	0.664	9	7.0	6
16.	Manipur	0.848	28	0.810	23	25.5	26
17.	Meghalaya	0.863	29	0.902	29	29.0	28
18.	Mizoram	0.772	23	0.819	24	23.5	23
19.	Nagaland	0.929	33	0.910	33	33.0	33
20.	Odisha	0.801	26	0.917	34	30.0	31
21.	Punjab	0.717	18	0.775	20	19.0	21
22.	Rajasthan	0.720	19	0.746	18	18.5	19
23.	Sikkim	0.716	16	0.730	17	16.5	17
24.	Tamil Nadu	0.483	1	0.567	3	2.0	2
25.	Tripura	0.890	31	0.862	27	29.0	28
26.	Uttar Pradesh	0.729	20	0.803	22	21.0	22
27.	Uttranchal	0.619	7	0.761	19	13.0	12
28.	West Bengal	0.800	25	0.832	25	25.0	25
29.	Andaman and Nicobar Islands	0.561	3	0.605	4	3.5	4
30.	Chandigarh	0.712	15	0.637	6	10.5	9
31.	Dadra and Nagar Haveli	0.682	10	0.685	13	11.5	10
32.	Daman and Diu	0.717	17	0.675	12	14.5	14
33.	Delhi	0.667	9	0.652	8	8.5	7
34.	Lakshadweep	0.623	8	0.673	11	9.5	8
35.	Puducherry	0.594	6	0.619	5	5.5	5

* D_i is more than 1 for Bihar State, as the C_i value crossed Average + 2 sigma limits.

Table 2: Ranking of States with respect to Development in different Dimensions of Education at the Primary level

Sl. No.	State/U.T.	Access	GER	Equity	Infrast- ructure	Quality Inputs	Effici- ency	Achie- vement
1.	Andhra Pradesh	2	24	3	23	4	27	24
2.	Arunachal Pradesh	35	1	32	24	30	32	5
3.	Assam	28	28	16	28	27	20	30
4.	Bihar	13	32	35	33	34	35	3
5.	Chhattisgarh	15	1	8	22	24	24	31
6.	Goa	10	1	27	7	19	7	35
7.	Gujarat	3	1	26	8	8	34	15
8.	Haryana	5	30	23	3	28	28	7
9.	Himachal Pradesh	33	1	2	20	20	29	34
10.	Jammu & Kashmir	26	29	28	25	18	13	33
11.	Jharkhand	31	31	33	34	29	21	17
12.	Karnataka	12	1	10	18	3	2	16
13.	Kerala	21	22	7	5	7	1	29
14.	Madhya Pradesh	17	25	11	16	15	31	9
15.	Maharashtra	8	1	19	9	6	5	12
16.	Manipur	25	1	21	31	33	15	1
17.	Meghalaya	18	1	12	35	23	26	17
18.	Mizoram	7	1	1	29	25	22	13
19.	Nagaland	9	33	30	32	31	23	22
20.	Odisha	23	1	18	30	11	25	8
21.	Punjab	6	35	20	15	26	11	14
22.	Rajasthan	24	23	24	12	21	30	11
23.	Sikkim	30	1	6	21	9	19	27
24.	Tamil Nadu	14	1	17	13	1	3	2
25.	Tripura	27	1	25	27	35	18	6
26.	Uttar Pradesh	20	26	15	10	17	33	32
27.	Uttanchal	22	1	9	19	5	4	28
28.	West Bengal	16	1	13	26	32	17	4
29.	Andaman and Nicobar Islands	29	1	5	6	2	12	26
30.	Chandigarh	11	34	34	1	10	14	25
31.	Dadra and Nagar Haveli	19	1	29	14	12	16	17
32.	Daman and Diu	34	1	22	11	16	9	17
33.	Delhi	32	27	31	2	22	8	10
34.	Lakshadweep	1	1	4	17	14	10	17
35.	Puducherry	4	1	14	4	13	6	23

Table 3: Ranking of States with respect to Development in different Dimensions of Education at the Upper Primary level

Sl. No.	State/U.T.	Access	GER	Equity	Infrast- ructure	Quality Inputs	Effici- ency	Achie- vement
1.	Andhra Pradesh	14	21	18	20	4	18	26
2.	Arunachal Pradesh	35	22	30	24	33	26	6
3.	Assam	18	30	23	34	26	3	8
4.	Bihar	16	35	35	30	30	35	13
5.	Chhattisgarh	29	20	10	26	34	31	32
6.	Goa	12	2	28	4	16	6	28
7.	Gujarat	4	16	5	15	9	29	33
8.	Haryana	5	19	26	2	2	34	5
9.	Himachal Pradesh	21	3	4	22	8	4	20
10.	Jammu & Kashmir	23	27	17	25	14	20	29
11.	Jharkhand	32	34	31	31	20	10	13
12.	Karnataka	10	14	2	16	3	13	4
13.	Kerala	6	6	6	5	6	1	19
14.	Madhya Pradesh	22	28	22	18	31	32	18
15.	Maharashtra	13	10	9	8	18	14	24
16.	Manipur	30	15	16	29	29	17	2
17.	Meghalaya	33	26	13	32	27	24	25
18.	Mizoram	24	11	1	35	25	7	21
19.	Nagaland	34	33	33	28	28	28	3
20.	Odisha	19	29	25	33	19	15	34
21.	Punjab	7	24	20	10	15	25	35
22.	Rajasthan	20	31	34	12	5	19	30
23.	Sikkim	28	18	12	21	17	23	12
24.	Tamil Nadu	26	5	8	9	1	11	10
25.	Tripura	17	17	19	27	23	33	11
26.	Uttar Pradesh	25	32	24	14	24	27	31
27.	Uttanchal	15	12	15	23	32	2	23
28.	West Bengal	27	25	27	19	35	30	1
29.	Andaman and Nicobar Islands	31	8	3	6	7	16	27
30.	Chandigarh	11	13	29	1	13	9	9
31.	Dadra and Nagar Haveli	9	23	21	11	11	22	13
32.	Daman and Diu	3	4	11	13	22	12	13
33.	Delhi	1	9	32	3	10	21	7
34.	Lakshadweep	1	7	14	17	12	5	13
35.	Puducherry	8	1	7	7	21	8	22

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Influence of School and Students Factors on Mathematics Achievement

SADIA MAHMOOD* AND TAHIRA KHATOON**

ABSTRACT

This study examined the effects of school type, gender and mathematics anxiety on mathematics achievement. The population consists of 863 males and 789 females from 15 secondary schools of Uttar Pradesh (India). The Mathematics Achievement Test and Mathematics Anxiety Scale were used for data collection, while stepwise multiple regression, ANOVA, t-test and correlation techniques were used for statistical analysis. The results of the analysis showed that among the three independent variables, school type had the greatest influence on mathematics achievement (46%), mathematics anxiety comes second in order while gender showed no significant influence. Moreover, the students of Missionary and A.M.U. schools had highest mathematics achievement, while students of Government and Government Aided schools had lowest achievement scores, moreover scores of students of Muslim and Hindu Managed schools slide in between the range of highest and lowest achievement. Further males reported more mathematics achievement than females and students with low mathematics anxiety had highest achievement scores. Findings also reveal a significant negative correlation (-0.48) between mathematics achievement and mathematics anxiety.

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Introduction

Mathematics is an important subject in secondary school because it is associated with more academic and career opportunities (Akinsola and Tella, 2003). Ironically, this subject is the basis for scientific, industrial and technological advancement of any country. But it is very sad to note that the performance by the secondary school students are not up to the mark and student's general impression is that it is a dreadful subject. Thus, mathematics learning and student's performance in mathematics receive considerable attention from educators, teachers and parents. It is therefore important to identify which particular school and student's factors influence student mathematics achievement most significantly, in order to help them improve and make substantial academic progress.

The student's educational outcome and academic success is greatly influenced by the type of school they attend. Crosnoe, Johnson and Elder (2004) suggested that school sector (public or private) and class size are two important structural components of schools. Private schools tend to have both better funding and smaller class sizes than public schools. The additional funding of private schools leads to more access to resources, which have shown to enhance academic achievement. The relative social class of a student body also effects academic achievement. Student from low socio-economic backgrounds who attend poorly funded schools do not perform well compared to students from higher social classes (Eamon, 2005).

Gender, touted to be a significant contributor for mathematics achievement has not been consistent and continue to be a much debated topic (Leder, 1992). Friedman (1989) noted that until age 10 either no differences between genders or differences favouring girls are observed. For the middle school years, some researchers favoured girls (Tsai and Walberg, 1983) and some favoured boys (Hilton and Berglund, 1974); other researches showed no difference (Fennema and Sherman, 1978; Abiam and Odok, 2006). Friedman (1989) observed that in five of seven studies 12th grade boys outperformed 12th grade girls, with the remaining two studies showing no differences between them. Boys outperformed girls with a difference of about one fifth of one standard deviation from TIMSS population third data (Schreiber, 2002). Further, general consensus seems to indicate that females tend to perform better than males in computation and males tend to perform better than females in problem solving (Hyde et. al., 1990).

Another significant contributor duly acknowledged in literature for mathematics achievement is mathematics anxiety. High and low levels of mathematics anxiety greatly determine student's achievement level in mathematics. Studies pertaining to anxiety and achievement have found that these two variables share a negative relationship with each other (Richardson and Suinn, 1972; Hembree, 1990; Engelhard, 1990). In the past, researchers have reported that students with lower level of mathematics achievement tend to have higher levels of mathematics anxiety (Cooper and Robinson, 1989; Morris, Davis and Hutchings, 1981). This negative relationship also appears at the elementary and the secondary school levels (Chui and Henry, 1990; Lee, 1992; Meece, Wigfield and Eccles, 1990). Hembree (1990) reports an average correlation of -0.34 for school students, concluding that mathematics achievement is highly constrained by mathematics anxiety and that reduction in mathematics anxiety is consistently associated with improvement in achievement. However, it should be noted that the observations of Hunsley (1987) using multiple regression and those of Hadfield and Maddux (1988) using analysis of variance, did not indicate a significant relationship between the two. Frary and Ling (1983) found that higher levels of mathematics anxiety are related to lower levels of mathematics achievement among university students.

Purpose of the study

The purpose of the study is to investigate the relationship, if any between a set of independent variables i.e. school type (managed by different authorities), gender and mathematics anxiety with mathematics achievement (dependent variable).

Hypotheses

In keeping with objectives of the study, the following research hypotheses are formulated as well as tested against empirical data:

H₁: *There is no significant amount of variance in mathematics achievement accounted for by school type, gender and mathematics anxiety.*

H₂: *There is no significant difference in the mathematics achievement of the students of different types of school having different types of management.*

H₃: *There is no significant difference in the mathematics achievement of male and female students.*

H₄: *There is no significant difference in the mathematics achievement of the students having different levels of anxiety.*

Methodology

The current work is a descriptive study investigating the role of independent variables such as school types, gender and mathematics anxiety on the dependent variable mathematics achievement. The population in this study consists of 1652 pupils of which 863 (52.24%) are male and the rest 789 (47.6%) are female students from 15 Secondary Schools of Western Uttar Pradesh, the largest state in terms of population of India. These schools are broadly categorised on the basis of their management. For instance, Missionary schools are prestigious English medium co-education schools managed by Christian missionaries having very high reputations in society. This is the reason that pupils in these schools belong to well-to-do families with high socio-economic status (SES). A.M.U. Schools managed by world famous Aligarh Muslim University are English Medium single sex schools, where pupils in Class IX and X are from high socio-economic strata and are admitted through all India based competitions. Government and Government Aided schools are Hindi medium single sex schools run by Government directly or indirectly through aids, and are widely known among general public for their poor management by Government machineries. Tuition fees in these schools are very meager and generally, pupils from low socio-economic strata of the society flog these schools. The schools run by Hindu and Muslim trusts through local managements are termed as Hindu or Muslim Managed schools respectively. These schools can be seen as somewhere in between Christian missionaries and A.M.U. schools on one hand and Government and Government Aided Schools on other hand.

Tools Used

Mathematics Achievement Test (MAT)

- Mathematics Achievement Test developed by investigators is a 50 questions multiple objective type test, with four options A to D and is based on three cognitive levels that is knowledge, understanding and application. There is one correct answer for each question. The test items are scored manually, each correct answer scored one mark while a wrong answer scored zero. The level of achievement of a student is taken as students total test score. Student's achievements are categorised into low, medium, good and excellent group.

Mathematics Anxiety Scale (MAS)

Mathematics Anxiety Scale (MAS) developed by investigators is a 16-item instrument of which 11 are worded positively and 5 worded negatively. The instrument uses a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). Mathematics anxiety score is calculated by adding the individual scores of all the items together whose possible range can be between 16-80. Low score on the MAS indicate a high level of mathematics anxiety that is the reason the sign is reversed. Student anxiety levels are categorised into low, moderate and high level of anxiety in accordance with average anxiety scores obtained. According to investigators, this scale has split-half reliability of 0.89. The inner consistency coefficient determined by the alpha correlation, which is a generalised form of 20 formulas of Kuder Richardson, is 0.91. Another consistency test of the scale is performed by item total correlations technique. Item total score correlations are between the range of 0.30 – 0.52 of all items with total test.

Pearson Product Moment Technique is used to assess the correlation between mathematics achievement and mathematics anxiety scores. t-test is utilised for testing the difference between mean scores of mathematics achievement and types of school, gender and mathematics anxiety. F-test is applied for determining the significant difference among the groups. For determining the combined affect of independent variables on dependent variable multiple regression is used. Data analysis is performed on computer with SPSS 14 software package and the significance level is taken 0.05, 0.01 and 0.001 for all statistical tests.

Results and Analysis

Table 1 shows that the achievement groups are categorised on the basis of percentage scores in test. The four groups therefore formed are, Low achievement group (0-49%), Medium (50-69%), Good (70-89%) and Excellent (90% and above). An examination of mentioned table shows that the students' population percentages in low, medium, good and excellent achievement groups are 33.89 per cent, 29.61 per cent, 22.64 per cent and 13.86 per cent respectively. In male sub-group, this translates into 16.70 per cent, 14.65 per cent, 11.14 per cent and 9.74 per cent, while in female sub-group it is 17.19 per cent, 14.95 per cent, 11.50 per cent and 4.12 per cent respectively. Thus, the medium and good achievement groups together comprise of a little more than half of population of students (52.25%),

Table 1 : Population Distribution According to School Type and Gender among Different Achievement Groups

Schools	Gender	Low		Medium		Good		Excellent		Total	
		N	%	N	%	N	%	N	%	N	%
Government	Male	82	4.96	20	1.21	3	0.18	2	0.12	107	6.47
	Female	103	6.23	28	1.69	0	0	0	0	131	7.92
Government Aided	Male	109	6.60	59	3.58	11	0.67	0	0	179	10.85
	Female	86	5.21	56	3.39	11	0.67	0	0	153	9.27
Hindu Managed	Male	24	1.45	37	2.24	23	1.39	19	1.15	103	6.23
	Female	20	1.21	48	2.90	30	1.82	11	0.66	109	6.59
Muslim Managed	Male	41	2.48	55	3.33	47	2.85	17	1.03	160	9.69
	Female	27	1.63	43	2.60	51	3.09	28	1.69	149	9.01
Missionary	Male	6	0.36	36	2.18	38	2.30	40	2.42	120	7.26
	Female	16	0.97	25	1.51	54	3.26	21	1.27	116	7.01
A.M.U.	Male	14	0.85	35	2.12	62	3.75	83	5.02	194	11.74
	Female	32	1.94	47	2.85	44	2.66	8	0.48	131	7.93
Total	Male	276	16.70	242	14.65	184	11.14	161	9.74	863	52.23
	Female	284	17.19	247	14.95	190	11.50	68	4.12	789	47.76
Grand Total		560	33.89	489	29.61	374	22.64	229	13.86	1652	100

while the low achievement group constitute one third (33.89%) of total population. Further only 13.86 per cent of total population is observed in excellent achievement group, in which males are a little more than double of that of females. As expected, the largest population of low achievers is found in Government and Government Aided schools. Whereas, A.M.U. schools have the largest number of excellent achievers, in this particular population of excellent achievers, the population percentage of males is four times greater in comparison to females.

To test null hypothesis 1, stepwise multiple regression prediction equations are generated using mathematics achievement as the criterion variable and school type, gender and mathematics anxiety scores as the predictor variables, shown in Table 2. The prediction equation which contained all independent variables is significant ($R = 0.65$, $R^2 = 0.42$, $F = 398.85$, $P < 0.001$). The coefficients of multiple determination indicated that these variables combined accounted for 42 per cent of the variability in mathematics achievement. The standardised beta weights indicated that the relative contributions of these variables in predicting mathematics achievement are, the school type contributed 46 per cent ($\beta = 0.46$, $t = 23.09$, $P < 0.001$), gender contributed only 0.8 per cent ($\beta = 0.008$, $t = 0.44$, $P < \text{not sig}$) and mathematics anxiety scores contributed 33% ($\beta = -0.33$, $t = 16.72$, $P < 0.001$). The school type scores are best predictor of mathematics achievement, mathematics anxiety scores are second in order and gender comes last in sequence.

Table 2 : Stepwise Multiple Regression Analysis for predicting Mathematics Achievement using School type, Gender and Mathematics Anxiety

Multiple Regression Equation 1							
<i>Criterion Variable</i>	<i>Multiple R</i>	<i>R²</i>	<i>Adjusted R²</i>	<i>Standard Error</i>	<i>df</i>	<i>F</i>	<i>P</i>
Mathematics Achievement	0.65	0.42	0.42	9.02	3,1648	398.85	< 0.001
Multiple Regression Equation 2							
<i>Predictor Variables</i>	<i>B</i>	<i>Std Error</i>	<i>β</i>	<i>t</i>	<i>P</i>		
School Type	3.13	0.14	0.46	23.09	< 0.001		
Gender	0.20	0.45	0.008	0.44	< not sig		
Mathematics anxiety	-0.34	0.02	-0.33	16.72	< 0.001		

One-way ANOVA is performed as shown in Table 3 to ascertain whether there is any difference in student's level of mathematics

achievement according to their school types. Results show that students level of mathematics achievement differed significantly according to different types of school ($df = 5, 1646, F = 88.73, P < .001$). Further t- test was used to determine the direction of these differences.

Table 3 : Analysis of Variance of Achievement Scores on the Basis of School Types

Source of Variation	df	Sum of Squares	Mean Squares	F Square	P <
Between groups	5	88234.50	17646.90	88.73	0.001
Within groups	1646	327366.9	198.89		
Total	1651	415601.4			

Table 4 shows that students of Government schools have significantly low mathematics achievement scores ($M=16.34, SD = 8.30$) than those of other five groups. Students of Government Aided schools have significantly lower mean achievement score ($M = 20.55, SD = 8.46$) than the Hindu, Muslim, Missionary Managed and AMU school students. Similarly students of Hindu and Muslim Managed schools have significantly lower achievement score ($M = 30.38, SD = 9.69; M = 31.52, SD = 10.03$) than Missionary and AMU students. The students of Missionary and AMU Managed schools have almost similar mean mathematics scores ($M = 35.78, SD = 9.47$ and $M = 35.90, SD = 10.02$ respectively).

Table 4 : Comparison of Mean Achievement Scores of Different Types of School

Types of School	N	M	SD	T					
				1	2	3	4	5	6
Government 1	238	16.34	8.30						
Government Aided 2	332	20.55	8.46	6.02***					
Hindu Managed 3	212	30.38	9.69	16.33***	12.65***				
Muslim Managed 4	309	31.52	10.03	18.97***	15.17***	1.30			
Missionary 5	236	35.78	9.47	23.88***	20.37***	5.96***	5.03***		
A.M.U. 6	325	35.90	10.02	11.29***	10.32***	2.98**	3.77***	0.07	

P < 0.01, *P < 0.001

Computation of the mean and SD for male and female sub-samples of each school level (Table 5) shows that male students have significantly higher mean achievement scores ($M = 36.98, SD = 9.85$

and $M = 38.43$, $SD = 9.50$) in Missionary and A.M.U. schools than the female students ($M = 34.53$, $SD = 8.95$ and $M = 28.95$, $SD = 9.62$). Significant sex difference is not observed in Government, Government Aided and Hindu and Muslim Managed schools.

Table 5 : Sexwise Comparison of the Achievement Scores by School Types

School Type	Group	N	M	SD	df	t
Government	Male	107	17.07	8.79	236	1.24
	Female	131	15.75	7.67		
Government Aided	Male	179	20.10	8.42	330	1.08
	Female	153	21.08	8.05		
Hindu Managed	Male	103	30.49	10.80	210	0.15
	Female	109	30.28	8.58		
Muslim Managed	Male	160	31.19	9.92	307	1.79
	Female	149	32.15	9.91		
Missionary	Male	120	36.98	9.85	234	1.99*
	Female	116	34.53	8.95		
A.M.U.	Male	194	38.43	9.50	323	8.78***
	Female	131	28.95	9.62		

* $P < 0.05$, *** $P < 0.001$

For a comparative study of gender difference in mathematics achievement, data is presented in Table 6. The result shows a significant difference between mathematics achievement scores of males and females ($t = 3.85$, $df = 1650$, $P < .001$). More specifically, male students scored significantly higher ($M = 29.26$, $SD = 12.36$) than females ($M = 27.03$, $SD = 11.09$).

Table 6 : Comparison of Mean Achievement Scores of Male and Female students

Group	N	M	SD	df	t	P<
Male	863	29.26	12.36	1650	3.85-***	.001
Female	789	27.03	11.09			

*** $P < 0.001$

In order to determine if there are any relationships between the achievement scores of the students and their anxiety levels, Pearson Product Moment Correlation is applied. A significant negative coefficient of correlation is found between achievement scores and mathematics anxiety ($r = -0.48$), which indicates that as mathematics achievement score increases, anxiety score decreases accordingly.

Table 7 : Analysis of Variance of Mathematics Achievement Scores on basis of Mathematics Anxiety

Source of Variation	df	Sum of Squares	Mean Square	F	P<
Between groups	2	55927.896	27963.95	128.21	0.001
Within groups	1649	359673.5	218.12		
Total	1651	415601.4			

F-test when applied (Table 7) reveals that the mean achievement scores of Low, Medium and High anxiety groups students are significantly different (df = 2, 1649, F = 128.21, P < 0.001). Further, t-test is applied in an aim to show among which group of students the mentioned difference exists. As shown in Table 8, students with High anxiety in mathematics have significantly lowest mean achievement scores (M = 21.54; SD = 10.69) than the other two anxiety groups. Similarly, those students with medium mathematics anxiety have significantly low mean achievement score (M = 25.10, SD = 10.47) than low anxiety group (M = 35.84; SD = 10.46). This result shows that higher achievement consistently accompanies reduction in mathematics anxiety.

Table 8 : Comparison of Mathematics Achievement Scores on Basis of Mathematics Anxiety

Mathematics Anxiety Group	N	M	SD	t		
				1	2	3
High (51-80)	296	21.54	10.69			
Medium (35-50)	743	25.10	10.47	4.91***		
Low (16-34)	613	35.84	10.46	11.52***	17.65***	0

***P < 0.001

Table 9 : Genderwise Comparison of the Achievement Scores on the Basis of Mathematics Anxiety

Mathematics Anxiety Group	Gender	N	M	SD	df	t
High (51-80)	Male	108	20.53	9.38	294	1.31
	Female	188	22.22	11.41		
Medium (35-50)	Male	391	25.19	10.90	10.90	0.25
	Female	352	24.99	9.96		
Low (16-34)	Male	364	36.23	10.95	611	3.18***
	Female	249	33.54	9.30		

*P < 0.001

Further, on doing genderwise comparison of mathematics achievement scores on the basis of mathematics anxiety (Table 9), it is evident that there is a significant difference in the mean scores of male and female students of Low anxiety group ($M = 36.23$, $SD = 10.95$ and $M = 33.54$, $SD = 9.30$ respectively) showing females have less mathematics achievement compared to males in this group. Whereas there is no significant difference found in the male and female students of High and Medium anxiety groups.

Discussion

On the basis of population distribution the result indicates, that the Medium and Good achievement group together comprise of a little more than half of the population of students (52.25%) while the Low achievement group has one third (33.89%) of total population, further only 13.86 per cent of total population is observed in excellent achievement group, in which male population is more than double that of females. In comparison to other schools, the largest population of low achievers is found in Government and Government Aided Schools.

The variables under study in the present investigation are school types, gender and mathematics anxiety. The findings in relation to the first hypothesis revealed that the combination of school type and mathematics anxiety predicted the mathematics achievement of the students (42%). School type has the greatest influence on their mathematics achievement (46%), this is followed by mathematics anxiety and gender shows no significant influence on mathematics achievement.

On comparing the mathematics achievement on the basis of type of management of schools, the study reveals that the mean achievement scores vary on a continuum of low (Government and Government Aided, 16.34 & 20.55) to high (Missionary and A.M.U., 35.78 & 35.90), with Hindu and Muslim Managed sliding in between (30.38 & 31.52). In fact greatest influence of school type on mathematics achievement was well supported by the study of Fuller (1987) where the researcher showed that the inclusion of developing countries such as India, Chile or South Africa actually changed the strength and direction of school-related factors on student achievement from little or non-existent to a strong and positive relationship. Similarly, as Werf, Creemers, Jong and Klaver (2000) suggested, in Western countries, large differences in student achievement were noted between students from different socio-economic backgrounds. However, in developing countries such

differences were much smaller. Han (2009) in his study reported similar results, where school quality and size were correlated with mathematics achievement and independent schools were seen to have higher mathematics achievement compared to public schools. Further, Kingdon (1999), Govinda and Varghese (1993) found that private unaided schools are better quality and strongly associated with higher achievement.

The disparity among different types of school can be due to significant disparity of socio-economic status of students which again can be visualised on the same continuum of low (Government and Government Aided) to high (Missionary and A.M.U.), with Hindu and Muslim managing somewhere in between. Coleman et. al. (1966) and Jencks (1972) concluded that schools bear little influence on student's achievement and home background has much more powerful influence. Coleman (1966) also reported that the social composition of the student was highly related to student's achievement. Thus the disparity in the results of school types can be attributed to the known fact that students of high socio-economic status (Missionary and A.M.U. in this study) can indulge in home coaching, enriched home environment such as tutorials disks and video programme, good library, computer facilities, good friend circle and better state of mental health. While students of low socio-economic status (Government and Government Aided in this study) can only hope for such luxuries.

Another interesting result coming from the analysis of this particular variable, i.e. types of school, is that female students of Missionary and A.M.U. managed schools have significantly low level of mathematics achievement in comparison to their male counterparts. While female and male students of Government and Government Aided schools and Hindu and Muslim Managed schools show no significant difference which can be nothing but just a trend.

The gender based results of this study show female as less achievers in mathematics compared to their male counterparts. This result is consistent with findings of many empirical studies showing that boys tend to outperform girls in mathematics achievement (Battista, 1990; Fennema and Carpenter, 1981; Wood, 1976). In contrast, Opdenakker et. al. (2002), reports that proportion of girls was positively related to mathematics achievement. Further, Anderson et. al. (2006) reported that relationship between student gender and mathematics achievement was weak and mixed. In the mathematics content domain males tend to do better than females and in mathematics problem domain females tend to do better than male.

This study finds a negative correlation between mathematics achievement and mathematics anxiety, which is consistent with previous studies on mathematics achievement and anxiety (Dutta and Dutta, 1994; Hembre, 1990; Karimi and Venkatesan, 2009; Ma, 1999; Reglin, 1990; Satake and Amato, 1995; Woodard, 2004; Zakaria and Nordin, 2007). There is significant corresponding relationship among the three sub-groups of mathematics anxiety and mean achievement (High 21.54, Medium 25.10 and Low 35.84). This indicates that high anxiety will result in academic drop down of scores while on other hand low anxiety will lead to academic boost. This result is corroborated by various researches on the subject of mathematics achievement and mathematics anxiety. For example, Lafferty (1996) and Miller (1991) working on the samples of elementary school students find that those with higher achievements in mathematics have lower degree of anxiety towards mathematics, while Norwood (1994), Ma and Xu (2004) and Yuksel-Sahin (2004) find the same results working on the sample of high schools and university students.

In conclusion, this study give evidence that the type of management has strong correlation with mathematics achievement, Missionary and A.M.U. Managed ones show high level of achievement in comparison to other types of schools. In general the study also provides evidence for the fact that males have more mathematics achievement than the female counterparts and not only that males of particular type of management (Missionary and A.M.U.) have more achievement in comparison to the same sex students. Last but not the least there is very significant negative correlation (-0.48) between mathematics achievement and mathematics anxiety.

Suggestion

The fundamental problem that arises from this study and other like this is how we can make an increment in mathematics achievement of students so that they can be a success in all spheres of life. The variables effecting mathematics achievement in this study are school types, gender and mathematics anxiety. A cursory glance at Table 4 and 5 hints at a latent variable that might be contributing towards mathematics achievement. From the previous studies it is well known that the socio-economic status both helps and deters mathematics achievement level among students. The students from Missionary and A.M.U. managed schools have fairly high socio-economic status, this contributes to the reason of high achievement by these students

compared to the low achievement by students of Government and Government Aided Schools who fall on very low level of socio-economic strata. This might suggest that all the students of high socio-economic status enjoy same level of mathematics achievement due to their background and surrounding but in reality, it is not the case. Female students show disparity from their male counterparts in high socio-economic status grouping of Missionary and A.M.U. schools. Therefore, the question arises what is the latent effect, which is manifesting itself under various forms cutting across socio-economic status groupings.

The latent variable can be the network effect. Network effect is used extensively in social science from psychology to business studies. Network theory posits that the network in which we are in effects us in variety of way. Educationist working on network theory have proportioned that a students network usually consists of his family, friends community and school. If we apply this line of thinking in our present study, we will immediately find that the network of students from schools like Missionary and A.M.U. is far higher than the network of students from Government and Government Aided Schools. Again, the females of Missionary and A.M.U. schools have significantly less mathematics achievement from their male counterparts. This could be due to the fact that in spite being formally in the same network males and females in these schools do not enjoy the same "network effect".

This phenomenon is not hard to pin down as theorists have long proportioned that it is not only the network but also the forms of relationships; quality of interactions within the relationships; and the effects, which have the moderating, effect on those inside a network (Astone et. al, 1999). Applying these three dimensions to our present school context, we can infer that male and female in our settings might not be having same "forms of relationship" in schools like Missionary and A.M.U. Another factor could be that males have more activated relationships than females. For example, males might be asking and interacting more with their teachers and parents while females might not be so open and hesitant to ask or interact more with other members of their network. Therefore, the quality of relationships and interactions vary among males and females, and relationships with different qualities will eventually, to various degrees, increase or decrease mathematics achievement among them.

If this is the case, then what explains the effect that there is no significant difference among low achieving males and females of single sex Government and Government Aided schools and moderate male

and female achievers in co-educational Hindu and Muslim Managed schools. One reason could be that both the males and females of Government and Government Aided single sex schools are at lowest level of mathematics achievement and co-educational Hindu and Muslim Managed schools are found in middle position in case of achievement therefore any gender effect arising due to network effect cannot change the results much.

Now we are in far better position to suggest practices, procedures and other routines that might help low achievement students cutting across school type and gender. To start with, since it has become clear that one of the lateral reasons could be that even in high socio-economic status females are not enjoying the network benefit of their high socio-economic network. This phenomenon since deals with informal settings should also be dealt more informally by creating environment where females feel free to increase their interaction level with other non-female members of their networks. This environment can be created by educating both the teachers and parents of female students and making them aware of the special needs of female students as well as encouraging females to have healthy, more frequent and quality relationship with their male counterparts. This could mean assigning high achiever males mentoring responsibility towards their low achiever female counterparts.

While in the case of school effect where we find Government and Government Aided School students far ahead low achiever than others, it needs lot of extra effort on the part of both the management of these schools as well as some kind of social responsibility initiative shown by schools like A.M.U. and Missionary. A closer interaction between these schools could possibly create both formal as well as informal channels of network at all levels from the management, teachers as well as students. Frequent interaction and special mathematics meets among these different background students can help Government and Government Aided schools students appreciate the beauty of mathematics and possibly help boosting the achievement.

Moreover, teachers must re-examine traditional teaching methods that often do not match the students learning styles and teaching skills need to be productive in society. Lessons must be presented in a variety of ways. Mathematical concepts should be taught through play acting, cooperative groups, visual aids, CAI (Computer Aided Instruction). Teachers and parents should be made aware of the use of technology such as software programming for learning and doing

mathematics and use of various mathematical CD's. Parents should also maintain an active role when encouraging their children to incorporate mathematics into their daily routine. Parents and teachers can also help students realise, that myths such as the general feeling that mathematics aptitude is genetic and mathematics is a male domain, is simply not true.

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Influence of School and Students Factors on...

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Responsible Environmental Behaviour of Secondary School Students in Relation to their Locus of Control and Achievement Motivation

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ABSTRACT

The aim of the present study was to study Responsible Environmental Behaviour of Secondary School Students in relation to their Locus of Control and Achievement Motivation. The findings reveal that there exists significant relationship between Responsible Environmental Behaviour and Locus of Control. Further it was found that Internal Locus of Control group students have better responsible environmental behaviour and developed more civic action, educational action, financial action, legal action, physical action, and persuasive action as compared to External Locus of Control group students. It was also found that there exists significant relationship between Responsible Environmental Behaviour and Achievement Motivation. Further it was found that High Achievement Motivation group students have better Responsible Environmental Behaviour and developed more Civic action, Educational action, Financial action, Legal action, Physical action, Persuasive action as compared to Low Achievement Motivation group students.

Introduction

“The unleashed power of the atom has changed everything except our ways of thinking.”

-Einstein (1946)

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World Wildlife Fund (WWF, 2000) living planet report found that the state of earth's natural ecosystem have declined by about 33 per cent in the last 30 years, while the ecological pressure of humanity on earth has increased by about 50 per cent (WWF, 2000). Man as such, will not survive unless the population growth, pestilence and the contamination of our air, water and land resources are controlled. Many researches have shown that human behaviour is identified as root cause of all environmental problems (Gigliotti, 1992; Newhouse, 1990).

All of this led to realisation that the current behaviour of people towards their environment needs to change, implying that people need to learn how to behave in an environmentally responsible way (Linke, 1998). Environmentally responsible behaviour is a measure of how far a person is prepared to take an active part in protecting the environment. An individual's knowledge of environmental concepts does not guarantee that individual will adopt environmentally responsible behaviour (Hwang *et. al.*, 2000, Monroe, 1993). For example, they asserted that an individual possessing more knowledge on the environment would be more aware and would thus adopt a more favourable attitude towards the environment (Hungerford and Volk, 1990). However, these conclusions proved too generalist and have been refuted, as they neglected an aspect that was just as important: intending or wanting to act (Monroe, 1993; Hwang *et. al.* 2000) and control centre.

Intending or Wanting to Act

Intending to act can be perceived as the will to act or behave in a certain way (Hwang *et. al.*, 2000). According to the model offered by Hines *et. al.* (1986), intending to act, combined with the knowledge and abilities of an individual, can lead to the development of Responsible Environmental Behaviour.

The Control Centre

The control centre is defined as individuals' beliefs concerning their capacity to improve their situation through action (Hines *et. al.*, 1986; Hungerford and Volk, 1990). It is characterised by *internal* and *external* dimensions. The internal dimension refers to a person's conviction that his or her actions will be beneficial and will contribute to change a given situation. The external dimension is based on the belief that changes in a given situation occur randomly or through the interventions of agencies that are more powerful, more competent,

better informed, older, etc. (like governments or corporations) rather than through one's personal behaviour.

Locus of Control

With the Locus of Control construct, we are dealing with a person as he views himself in conjunction with the things and the meaning that he makes of these interactions between himself and his experiences (Lefcourt, 1976). It is a measure of a person's perception of the determinants of the reinforcement he receives. According to Rotter (1966), if the person believes that the event is contingent upon his own behaviour or his own relatively permanent characteristics, he has belief I, i.e., 'internal control'. But if he believes that reinforcement is not due to his actions, and so is contingent upon connections, fate, chance or as under the control of powerful others, the individual has a belief E, i.e., 'external control'. In the words of Ducette and Wolk (1972), an internal person perceives that he is in control of his fate and that effort and reward will be correlated. But an external person perceives that powerful others or the systems determine how well he can do and that rewards are distributed by such powerful others in a random fashion. So Locus of Control refers to the extent to which a person believes that he has control over the reinforcements which he experiences. Those who believe, report, or act as though forces beyond their control are the important factors in determining the occurrence of reinforcing events are referred to as having an External Locus of Control. Such forces might include fate, chance, powerful others, social constraints and the complexity in unpredictability of the world, etc. On the other hand, those who believe and act as though they control their own future and believe that they are the effective agents in determining the occurrence of reinforcing events are referred to as having an Internal Locus of Control.

Researches tell us that an important factor in determining whether an individual will engage in environmentally responsible behaviour is the person's Locus of Control or feeling of effectiveness (**Hines et. al., 1987; Sia, Hungerford and Tomera, 1986; Marcinkowski, 1989**). A person with Internal Locus of Control feels that he/she has a measure of control over events which occur.

Achievement Motivation

Achievement Motivation means finding satisfaction in facing some difficulty and complicated situation and in order to solve these

situations, the individual tries to set the new pattern and new standards. An achievement oriented person is one, who tries to improve the conditions of life for herself/himself. So the term Achievement Motivation has been defined by psychologists as the tendency to maintain and increase individual proficiency in one's area of work. It is an 'urge to improve'. Everyone has an achievement motive to some extent but some people are constantly more oriented towards achievement than others. Perhaps the most important aspect of a really strong achievement motive is that it makes possessor very susceptible to appeal so that he tries harder.

The most fascinating aspect of the achievement motive is that it seems to make the accomplishments an end in itself. He takes a special job in winning, in competing successfully with a difficult standard. Hence, Achievement Motivation is a concern for excellence which involves planning, excitement and a specific set of action strategies. It involves fundamental assumption that the desire to achieve something of excellence is in all beings. Achievement Motivation training encourages individual to find her/his own unique way of satisfying his concern for excellence.

Mehta (1969) has put forward broader conceptual definition of Achievement Motivation as dissatisfaction with the present state of affairs and urge to improve the life and conditions for oneself.

Operational Definitions of the Variables

Responsible Environmental Behaviour

Responsible Environmental Behaviour is defined as a measure of how far a person is prepared to take an active part in protecting the environment. Operationally it is defined as scores obtained by the students on Responsible Environmental Behaviour scale developed by the investigator herself/himself.

Locus of Control

Locus of Control refers to the extent to which a person believes that he/she has control over the reinforcements which he/she experiences. The person who believes, reports, or acts as though forces beyond his/her control is the important factors in determining the occurrence of reinforcing events are referred to as having an External Locus of Control. On the other hand, one who believe and acts as though he/she control his/her own future and believes that he/she is the effective agent in determining the occurrence of reinforcing events is referred to

as having an Internal Locus of Control. Operationally Locus of Control means scores as obtained by students on Locus of Control scale (Internal-External scale) constructed and standardised by Pal (1980).

Achievement Motivation

Achievement Motivation means finding satisfaction in facing some difficulty and complicated situation and in order to solve these situations, the individual tries to set a new pattern and new standards. An achievement oriented person is one who tries to improve the conditions of life for herself/himself. Operationally Achievement Motivation is defined as scores as obtained by students on Achievement Motivation test developed by Deo-Mohan (1985).

Review of Related Literature

Studies Related to Responsible Environmental Behaviour

Chapman and Sharma (2006) investigated on the environmental attitudes and knowledge of Indian and Filipino primary and secondary school students, and their readiness to engage in pro-environmental behaviour that could involve some changes in their personal lifestyle. For the most part, Environmental Education efforts are embedded mainly into various science subjects. The relationship between Environmental education and Environmental awareness is analysed to examine whether schools' Environmental Education could contribute to the shaping of environmental attitudes. A strategy and accompanying methodology for establishing Environmental Education are supplied. They found that intradisciplinary approach to environmental education does not help much in increasing environmental awareness and developing positive environmental attitudes.

Sarkar (2006) developed a comprehensive framework for understanding the approaches adopted by firms to address their environmental responsibilities when confronted with a variety of pressures. This framework is used to analyse the economic rationale behind a firm's environmental strategy from the point of view of the environmental manager. Thus, the focus of the study is on the private costs incurred and benefits obtained by firms. The public nature of environmentally conscious activities of firms is also looked at, but only in the managerial context. In addition to exogenous pressures such as regulations and changing consumer preferences, various endogenous motivating and de-motivating factors for environmentally responsible behaviour have been identified using a case study

approach. Factors inhibiting pollution prevention initiatives are identified and highlighted. Four in-depth case studies of steel and paper producing firms, covering both the public and private sector have been conducted. Within-case and cross-case analysis has yielded several useful insights, like people should be responsible towards the environment, which have been translated into appropriate policy recommendations.

Abraham (2008) studied the Green Marketing which is the marketing of products that are presumed to be environmentally safe. Green marketing covers more than a firm's marketing claims. While firms must bear much of the responsibility for environmental degradation, ultimately it is consumers who demand goods, and thus create various environmental problems. One of the examples is *McDonald's*, which is often blamed for polluting the environment because much of its packaging finishes up as roadside waste. It must be remembered that it is the uncaring consumer who chooses to dispose off his/her waste in an inappropriate fashion. Ultimately green marketing requires those consumers who want a cleaner environment and are willing to 'pay' for it, possibly through higher priced goods, modified individual lifestyles, or even governmental intervention. Until this occurs it will be difficult for firms alone to lead the green marketing revolution.

Lake, Flanagan and Osgood (2010) presented a descriptive analysis of trends in the environmental attitudes, beliefs and behaviour of high school seniors from 1976 to 2005. Across a range of indicators, environmental concerns of adolescents show increases during the early 1990s and declines across the remainder of the three decades. Declining trends in reports of personal responsibility for the environment, conservation behaviours, and the belief that resources are scarce are particularly noteworthy. Across all years, findings reveal that youth tended to assign responsibility for the environment to the government and consumers rather than accepting personal responsibility. Recent declines in environmental concerns for this nationally representative sample of youth signal the need for a renewed focus on young people's views and call for better environmental education and governmental leadership.

Studies related to Responsible Environmental Behaviour and Locus of Control

Newhouse (1990) researched on the college students and found that individuals with a stronger Internal Locus of Control are more likely

to participate in activities related to environmentally responsible behaviour because they believe their actions can help in behaviour change.

Sheng (1990) found that people like to be able to explain the causes and speculate about the outcome of their own and other people's behaviour. They need to know the world around them and to control their environment. Comprehension of human behaviour can be attributed to one of these categories: (1) external causes (such as environment, situation, the effect of other people's behaviour); (2) dispositions and internal states (such as cognition, affection, emotion, will, moral values, character and ability); (3) a combination of both internal and external causes. The study of these essences and principles is called Attribution Theory, and was first put forward by the American social psychologist, Heider with his colleagues, Robert and Weiner. Other psychologists applied this theory to the practice of education, and through the study of educational psychology, they developed the term 'Locus of Control'.

Smith-Sebasto (1995) focussed upon the possibility of modifying or altering either as individual's Locus of Control for Reinforcement (LOCR) or perception of knowledge of responsible environmental behaviour. From pre- and post-semester survey administered to an environmental studies class (experimental) and a history class (control) findings indicated the students in the study who completed an environmental studies course had a more internal LOCR for higher perception of their knowledge and skill in using categories of responsible environmental behaviour and more frequent performance of selected responsible environmental behaviour than at the beginning of the course. The control students, who had no environmental studies courses, showed no change in these areas, they did show a statistically lower perception of their knowledge and skill in responsible environmental behaviour, which may be indicative of their lack of knowledge concerning performance.

Harjai (2008) studied the effectiveness of experiential learning strategies for enhancing environmental awareness and sensitivity among primary school students with internal and external locus of control. $2 \times 2 \times 2$ factorial design was employed with the help of ANOVA for analysing the mean gain scores on environmental awareness and sensitivity of the students. Variable of instructional treatment was studied at two levels, viz. experimental group (T_1) which was taught by experiential learning strategy and the control group (T_2) which was taught by traditional learning method. Variable of locus of control was studied with respect to internal and external locus of control. The results show that students having internal locus

of control taught by experiential learning strategies exhibited better performance on total environmental awareness and sensitivity on all of its domains than students having external locus of control and taught by traditional learning method.

Studies related to Responsible Environmental Behaviour and Achievement Motivation

Ernst and Monroe (2000) examined the relationship between environment-based education and high school students' critical thinking skills, disposition towards critical thinking and Achievement Motivation. These outcomes were selected because of their relevance to both the formal education and Environmental Education communities. Environment-based education was defined in this study as formal instructional programmes that adopt local environment as the context for a significant share of students' educational experiences; characteristics include interdisciplinary learning based on the local environment, project and issue-based learning experiences, learner-centred instruction, and constructivist approaches. Twelve environment-based programmes in Florida high schools were selected for participation, and 586, 9th and 12th grade students from 11 of these programmes participated in the study over the course of the 2001-2002 school year. The instruments used were the Cornell Critical Thinking Test (critical thinking), the California Measure of Mental Motivation (disposition towards critical thinking), and the Achievement Motivation Inventory. A Pre-test, Post-test Non-equivalent Comparison Group Design was used for the 9th grade study, and a Post-test Only Non-equivalent Comparison Group Design was used for the 12th grade study.

Pre-tests were administered to the 9th graders, before the environment-based education programmes began. Many of the 12th grade students had previously participated in environment-based programmes; thus, a pre-test for 12th grade students was not possible. Post-tests were administered to the 9th and 12th grade students at the end of the school year. In addition, interviews of students and teachers were used to help explain the test results.

Multiple linear regression and SPSS 10.0 were used in the quantitative data analysis. When controlling for pre-test scores, gender, and ethnicity, environment-based programmes had a positive effect on 9th grade students' critical thinking skills ($p = 0.002$) and Achievement Motivation ($p = 0.025$). When controlling for gender, and ethnicity, environment-based programmes had a positive effect on

12th grade students' critical thinking skills ($p < 0.001$), disposition towards critical thinking ($p < 0.001$), and Achievement Motivation ($p < 0.001$); the effects on Achievement Motivation were moderated by ethnicity. Student and teacher interviews reinforced these results, as they indicated that key elements of environment-based programmes were responsible for increasing students' critical thinking skills, encouraging students to use their thinking skills, increasing the Achievement Motivation and making school more exciting and relevant. These results support the use of environment-based education in achieving goals of national education reform and can be used to help establish a place for environment-based learning in the formal school setting.

Simmons (2001) investigated the changes in 6th grade students' and their parents' environmental knowledge, attitudes, motivation, and behaviour following an Environmental Education programme (EEP) over a school year. Results indicated that at the end of the school year, children who were of High Achievement Motivation group show more environmental knowledge, positive environmental attitudes, and more responsible behaviour towards the environment as compared to children of Low Achievement Motivation group. Parents of children in the EEP group were significantly more dissatisfied with local environmental conditions as compared to parents of children in the control group. No other significant differences between groups were observed for other measured child and parental variables. Recommendations are presented to guide future studies evaluating an EEP.

Athman and Monroe (2004) found that greater achievement motivation is associated with greater cognitive engagement in schoolwork, which improves academic performance. In eleven Florida high schools, four hundred 9th and 11th grade students took part in a comparison of achievement motivation in classrooms with EIC programmes and traditional classrooms. Students filled out a 20-item Achievement Motivation Inventory and selected teachers and students in the participating programmes were also interviewed. Controlling for grade point average, gender and ethnicity, environment-based education significantly raised 9th and 11th graders' achievement motivation in comparison to the control groups. Students and teachers attributed increased motivation to the use of the local environment, teachers' ability to tailor learning experiences to students' interests and strengths, and the application of learning to real-life issues and problems, which often enabled students to present their work to community audiences beyond their teacher.

Need of the study

Environmental educators agree that respect for the environment, the teaching of values as related to the environment and encouraging Responsible Environmental Behaviour (REB) should be the integral parts of any environmental education curriculum. Ecological crisis is really a crisis of maladaptive behaviour and not a technological problem (Newhouse, 1990). In order for environmental education to be effective, it needs to help to shift behaviour to be more environmentally mindful. Most of these studies related to environmental behaviour of school students have been conducted in foreign settings and in India these are mostly conducted on environmental attitude, pro-environmental behaviour, environmental awareness and sensitivity (Chapman and Sharma, 2006, Harjai, 2007) and on the people owing private firms like steel and paper producing firms to understand the different measures adopted by them for behaving responsibly towards the environment (Sarkar, 2006, Abraham, 2008). All of the studies reviewed by the researcher help him/her to take the variable of Responsible Environmental Behaviour.

Studies related with Locus of Control show that students who completed an environmental studies course had a more internal locus of control (Smith-Sebasto, 1995) or individuals with a strong Internal Locus of Control are more likely to participate in activities related to environmentally responsible behaviour (Newhouse, 1990, Harjai 2007). But these studies are very scanty. So researcher felt the need to explore more in this direction.

Further it was found that rare researches have been done where Responsible Environmental Behaviour is studied in relation to Achievement Motivation. While scanning the studies related to Achievement Motivation, it was found that Environmental knowledge, attitudes and behaviour are positively and significantly related to the Achievement Motivation of the school students. Work has been done on the effect of Environmental education programmes on Achievement Motivation (Ernst and Monroe, 2000, Ahman, Julie and Monroe, 2004). However Simmons (2001) reported that children who were of high achievement motivation group show more environmental knowledge, positive environmental attitudes, and more responsible behaviour towards the environment as compare to children of Low achievement motivation group. Hence there is need to explore it further. So in the present study an attempt is made to study Responsible Environmental Behaviour in relation to Achievement Motivation.

According to Lake, Flanagan and Osgood (2010) since the Environmental Movement began, adolescents' views have been largely ignored in studies of public opinion. There are two main reasons for paying close attention to trends in this age group's views. First, according to the theory of generational replacement the changes in adolescents' attitudes are important markers of long-term social change. Secondly, young people's environmental concerns also deserve attention because they act as active agents in protecting the environment. So the researcher decided to study the Responsible Environmental Behaviour of secondary schools student in relation to their Locus of Control and Achievement Motivation.

Objectives

1. To find out the significance of difference between the mean scores of the students with Internal and External Locus of Control on Responsible Environmental Behaviour and its dimensions namely Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action.
2. To find out the significance of difference between the mean scores of the students having High Achievement Motivation and Low Achievement Motivation on Responsible Environmental Behaviour and its dimensions namely Civic-action, Educational action, Financial action, Legal action, Physical action and Persuasive action.

Hypotheses

- There exists no significant difference in Responsible Environmental Behaviour and its dimensions namely Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action between the students with Internal and External Locus of Control.
- There exists no significant difference in Responsible Environmental Behaviour and its dimensions namely—Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action between students having High Achievement Motivation and Low Achievement Motivation.

Research questions

1. Is there any difference among students with Internal and External Locus of Control on Responsible Environmental Behaviour and

Responsible Environmental Behaviour of...

its dimensions namely Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action?

2. Is there any difference among these students, having High Achievement Motivation and Low Achievement Motivation on Responsible Environmental Behaviour and its dimensions namely —Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action?

Tools

For the present study the following tools were employed to collect relevant data.

1. **Responsible Environmental Behaviour scale developed and standardised by the investigator himself/herself to collect the scores on Responsible Environmental Behaviour.** 'Responsible Environmental Behaviour' scale consists of forty six items having six dimensions, namely, Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action and it is a five point scale. Every item is in the statement form. Positive and negative statements are included in the scale to add variety and reduce the students' tendency to respond perfunctorily. Five response categories are provided for responding to every item. These are:
 - Always;
 - Mostly;
 - Sometimes;
 - Rarely; and
 - Never.

In these response categories the subject is required to select the most appropriate response category indicating her/his behaviour. The reliability coefficient by Spearman Brown Prophecy formula came out to be 0.83. For determining content validity, Index of Suitability (IOS) was worked out. The value of IOS ranged from 0.88 to 1.

2. **Locus of Control Scale by Pal (1980) to collect the scores on Locus of Control.** Locus of Control scale has 35 pairs of items related to need for Achievement, Striving for superiority, Competence and Personal Causation. The reliability coefficient was found to be 0.78 for undergraduate and 0.82 for post

graduate students. The validity coefficient was found to be 0.77.

3. **Achievement Motivation scale by Deo and Mohan (1985) to collect the scores on Achievement Motivation.** The scale consists of 50 items based on 15 factors as cues to achievement imagery. These factors are : Academic motivation, Need for achievement, Academic Challenge, Achievement Anxiety, Importance of grades / marks, Meaningfulness of task, Relevance of school/college to future goals, Attitude towards education, Work methods, Attitude towards teachers, Interpersonal relations, Individual concerns, General interests, Dramatics and Sports. There are 37 positive and 13 negative items. The reliability coefficient was found to be 0.67 for males and 0.78 for females. Concurrent validity of the scale was found by coefficient of correlation between the scale and the projective test of Achievement Motivation. The coefficient of correlation between the scale and the projective test was 0.54.

Sample

For the present study investigator decided to adopt descriptive survey method. Students of class IX studying in private schools of Patiala affiliated to CBSE, formed population for the study. The data was collected from Class IX students studying in schools situated in Patiala. A sample of 260 students was raised. The technique employed was multistage randomisation of clusters at school level. Firstly, the researcher took the list of all private Schools of Patiala affiliated to CBSE from CBSE office, Sector 32, Chandigarh. There were 18 schools and out of these, 4 schools were selected randomly. Out of 4 schools, 260 students were selected randomly.

Statistical Techniques Used

The researcher used the t-test for analysis of data.

Results and Discussion

The t- ratio were computed for determining the significance of difference between means of Internal Locus of Control students and External Locus of Control students on REB and its dimensions namely—Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action.

Table 1
Comparison of Internal Locus of Control students and External Locus of Control students on REB and its dimensions

<i>REB and its dimensions</i>	<i>Internal Locus of Control students</i>		<i>External Locus of Control students</i>		<i>t-value</i>
	<i>Mean</i>	<i>S.D</i>	<i>Mean</i>	<i>S.D</i>	
REB	95.54	7.3	56.78	7.8	17.12*
Civic action	18.56	5.6	10.45	6.2	7.34*
Educational action	15.64	6.1	12.35	6.7	6.98*
Financial action	17.54	5.3	9.67	6.3	5.67*
Legal action	15.45	7.5	12.45	6.9	6.23*
Physical action	25.34	6.5	14.56	5.8	9.18*
Persuasive action	12.59	5.7	5.90	7.2	7.02*

*= significant at 0.01 level

From Table 1 it is clear that obtained t-ratio for Responsible Environmental Behaviour and its dimensions namely—Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action for Internal Locus of Control group students and External Locus of Control group students is more than the table value at 0.01 level of significance. Therefore it is significant at 0.01 level of significance. It means that there exists significant difference between Internal Locus of Control group and External Locus of Control group on Responsible Environmental Behaviour and its dimensions namely—Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action. Thus, the null hypothesis which states that there exists no significant difference in Responsible Environmental Behaviour and its dimensions namely—Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action between students with Internal and External Locus of Control is rejected.

The t-ratio were computed for determining the significance of difference between means of High Achievement Motivation students and Low Achievement Motivation students on REB and its dimensions namely—Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action.

Table 2
Comparison of High Achievement Motivation students and Low Achievement Motivation students on REB and its dimensions

<i>REB and its dimensions</i>	<i>High Achievement Motivation students</i>		<i>Low Achievement Motivation students</i>		<i>t-value</i>
	<i>Mean</i>	<i>S.D</i>	<i>Mean</i>	<i>S.D</i>	
REB	64.78	5.8	38.34	6.8	14.23*
Civic action	13.34	7.5	8.45	6.7	6.54*
Educational action	11.34	5.9	7.65	4.7	5.98*
Financial action	9.78	4.9	5.78	5.6	5.67*
Legal action	11.23	5.2	7.67	6.1	6.02*
Physical action	18.02	6.1	12.57	5.8	7.34*
Persuasive action	12.59	6.7	5.90	6.9	5.57*

*= significant at 0.01 level

From table 2 it is clear that obtained t-ratio for Responsible Environmental Behaviour and its dimensions namely—Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action for High Achievement Motivation group students and Low Achievement Motivation group students is more than the table value at 0.01 level of significance. Therefore it is significant at 0.01 level of significance. It means that there exists significant difference between High Achievement Motivation group students and Low Achievement Motivation group students on Responsible Environmental Behaviour and its dimensions namely—Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action. Thus, the null hypothesis which states that there exists no significant difference in Responsible Environmental Behaviour and its dimensions namely—Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action between students having High Achievement Motivation and Low Achievement Motivation is rejected.

CONCLUSION

1. There exists significant difference between Internal Locus of Control group and External Locus of Control group on Responsible Environmental Behaviour and its dimensions namely—Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action. The mean scores of

Internal Locus of Control group students are considerably higher than the mean scores of External Locus of Control group students. It reveals that Internal Locus of Control group students have better Responsible Environmental Behaviour and developed more Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action as compared to External Locus of Control group students. The present result is supported by findings of Newhouse (1990) who researched on the college students and found that individuals with a stronger Internal Locus of Control are more likely to participate in activities related to environmentally responsible behaviour because they believe their actions can help in behaviour change.

2. There exists significant difference between High Achievement Motivation group and Low Achievement Motivation group on Responsible Environmental Behaviour and its dimensions namely—Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action. The mean scores of High Achievement Motivation group students are considerably higher than the mean scores of Low Achievement Motivation group students. It reveals that High Achievement Motivation group students have better Responsible Environmental Behaviour and developed more Civic action, Educational action, Financial action, Legal action, Physical action and Persuasive action as compared to Low Achievement Motivation group students. According to Colman (2001), "Achievement Motivation is a social form of motivation involving a competitive drive to meet standard of excellence, desire to achieve ethics, and need for having environmental ethics, and own wish to achieve that." In the light of the above statement, it can be inferred that highly motivated persons shape their own behaviour to act responsibly.

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Vocational Interests and Academic Achievement of Secondary School Students at Different Levels of Creative Thinking Ability–A Comparative Study

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ABSTRACT

The study was carried out with an attempt to find out how a particular age group with a fibre of high creative potential are differentiable from the ones who possess low level of creative ability on certain areas of vocational interests and academic achievement. A sample of 1000 students (700 boys and 300 girls) was selected from 26 secondary schools of Kashmir valley. Baquer Mehdi's Verbal Test of Creative Thinking Ability and Chatterji's Non-language Preference Record were used to collect the data. Following the criteria of top 25% (Q3) and bottom 25% (Q1), two extreme groups (high and low) were identified. Two way analysis of variance was used to find out the differences between these two categories. The findings revealed that the two groups have been seen to differ significantly on variables under investigation excluding academic achievement. Besides, gender differences could not be established.

1. Introduction

Of all the abilities that human beings are endowed with; creativity is considered to be the highly valued quality. It is this ability which seems to have an impact on all activities. These brains are considered to be the nations greatest asset. Therefore, proper nurturance of such brains demands not to be ignored. It is an admitted fact that we

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must protect these promising human resources at any cost by way of early identification, encouragement and opportunities for their upward mobility. It is reported that.... to give a fair chance to potential, creativity is a matter of life and death for any society (Toynbee, 1964). Manpower specialists have also observed that countries may not be able to sustain economic growth unless all the reserves of talent in the population are actively sought out and attracted into the needed educational channels (Raina, 1988). It is an established fact that every society has a *creative population* to be counted on finger tips and through their efforts the *commanding population* makes the decisions that control the collective life. In this context Lerner (1962) has rightly observed that educational revolution has two tasks, of which one is the confronting of the tendencies in a mass society. The second is to help a creative culture within the mass society and even out of many of its materials. Besides, if it is true that in every fat man there is a thin man shrieking to get out, it is also true that in every civilisation, there is a minority fibre always in the process of coming into being." Keeping this observation in line an effort is to be needed to discover, release and recognise this minority fibre in order to voyage in the developmental arena and aspirations. Ever since the inception of human race the contribution of talented has remained the area of focal interest. Even the early cave dwellers recognised the superiority of particular children and utilised their alertness, accuracy, and quickness in learning to teach them the more complex methods of fishing and hunting. Over more than 2000 years ago, Plato distinguished the 'men of gold with intellects from those of 'silver and 'iron (Chaudhari, 1988). As reported earlier, that creatives are the valuable resource of any country. They are capable of making major contributions to usher into innovative developments in almost every field of human endeavour—be it science, technology, literature, art, business, social and human relations (Gulati, 1988). It is said that human history more or less has been created by these small percentage and we must try to protect and sharpen their abilities. They have an important role in all areas of human activity (Torrance, 1969; Khatena, 1982; Renzulli, 1981; Wolfe, 1954). No one can afford to waste the specialities of its young buds at its own peril; these must be allowed to flourish (Saxena, 1984; Torrance, 1969; Guilford, 1968). History bears testimony to this fact that a single individual has a potential to shake the whole globe due to his consistent commitment for future scientific discoveries, future works of art, literature and other related fields (Goyal, 1988). Today, we notice a

sea change in and around the every nook and corner of this planet. Even impossible and difficult tasks seem to be within the possibility range in every field due to the challenging efforts of these promise keepers. Rightly remarked by University Education Commission (1948-49), "...special provision is needed for talented as they take leadership positions..." They are 'seed people, the concept changers and pulse takers of the society. Their worthwhile endeavour keeps a promising sharp line in music or graphic art, dramatics, mechanical skills, creative writings etc. (Zettle, 1979). The creative spark has made it possible to communicate on instant basis by the replacement of pigeon post into satellites. It is our national responsibility to provide an appropriate place to this fibre so that square pegs do not get fixed in round holes. Studies from Galton to Guilford and Terman to Torrance reveal that the area has gone to a tremendous change (Chaudhari, 1988). Shah (1960) has established that talented have leaning towards a wide range of fields like travelling, dramatics, sports reading, and debates.

A plethora of research reveal that a host of variables have been investigated in the field of creativity- Adjustment problems, scholastic achievement, socio-economic status, level of aspiration, vocational interests, personality characteristics, values, scientific outlook, birth order syndrome and intellectual abilities. The findings have been reported to be of divergent nature. Studies have shown that creatives experience adjustment conflicts (Pathak, 1989; Asha, 1980; Summungala, 1988; Zargar and Dhar, 1988; Kaile and Kour, 1987; Singh, 1981). Some revealed that creativity and adjustment go together (Mishra, 1987; Jarial and Sharma, 1981; Sinha and Sharma, 1980; Kumari, 1975). There are reports which reveal that highly creative people have entirely different patterns of career choices than those who seem to be low on creative ability (Nandwana, and Asawa, 2007; Mattoo, 2003; Jansari, 1995; Pathak, 1989; Vasesi, 1985; Gupta, 1984; Saxeena, 1984; Tiwari and Paul, 1983; Kumar, 1981; Singh, 1981; Singh and Mehra, 1981; Asha, 1980; Kour, 1980; Tripathi, 1979; Bharadwaj, 1978; Rasool, 1977; Parmesh and Narayanan, 1976; Gakhar, 1975; Passi, 1972; Sharma, 1971; Dauw, 1966). Besides, Creativity has been seen to have a link line with academic achievement (Charlton, 2009; Heinze, Shapira and Rogers, 2009; Ivcevic, 2009; Nori, 2009; Yousuf, 2009; Bal, 1988; Chadha, 1987; Mishra, 1987; Singh, 1987; Goyal, 1973; Asha, 1980; Vijaylakshmi, 1980; Ameerajan et.al. 1978; Mehdi, 1974; Passi, 1971). No agreement is seen between creativity and achievement (Sandhu, 1979). Review of studies reveals that there is inconsistency in the inferences drawn.

Therefore, further exploration merits attention. The present study is an attempt in this direction.

2. Objectives of the study

The present study was undertaken to with objectives as recorded under:

- To find out the differences in scientific and outdoor interests of high and low creative students,
- To find out the differences in the academic achievement of high and low creative students,
- To find out the effect of gender on scientific and outdoor interest of high and low creative students,
- To find out the effect of gender on academic achievement of high and low creative students, and
- To find the degree of relationship between vocational interests (scientific and outdoor), creative thinking ability and academic achievement.

2.1 Hypotheses

In the light of objectives, following hypotheses have been formulated.

- High creative students differ significantly in scientific and outdoor interests in comparison to low creative ones.
- High creative students will perform significantly better in their academic achievement than low creative ones,
- Gender has a significant impact on scientific and outdoor interests of high and low creative students, and
- Gender has a significant impact on academic achievement of high and low creative students.
- Vocational interests (scientific and outdoor), creative thinking ability and academic achievement are significantly related to each other.

3. Design of the study

3.1 Sample

A sample of 1000 high school teen agers (300 girls and 700 boys) was drawn randomly from nineteen secondary schools situated in the districts of Anantnag and Srinagar of Jammu and Kashmir state.

3.1.1 Tools

The investigator administered the following tools to collect the required information:

- Baquer Mehdis, Verbal test of creative thinking ability.
- Chatterjis Non-language Preference Record.
- Academic achievement—this has been considered as the total marks obtained by the students in their previous two annual examinations conducted by the Jammu and Kashmir Board of School Education.

3.1.2 Identification Criteria

In order to identify the high and low creative subjects, the raw scores obtained on verbal test of creative thinking were converted into standard scores as per the guidelines of the tool. Thereafter, subjects whose scores were found on and above the 75th percentile were considered as high creative and subjects whose scores were on and below the 25th percentile were considered as low creative. This criterion has also been adopted by most of the researchers (Mattoo and Sugra, 2008; Zargar and Dhar, 1988; Kumar, 1981; Gupta, 1979). Table 1 shows the cut-out points for these two extreme groups.

Table 1 : Score distribution of High and Low categories

<i>Group</i>	<i>Cut Point</i>	<i>No. Identified</i>	<i>Boys</i>	<i>Girls</i>
High Creative	163 and above	240	160	80
Low Creative	130 and below	240	160	80

3.1.3 Explanation of Vocational Interest

Vocational interests play an important role in the life of an individual as these determine what one will do and how well he will do it. It refers to variety of choices which an individual makes with respect to activities in which he is engaged. It is an admitted fact that an individual shows preference for one and aversion for another. It is the sum total of many interests that bear in any way upon an occupational career (Strong, 1954). Vocational interests are motivating forces which impel one to attend to a person or an activity. These are considered as a form of selective awareness or attention that produces meaning to ones experience (James, 1981). It is considered as a tendency to become absorbed in an experience (Ahuwalia, 1988). Many other researchers have also considered

vocational interests as likings and disliking (Fryer, 1931; Gilger, 1942; Ginzberg, 1951; Trow, 1956; Hamburger, 1958; Crites, 1969). In the present investigation interests are taken in the light of above explanation.

Analysis of Data

The collected data was put to statistical analysis by applying two way analysis of variance. Besides, Pearsons Product movement coefficient of correlation was computed. The results are reflected in tabular forms as.

Table 2 : Summary of Two-way ANOVA on Scientific Interest

<i>Source of Variance</i>	<i>Sum of squares</i>	<i>df</i>	<i>MSS</i>	<i>F ratio</i>
Creativity	46.26	1	46.26	59.0805*
Gender	0.74	1	0.74	0.0860
C*G	33.34	1	33.34	42.5798*
Total	372.71	476	0.783	

*Significant at 0.01 level

A perusal of the above table reveals that the contribution of creativity towards variance in scientific interest seems to be significant, ($F = 59.081$, $df 1/476$) at 0.01 level. This means that high creative students have greater interest towards scientific activities than low creative ones. These interests include the tendency towards physics, lab work and studying literature, reading books with explorative information. The variable of gender does not interfere with scientific interests ($F = 0.086$, $df 1/476$). It can be said that boys and girls have more or less similar inclination towards the scientific choice. The joint effect (interaction) of C*G is significant ($F = 42.579$, $df 1/476$) at 0.01 level. It reveals that the creativity and gender have greater interaction towards scientific activities than lower interaction of C*G. The results are in line with the findings of other researchers (Nandwana and Asawal, 2007; Dfgh, 2008; Mattoo, 2003; Pathak, 1989; Bhardwaj, 1978; Tripathi, 1979; Hocevar, 1976;). The findings of Tripathi (1979) reveal that highly creative subjects often choose vocations which are unusual and provide scope for the expression of creative talent like work of an inventor, scientist, musician and explorer.

Table 3 : Summary of Two-way ANOVA on outdoor interest

Source of Variance	Sum of squares	df	MSS	F ratio
Creativity	10.34	1	10.34	2.825
Gender	19.58	1	19.58	5.349*
C*G	8.33	1	8.33	2.275

*Significant at 0.01 level

The information presented in table 3 reveals that F-ratio for the two levels of creativity has turned to be insignificant ($F = 2.825$, $df 1/476$). This means that the differences between the two groups i.e. high creative and low creative on outdoor interest are not significant. It can be said that both the groups have outdoor interest to an equal extent. The variable of gender has shown a significant influence in outdoor interest ($F = 5.43$, $df 1/476$). The results reveal that high creative boys have a greater tendency towards outdoor activities than high creative girls. The results obtained are significant at 0.01 level. The interaction effect between creativity and sex has been found to be insignificant ($F = 2.275$, $df 1/476$). The findings are supported by some of the earlier results (Mattoo, 2003; Pathak, 1989; Vasesi, 1985; Kumar, 1981; Singh and Mehra, 1981; Bharadwaj, 1978).

Table 4 : Summary of Two-way ANOVA on Academic Achievement

Source of Variance	Sum of squares	df	MSS	F-ratio
Creativity	148.99	1	148.99	179.73*
Gender	0.18	1	0.18	0.212
C*G	0.01	1	0.01	0.02
Total	394.640	476	0.829	

*Significant at 0.01 level

Table 4 gives information that the contribution of creativity towards variance for variable of academic achievement is found to be significant at 0.01 level ($F = 179.73$ $df 1/476$). The results indicate that high creatives are differentiable from those of low creative ones on academic achievement. It is observed that high creatives have higher achievement than low creatives. The variable of gender does not contribute significantly towards the variance in academic achievement. It signifies that both the groups under discussion are not different in academic achievement. ($F = 0.212$, $df, 476$). The interaction of creativity and gender for academic achievement has also been found to be insignificant ($F = 0.02$ $df, 1/476$). (Steinmayar

and Spinath, 2009; Coyle and Pillow, 2008; Ai, 2007; Palaniappan, 2007; Shan, 2003; Chandel, 2003; Mattoo, 1995; Acharyulu, 1988; Chadha, 1987; Singh, 1987; Venkateswarn, 1987; Vijaylakshmi, 1980; Mehdi, 1977; Saxeena, 1977; Passi, 1971; Raina, 1968; Getzels and Jackson, 1962).

Table 5 : Intercorrelation of Variables

Variables	CR	SC	OD	AC
CR	1.00	0.462	0.521	0.183
SC		1.00	0.392	0.321
OD			1.00	0.123
AC				1.00

The results reported in table 5.00 reveal the intercorrelations of variables viz. creativity, scientific interest, outdoor interest and academic achievement. Positive and significant relationship is found between creativity and scientific interest ($r = 0.462$, significant at 0.01 level). Creativity and outdoor interest are seen to be associated positively ($r = 0.521$, significant at 0.01 level), whereas creativity and academic achievement are in agreement to each other but their relation seems to be slightly weak ($r = 0.183$). The results also show that correlations of scientific interest with outdoor and academic achievement are all significant at 0.01 level of confidence ($r = 0.392$, and 0.321). Outdoor interest is also reported to be positively correlated with academic achievement ($r = 0.123$), but the relation seems to be low and insignificant.

Inferential Observations

The study is concluded with the following conclusions:

1. Scientific interest has been seen to go with high creativity. The variable of gender seems to contribute in scientific interest of the subjects.
2. Creativity thinking ability has shown a significant influence with respect to outdoor interest of the subjects. However, gender differences were found to exist.
3. High creatives have been found to be higher in their academic achievement than low ones. However, gender could not differentiate the subjects on the index of achievement.
4. Scientific interest and outdoor interest are reported to be positively correlated. However, outdoor interest and academic achievement are weakly related to each other.

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Book Reviews

Remaking Higher Education

Essays in Dissent

by Amrik Singh

PUBLISHED BY Harper Collins

PRICE ₹ 275. PAGES 196

This is the latest in the series of books written by Amrik Singh which deals with a lot of issues in higher education. The book has a foreword by Kuldip Nayar and is divided in 10 chapters.

The author goes down the memory lane, recalls his experiences and becomes analytical and suggestive in this polemical study of state of higher education in India.

The author strongly feels that the two serious mistakes which India made were to continue with the legal and educational system more or less as they were before 1947. The major issues highlighted in the introductory part is negligence of teaching profession and its management. He comments that having neglected constructive role of teacher education has resulted in poor syllabus for teacher education and non-availability of the right kind of education.

Drawing on his vast experience as an academician he deftly portrays the issues of in forms of questions related to hike in fee, passivity of teachers and effects on teacher performance which need serious thinking. He candidly suggests improvement in this flaw.

The author states that still only 4 per cent of the GDP is being utilised for education and feels that how difficult it is to find more funds and spend them purposefully. The author in subsequent chapters deals with the trivial issue of urbanisation, increasing pressure on professional colleges and growth of private universities. He analyses the functioning of Medical Council, AICTE, NAAC and the UGC between and plainly minces no words in telling what they could do and have not done.

He laments on the problem of our country that by continuing to be traditional in our thinking and ways of functioning we have not embarked upon the path of self governance and self growth and say

that once this is enforced upon the doors of quality will be automatically opened.

Shortcoming of B. Ed course and NCTE, training and retraining of teachers, statistical information on some open universities and dealt within the subsequent chapters. The non-uniform spread of open learning system is also probed into the issue of leadership in education, financial management and restructuring system is discussed at length, questions raised and measures suggested.

The book ends with a note that the coordination between different agencies cannot be overlooked and suggests financial and procedural changes essential for improving and to make India stand at par with more progressive nations of the world. Suggestion for teachers to take proactive role in training of policies has been emphasised upon.

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Career Growth and Joy at Work

by Ashutosh Pandey

PUBLISHED BY India gen NEXT Publication

PRICE ₹ 180 PAGES 269

The present book is about building an enriching and motivating environment around human beings that make one possible to develop strategies around strengths. The book has adapted various concepts of management being practiced in the cooperative word like motivation, creative thinking etc. to individual's concern for career growth and joy while doing work. The book has tried to help individuals visualise and reflect on their strengths and key advantages for working out their unique strategy for career growth. The book has tried to explain an individual's ability to open new avenues for personal growth and career advancement by designing their generic project that may help them in being flexible and responsive to new opportunities. The book begins

with describing the basic purpose of work and has differentiated between life and career.

The book is divided into 10 chapters. The introductory chapter explains the purpose of work career growth along with the tranquility of mind and the path ahead. There are three main themes explained in this chapter. They are mental model which helps in discovering and nurturing our inherent strength; vision based on our inherent strength and emerging career opportunities; execution —The art of making it happen. The second chapter, “Mental models for higher latitude,” deals with the self exploration that lies behind us and before us or with in us. This chapter includes the self empowerment through emotional competence and the success in life as independent of an Individual's intelligence and supported his contention with research evidence. This chapter also explains that there are two types of self-empowering unhelpful belief and helpful belief which includes 3 basic choices—

1. Choice of positive belief
2. Choice of positive relationship
3. Choice of positive action

Next two chapters explain the nurturing and stimulating the inner core and opening new avenues with the generic projects. One makes a beginning for developing a generic project around the natural strengths and circumstances whereas, the other explains the refined generic project and provides the best opportunities for an individual's career growth and long them success.

The fifth chapter deals with the “Aligning Career Goals” with critical roles. This chapter explains the clarity and harmony of our inner world which may be disturbed due to external factors or circumstances. Execution is the only way in which a person can get into the state of flow, learning the implicit aspect, finer aspect of the process of making it happen. Execution is strategy and learning is action. The author advocates that a passion and honesty about the reality are the only ways by which a person can develop confidence and credibility in their career and profession or any other chosen field. This chapter also explains developing a long term vision and examines critical roles for achieving meaningful goals. Other chapters include “Identifying latest patterns inhibiting growth” and “Emerging Careers and new Opportunities” respectively. Chapter six diagnosed the latent patterns that affect the career and life like Plateau effect, Boom rent effect. These two effects are shown to be important for parents who guide their children in their career. This chapter also explains diagnosing typical latent patterns and their antidote symptoms and also identifies some typical patterns that are affecting the career prospects with suggestions for appropriate strategies to deal with them. Chapter seven explains

the business reality of an individual's profession/industry and also explains various emerging career metamorphosis such as technological, social, judicial activism, consumerism, government policy etc. which lead to demand for new or specialised types of product or services.

The book also includes "The Reinforcing Cycle of motivation" and "branding for success." The Reinforcing Cycle of motivation includes four steps. Enthusiasm for the project, enthusiasm to systematic effort or energy and drive, execution excellence including its key factors of competence and execution strategy, and the cycle of motivation which shows as encouragement/satisfaction. Branding for success explains various types of brands with examples and also explains self image. It also includes branding self-meaning which is a process for creating a positive image and credibility about one's strengths and abilities to make positive contribution to organisation/steps etc. The book has shown three phases of branding process: (a) Being Confident and at care with one self, (b) Examining value and beliefs, (c) Getting used to the process and learning from it. In the end the book has explained "Pro-active planning for execution excellence with importance of a balanced perspective." The book has also given key and important areas that are crucial to maintain tranquility in the face of numerous pressures of our competitive times.

This book is primarily meant for experienced professionals, who are executives who wish to revitalise their vision and align their career strategies to their inherent strength. This book is all about developing a holistic career which brings long term satisfaction and enrichment to individual. From the background of the book, the important contribution is thorough exercise aimed at assessing one's potential and developing one's own strategies, applications and action points for career growth and joy while at work. The book has tried to analyse the career guidance and the job satisfaction from sociological as well as psychological perspective with the aim at drawing best out of one's strengths to cope up with the stress management strategies.

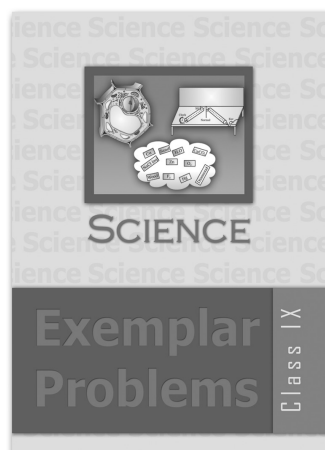
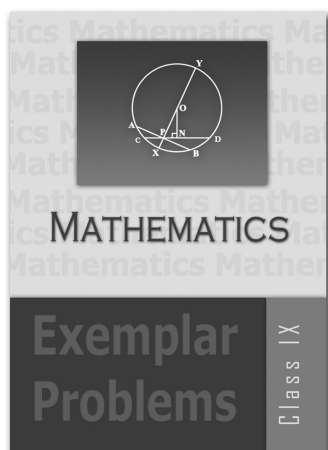
N.K. GUPTA

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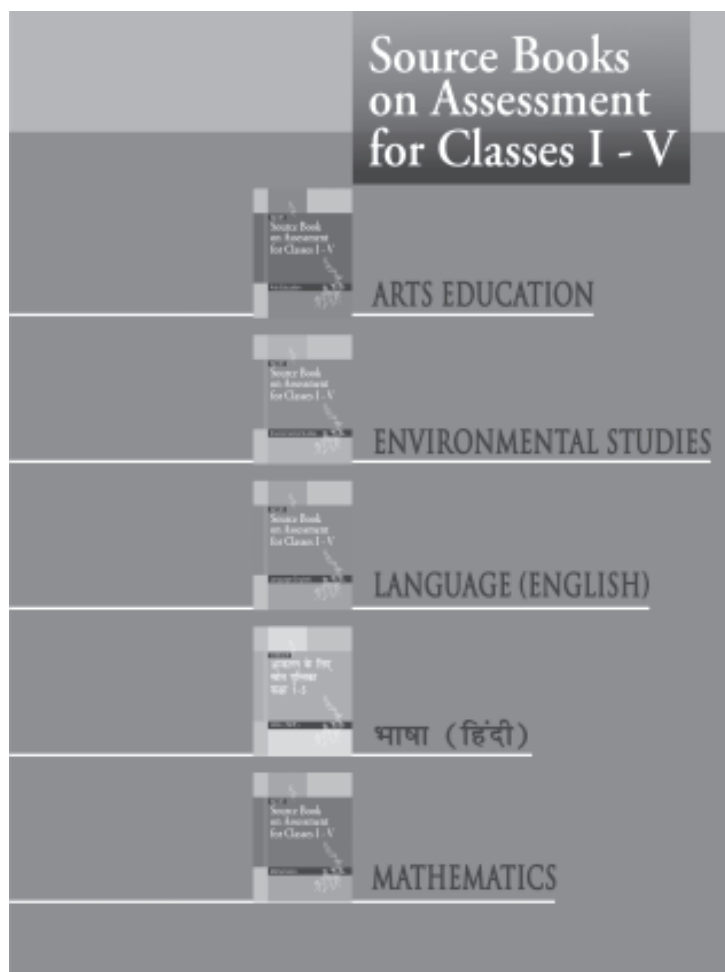
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- (ii) **Ph.D. Programme**
- (iii) **Part-time Ph. D. Programme**

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