ABSTRACT

Introduction:

We live in exciting times for it is the century of science and technology. Like the previous century, ushering in the new millennium is a jubilant introduction and the consequences are of far reaching importance. In such conditions, science is going to be an indispensable part of one's life and living styles in the rural and urban sectors. Therefore, the inculcation of scientific temper among the individuals especially among the adolescents’ learners has become inevitable for conquering over the space as well as for the modernization of society existing on this planet. The progress, welfare and prosperity of a nation depend on a planned and sustained growth and development of an education and research in science and technology. Thus, science has become a priority area in education both at compulsory level and level of specialization. Science achievement (SA) has long been the centre of research inquiries since the presence of science curriculum in schools, and after each new implementation of science curriculum reform across the world. A common rationale given for studying science subjects in school is the achievement of scientific literacy.

The science achievement of secondary school students has long been of concern to parents, academicians, policymakers, and the general public. Policymakers are inspired to inquire about the standing of their country relative to other countries with respect to students’ achievement. School performance in primary and secondary school does not depend on a student’s mental and physical abilities alone; other factors also have an important role. At the time of lively appraisal of educational development in India when many changes are being witnessed in organization, curricula and teaching techniques, it is pertinent to seek
systematic and up to date information on the significant aspects of pupil achievement in science. It is appropriate in this context, to consider at once factors affecting the achievement in science such as attitude towards computer and multimedia, socio-economic background, personal variables (like gender, religion, participation in school sponsored activities, subject choice, computer and internet access etc.), language as a medium of instruction, various institutional factors, etc. These factors are of utmost theoretical and practical importance in developing curricula and designing educational programmes to suit the needs of pupils with varied backgrounds. Further the study of these factors assumes special significance in view of their implications in respect of day-to-day curriculum planning on part of the curriculum teacher.

Review of the related literature

In India and abroad substantial body of research has accumulated over the last few decades concerning the importance of various factors towards achievement in science. Researches have examined an array of variables that are believed to be related to students’ achievement in science.

The findings of Frear & Hirschbuhl (1999) indicate that the Interactive Multimedia had a significant effect on achievement and problem solving skills on non-science majors in an Environmental Science course. Owston & Wideman (2001) examined that optimal learning occurs in classrooms where every child has access to their own computers. Sultana (2001) revealed that the students having most favourable attitude towards computer had significantly higher achievement in science. The positive educational value of the computer and internet is widely known and it is important medium for self learning and development (Kerawalla & Crook, 2002). The effective learning resulting from the use of computer in education depends upon a number of social and personal factors like the attitude of students’ towards computer (Kerawalla & Crook, 2002). Demographic and family background characteristics such as socio-economic status, parental education, and
cultural and social capital have traditionally been found to be related to students’ achievement in science (Okes, 1990; Berryman, 1983; Schibeci & Riley, 1986). Achievement varies directly with SES level, with higher SES students generally have higher science achievement than lower SES students (Clewell & Ginorio, 1996; Drew, 1996).

Students who have a low SES have lower test scores and are more likely to drop out of school (Eamon, 2005; Hochschild, 2003). Literature reveals (Von Secker, 2004; Bacharack, Baumeister & Furr, 2003; Dimitrov, 1999) that gender is another factor which influences science achievement in which boys generally performs better than girls in science. Gupta (1983) found that differences in the achievement of Hindu-Muslim students are significant. Indira (1991) explored the relationship between religion and academic achievement. Nessa (1994) observed that father’s education and mother’s education are correlated with academic achievement. Narang (1987) found that the number of siblings seemed to affect performance. Most high achievers had only one sibling. In the village areas most of the respondents among all categories of achievers had three siblings. Rehman, (2003) observed that there was significant difference between the mean achievement scores of children having guidance from their parents and coaching/tution from their tutor. Extra-scholastic activities have been associated with an improved educational level, more interpersonal competencies, higher aspirations and better attention level (Mahoney, Cairo & Farwer, 2003). Sharma (1988) conducted a study of factors in pupil academic achievement in different streams of courses of the higher secondary stage and found that the choice of the courses depended upon the interest. Science stream attracted the most intelligent students.

A study conducted by Kingdon (1999) revealed that private unaided school is strongly associated with higher achievement than government funded schools. Type of schools (single-sex/co-educational schools) influence attitude towards and achievement in science of male and female students in single-sex schools and
students in co-educational schools (Dhindsa & Chung, 2003). In terms of the type of school community, Zhang (1999) observed that students from suburban schools had higher science achievement than those from urban schools. However, rural and suburban schools show the same level of science achievement as their counterparts from urban schools. Narsimhan, et al. (1988) observed that the English medium students performed better as compared to their telugu medium counterparts.

**Statement of the problem**

"A Study of Secondary School Students' Achievement in Science in Relation to Attitude towards Multimedia, their Socio-Economic Status and Certain Personal and Institutional Factors"

**Objectives of the study**

The investigator has started the work with the following objectives:

1. **To study the general features of science achievement of secondary school students.**
2. **To study the attitude towards multimedia information technology (combination of audio-video, text, graphics, sound, animation etc.) in relation to science achievement.**
3. **To study the socio-economic status (upper, middle and lower classes) in relation to science achievement.**
4. **To study the personal factors (gender difference, religion, parental education and occupation, family size, pre-primary education, type of primary education, type of assistance, computer and internet access friends interested in computers, time spent on study at home, school sponsored sports activities, educational...**
tours organized by schools, on-school hours playing with friends and choice of stream) in relation to science achievement.

5. **To study the institutional factors** (private and government, convent and non-convent, single-sex and coeducational, urban and rural, English and Hindi medium, multimedia and non-multimedia schools) in relation to science achievement.

**Hypotheses of the study**

The study was conducted after formulating the following research hypotheses in the light of its above-mentioned objectives:

1. **There is no significant difference in science achievement in relation to attitude towards multimedia information technology (combination of audio-video, text, graphics, sound, animation etc.) of students.**

2. **There is no significant difference in science achievement in relation to socio-economic status (upper, middle and lower classes) of students.**

3. **There is no significant difference in science achievement in relation to personal factors (gender difference, religion, parental education and occupation, family size, pre-primary education, type of primary education, type of assistance, computer and internet access friends interested in computers, time spent on study at home, school sponsored sports activities, educational tours organized by schools, on-school hours playing with friends and choice of stream) of students.**

4. **There is no significant difference in science achievement in relation to institutional factors (private and government, convent and non-convent, single-sex and coeducational, urban and rural,
Sample

The sample was selected keeping in view the needs and objectives of the study. It should be mentioned that these students have been chosen from 30 schools of Western U. P., (India). All students who participated in the investigation were studying science as one of their academic subjects at standard 9th; their ages ranged between 15 and 17 years. Out of 30 schools selected 18 were private which includes 1008 students and 12 were government schools which includes 492 students. Out of these seven are girls’ schools; eighteen co-educational and the rest are boys’ schools. 1155 students were selected from 22 schools of urban areas and 345 students were selected from 8 schools of rural areas. Further, out of 30 schools, 1140 students were selected from 21 English medium schools and 360 students were selected from 9 Hindi medium schools. The number of the male students is more than that of female students, their numbers being 813 and 687 respectively.

Data collected for the study

The following baseline data were collected for carrying out the present investigation:

1. Data used for development of Multimedia information technology attitude scale.
2. Scores on the science achievement of the students.
4. Scores of the students’ personal factors.
5. Data related to institutions of the students.
Tools used for the study

The following tools were used by the investigator for the collection of data.
1. Multimedia information technology attitude scale (developed by the investigator)
2. Socio-economic status scale (modified by the investigator)
3. Science achievement test (developed by the investigator)
4. Personal information sheet (prepared by the investigator)

Statistical techniques employed

The analysis of the data was done by using statistical techniques, which were chosen only after investigator found them to be most appropriate and compatible for the analysis of data. They are as follows:

- Determination of the reliability and validity of the MITA Scale. Socio-economic status scale and science achievement test using known techniques.
- Computation of mean percentage of science achievement test.
- Computation of mean and standard deviation.
- Use of linear measure of correlation (Pearson’s Product Moment Coefficient Correlation).
- Use of F-test for measuring the significance of difference among many means.
- Use of t-test for measuring the significance of the difference.
Findings

After statistical analysis, the following conclusions were drawn in accordance with the hypotheses and results of the hypotheses and results of the study:

1. **Attitude towards MIT and achievement in science.**
   The attitude towards MIT and achievement in science are positively correlated in this study. The higher the attitude of students towards MIT, the higher is the achievement in science.

2. **Socio-economic status and achievement in science.**
   Socio-economic statuses of students have been shown to have a direct positive association with achievement in science. The higher the SES of students, the higher is the achievement in science. The children of upper economic strata and lower economic strata differed in science achievement very significantly. The upper and the middle economic groups differed in science achievement significantly. The middle and the lower economic groups differed in science achievement significantly.

3. **Personal factors and achievement in science.**
   - There exists no significant difference between male and female students so far as their achievement in science is concerned, i.e. gender did not relate to science achievement. Both the groups are equally good or bad in the same measure.
   - There exists no significant difference in science achievement of muslim and non-muslim students.
   - In this study parental education is found to be an important factor of children’s achievement in science. Children from highly educated parents are likely to have significantly higher science achievement as compared to the children of less educated parents.
   - It has been found that father’s occupation is related to their children’s achievement in science. The nature of father’s occupation is important
for their children’s science achievement. Children of professional group have achieved highest score than all other groups. There was significant difference between achievement scores in science of children of housewife and working mothers.

- The study also explained the relationship between students’ achievement in science and their family size. Children of smaller family size have got significantly higher achievement in science than the children of larger family size.

- Knowledge of how students started their pre-primary education can help in predicating their performance in science in higher classes. This result presented support that students who started their education from play schools brings some benefits for students in science achievement.

- In this study school type at primary level has envisaged as a significant contributor in the determination of science achievement. The students of private schools have got significantly higher score in science than the students of government schools.

- The statistical result revealed that type of assistance (familial assistance, no assistance and assistance by tutor/coaching centre) is not related to the achievement in science. Students perform in science in all the cases equally. Thus the study reveals that the intensity of tution availed will not improve science achievement.

- The results showed that the achievement in science of students having access to computer was significantly better with the one that does not.

- The present result indicated that the students having access to internet have significantly better science achievement than those who have not access to internet.

- The result showed that mean achievement scores of students whose friends were interested in computers had significantly better science achievement.
• The result presented support the idea that study at home brings some benefits for students. The result shows that those students who spent more than two hours on study at home have more achievement in science than the students who spent less than two hours.

• The result indicated that the students who have participated in school sponsored activities have higher science achievement than the students who have not participated.

• The result indicated that the students who have participated in educational tours organized by the schools have higher science achievement scores than the students who have not participated in such type of tours.

• In this study, science achievement was predicted in the best way by the amount of time spent playing with friends outside schools. The result indicates that students who spent more than two hours daily on playing with their friends outside schools is negatively associated with science achievement than those who spent less than two hours time.

• The result indicated that students who will opt science stream at higher classes have higher mean achievement than their counterparts (who will opt non-science stream).

4. Institutional factors and achievement in science.

• The statistical result showed that students of government schools secured significantly lower achievement scores in science than private school students.

• The students of convent schools achieved significantly higher achievement in science than the students of non-convent schools.

• The statistical result showed that the science achievement of students in co-educational schools were significantly higher than that of boys as well as of girls student in single-sex schools. Further, it was found that boys of co-educational schools have significantly higher achievement in
science than the boys of single-sex schools and also girls of co-educational schools have significantly higher achievement in science than the girls of single-sex schools.

- The result showed that students of urban schools excelled in science than their rural counterparts.
- The result revealed that students of English medium schools achieved significantly higher achievement scores in science than Hindi medium school students.
- The statistical result indicated that students of multimedia schools (having computer for practical) have got significantly higher achievement scores in science than the non-multimedia school (not having computer for practical) students.

Implications

The results of this study have implications for governments, parents, educational planners and policy makers and the school authorities as well as for further research. The design of effective and efficient education policies requires a more comprehensive knowledge of the determinants of educational achievement. The results of this study suggest that there is a pressing need for more effective polices that seek to minimize the undesirable consequences of discrepancies in science achievement. Government key policy deliberations must include formulating sound educational policies that provide appropriate support for parents, students, teachers and school, modifying curriculum, and adapting instructional practices. Educational policies could be designed that specifically take into account the school characteristics and family background characteristics of students.

The results might have some practical implications for science curriculum design in terms of enhancing interest in integrated science subject. The results of the study provide new information on the interrelationship of various factors and
students’ science achievement. The present study help in bringing about qualitative as well as quantitative improvement in teaching learning process, which would enhance the quality and level of educational products. It will also serve as a reference work for the researchers who are interested in investigating the different factors influencing the achievement in science of the students.

**Limitations**

The limitations of this study are as follows:

1. The present study was focused upon the achievement of secondary school students only. It did not study the achievement of elementary, graduate and post graduate students.

2. The study was conducted in mostly urban areas only. The sample includes only 345 students (8 schools) from rural areas; therefore, one cannot generalize the findings of this study to all the institutions of India due to number of differences in their conditions and circumstances.

3. The results of the present study had reflected the secondary school students’ achievement in science in Aligarh and Bulandshahar at a particular time. But these findings might be quite different at some other time or in other social-cultural settings.

4. The present study was conducted to find out the science achievement of private and government schools only. The students can also be categorized in more categories on the basis of management in schools.

5. The present study was limited only to find out the influence of various factors on the achievement in science. Other subjects (English, Hindi, Social Science and Mathematics) were not covered under this study.