Relationship between Gender, Exposure to Media, Medium of Instructions and Science Achievement of Secondary School Students

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ABSTRACT   *This study examined the influence of gender, exposure to media; time spent at home work in Science and medium of instructions on Science achievement. A convenience sample of 2006 students, 1080 males and 926 female from twenty one schools of central U.P. was used for study. The Science Achievement Test and Personal and Environmental background assessment Questionnaire were used for data collection, while t-test, and correlation techniques were used for statistical analysis. The results revealed that there was a significant difference between science achievement of boys and girls. The results of analysis showed that the school types had not influenced science achievement of secondary school students the medium of instructions. Further this study showed that the exposure to media and time spent with Science homework had influenced the science achievement of secondary school students.*

INTRODUCTION

Education is the key to all processes of development especially-human development. Catalytic action of education in this complex and dynamic growth process needs to be planned meticulously and executed with great sensibility.

Education is fundamental to all round development of human Potential -material and spiritual. It refines sensibility and perceptions that contribute to national cohesion, a scientific temperament and independence of mind and spirit. Thus furthering goal of socialism, secularism and democracy enshrined in our constitution. Education develops manpower for different levels of economy and empowers the poor masses to become self-reliant enough to participate in the process of national development. Education is thus an instrument for developing an economically prosperous society and for ensuring equity and social justice through enriching the knowledge.

Education systems worldwide are trying to build a scientific temper in children and scientific literacy in society. The attitude of Indian students towards science is changing because of feeling that science can solve our national problems of over population, mass illiteracy abysmal ignorance, backwardness and low-standards of living. Science is all pervasive. Modern societies exist on the basis of science. Science is intimately related to the means of production, communication and transportation. Even economics and politics have to depend on scientific factors such as productivity from land or from industry. The powers of modern weapons are the speed of transportation on land, air and water. In the present situation, therefore, everyone in every walk of life must know of certain quantum of science and technology. The fact of today may not be fact of tomorrow and theories may also undergo changes but there can be going away from the scientific method.

Education and training play a vital role in assisting individuals and societies to adjust to social, economic and cultural changes and promote the development of the human capital essential for economic growth. Modern education, schooling in particular, aims at imparting knowledge, skills and attitudes required by the young ones to become functional in their respective societies. Schools are therefore intended to serve as agents for developing individual citizens within a country (Pandey 1996:77). In essence, schools are institutions where children are groomed to appreciate what the society in which they live stands for and are equipped in order for them to contribute to the advancement of their society.

Science education is a part of education which makes a man rational, develops his independent thinking and helps in removing the superstitions, prevalent in the society in various forms. In view of the modern developments in Science and it's impor-

tance in today's world, Science education and scientific outlook have assumed a significant place. Don-Phillips (1973) stated that science education or indeed all education must develop in students both an awareness of the problems facing the society and the capacity to contribute toward their solution.

Science and Mathematics are the parts of educational system which play a pivotal role in making a man rational and develop his independent thinking and help in removing the superstitions, prevalent in the system in various forms. In view of the modern development and its importance in today's world, the Science and Mathematics education has assumed a significant place in the curricula of primary and secondary school education.

In India, an attempt to take a holistic view of the role of education in national development was made in 1986. The National Policy on Education NPE-1986 (Govt. of India, 1986) is a landmark in the history of Indian education. The NPE-1986, visualized education as a dynamic, cumulative, life long process providing diversity of learning opportunities to all segments of the society. It envisaged improvement and expansion of education in all sectors, elimination of disparities in access and stresses on improvement in the quality and relevance of education at all levels. The NPE-1986 also emphasized that education must play a positive and interventionist role in correcting social and regional imbalances in empowering women.

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There is close interaction between Science and Mathematics and the economic, social, political and educational issues of the society. There is much discussion about the relationship between gender and achievement in Science and Mathematics education in these days. The concern has arisen because less number of female enters the academic and professional areas related to Science and Mathematics. Here it would be appropriate to understand the word "Gender". It is the word that is inclusive of both boys and girls on the basis of social justice and mutual respect. Meanwhile, investigation of gender equity has attracted the attention of many scholars in national and international study. According to Stevenson (1992) cross cultural research is necessary to assess the generality of gender difference in academic performance and for gaining insight into variables

that might be related to such differences.

Science has responded to human concerns in several areas like medicine and agriculture. The technological developments have reduced drudgery for a considerable sector of the population. In future, however, the side effects of the developments and developmental activities which alienate human society from nature will have to be seriously responded. Every individual will require training and preparedness in areas like disaster management. Need based knowledge would be valued by the society and the community.

In this context the role of science is of utmost importance. Science education must become an integral part of school education, and ultimately, some study of science should become a part of all courses in the humanities and social sciences at all stages from school to the university stage.

Science is the most potential vehicle for inculcating and nurturing the creative talent of every single individual, irrespective of all other differences and diversities. In the ageing society, utilization of leisure could also become a major issue. Leisure is no gift but a load which is tiresome, burdensome and cumbersome to the individual. Science education provides a vast potential for inculcation of values, particularly the values enshrined in the Constitution of the country concerned.

Achievement is the end product of all educational endeavours. The main concern of all education efforts is to see that the learner achieves. Quality control, quality assurance and total quality management of achievement have increasingly gained the attention of research in education. After exploring the concept of achievement in the cognitive, affective and psychomotor aspects of human behaviour, researchers have probed further and have attempted to understand the 'black box' of achievement.

Academic Achievement has always been given much importance since the origin of formal system of education. In today's competitive world, it is given more importance than ever before. Academic achievement not only facilities the process of role allocation for the social system but opens out avenues for advancement. Perhaps it is a ladder through which a child of today can reach his destination. It is a root for future development. Success in school, therefore, has often been shown to be predictive of success in further education, career, and personal fulfilment. Obviously in the school, great emphasis is placed on academic achievement right from the beginning of formal education. Inspite of considerable efforts, achievement of students is not satisfactory. A great difference of performance is found among students.

Academic achievement is a paramount importance particularly in the present social, economic and cultural context. Obviously, in the school great emphasis is placed on achievement right from the beginning of formal education. The school has its own systematic hierarchy which is largely based on achievement and performance rather than quality. Thus, the school tends to emphasise achievement which facilitates among other things, the process of role allocation for the social system.

The school performs the function of selection and differentiation amongst students on the basis of their scholastics and other attainments and open out avenues for advancement again, primarily in terms of achievement. The student at school is trained to accept the hierarchy based on achievement. This helps him to be released from the family status in certain ways his personal status is a direct function of the position he achieves mainly in the formal classroom settings. Acceptance of the system of hierarchy in terms of achievement helps also to integrate the school system. Different types of schools, managed by different authority has influence on the performance are of their students. The studies supported by Chaturvedi M . (2009) investigated that type of school was significant effect on academic achievement. The medium of instructions (reading and writing) of the students affect the performance of the. Science the studies like, Anand (1933) found the Students studying through Kannada

Medium achieved significantly mean score than those studying through English medium. Singh & Saxena (1995), investigated that the teacher of educational and physical facilities in school have positive association with school mean achievement in mathematics and science.

The purpose of this study was to examine the relationship of science achievement (dependent variable) with gender, exposure to media, types of management, medium of instructions and school resources (independent variables) of secondary school students central U.P.

The research questions for this study include the following:
1. Do genders explain differences in the Science achievement?
2. Does the exposure to media and Science achievement of secondary school students correlates?
3. Does the time spent on Science homework correlate with the science achievement of secondary school students?
4. Do the medium of instructions influence Science achievement of secondary school student?

Method
The present work is a descriptive study investigating if students' science achievement differed significantly to a group of variables such as gender, attitude towards science and participation in sports activities. The sample consisted of 2006 students of class IX, selected from 21 schools of central U.P. in which 1080 were male and 926 were female students. In this study, schools were categorized on the basis of their medium of instructions. For instance, English Medium schools, where pupils in IX are from all socio-economic strata and are admitted through competitions and Hindi Medium schools, where pupils in IX are from all socio-economic strata and are admitted through competitions.

TOOLS USED
Science Attitude Scale
The science attitude has operationally defined as a generalized attitude towards the universe of science content and being measured in terms of its favourableness or unfavourableness estimate d from the scores obtained by the subjects on an attitude scale toward science comprising of the four categories from the universe of content 'Science Attitude', (i) Positive intellectual (ii) negative intellectual, (iii) positive emotional and (iv) negative emotional attitudes.

The Science Attitude Scale is a dependable tool for measuring student's attitude towards science. It appears to be useful for teachers of science, guidance workers and research scholars. It can be used by the curriculum specialists to measure the outcomes of teaching science. The students of Psychology and Education can also use it to study the development of their attitude towards attitudes.

The attitude score of a subject is the sum total of scores on all the twenty items of the scale. For each student a total score on the scale can be obtained by summating his scores for the individual items. Thus a maximum of 80 scores can be obtained by a subject. However, the administration of the test reveals that the scores ranged from 25 to 70.

The summation of score earned by a student on all statements was taken as his attitude score. The total scores indicate favourableness or unfavourableness of the attitude of students towards math. The higher is the score the more favourable is the attitude towards math and lower is the score the more unfavourable is the attitude towards math of the students.

Science Achievement Test
The achievement test in science for class IX students that is used in the present study was constructed by the investigator. This is a very comprehensive test based on 16 chapters of class VIII science text book (NCERT). The test consists of 75 items of multiple choice types representing achievement at various areas of science such as Physics, Chemistry and Biology of eighth class of U.P. Board and C.B.S.E. Board.

Physics have 35 items, chemistry have 20 items and biology having 20 items. The total score on the test as a whole was used as a measure of achievement in science. All the items in the test were the easy items in the test were arranged in order of difficulty, the easy items being placed in the beginning and this was done to motivate the students. The difficulty values of items in the test between the range of .25 to .85 similarly, each item had a discriminating power greater than 0.30. The test was based on the latest syllabus prescribed by the directorate of education, U.P. & NCERT. This test had a fairly high content validity and its reliability is found to be 0.87.

A Personal and Environmental background assessment Questionnaire

The personal and environmental information sheet is prepared by the investigator. This sheet contains such questions requiring the subjects to give information on their parental educational, science resources available at home, exposure to media, gender, participation in sports activities and time spent on watching T.V. etc.

Results and Analysis

Data analysis is performed on computer with SPSS 17 software package. When data was analyzed to make a comparative study of the achievement in science of male and female students (Table 1) the result shows a significant difference between achievement in science of males and females (df=2004, t=4.51).

Table 1: Comparison of mean science achievement scores of male and female students

Gender	N	Mean	SD	df	t-value
Male	1080	31.20	12.34	2004	4.51**
Female	926	28.75	11.88		

** Significant at 0.01 level

The total numbers of male and female students were 1080 & 926 respectively as indicated by the table 1. Out of 75 scores, the mean achievement scores in science of male student is 31.20 and standard deviation (SD=12.34). In case of female students, the mean science achievement score is 28.75 and standard deviation (SD=11.88). The statistically calculated t-value is 4.51; which is significant at 0.01 level with 2004 df. The result clearly indicates that there is significant difference between mean science achievement score of male and female secondary school students. Both are not equally good they differ in their science achievement. Thus the hypothesis study that "there is no significant difference between male and female students in science achievement" is rejected at 0.01 level of significance.

Table 2 (i) Relationship between exposure to media and achievement in science of secondary school students

Exposure to media like in the sense like news paper and using internet by the child play an important role in the learning of students. To examine that it was divided into two parts that is reading news paper and using internet.

(i) Relationship of internet and mean science achievement scores of secondary school students

Variables	N	Mean	SD	Correlation coefficient (r)
INTERNET	2006	1.78	0.59	0.114**
SAT	2006	30.07	12.19	

** Significant at 0,01 level

The technique of correlation is employed to find out the relationship between internet and achievement in science. The total samples were 2006 (1080 Boys and 926 Girls). The total samples were categorized in to three groups i.e. never sometimes

and always on the basic of internet. The mean scores of internet and achievement in science is 1.78 and 30.07 respectively, where as the Standard Deviation of internet and achieving in science is 0.59 and 12.19 respectively. The employed correlation coefficient (r) is 0.114**, which is significant at 0.01 level. The mean scores, standard deviation (SD) and 'r' values are given in table 2(i). The result clearly indicates that a strong relationship between the internet and achievement in science has been demonstrated by the findings

(ii) Relationship of news paper reading and mean science achievement scores of secondary school students

Variables	N	Mean	SD	Correlation coefficient (r)
NEWS PAPER	2006	0.66	0.47	0.143**
SAT	2006	30.07	12.19	

** Significant at 0,01 level

The total sample was categorized in to two groups that is yes and no on the basis of reading news paper daily. The mean score of news paper reading and achievement in science is 0.66 and 30.07 respectively whereas the Standard Deviation of news paper reading and achievement in science is 0.47and 12.19 respectively. The employed correlation coefficient (r) is 0.143**, which in significant at 0.01 level. The main score, standard deviation (SD) and 'r' values are given in table 2(ii). The result clearly indicates that a strong relationship between the news paper reading and achievement in science has been demarcated by this findings.

Hence the overall results [table 2(i) & table 2(ii)] clearly indicates that a strong relationship between exposure to media and achievement in science of students. Hence the 9th hypothesis stating that "there is no significant relationship between exposure to media and achievement in science of secondary school students" was rejected at 0.01 level of significance.

Table 3 Relationship of time spent at science home work and mean science achievement scores of secondary school students

Variables	N	Mean	SD	Correlation coefficient (r)
SHW	2006	1.92	0.66	0.058**
SAT	2006	30.07	12.19	

** Significant at 0,01 level

The technique of co-relation was employed to find out the relationship between time spent at science home work and achievement in science. The total samples were 2006 (1080 boys and 926 girls). The mean scores of time spent at science home work and achievement in science is 1.92 and 30.07 respectively where as the standard divination (SD) of time spent at science home work and achievement in science is 0.66 and 12.19 respectively. The estimated correlation coefficient (r) is 0.058** which is significant at 0.01 level. The result clearly indicates that a strong relationship between the time spent at science home work and achievement in science has been demonstrated by this findings. Hence the hypothesis stating that "there is no significant relationship, between time spent at science home work and achievement in science of secondary school students" was rejected at 0.01 level of significance.

Table 4 Comparison of science achievement scores of students of medium of instructions

Medium of instructions	No of Schools	Number of students	Mean	SD	t-value
Hindi	14	1306	27.94	5.99	1.52
English	7	700	32.94	9.10	

Not Significant

The t-test was employed to find out the influence of medium of instructions on science achievement of students .To find out the influence of medium of instructions and science achievement of the students, the total sample was categorized into two groups on the basis of medium of instructions, which are Hindi and English.

The total number of Hindi and English students were 1306 and 706 respectively as indicated in the table 4, whereas the total no of school were 14 and 7 respectively. Out of 75 scores the mean achievement scores of Hindi medium school is 27.94 and standard deviation is 5.99, in case of English medium school the mean achievement score is 32.94 and standard deviation is 9.10. The statistically calculated t-value is 1.52 which is not significant. Thus the result clearly indicates that there is no significant difference between mean science achievement scores of Hindi and English medium school. Hence the hypothesis stating that "there is no significant difference among the categories of medium of instructions and achievement in science of secondary school students" is accepted.

DISCUSSION

There was significant difference in science achievement scores between boy and girls in the present study. The finding of this study in supported by Linn C. Merle (1989) investigated that male had greater access to science and technical fields and greater earning power than females. The national assessment of educational progress and 'Every bad counts': reports that male were found to show higher motivation levels than females.

Hensley Clementine, Elizabeth Barber (1987) investigated that boys consistently scored lower than girls. Sarkar (1983), Singh (1984) are also supported that male scored higher than boys. Wing and Staver (1997) the study "An empirical study of gender Differences in Chinese students science achievement. found that boy scored higher than girls. Melkonion, Michael (1997) the study was conducted to know the effect of gender on science achievement level found that generally female student attained significantly higher grades than their male. Manning, M. Lee (1998) and Pinchas Tamir (1998) supported that boys like to study math and science that female and achieve hinge scored in sconce. Leader (1992) has also reported the existence of gender differences in science subjects in general as well as in math. According to same findings like Tzuriel David (2010) this study explored barriers to children's achievement in the areas of science, math and engineering. A gender difference in girls special abilities emerges very early in development. In that the two groups one is training program and other is controlled group, after eight weeks he found there are gender difference in the first group.

Exposure to media like news paper, using internet by the children play an important role in the science achievement of the students. The study by this are Young et al. (1996) this study "science dishevelment and educational productivity in his study he founds that exposure to mass media were significant individual influence on science achievement. Nigel Barber (2002) found that math , science and reading scares were positively correlated with national income and mass media. Dina L.G. (2005) found that media influence that academic achievement of the students. Kirkorian et al. (2008), to examine relationships among a Childs household media environment, media use and academic achievement he found that having a bedroom television set was significantly and negatively associated with students test scores, while home computer access and use were positively associated with the scores. Absence of a bedroom television combined with access to a home computer was consistently associated with the highest standardized test score. Young et al. (2006), found that exposure to mass media were also significant individual level influence on science achievement.

The student spent some times on their science home work, must affect their achievement in science supported by Joyce Epstein and Frances Van Voorhis (2001) found that the students who spent time on science homework improve their achievement. Kusum Singh (2002) found that the positive effects of the

motivation factors, attitude and academic time on mathematics and science achievement. The strongest effects were those of academic time spent on homework. Michael Holmes (2002) found that there is a strong relationship of time spent on science home work and achievement. TIMSS (2007) , the aim of the report is to analyze the effect of homework on pupil achievement. There seem to be a positive effect of homework an average. However, not all pupils seem to benefit from homework. In fact, pupils from lower Scio Economic background (measured as no or very few books at home) actually perform better if less homework's assigned.

The medium of instructions (reading and writing) of the students affect the performance of the. Science the studies like, Anand (1933) found the Students studying through Kannada Medium achieved significantly mean score than those studying through English medium. Ravendranathan, A.K. (1983) studies the impact of medium of instructions on the science achievement, Science Interest and mental Health status of secondary school students found that science achievement, Science interest and mental health status of pupils of English medium classes were higher than those of pupils of Malayalam medium classes. Ansari, A.M. (1984) found that as Hindi medium schools students boy students perform better than the girls students, Begum T.S. and Phokan M (2000) Conducted a study in English medium school at Jarhat district following the syllabus of board of secondary Education Assam After the analysis he found that type of family number of siblings education of parents and family Income had significant impact on academic achievement of the students .

DELIMITATIONS

It is not possible in a single research study to cover every aspect of variables associated with the problem under investigation. Although, the problem is very natural and is prevalent everywhere yet due to shortage of time & resources all the aspects variables could not be covered & the study is limited in several ways. It had to be determined in terms of population covered, sample selected, scope of variables studied, the scope of genralizability of finding & so on.

1. Due to the shortage of time & resources the study was carried out only on students of class 9th although problem of achievement is common to elementary classes yet the focus of the study has been on the secondary stage only.
2. The sample was restricted to rural and urban areas of central U.P. only so as to make an in-depth study of the factors that affect achievement in science in these schools.
3. The phenomenon of achievement has been studied on in relation to selected personal, environmental and institutional variables only.
4. The scope of study covers only a few districts of central U.P. as the investigator felt that no study had been conducted in this area. Hence the generalizability of the findings would be limited accordingly.
5. The tool for the assessment of the achievement in science is developed by investigator himself. Although attempt has been made for proper item selection, try out, estimation of reliability and validity of the tool, detailed norms still remain to be prepared.
6. It is desirable that the researcher reaches first hand or original sources for the study, but as access to some material was not possible materials taken from available secondary sources has been used.
7. Collecting of data in two sitting may be one of more delimitation as a number of students are present only in one of the two sessions. Through a third visit is made to cover such students, some drop outs still remain beyond reach of the investigator and have been dropped from the study.

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