Influence of Gender, Locality and Attitude Towards Science on Achievement in Science of High School Students

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Abstract—The purpose of the present study was to find out the influence of gender, locality and attitude towards science on achievement in science. For this purpose, 600 students of Grade X were selected from 10 secondary schools of the Kumaun region of Uttarakhand using the simple random sampling technique.

To collect the data, the Attitude towards Science Scale developed and standardized by Rai (2007) and the Learning Environment Scale developed by Rai (2007) were used. For data analysis, the t-test and analysis of variance (ANOVA) were applied. The study revealed that the influence of gender on achievement in science was significant in favor of male students, whereas the influence of locality was not found to be significant. A significant and positive influence of attitude towards science on achievement in science was also observed.

Index Terms—Achievement in science, attitude towards science, gender, and locality

I. INTRODUCTION

Science is an important core subject in the school curriculum and plays a vital role in the intellectual, social and technological development of individuals and society. It helps learners understand natural phenomena, develop scientific temper, and apply knowledge for solving real-life problems. Science education nurtures curiosity, critical thinking, observation, experimentation and logical reasoning among students. In the modern era of rapid scientific and technological advancement, the importance of science education has increased manifold.

Despite its importance, a considerable number of students face difficulties in learning science at the secondary level, which results in poor academic achievement. This problem is not confined to India alone but is also observed in many other countries. Several factors influence students' achievement in science, such as intelligence, learning environment, teaching methods, attitude, gender and locality. Among these variables, gender, locality and attitude towards science have attracted the attention of researchers for a long time.

There exists a general perception in society that science is a difficult subject and can be mastered only by highly intelligent students. Sometimes teachers also unintentionally reinforce this belief, which leads to the development of a negative attitude towards science among learners. Similarly, science is often considered a male-oriented subject, resulting in gender stereotypes that may influence students' performance. Locality is another important factor, as it is generally believed that urban students have better facilities, exposure and resources compared to rural students, which may affect their achievement in science.

Keeping these issues in view, it becomes essential for educators and researchers to examine the influence of gender, locality and attitude towards science on students' achievement in science. Therefore, the investigators decided to undertake the present study.

II. REVIEW OF RELATED LITERATURE

Studies of Gender and Locality Related to Achievement in Science

Several studies have examined the influence of gender and locality on academic achievement, including science achievement. Choudhury and Das (2012) reported no significant influence of gender on academic achievement. Anjum (2015) found significant gender differences in academic achievement at the upper primary stage. Charles-Ogan (2015) reported no significant gender difference in achievement, whereas Igbo, Onu and Obiyo (2015) found a significant influence of gender in favour of male students. Nepal (2016) reported significant differences between rural and urban students in academic achievement in favour of urban students. Hooda and Devi (2017) observed significant effects of gender and locality on students' achievement. Yadav (2019) reported higher achievement of urban students compared to rural students. These studies indicate mixed results, highlighting the need for further investigation in the context of science achievement.

Studies of Attitude Towards Science Related to Achievement in Science

Research studies have consistently shown that attitude towards science plays a crucial role in determining students' achievement in science. Savaş, Taş and Duru (2010) reported a significant relationship between students' attitude and achievement. Ajisuksmo and Saputri (2017) found a positive relationship between attitude and academic achievement. Simegn and Asfaw (2017) also reported that students with a positive attitude towards science achieved better than those with a negative attitude.

III. OBJECTIVES OF THE STUDY

The following objectives were framed for the present study:

1. To study the influence of gender on achievement in science of high school students.
2. To study the influence of locality on achievement in science of high school students.
3. To study the influence of attitude towards science on achievement in science of high school students.

Hypotheses
The following null hypotheses were formulated:

- H01: There is no significant influence of gender on achievement in science of high school students.
- H02: There is no significant influence of locality on achievement in science of high school students.
- H03: There is no significant influence of attitude towards science on achievement in science of high school students.

IV. METHODOLOGY

The present study adopted a descriptive survey method. A sample of 600 students of Grade X was selected from 10 secondary schools of the Kumaun region of Uttarakhand using the simple random sampling technique. For data collection, the Attitude towards Science Scale developed and standardized by Rai (2007) and the Learning Environment Scale developed by Rai (2007) were used. Achievement in science was measured using students' scores obtained in the science subject. The collected data were analyzed using the t-test and analysis of variance (ANOVA).

V. RESULTS AND DISCUSSION

1. Influence of Gender and Locality on Achievement in Science

To find out the influence of gender and locality on achievement in science, the t-test was applied. The summary of the t-test results is presented in Table–1.

Table–1 Summary of t-test for Influence of Gender and Locality on Achievement in Science

Variable	Group	N	Sum	Sum of Squares	Mean	S.D.	t
Gender	Male	300	18621	1220917	62.07	14.732	6.03 **
	Female	300	20831	1515206	69.437	15.141	
Locality	Rural	300	19588	1339991	65.293	14.262	0.732
	Urban	300	19864	1396132	66.213	16.419	

Significant at 0.01 level

The table shows that the obtained t-value for gender (6.03) is greater than the table value at the 0.01 level, indicating a significant difference between male and female students in their achievement in science. Hence, gender significantly influences achievement in science and null hypothesis H01 is rejected. The mean score of male students was found to be higher than that of female students.

The obtained t-value for locality (0.732) is less than the table value at the 0.05 level, indicating no significant difference between rural and urban students in achievement in science. Thus, locality does not significantly influence achievement in science and null hypothesis H02 is accepted.

2. Influence of Attitude Towards Science on Achievement in Science

Descriptive statistics for students with low, moderate and high attitude towards science are presented in Table–2, and the ANOVA results are shown in Table–3.

Table–2 Sum, Sum of Squares, Means and Standard Deviations of Students with Low, Moderate and High Attitude Towards Science on Achievement in Science

Attitude Towards Science	N	Sum	Sum of Squares	Mean	S.D.
Low	174	9195	518253	52.845	13.634
Moderate	247	16631	1156766	67.332	12.234
High	179	13626	1061104	76.123	11.544

Table–3 Summary of Analysis of Variance for Influence of Attitude Towards Science on Achievement in Science

Source of Variance	df	Sum of Squares	Mean Square	F	Sig. Level
Between Groups	2	48856.6	24428.3	156.535	0.01
Within Groups	597	93165.9	156.057		
Total	599	142022			

The obtained F-ratio (156.535) is significant at the 0.01 level, indicating a significant difference among students having low, moderate and high attitude towards science. Students with a high attitude towards science showed better achievement than those with moderate and low attitude. Hence, null hypothesis H03 is rejected.

VI. DISCUSSION

The findings of the present study revealed a significant influence of gender on achievement in science in favor of male students. This finding is in agreement with earlier studies that reported higher achievement of male students in science. However, some studies have reported contrary results, indicating the need for context-specific research.

The study also revealed that locality did not have a significant influence on achievement in science. This suggests that with improved access to educational resources and facilities, the achievement gap between rural and urban students is gradually narrowing.

Further, a significant and positive influence of attitude towards science on achievement in science was found. Students possessing a positive attitude towards science performed better academically, which supports the findings of earlier research.

Educational Implications

The findings of the study have important implications for science teachers, teacher educators and parents. Science teachers should make continuous efforts to develop a positive attitude towards science among students by using activity-based and learner-centered teaching methods. Teacher educators should train prospective teachers to identify and reduce gender stereotypes in science learning. Parents should also motivate and support their children to develop interest and confidence in learning science.

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