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PROBLEMSOLVING ABILITY OF SECONDARY SCHOOL STUDENTS IN RELATION TO SCIENTIFIC ATTITUDE

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ABSTRACT

The present study was conducted to examine the problem-solving ability of secondary school students in relation to their scientific attitude. A sample of 100 government secondary school students (50 Boys and 50 Girls) was selected randomly from Chandigarh, India. The tools used for conducting the present study were: Problem Solving Ability Test developed by Dubey (2010) and Scientific Attitude Scale developed by Bajwa and Mahajan (2012). The calculated t-value of 1.80 to ascertain difference in Problem Solving Ability of Boys and Girls is less than the critical value of 1.984 at 0.05 level of significance.Similarly the calculated value of the t-value of -0.754 to ascertain difference in Scientific Attitude of Boys and Girls is less than the critical value of 1.984 at 0.05 level of significance. The results of this research study show that there exists no significant difference in the problem solving ability and scientific attitude of boys and girls secondary school students. The calculated coefficient of correlation between Problem Solving Ability and Scientific Attitude was 0.049, which is less than the critical value of 0.195 at 0.05 level of significance. Thus the study also found that there exists no significant correlation between the problem-solving ability and scientific attitude of secondary school students.

Key Words: *Problem Solving Ability, Scientific Attitude, Secondary Education, Gender Differences, Cognitive Skills*

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INTRODUCTION

In today's rapidly evolving world, the development of scientific attitude and problem-solving abilities has become paramount for educational success. Problem solving ability refers to a person's cognitive capacity to recognize, evaluate, and efficiently complete difficult tasks or problems that arise in various settings, particularly in the secondary school sector. This skill involves designing and implementing suitable solutions by applying critical thinking, logical

reasoning, creativity, and decision-making abilities.In their study Kumar and Verma (2019) investigated gender differences in Problem solving ability across 400 students from government schools as well as from private schools. The results showed that there were no appreciable variations in the Problem solving abilities of male and female students.

Scientific attitude, on the other hand, encompasses a collection of intellectual qualities that motivate students to approach issues objectively, logically, and with curiosity. It involves asking questions, being receptive to new ideas, and depending more on facts than on conjecture. Students who adopt a scientific mindset are better able to conduct thorough problem analysis and produce well-thought-out answers.The study by Jakhar (2021) indicated that the varying distribution of the scientific attitude among rural and urban students. The study further indicated significant difference in the scientific attitude of the rural and urban school students in favour of the rural school students and significant difference in the scientific attitude of the male and female students in favour of the female in the rural area.

The relationship between these two variables has gained significant attention in educational research, as both skills are essential for preparing students for future academic and professional endeavours. Science education significantly influences the attitudes and problem solving abilities of high school students, connecting scientific knowledge with personal responsibility, and thereby increasing interest and a positive attitude towards science. Pradhan and Bhutia (2020) conducted a study on scientific attitude and Problem solving ability among senior secondary students in Namchi, Sikkim. They found that while most students possessed an average level of scientific attitude, their Problem solving abilities were generally low. Furthermore, there was no significant relationship between the two variables. This suggested that although scientific attitude is important, it may not automatically lead to better Problem solving ability without specific instructional strategies or practice.Ardithayasa, Gading, and Widiana (2022) developed and implemented project-based learning modules to enhance students' scientific literacy and Problem solving ability. Their research showed that students involved in hands-on, project-based activities developed a deeper understanding of scientific concepts and improved their ability to solve real-life problems. This indicated that experiential learning approaches could simultaneously strengthen scientific attitude and Problem solving ability.Sharma and Yadav (2023) studied

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he scientific attitude of secondary school students in relation to their academic achievement in science. Their findings indicated a moderate positive correlation between scientific attitude and science achievement, implying that students with a stronger scientific attitude tended to perform better in science subjects. They also observed that female students and those from private schools generally exhibited more positive scientific attitudes. These results supported the idea that scientific attitude could play a role in shaping students' Problem solving orientation and academic performance.Handayani and Suyanta (2024) examined the impact of the Problem-Based Learning (PBL) model on students' Problem solving abilities and scientific attitudes. Their study revealed that students who were taught using the PBL approach demonstrated significantly higher Problem solving ability and more positive scientific attitudes compared to those taught using conventional methods. This suggested that tudent-centred, inquiry-based teaching could foster both cognitive and attitudinal development in science learning.

Looking at the current literature, there seems to be a mixed picture when it comes to how scientific attitude and problem-solving ability are connected for secondary school students. Some studies, like those by Ardithayasa et al. (2022), show that active learning methods like project-based and problem-based learning can help boost both problem solving skills and scientific attitude. However, other studies, like Pradhan and Bhutia (2020), didn't find a direct link between the two, suggesting that a positive scientific attitude may not always lead to better problem-solving abilities.Despite the insights these studies provide, there's still a lot we don't fully understand, especially when it comes to secondary school students. Many studies haven't really looked at how specific teaching methods affect both problem-solving ability and scientific attitude in this age group, and there's little focus on how these two factors interact in real classroom settings.

SIGNIFICANCE OF THE STUDY

Problem solving is widely recognized as critical to success and is considered a fundamental aspect of human conduct. Education aims to develop better performance, with individual differences evident in Problem solving abilities. Some individuals excel at coping, while others struggle. The majority of human life involves grappling with problems in order to find effective solutions. Students with strong Problem solving ability tend to adjust well in both

academic and home environments. Effective Problem solving requires critical thinking, supporting the power of thought to find solutions. The primary goal is to overcome barriers in various aspects of life, including physical, psychological, social and environmental factors. Science education brings about behavioural changes and enriches character and personality by fostering creative thinking, Problem solving ability, and imagination. Students develop the habit of seeking the truth, influencing their behaviour patterns. Science education significantly influences the attitudes and Problem solving abilities of high school students, connects scientific knowledge with personal responsibility, and thereby increases interest and a positive attitude towards science.

In today's world, scientific attitude and Problem solving attitude are extremely important. First, they are vital to preparing students for the future. With rapid advances in technology, scientific attitude is not only beneficial, but essential to understanding and engaging in a variety of fields, especially STEM (Science, Technology, Engineering, and Mathematics) fields. These skills lay the foundation for future careers in areas where demand is high. Additionally, many of the pressing global issues we face today, such as climate change and health care, require scientific solutions. By developing scientific attitude, students gain a deeper understanding of these complex problems and are better positioned to engage with them and potentially contribute to solutions.Scientific attitude enables students to become informed citizens. It enables them to critically evaluate scientific claims, understand the implications of scientific research, and engage in meaningful discussions about societal issues with a scientific basis. This enables them to actively and responsibly participate in shaping the world around them. So here we can say scientific attitude and Problem solving ability are indispensable for secondary school students in today's world. Not only they prepare students for future careers, but they also foster critical thinking, innovation and informed citizenship, making them essential components of a well-rounded education.

Hence keeping in view the importance of Problem solving ability and scientific attitude for the development of nation, the investigator thought it appropriate to study the relationship between Problem solving ability and scientific attitude of secondary school students. It is believed that the findings of this study may affirm the pivotal role of scientific attitude in shaping the Problem solving capabilities of students. It may be evident that fostering a

positive scientific attitude among students is not just beneficial but essential for their success in navigating the diverse challenges and opportunities of the modern world. It is believed that by acknowledging and leveraging this relationship, educators will hold the key to empowering the next generation with the skills and mind-set necessary to confront the multifaceted challenges and opportunities of the 21st century.

OBJECTIVES OF THE STUDY

The present study was conducted to attain the following objectives:

1. To study the Problem-Solving Ability of secondary school students
2. To study the Scientific Attitude of secondary school students
3. To study the relationship between Problem-Solving Ability and Scientific Attitude of secondary school students

HYPOTHESES OF THE STUDY

The study was designed to test the following hypotheses:

1. There is no significant difference in Problem Solving Ability of Secondary School Boys and Girls
2. There is no significant difference in the Scientific Attitude of Secondary School Boys and Girls
3. There is no significant relationship between Problem Solving Ability and Scientific Attitude of Secondary School students.

METHODOLOGY

Research Design

Descriptive survey method was used for conducting the present study. The present study covered two variables: Problem Solving Ability and Scientific Attitude.

Sample of the Study

The study was conducted on randomly selected 100 students (50 Boys and 50 Girls) of government secondary schools of Chandigarh, India.

Tools Used

Following standardized tools were used for conducting this study:

1. Problem Solving Ability Test developed by Dubey (2010)

2. Scientific Attitude Scale developed by Bajwa and Mahajan (2012)

Delimitation of the Study

The study was delimited to 100 students of class IX and X out of which 50 were boys and 50 were girls from government schools of Chandigarh.

Statistical Techniques

Descriptive statistics were employed to find out mean, median, mode, standard deviation, kurtosis etc. to study the nature of data and Inferential statistics such as t-test and correlation were computed to study the significant variation in the data.

RESULTS AND DISCUSSION

The results have been discussed in the light of the hypotheses of the study.The descriptive statistics of scores of Problem Solving Ability revealed that the mean and median of problem-solving ability scores were 14.99 and 15.00 respectively, with a standard deviation of 3.07. The skewness value of -0.015 indicated a nearly normal distribution of Problem Solving Ability scores.

Table 1

\Difference in mean scores of Problem Solving Ability of Boys and Girls

Variable	Type	N	Mean	S.D	t- value	Remarks
Problem solving Ability	**Boys**	**50**	**14.54**	**2.73**	**1.80***	**Not significant at 0.05 level**
	Girls	**50**	**15.48**	**2.50**		

*Critical value at 0.05 level is 1.984

The Table 1 show that the t-value of 1.80 is less than the critical value of 1.984 at 0.05 level of significance. Hence, the null hypothesis "There is no significant difference between problem solving ability of secondary school boys and girls" is not rejected.Therefore, it can be concluded that there is no significant difference in problem solving ability of the boys and girls.

The descriptive analysis of scores of Scientific Attitude revealed that the mean and median of scientific attitude scores were 191.77 and 190.50 respectively, with a standard deviation of 10.93. The skewness of approximately -0.030 in the data indicated the normal distribution with regards to Scientific Attitude scores.

Table 2

Difference in mean scores of Scientific Attitude of Boys and Girls

Variable	Type	N	Mean	S.D	t- value	Remarks
Scientific Attitude	**Boys**	**50**	**190.35**	**10.58**	**-0.754***	**not significant at 0.05 level**
	Girls	**50**	**191.96**	**10.98**		

***Critical value at 0.05 level is 1.984

The Table 2 show that the t-value of -0.754 is less than the critical value of 1.984 at 0.05 level of significance. Hence, the null hypothesis "There is no significant difference in Scientific Attitude of secondary school boys and girls" is not rejected. Therefore, it can be concluded that there is no significant difference in the scientific attitude of the boys and girls.

Table 3

Correlation between ProblemSolving Ability and Scientific Attitude

Variable	Degree of freedom	Coefficient of correlation	Remarks
Problem Solving Ability and Scientific Attitude	98	0.049*	Not significant at 0.05 level

***Critical value at 0.05 level is 0.195

The calculated coefficient of correlation between Problem Solving Ability and Scientific Attitude was 0.049, which is less than the critical value of 0.195 at 0.05 level of significance. Therefore, the hypothesis "There is no significant relationship between Problem Solving Ability and Scientific Attitude of Secondary School students" is not rejected. Hence it can be

concluded that there is no significant correlation between Problem Solving Ability and Scientific Attitude of Secondary School students.

CONCLUSIONS

On the basis of the findings, the following conclusions can be drawn:

1. There is no significant difference in problem solving ability of the boys and girls.
2. There is no significant difference in scientific attitude of the boys and girls.
3. There was no significant correlation between problem solving ability and scientific attitude of secondary school students.

These findings suggest that problem-solving ability and scientific attitude operate independently in the cognitive profiles of secondary school students.

EDUCATIONAL IMPLICATIONS

The analysis revealed several important educational implications:

1. Schools should create an inclusive academic environment where every student has equal access to learning opportunities, free from gender-based expectations.
2. Teaching methods must be diverse and student-centred, encouraging the development of problemsolving and scientific thinking through practical engagement.
3. Since problem solving ability and scientific attitude are not strongly linked, targeted interventions should focus on each skill separately.
4. Educator training should prioritize awareness of equitable teaching practices and equip teachers with tools to address different learning preference.
5. Educational planning should be grounded in actual student performance data to support a more responsive and inclusive education system.

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