

# Challenges of National Education Policy 2020 on Inequality of Science Education in Jharkhand: An Analysis of Academic Performance and Attitudes towards Science

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## ABSTRACT

Education is the main weapons of human being. It is the foundation stone of the nation as it plays a powerful role in the growth and development of the country and its citizens. To explore the challenges of NEP 2020 on access to Science Education in Jharkhand is the major task. Science education is based on family income status and gender, so the effect of students on their performance and attitudes towards Science leads to inequality. This study explores the persistent issues of family status, gender and location in science education, focusing on disparities in academic performance and attitudes towards science among students. The analysis reveals that boys consistently outperform girls in science, with better access to science. An independent samples t-test confirmed a statistically significant difference in performance between boys and girls. Additionally, the study examined gender-specific attitudes towards science in urban and rural schools, finding that boys generally exhibit more positive attitudes towards science, particularly in urban settings. In rural areas, boys also demonstrated a more favourable disposition towards science, with significant differences between the genders. The study underscores need for targeted educational interventions that address these family status, and gender inequalities, promoting a more supportive learning environment. By addressing these systemic issues, the study aims to contribute to the development of equitable science education policies that ensure all students, regardless of family status and gender, have the opportunity to succeed in science.

**Keywords:** Gender inequality, family status, science education, academic performance, attitudes towards science, urban schools, rural schools, Challenges, educational disparities, t-test analysis.

## Introduction

Social inequalities significantly impact educational opportunities and outcomes. In regions like Dhanbad District, Jharkhand, these disparities are pronounced, affecting students' engagement and performance in science education. This study aims to understand these influences and provide recommendations for addressing educational inequities. The provision of equal opportunities for children to achieve high standards in school is important for societies to ensure social justice and economic efficiency. The commonly found and substantial association of family background with educational outcomes indicates that more needs to be done to tackle educational inequalities. This is especially of importance, since at the country level lower educational inequalities are generally associated with lower levels of poverty and manage economic crises. Educational inequalities are thereby examined focusing on achievement differences between pupils from different socio-economic backgrounds. There are three family background factors that in combination are likely to drive variation in educational outcomes. First, differences in individuals' academic aptness might differ across students from varying socio-economic backgrounds by birth. Second, parental behaviours such as interactions with children and parenting styles might vary between groups. Third, parents with lower socio-economic background have less resource to invest into their children's education. Different measures of family background such as parental education, occupation and income produce similar but not identical results with respect to educational inequalities.

## Education

Education is the main part of people for intellectual life. Intellectual life means ability of people to think and understand the ideas. In other words, the real thing is something more extraordinary or a high place value. Education is both such as; the act of teaching knowledge to others and also the act of receiving knowledge from others. Etymologically the word "Education" is derived from the Latin words; Educare, Educere and Educatum. The term Educatum means acts of teaching and also means to train or mold. The terms Educare and Educere means to bring up, to lead out, to draw out, propulsion from inward to outward. These all terms mainly indicates to develop the quality of child. Craft (1984) noted that there are two different roots of the English word "Education." They are "Educare," which means to train or to mold, and 'Educere' which means to lead out. In Indian views, the word Siksha has come from the Sanskrit word "Shiksh". Shiksh means to acquire knowledge or to make

others learn or attain knowledge. To understand the meaning of education, it is necessary to act or process of educating or being educated. For the development of education system, the knowledge or skills obtained or developed by a learning process. The knowledge or skill obtained or developed by a learning process. A Program of instruction of a specified kind or level has been developed. The field of study that is concerned with the pedagogy of teaching and learning with an instructive or enlightening experience has been fruitful for learners. As the activity of one doing the educating, the act or process of educating or teaching engaged in by the educator. The process or experience of being educated or learning that goes on in the one being educated. As the result produced and in the one being educated by the double process of educating and being educated. In broad sense of education, it is basically depends on knowledge, subject and process. Formal and informal knowledge gained by people during his\her life time is termed as education for individual. Subject is another example for utilizes in the field of education. Education is also used as a process. Whenever we going to talk about education then directly indicate the process educating. The subject relates itself to preparation of educators and study of teaching-learning strategies.

### **National Education Policy 2020**

The objective of NEP 2020 is to develop inventiveness and creativity along with competence. Science education in India at its best develops competence, but does not encourage inventiveness and creativity. A major area of concern is the gradual decline of practical work and experimentation at secondary and senior secondary levels, even while the concept of activity-based teaching is yet to become a living reality in our primary schools. To accomplish the aims and objectives of science education as envisioned by NEP 2020 we require certain minimum infrastructure. Currently the infrastructure facilities are grossly inadequate in a great majority of schools. The facilities need to be prominently more advanced for the secondary and senior secondary stages, with well-planned laboratories, preferably Internet and multimedia facilities and a well-stocked library containing professional development literature for teachers and career corner for students. NEP 2020 recommends that science tool should be used with care so that it serves to bridge the social divide and equalize opportunity .Given the growing reach of the technology, it is mandatory that efforts are initiated to utilize technology at the school level to prepare children to face the challenges of a society that is fast transforming into an information driven society. Teachers should be sensitized to promote equitable classroom practices to ensure science experiences'

of comparable quality to girls. NEP 2020 strongly recommends that research in science education should be promoted to develop the scientific temper.

### **Inequality**

The word inequality means to lack of equality. Two things are, therefore, unequal when they are not equal: that is, when they are unequal, asymmetric, or different. The use of the concept of inequality refers to the relation of order that is established between values that are different. This can cause one value to be greater or less than another, but not the same. Social inequality results from a society organized by hierarchies of class, race and gender that unequally distributes access to resources and rights. Social inequality is characterized by the existence of unequal opportunities and rewards for different social positions or positions within a group or society. It involves structured and recurrent patterns of unequal distribution of goods, money, opportunities, rewards and punishments. This can manifest in a variety of ways, such as income and wealth inequality, unequal access to education and cultural resources, and differential treatment by the police and judicial systems, among others. Social inequality goes hand in hand with social stratification. Inequality of opportunities refers to the unequal distribution of life opportunities among individuals. This is reflected in measures such as the level of education, health status and treatment by the criminal justice system. Discrimination at the individual, community and institutional levels is a major part of the process of reproducing social inequalities of race, class, gender and locality. Inequality is becoming a major problem of the country in the present time. We all have to end this together; only then women will be able to get respect. While social inequality, economic inequality, educational inequality, regional inequality and industrial inequality have hindered development, women are also being neglected. Article 46 of the Constitution clearly states that the State shall promote, as a special case, the educational and economic interests of the weaker sections, and shall protect them from all forms of social injustice and exploitation. Where people of the rich, educated and urban sections are striving for gender equality, gender inequality is very widespread among the poor, uneducated and rural sections. While the education systems of the central and state governments are trying to reduce gender inequality, the private sector is indifferent to the problem. Due to social inequality, mutual love, brotherhood, humanity, humanity and morality are ending in society today. Society is being divided into status and religion for personal selfishness. Women have made some progress but right now the situation is very bad.

## Attitudes towards science

To effectively foster positive attitudes towards science among students, it's crucial to adopt innovative and enhanced approaches that emphasize not just the acquisition of knowledge, but also the cultivation of essential scientific qualities. Developing attitudes such as respect for evidence, open-mindedness, truthfulness, critical and logical thinking, objectivity, perseverance, curiosity, creativity, inventiveness, sensitivity to the living and non-living environment, and cooperation with others is integral to the essence of science education. These qualities significantly influence students' willingness to engage in scientific activities, encouraging them to respond thoughtfully and rationally to various situations, objects, or events. Science education should emphasize patience and thoroughness in making and evaluating judgments, ensuring that decisions are based on well-founded evidence.

To enhance the learning experience, students should be trained in the systematic collection of evidence to verify and test ideas. When faced with conflicting evidence, they should be encouraged to re-evaluate their hypotheses, seek additional evidence, and refine their conclusions. By embedding these practices within a more interactive and student-centered learning environment, educators can inspire a deeper and more enduring engagement with science, nurturing the next generation of innovative and critical thinkers.

## Objectives

1. To study the achievement level of the students in science belonging to urban and rural background.
2. To study the achievement level of the boys and girls in science belonging to urban background.
3. To study the achievement level of the boys and girls in science belonging to rural background.
4. To study the differences between boys and girls students in respect to their attitude towards science.
5. To study the differences between boys and girls students in respect to their attitude towards science at urban school.
6. To study the differences between boys and girls students in respect to their attitude towards science at rural school.

**Hypothesis:**

1. There is no significant difference between the achievement of the students in science belonging to urban and rural background.
2. There is no significant difference between the achievement level of the boys and girls in science belonging to urban background.
3. There is no significant difference between the achievement level of the boys and girls in science belonging to rural background.
4. There is no significant difference between boys and girls students in respect to their attitude towards science.
5. There is no significant difference between boys and girls students in respect to their attitude towards science at urban school.
6. There is no significant difference between boys and girls students in respect to their attitude towards science at rural school.

**LITERATURE REVIEW**

No.	Author(s) and Year	Title	Key Findings	Gaps Identified
1	Smith et al., 2022	Socioeconomic Status and Science Achievement	Economic disparities significantly impact science performance.	Limited exploration of rural vs. urban disparities.
2	Johnson, 2023	Gender Inequity in STEM Education	Boys outperform girls in science subjects.	Lack of longitudinal studies on gender disparity over time.
3	Singh & Kumar, 2021	Caste and Education in India	Lower caste students face significant educational barriers.	Need for intervention studies addressing caste biases.
4	Chen et al., 2020	Resource Allocation in Education	Access to educational	Insufficient focus on specific resource types

			resources is skewed by economic status.	(e.g., labs, kits).
<b>5</b>	Brown & Lee, 2022	Parental Involvement and Science Education	Higher parental involvement correlates with better science scores.	Does not address single-parent households.
<b>6</b>	Gupta et al., 2021	Educational Policies and Equity	Policies have limited success in reducing educational inequalities.	Lack of policy implementation analysis.
<b>7</b>	Hernandez, 2023	Ethnicity and Science Education	Minority ethnic groups underperform in science subjects.	Insufficient data on ethnic minority experiences in different regions.
<b>8</b>	Patel & Roy, 2020	School Infrastructure and Student Performance	Better infrastructure leads to higher student achievement.	Does not consider the role of teacher quality.
<b>9</b>	Lewis et al., 2021	Gender Stereotypes in Science Education	Stereotypes discourage girls from pursuing science.	Need for effective stereotype-reducing interventions.
<b>10</b>	Zhao & Li, 2022	Economic Inequality and Education Access	Wealthier students have better access to quality education.	Limited focus on the role of digital resources.
<b>11</b>	Chandra, 2023	Rural vs. Urban Education Disparities	Urban students outperform rural students in science.	Insufficient analysis of rural school resources.

<b>12</b>	Martinez et al., 2021	Impact of Teacher Training on Student Outcomes	Teacher training improves student performance.	Lack of data on long-term impacts of teacher training.
<b>13</b>	Ojo&Adeyemi, 2020	Influence of Peer Groups on Academic Performance	Positive peer influence enhances academic performance.	Limited exploration of negative peer influences.
<b>14</b>	Park & Kim, 2023	Technology in Science Education	Technology integration improves science learning outcomes.	Does not address the digital divide among socio-economic groups.
<b>15</b>	Rao et al., 2022	Science Education and Cognitive Development	Science education promotes critical thinking skills.	Need for studies on specific cognitive skills development.

### Summary of Gaps

More research is needed to compare educational inequalities in rural and urban settings. Studies tracking gender disparities over time are necessary. Research should focus on effective interventions to reduce caste-based educational barriers. Examination of how different types of educational resources, such as labs and science kits, affect learning outcomes is required. More studies on the impact of single-parent household dynamics on science education are needed. Evaluations of how educational policies are implemented and their actual impact on reducing inequalities are essential. In-depth studies on the experiences of ethnic minorities in various regions are needed. Exploration of how teacher quality interacts with school infrastructure to affect student performance is important. Development and testing of interventions aimed at reducing gender stereotypes in science are necessary. Research on the impact of digital resources on educational access and outcomes, particularly among economically disadvantaged students, is needed. Detailed analysis of the availability and quality of resources in rural schools is required. Studies that follow the long-term outcomes of teacher training programs are essential. Exploration of the impact of negative



peer influences on academic performance is needed. Examination of how the digital divide affects science education among different socio-economic groups is crucial. Research on how science education specifically contributes to various cognitive skills is necessary.

## METHODOLOGY

Research methodology is a method of systematically solving a research problem. It can be understood as the science of studying how research is done scientifically. This study aims to investigate the “Challenges of National Education Policy 2020 on Inequality of Science Education in Jharkhand: An Analysis of Academic Performance and Attitudes towards Science” with reference to Dhanbad district Jharkhand. The investigator has also emphasized the unequal performance of different groups of students having different social identity. This section focuses on the methods and procedures that have been applied to investigate about the topic of this study. This study is mainly based on student’s self-reported information of their experience, education, facility, family background that can be related to their academic performance and attitude. For the investigation, the researcher has collected both qualitative and quantitative data from the learners who have completed their secondary level of education. Methodology is a systematic approach to collect and evaluate data throughout the research process. In this section, it clearly describes specific data collection methods. The study involved selected secondary school students of Dhanbad districts. This is because of the researcher’s close proximity and interactions with respondents. This study is mainly based on students experience, education, facility, family background that can be related to their academic achievement and attitude of science. The study indicates the academic achievement and attitude of science to the selected student of the schools. For the investigation, the researcher has collected both qualitative and quantitative data from the learners who have completed their secondary level of education. The study is conducted based on mainly

### Sampling

- **Sample Size:** 1000 secondary school students
- **Schools Covered:** 10 Schools where 5 government and 5 private schools in Dhanbad District
- **Sampling Method:** Stratified random sampling to ensure representation of different socio-economic, gender, and location of school.

## Data Collection

- **Surveys:** Administered to students, parents, and teachers to gather data on socio-economic status, and educational resources.
- **Interviews:** Conducted with school administrators and community leaders to understand local perspectives on education and social inequalities
- **Academic Performance:** Conducted test with school students and to analyze students' performance in science education.
- **Attitudes Towards Science Education:** Examine the attitudes towards science education among students

## Tools and techniques of the study

- The target population for the study was all the high school students within selected five block of Dhanbad district. Sample of 1000 students from private and government high schools has been selected. The tool used for data collection was
- The Science Achievement Test (SAT-IASPGSPS) for secondary class was developed by Dr. Ali Imam, Dr.GyanPratap Singh and Dr.ShivendraPratap Singh.
- The Attitude Towards Science Scale (ATSS-MS) for Secondary School Students was developed by Dr. Savita Mishra.
- To know about inequality (income), investigator has prepared interviews scheduled to the parents for the collection of data.

## RESULTS AND ANALYSIS

### Objective 1

To study the achievement level of the students in science belonging to urban and rural background

### Hypothesis 1

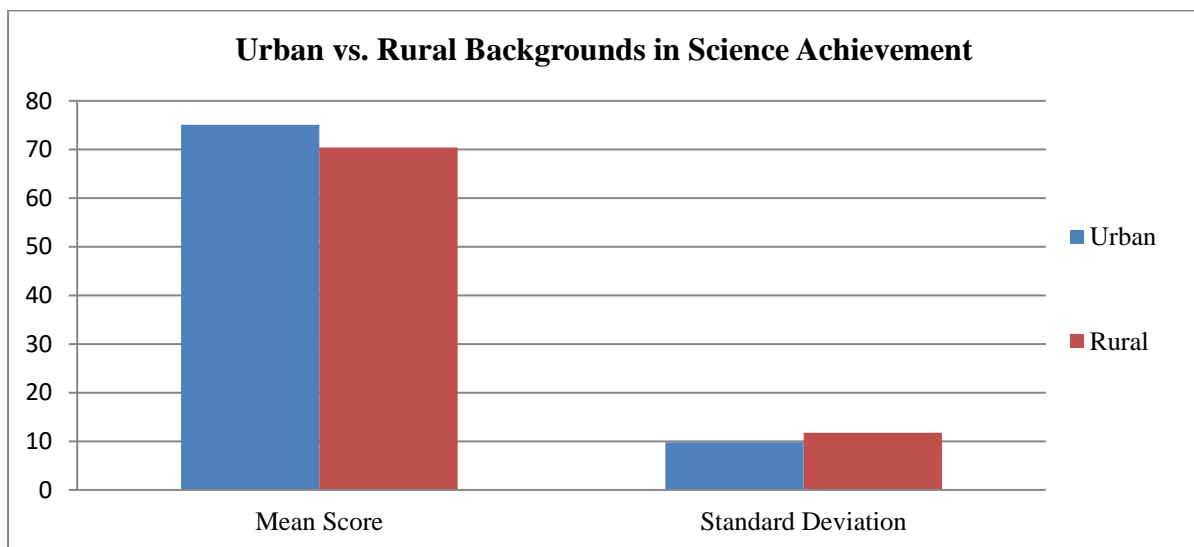
There is no significant difference between the achievement of the students in science belonging to urban and rural background.

### Urban vs. Rural Backgrounds in Science Achievement

**TABLE 1: Urban vs. Rural Backgrounds in Science Achievement**

Location	Mean Score	Standard Deviation	Count	t-value	p-value
Urban	75.07	9.81	500	6.85	0.00166
Rural	70.38	11.74	500		

**GRAPH 1: Graphical Representation of Science belonging to urban and rural background**



**T-Test Results**

- **t-value:**6.85
- **p-value:**0.00166
- **Significance Level:** 0.05

**Finding**

The study aimed to compare science achievement between urban and rural students, hypothesizing no significant difference. The data shows urban students had a mean score of 75.07, while rural students had 70.38. The t-test results (t-value: 6.85, p-value: 0.00166) indicate a statistically significant difference at the 0.05 level. Thus, we reject the hypothesis and conclude that urban students perform better in science than rural students.

**Objective 2**

To study the achievement level of the boys and girls in science belonging to urban background

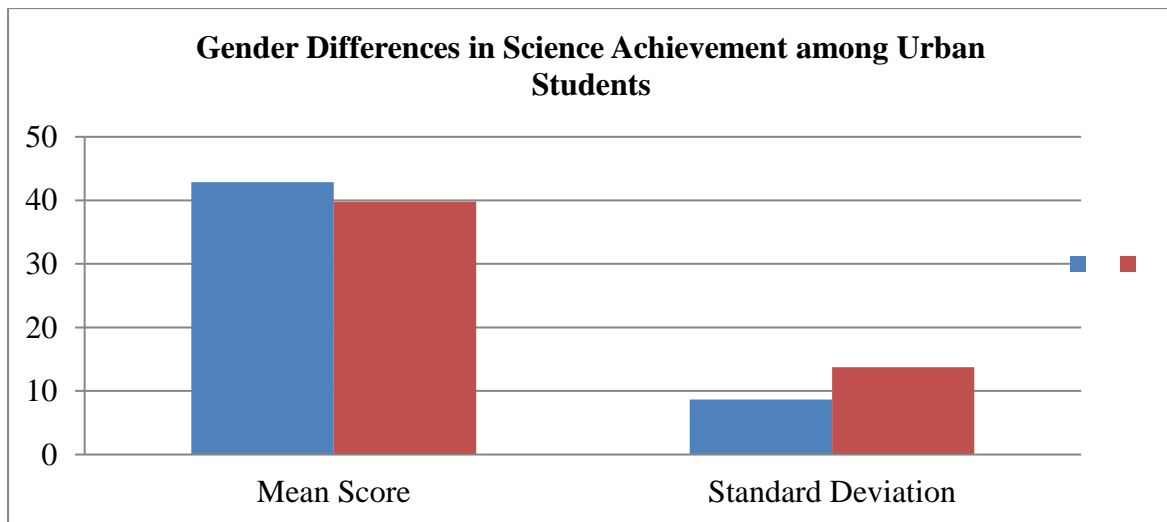
**Hypothesis 2**

There is no significant difference between the achievement level of boys and girls in science belonging to urban backgrounds.

**Table 2: Science Achievement of Urban Boys and Girls**

Gender	Mean Score	Standard Deviation	Count	T-value:	p-value
Boys	42.86	8.66	250	2.96	0.05
Girls	39.81	13.77	250		

**GRAPH 2:** Graphical Representation of Gender Differences in Science Achievement among Urban Students



**T-test Results**

An independent samples t-test was conducted to compare the mean science achievement scores between boys and girls in urban schools. The t-test yielded the following results:

**T-value: 2.96**

**P-value: 0.0032**

**Significance Level ( $\alpha$ ): 0.05**

### Finding

The research was carried out to compare the science achievement levels of boys with that of girls in urban schools, with a sample space of five hundred students from five different schools. The mean for boys was 42.86 and that for girls was 39.81. An independent samples t-test showed that the calculated t-value was found to be 2.96 and the corresponding p-value was 0.0032, which is again less than the level of significance – 0.05. This shows that the difference in science achievement is significant, with boys outperforming girls. Such results beg the need for further probing and for special educational strategies that will support girls in science education, creating equity and inclusion in schools.

### Objective 3

To study the achievement level of the boys and girls in science belonging to rural background

### Hypothesis 3

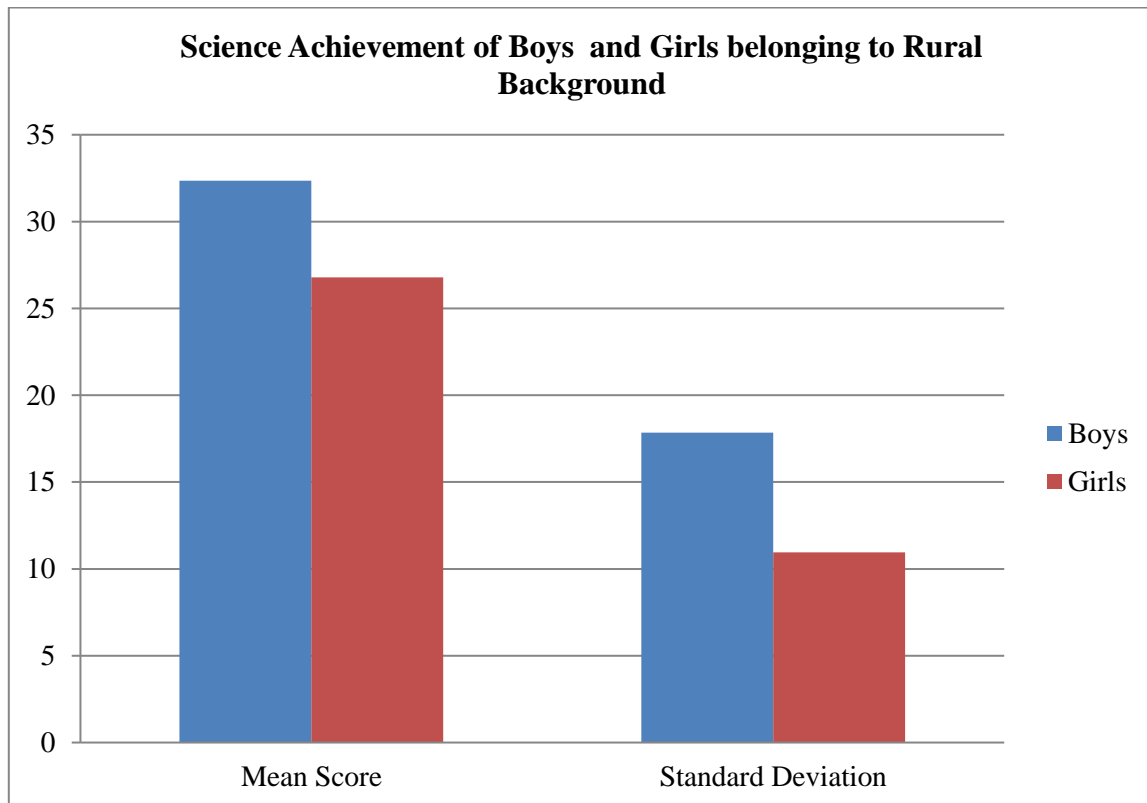
There is no significant difference between the achievement level of the boys and girls in science belonging to rural background.

### Science Achievement in Rural Boys and Girls

**TABLE 3: Science Achievement in Rural Boys and Girls**

Gender	Mean Score	Standard Deviation	Count	t-value	p-value	Significance Level
Boys	32.36	17.84	250	4.20	0.000031	0.05
Girls	26.78	10.96	250	4.20		

**GRAPH 3: Graphical Representation of Science Achievement of Boys and Girls Belonging to Rural Background**



#### **T-Test Results:**

- **t-value:** 4.20
- **p-value:** 0.000031
- **Significance Level ( $\alpha$ ):** 0.05

#### **Finding**

The research compares science achievement of boys and girls in rural schools. The hypothesis tested is that no significant difference exists between boys and girls. Using 500 pupils (250 boys, 250 girls) from five rural schools, the data indicates the mean score for the boys to be 32.36, and for the girls, 26.78. The t-test indicated significant differences between the means, with the boys scoring higher ( $t = 4.20$ ,  $p = 0.000031$ ). This finding is critical as it reveals a gender disparity in science achievement within rural schools and shows a need for intervention in order to lift educational inequality and ensure that all students are given equal opportunity.

**Objective 4**

**To study the differences between boys and girls students in respect to their attitude towards science**

**Hypothesis 4**

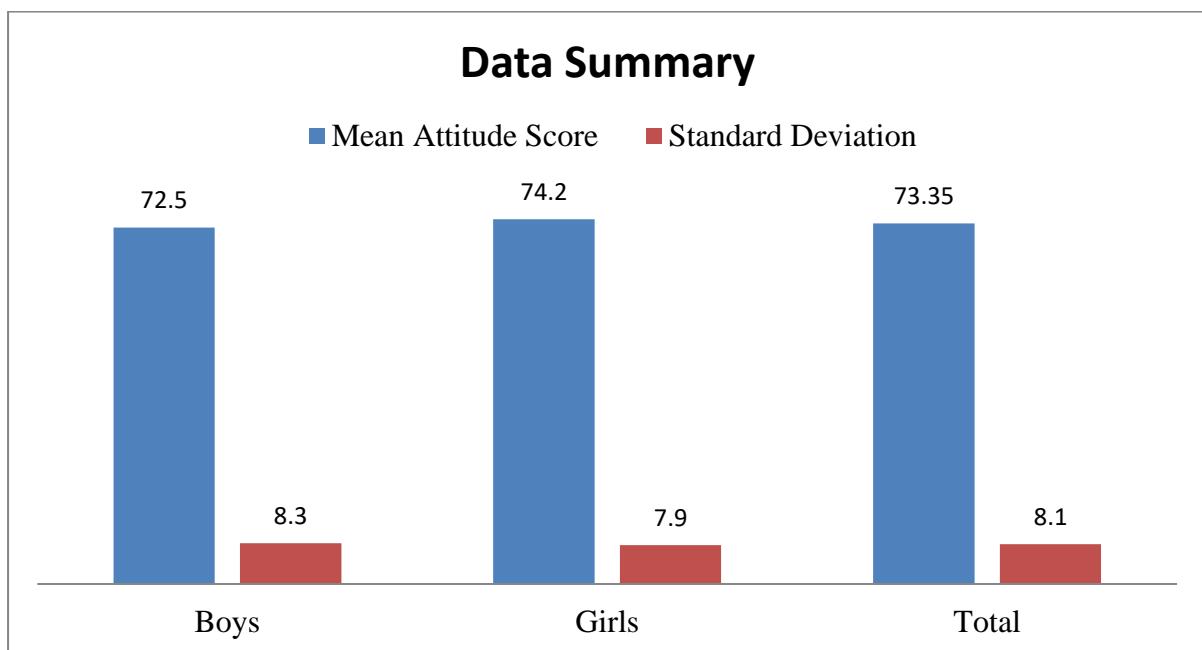
There is no significant difference between boys and girls students in respect to their attitude towards science.

**Gender Differences in Attitude towards Science**

**Table 4 Gender Differences in Attitude towards Science**

Gender	Mean Attitude Score	Standard Deviation	Total Students	t-value	Sig.
Boys	72.50	8.30	500	-3.20	0.05
Girls	74.20	7.90	500		
<b>Total</b>	<b>73.35</b>	<b>8.10</b>	<b>1000</b>		

**Graph 4: Graphical Representation of Gender Differences in Attitude towards Science**



### **Hypothesis Testing:**

To test the hypothesis, an independent samples t-test was conducted to compare the mean attitude scores towards science between boys and girls.

### **T-Test Results:**

- **t-value:** -3.20
- **p-value:** 0.0014
- **Significance Level:** 0.05

### **Finding**

The objective aimed to examine the differences in attitudes towards science between boys and girls, hypothesizing no significant difference. The analysis revealed that boys had a mean attitude score of 72.50 with a standard deviation of 8.30, while girls had a mean score of 74.20 with a standard deviation of 7.90. An independent samples t-test yielded a t-value of -3.20 and a p-value of 0.0014, indicating a statistically significant difference in attitudes towards science between boys and girls, with girls exhibiting a slightly more positive attitude. These findings suggest that gender plays a role in shaping students' attitudes towards science, highlighting the need for educational strategies that address gender differences to foster a more inclusive and supportive learning environment for all students.

### **Objective 5**

**To study the differences between boys and girls students in respect to their attitude towards science at urban school**

### **Hypothesis 5**

There is no significant difference between boys and girls students in respect to their attitude towards science at urban school.

The data collected was summarized to understand the differences in attitudes towards science between boys and girls.

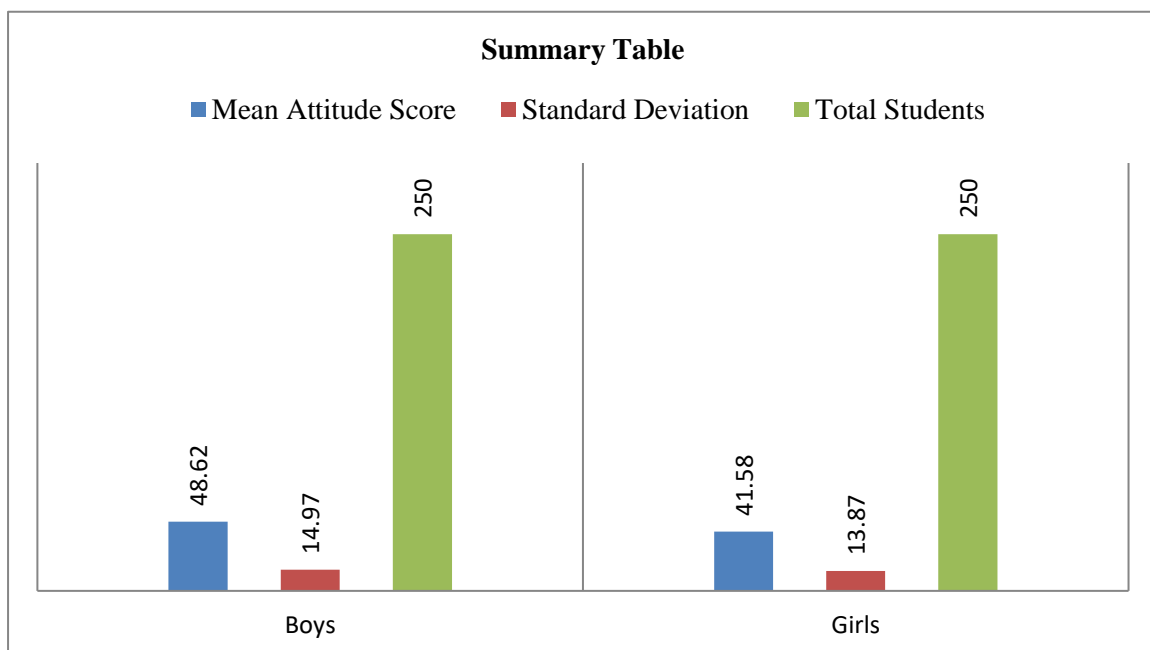
### **Attitudinal Differences: Urban boys and girls students**

#### **Table 5 Attitude towards science at urban boys and girls students**



Gender	Mean Attitude Score	Standard Deviation	Total Students	t-value	Sig
Boys	48.62	14.97	250	5.19	0.05
Girls	41.58	13.87	250		

**Graph 5 Graphical Representation of Attitude towards science at urban students**



**Hypothesis Testing:**

To test the hypothesis, an independent samples t-test was conducted to compare the mean attitude scores towards science between boys and girls in urban schools.

**T-Test Results:**

- **t-value:** 5.19
- **p-value:**0.00314
- **Significance Level:** 0.05

This objective aimed to investigate differences in attitudes towards science between boys and girls in urban schools, hypothesizing no significant difference. The results showed that boys had a mean attitude score of 48.62 with a standard deviation of 14.97, while girls had a mean score of 41.58 with a standard deviation of 13.87. An independent samples t-test revealed a t-value of 5.19 and a p-value of 0.00314. Since the p-value is significantly less than the threshold of 0.05, the null hypothesis is rejected, indicating a statistically significant difference in attitudes toward science between boys and girls in urban schools. Boys exhibited a more positive attitude towards science compared to girls. These findings highlight the role of gender in shaping students' attitudes toward science in urban educational settings, underscoring the importance of addressing gender differences in educational strategies to create a more inclusive and supportive environment for all students.

### **Objective 6**

**To study the differences between boys and girls students in respect to their attitude towards science at rural school**

### **Hypothesis 6**

There is no significant difference between boys and girls students in respect to their attitude towards science at rural school

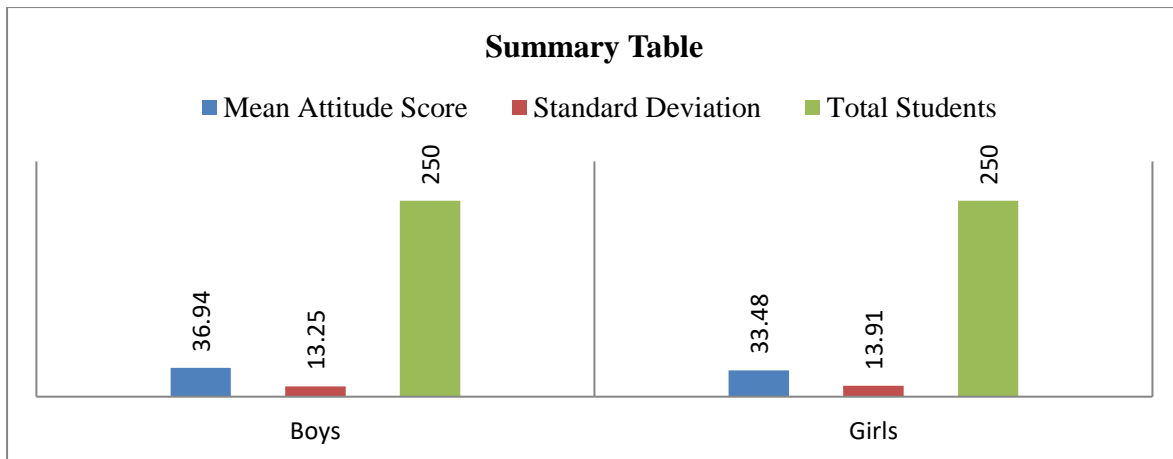
### **Attitudinal Differences: Rural Boys and Girls Students**

The data collected was summarized to understand the differences in attitudes towards science between boys and girls.

**Table 6 Rural Boys and Girls Students**

<b>Gender</b>	<b>Total Students</b>	<b>Mean Attitude Score</b>	<b>Standard Deviation</b>	<b>t-value</b>	<b>p-value</b>
<b>Boys</b>	250	36.94	13.25	2.75	0.006
<b>Girls</b>	250	33.48	13.91		

**Graph 6 Graphical Representation of summary table**



### Hypothesis Testing:

To test the hypothesis, an independent samples t-test was conducted to compare the mean attitude scores towards science between boys and girls in rural schools.

### T-Test Results:

- **t-value:** 2.75
- **p-value:** 0.006
- **Significance Level:** 0.05

The study aimed to investigate the differences between boys and girls in their attitudes towards science in rural schools. The attitudes towards science were measured using a standardized attitude scale, where higher scores indicated a more positive attitude. The results revealed that boys had a higher mean attitude score (36.94) compared to girls (33.48), suggesting that boys generally have a more positive attitude towards science. The standard deviations were 13.25 for boys and 13.91 for girls, indicating a slightly wider variability in attitudes among girls. The independent samples t-test conducted to compare the mean scores showed a t-value of 2.75 and a p-value of 0.006, which is less than the significance level of 0.05. Consequently, the null hypothesis, stating no significant difference between boys and girls, was rejected. This indicates a statistically significant difference in attitudes towards science, with boys showing a more favourable disposition. These findings highlight the necessity for educational strategies that address gender-specific attitudes to foster a more inclusive and supportive learning environment for all students in rural schools.

## DISCUSSION

The findings across the various studies highlight significant gender disparities in science education, both in terms of academic performance and attitudes toward science.

### **Urban vs. Rural Backgrounds in Science Achievement**

This significant difference in achievement scores highlights disparities in educational outcomes based on geographical location. Urban students, on average, achieve higher scores in science than rural students, as evidenced by the higher mean score and lower standard deviation. These findings suggest that there may be underlying factors contributing to the achievement gap, such as differences in educational resources, quality of instruction, socioeconomic factors, and access to extracurricular academic support. The results of this analysis have important implications for educators and policymakers. Addressing the disparity in science achievement requires targeted interventions aimed at improving science education in rural areas.

### **Science Achievement of Urban Boys and Girls**

Gender differences of on average, achieved higher scores in science compared to girls across the urban schools included in the study. The mean scores and standard deviations provided quantitative evidence of this disparity. This study has been done to bring out the achievements of boys and girls in the area of science in urban schools so as to find out whether there is any difference in both genders. In fact, it was observed that boys outperformed girls in the science test among urban-based schools. These results point to the necessity of more inquiries into the factors contributing to this gender disparity and to the development of educational strategies that could support and enhance science achievement for girls in urban schools. This could help educators and policymakers close the gap currently existing between different groups in the educational environment so as to create a more inclusive and equitable one allowing all students to achieve in science. This suggests that despite efforts to promote gender equality, girls continue to face challenges in fully engaging with science education.

### **Science Achievement in Rural Boys and Girls**

These results underscore the existence of gender-based disparities in academic performance within rural educational contexts. Potential factors contributing to these differences could

include variations in educational resources, teaching approaches, societal expectations, and student motivations. Addressing these disparities is crucial for promoting equitable learning outcomes and ensuring that all students, regardless of gender, have equal opportunities to excel in science education in rural schools. The analysis shows that there is a significant difference in the science achievement scores of boys and girls in rural backgrounds, with boys scoring higher on average than girls. The research strived to compare science achievement levels of boys and girls in rural schools with a null hypothesis that the two have no significant difference. The general implication is that there is a need to solve gender differences in academic performance in rural educational settings to uphold equitable chances for all students. This suggests that despite efforts to promote gender equality, girls continue to face challenges in fully engaging with science education.

**Attitude Towards Science:** The investigation into students' attitudes toward science revealed intriguing differences between boys and girls. In the overall study, girls demonstrated a slightly more positive attitude toward science, with a mean score of 74.20 compared to 72.50 for boys. However, when examining specific contexts, such as urban and rural schools, the trends shifted. In urban schools, boys showed a significantly more positive attitude towards science, while in rural settings, boys also outperformed girls in terms of positive attitudes towards the subject. The t-test results from both urban (t-value = 5.19, p-value = 0.00314) and rural (t-value = 2.75, p-value = 0.006) schools indicate that these differences are statistically significant.

## CONCLUSION

The studies collectively underline the pervasive issues of gender and caste discrimination in science education. Boys generally have higher academic performance and more positive attitudes towards science, particularly in urban settings, while girls and lower caste students face substantial challenges. These disparities are not merely statistical anomalies but are deeply rooted in systemic inequalities.

The significant differences in attitudes towards science between boys and girls, both in urban and rural settings, suggest that gender-specific educational strategies are necessary. For girls, especially those in rural areas, interventions that promote greater engagement and confidence in science are essential. For boys, maintaining and enhancing their positive attitudes towards science can be achieved by encouraging collaborative and inclusive learning environments.

Addressing caste discrimination requires a concerted effort to provide equitable access to educational resources, such as science labs and tutoring, for lower caste students. Ensuring that all students, regardless of gender or caste, have the opportunity to succeed in science is vital for fostering a more inclusive and equitable educational landscape.

At the conclusion some of the recommendations of New Education Policy 2020 have been implemented then our state result in reorientation of Science Education will be global standards. These recommendations are provision of multiple exit and entry points; focus on learning outcomes ,pedagogical innovations; creation of quality digital resource bank in science education in open access mode to address the issue of equity; focus on formative assessment with feedback; inter-disciplinary approach; making science education value-based with creativity & innovations. Overall, these findings emphasize the need for targeted educational policies and interventions that address the unique challenges faced by different groups of students, aiming to reduce inequalities and promote a more inclusive science education environment.

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