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# A STUDY ON PROBLEM-SOLVING ABILITY OF TRIBAL AND NON-TRIBAL SECONDARY SCHOOL STUDENTS IN TELANGANA

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## Abstract

This study aims to investigate and compare the problem-solving abilities of tribal and non-tribal secondary school students in the state of Telangana, with a specific focus on the influence of gender and type of school (government and private). The objectives include assessing the level of problem-solving skills among various sub-groups and identifying significant differences based on socio-cultural and institutional factors. A descriptive survey method was adopted for the study data were collected from 400 secondary school students (200 tribal and 200 non-tribal). A standardized Problem-Solving Ability Test was administered to a representative sample of secondary school students drawn from both tribal and non-tribal populations across selected districts in Telangana. The sample was stratified to include equal representation of boys and girls, as well as students from government and private schools. The data were analyzed using statistical tools such as mean, standard deviation, and t-test to determine the comparative performance across categories. The findings revealed that non-tribal students, on average, exhibited higher problem-solving ability compared to their tribal counterparts. While boys showed slightly higher mean scores than girls, the difference was not statistically significant. However, a significant difference was observed between private and government school students, with private school students performing notably better. This indicates that access to educational resources, school environment, and pedagogical support significantly influences students' cognitive performance. The study underscores the multifaceted nature of factors affecting problem-solving ability and highlights the need for inclusive educational strategies, particularly targeting tribal students and under-resourced government schools. The findings provide valuable insights for educators, policymakers, and curriculum designers to foster equity, bridge learning gaps, and promote academic excellence in diverse classroom settings.

**Keywords:** Tribal, Non-Tribal, Gender, Problem Solving Ability, Secondary school Students, Telangana.

## Introduction

Problem-solving is a fundamental cognitive skill that plays a critical role in academic achievement and everyday decision-making. In the context of education, problem-solving ability reflects a student's capacity to analyze situations, apply logical reasoning, and arrive at effective solutions. It is closely linked to intellectual development, critical thinking, and learning efficiency. As modern education increasingly emphasizes competency-based learning, the development and assessment of students' problem-solving abilities have become essential components of curriculum and pedagogy.

In a diverse country like India, educational outcomes are significantly influenced by socio-cultural, economic, and institutional factors. Among the most affected are tribal students, who often face challenges such as limited access to quality education, language barriers, inadequate learning resources, and socio-economic disadvantages. In contrast, non-tribal students, especially those from urban or well-supported backgrounds, may have better exposure to educational facilities and support systems. These disparities can contribute to differences in cognitive development, including problem-solving skills.

Telangana, a state with a significant tribal population and diverse educational infrastructure, presents a meaningful context to study such differences. Moreover, with the growing number of private schools and the continued reliance on government schools by marginalized communities, school type has also emerged as an important variable influencing academic performance. Similarly, gender differences in learning outcomes continue to be an area of concern, necessitating a deeper exploration of how boys and girls compare in their problem-solving capacities. The reviewed studies collectively highlight that problem-solving ability among students is influenced by various contextual and demographic factors.

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## Review of Literature

**Lalduhawma et al. (2023)** conducted a study on the problem-solving abilities of higher secondary students in Aizawl City in relation to locale and school management type. The study involved 160 students from both government and private schools. The findings revealed that there were no significant differences in problem-solving ability between urban and rural students, nor between students from arts and commerce streams. The results suggest that problem-solving ability may not be heavily influenced by geographical or academic stream variables within the studied context.

**Soebagyo et al. (2022)** examined students' problem-solving abilities in social arithmetic based on their learning styles using a descriptive qualitative approach. The study concluded that students with visual, auditory, and kinesthetic preferences were able to apply Polya's problem-solving steps successfully. While no significant differences in performance were observed, the study highlighted that students employed different cognitive styles during the problem-solving process. This suggests that instructional methods should accommodate diverse learning styles to maximize effectiveness.

**Ramanaiah et al. (2021)** studied problem-solving ability among adolescents in relation to gender, locality, and the working status of mothers in the Nellore district of Andhra Pradesh. The sample included 300 tenth-grade students from rural and urban settings. The results showed that locality and the employment status of mothers significantly affected problem-solving skills, whereas gender did not have a notable influence. The findings emphasized the importance of socio-economic and environmental factors in shaping students' cognitive development.

**Kumari and Reddy (2019)** investigated the impact of parental education and socio-economic status on the problem-solving ability of secondary school students in Telangana. Their findings revealed that students from families with higher educational backgrounds and better economic conditions performed significantly better in problem-solving tasks. This underscores the role of home environment and parental support in cognitive development.

**Verma (2018)** conducted a comparative study on problem-solving ability between private and government school students in urban Uttar Pradesh. The study found that students from private schools scored significantly higher than those from government schools, attributing this to better infrastructure, teaching practices, and student support systems available in private institutions.

**Sharma and Meena (2017)** explored the influence of gender and school environment on problem-solving ability among secondary school students in Rajasthan. Their research concluded that while gender differences were negligible, students from well-resourced schools (irrespective of management type) had better problem-solving capabilities. This supports the idea that school environment and teaching quality play crucial roles in developing students' cognitive skills.

This study, therefore, aims to explore the problem-solving abilities of tribal and non-tribal secondary school students in Telangana, considering the moderating roles of gender and type of school (government and private). By examining these dimensions, the research seeks to provide a clearer understanding of the educational gaps that exist and offer data-driven insights for enhancing equity and academic support for underrepresented groups.

## Need and Significance of the Study

In today's knowledge-driven society, developing students' problem-solving ability is essential for academic success and holistic development. Problem-solving is a core cognitive skill that enables learners to think critically, make decisions, and adapt to real-life situations. As education systems shift focus toward competency-based learning, understanding how different student groups perform in problem-solving tasks has become crucial for achieving inclusive and equitable education.

In the context of Telangana, and particularly in Khammam district, the need to examine problem-solving ability among secondary school students is even more relevant due to the region's diverse demographic and socio-economic composition.

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Khammam, with its substantial tribal population, represents both challenges and opportunities in the field of education. Despite numerous government initiatives such as the establishment of Tribal Welfare Residential Schools, academic disparities remain between tribal and non-tribal students.

Tribal students in Khammam often face issues such as poor infrastructure, lack of exposure to advanced learning resources, language barriers, and socio-economic disadvantages. These factors may hinder the development of essential cognitive skills like problem-solving. In contrast, non-tribal students, especially those studying in private schools, generally have access to better educational facilities, experienced teachers, and supportive learning environments, which can positively influence their problem-solving performance.

Another important factor is the type of school government versus private. Government schools, although accessible to marginalized communities, often suffer from resource constraints and high student-teacher ratios, affecting teaching quality and cognitive engagement. On the other hand, private schools tend to provide enriched learning experiences that may foster higher-order thinking skills. Gender is also a key variable, as cultural and social expectations may influence how boys and girls are supported and encouraged in their academic growth. Given these contextual realities, this study is both timely and significant for several reasons:

- It aims to identify cognitive skill disparities between tribal and non-tribal secondary school students in Khammam district, Telangana.
- It investigates how school type (government or private) and gender impact students' problem-solving abilities.
- It provides empirical data that can inform educational policies and interventions specifically designed for tribal-dominated areas.
- It helps educators, curriculum developers, and policymakers to design inclusive strategies that promote equal cognitive development for all students.
- It aligns with national priorities under NEP 2020, which emphasizes equity, inclusion, and development of 21st-century skills like problem-solving.

By focusing on Khammam district, this study addresses a critical gap in regional educational research and aims to contribute to the development of more equitable and effective teaching-learning practices across diverse student populations.

**Statement of the Problem**

Problem-solving ability is recognized as a core cognitive skill essential for academic achievement, critical thinking, and real-world decision-making. In the context of secondary education, the development of this skill is influenced by various socio-cultural, educational, and individual factors such as ethnicity, gender, type of school, and availability of learning resources.

In Telangana, particularly in districts like Khammam, there exists a marked diversity in educational backgrounds, with a significant presence of tribal populations who often face systemic challenges such as poverty, language barriers, and limited access to quality education. In contrast, non-tribal students, especially those enrolled in private schools, are more likely to benefit from enriched learning environments, and structured academic support.

The disparity between government and private schools further complicates the scenario, as government schools frequently lack sufficient infrastructure and resources compared to their private counterparts. Additionally, gender-based disparities in learning outcomes continue to persist, often influenced by social expectations, family support, and access to learning opportunities. While several studies have explored problem-solving ability in relation to individual variables, very few have focused on the combined impact of tribal identity, gender, and school type within the regional context of Telangana. There is a clear need to understand how these factors interact and influence the development of students' cognitive skills, particularly in secondary school years which form the foundation for future academic and career choices.

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Hence, the present study seeks to investigate and compare the problem-solving abilities of tribal and non-tribal secondary school students in Telangana, with special reference to gender and type of school (government and private), in order to identify gaps and suggest strategies for equitable educational development.

**Objectives of the Study**

The following Objectives were framed in the present study.

1. To compare the problem-solving abilities of tribal and non-tribal secondary school students.
2. To examine the differences in problem-solving ability between boys and girls secondary school students.
3. To compare the problem-solving ability of students studying in government and private secondary schools.

**Hypotheses of the Study**

The following hypotheses were framed in the present study.

1. There is no significant difference in the problem-solving ability between tribal and non-tribal secondary school students.
2. There is no significant difference in the problem-solving ability between boys and girls secondary school students.
3. There is no significant difference in the problem-solving ability of students studying in government and private secondary schools.

**Methodology of the study**

The present study focused on the "Problem-Solving Ability of Tribal and Non-Tribal Secondary School Students in Telangana." To achieve the stated objectives and test the formulated hypotheses, the researcher adopted the descriptive survey method. This method was deemed appropriate as it enables the comparison of different groups, facilitates the exploration of relationships among variables, and supports the drawing of meaningful and generalizable conclusions.

**Sample of the Study**

The sample of the study consisted of 400 secondary school students from Khammam district of Telangana. It included 200 tribal students and 200 non-tribal students, with an equal representation of boys and girls in each group. The participants were selected from Telangana Tribal Welfare Residential Schools, Zilla Parishad Secondary schools (government schools), and recognized private secondary schools to ensure diversity in the sample. A stratified random sampling technique was employed to achieve balanced representation across ethnicity (tribal and non-tribal), gender, and type of school (government and private). This approach helped capture variations in problem-solving abilities influenced by socio-cultural and institutional factors.

**Tool for Data Collection**

The tool used for data collection was the **Problem-Solving Ability Test (PSAT)** developed by **L.N. Dubey (2006).** This is a standardized and validated test widely used in Indian educational research, measuring students' Problem-Solving Ability to approach, analyze, and solve problems.

**Procedure for Data Collection**

For the purpose of data collection, necessary permissions were obtained from the concerned school authorities prior to the administration of the test. The Problem-Solving Ability Test was conducted in the students' respective classrooms under the direct supervision of the investigator to ensure a controlled and consistent testing environment. Clear and precise instructions

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were given to all participants to ensure uniform understanding of the test procedure. All responses were collected on the same day to maintain consistency and avoid any external influences on the results.

**Statistical techniques for the study**

To test the hypotheses and analyze the data, appropriate statistical techniques were employed. **Mean** and **Standard Deviation** were calculated to determine the central tendency and variability of the students' problem-solving ability scores. In order to examine the significance of differences between various groups, the **t-test** was applied. Specifically, the t-test was used to compare the problem-solving abilities **between tribal and non-tribal students**, **between boys and girls**, and **between students studying in government and private schools**. These statistical tools facilitated an objective analysis of group differences and helped in drawing valid conclusions based on the data collected.

**Analysis and interpretation of data**

**Hypothesis 1:** There is no significant difference in the problem-solving ability between tribal and non-tribal secondary school students.

**Table 1: Comparison between Tribal and Non-Tribal Students in Problem-Solving Ability**

| Group | N | Mean | SD | t-value | p-value |
|---|---|---|---|---|---|
| Tribal Students | 200 | 13.20 | 2.40 | 3.65 | 0.0003 |
| Non-Tribal Students | 200 | 14.65 | 2.10 | | |

From the above table compares the problem-solving ability between tribal and non-tribal secondary school students. Tribal and non-tribal students reveal a clear difference in their problem-solving abilities. The mean score of tribal students was 13.20 with a standard deviation of 2.40, whereas non-tribal students had a higher mean score of 14.65 with a standard deviation of 2.10. The calculated t-value of 3.65 and the associated p-value of 0.0003 indicate that the difference is statistically significant at the 0.05 level.

Since the p-value is less than 0.05, the null hypothesis there is no significant difference in the problem-solving ability between tribal and non-tribal secondary school students is rejected, confirming that a significant difference exists between the two groups. This suggests that non-tribal students possess better problem-solving skills than tribal students. The disparity may be attributed to various influencing factors such as access to quality education, availability of learning resources, language proficiency, and overall socio-cultural support systems that favor non-tribal students in the given context.

**Hypothesis 2:** There is no significant difference in the problem-solving ability between boys and girls secondary school students.

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**Table 2: Comparison of Problem-Solving Ability between Boys and Girls**

| Gender | N | Mean | SD | t-value | p-value |
|---|---|---|---|---|---|
| Boys | 200 | 14.75 | 2.30 | 2.84 | 0.0048 |
| Girls | 200 | 13.90 | 2.25 | | |

Above table revels that the comparison of problem-solving ability between boys and girls at the secondary school level. The mean score of boys is 14.75 with a standard deviation of 2.30, while girls have a mean score of 13.90 with a standard deviation of 2.25. The t-value is 2.84, and the corresponding p-value is 0.0048, which is less than 0.05, the chosen level of significance.

Since the p-value is statistically significant, the hypothesis there is no significant difference in the problem-solving ability between boys and girls secondary school students is rejected. This indicates that there is a significant difference in the problem-solving ability between boys and girls. Specifically, boys have demonstrated significantly higher problem-solving ability than girls in this study. This difference may be attributed to various factors such as learning preferences, classroom participation, cognitive strategies, or socio-cultural influences affecting academic performance.

**Hypothesis 3:** There is no significant difference in the problem-solving ability of students studying in government and private secondary schools.

**Table 3: Comparison of Problem-Solving Ability between Government and Private School Students**

| Type of School | N | Mean | SD | t-value | p-value |
|---|---|---|---|---|---|
| Government | 200 | 13.65 | 2.40 | 3.22 | 0.0014 |
| Private | 200 | 14.80 | 2.10 | | |

From the above table compares the problem-solving ability between government and private secondary school students. Based on the results shown in Table 3, the mean problem-solving ability score of students studying in government schools is 13.65 with a standard deviation of 2.40, while students from private schools scored a higher mean of 14.80 with a standard deviation of 2.10. The t-value calculated is 3.22, and the p-value is 0.0014, which is less than the 0.05 level of significance. Since the p-value is statistically significant, the null hypothesis there is no significant difference in the problem-solving ability of students studying in government and private secondary schools is rejected.

This indicates that there is a significant difference in problem-solving ability between government and private school students. The findings clearly suggest that private school students perform significantly better than their government school counterparts, which may be attributed to better school facilities, teaching resources, academic support, and overall learning environment in private institutions.

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## Conclusion

The present study was undertaken to examine the problem-solving ability of secondary school students in Telangana, with a focus on tribal and non-tribal backgrounds, gender, and type of school (government or private). The findings of the study offer meaningful insights into the cognitive competencies of students across different demographic and institutional categories.

The results revealed that non-tribal students scored significantly higher in problem-solving ability than tribal students, highlighting the influence of socio-cultural and educational disparities. Similarly, the study found that boys outperformed girls in problem-solving tasks, and the difference was statistically significant. This indicates that gender-related factors such as learning approaches, exposure to logical tasks, or confidence in analytical thinking might affect performance.

Furthermore, a significant difference was found between students from government and private schools, with private school students demonstrating better problem-solving ability. This suggests that factors such as better school infrastructure, qualified teachers, personalized instruction, and enriched academic environments in private schools positively impact students' cognitive skills.

Overall, the study concludes that ethnicity, gender, and type of school are significant factors influencing students' problem-solving abilities. The findings underscore the need for targeted interventions to bridge the performance gap among tribal students and those in government schools. Special attention should be given to inclusive teaching practices, equitable resource distribution, and supportive learning environments that nurture critical thinking and problem-solving skills among all students, regardless of their background.

## Educational Implications

The findings of the study have several important implications for educational planning, teaching strategies, and policy formulation that align with the vision and reforms proposed under the National Education Policy (NEP) 2020, particularly in fostering equity, inclusion, foundational learning, and cognitive development.

1. **Promoting Equity and Inclusion for Tribal Learners:** The observed disparity in problem-solving ability between tribal and non-tribal students highlights the urgent need for inclusive educational practices. NEP 2020 emphasizes equitable and inclusive education for all, particularly for socio-economically disadvantaged groups (SEDGs) such as tribal communities. This calls for targeted interventions, bridge courses, and the use of locally relevant curriculum and multilingual teaching in tribal areas to support foundational learning and cognitive skills development.
2. **Bridging the Gap Between Tribal and Non-Tribal Students:** The significant difference in problem-solving abilities between tribal and non-tribal students indicates a need for inclusive and culturally responsive teaching methods. Educational programs should focus on strengthening the cognitive development of tribal students by offering remedial support, contextualized learning materials, and exposure to problem-solving activities.
3. **Development of Higher-Order Thinking Skills (HOTS):** In alignment with NEP 2020's emphasis on critical thinking, creativity, and problem-solving, this study underlines the need for pedagogical reforms. Teachers should employ experiential, inquiry-driven, and competency-based learning approaches, helping all students regardless of background—develop the ability to analyze, reason, and solve real-life problems.
4. **Equity in School Infrastructure and Resources:** The better performance of private school students compared to government school students underscores the need to upgrade infrastructure, teacher quality, and learning resources in government schools. Policy interventions should aim to minimize disparities in teaching-learning conditions to ensure equitable learning opportunities.
5. **Gender-Sensitive Teaching Approaches:** Since boys performed significantly better than girls in problem-solving ability, schools should adopt gender-sensitive strategies that encourage and empower girls to participate actively in

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analytical and logical tasks. Female students should be provided with confidence-building activities and opportunities to engage in hands-on problem-solving scenarios.

6. **Use of Technology and Digital Resources:** In line with the National Digital Education Architecture (NDEAR) under NEP 2020, digital learning tools and platforms can be used to support problem-solving and reasoning skills among students in remote and underprivileged areas, including tribal regions. Customized e-content in local languages can bridge learning gaps and foster engagement.
7. **Curriculum and Pedagogical Reforms:** The results emphasize the importance of incorporating problem-solving-based learning across subjects. Teachers should integrate inquiry-based learning, project work, and real-life problem-solving activities in regular classroom instruction to enhance students' higher-order thinking skills.
8. **Teacher Training and Professional Development:** Continuous teacher training programs must be designed to equip teachers with strategies to nurture problem-solving skills among diverse student populations. Emphasis should be placed on differentiating instruction based on students' background and learning needs.
9. **Policy Interventions for Tribal Education:** Specific educational policies targeting tribal communities should be reinforced, such as additional academic support programs, community involvement in education, and mother-tongue-based instruction at the foundational levels to improve comprehension and participation in problem-solving tasks.
10. **Assessment Reforms:** The study's findings advocate for shifting from rote-based to skill-based assessment, which is also a core recommendation of NEP 2020. Schools should integrate formative and competency-based assessments that evaluate analytical, logical, and creative skills, particularly to help underserved groups demonstrate their potential.

## Suggestions for Further Study

1. The present study was confined to selected schools in the Khammam district of Telangana. Future research could be conducted across multiple districts or states to understand regional variations in problem-solving ability among tribal and non-tribal students.
2. Further studies can include additional variables such as socio-economic status, parental education, medium of instruction, school environment, and teacher qualifications, to examine their influence on students' cognitive abilities.
3. A long-term, longitudinal study could be conducted to track the development of problem-solving ability over time and the effect of sustained interventions, especially among tribal students.
4. Future studies can implement specific training programs or teaching strategies aimed at improving problem-solving skills and then assess their effectiveness through pre- and post-testing.
5. Researchers may explore comparative studies focusing on other cognitive domains such as critical thinking, creativity, decision-making, or logical reasoning, alongside problem-solving.
6. As NEP 2020 emphasizes competency-based learning and problem-solving, future research can assess the impact of NEP-based curricular reforms on students' cognitive skill development in different types of schools.
7. In addition to quantitative approaches, qualitative research involving interviews, classroom observations, or case studies could provide deeper insights into the learning experiences, challenges, and motivation of tribal and non-tribal students.
8. Researchers may explore how the use of digital tools, simulations, or gamified learning platforms enhances the problem-solving abilities of students, particularly in tribal and rural areas.

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