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Levels and Variations in Problem-Solving Ability among Higher Secondary School Students

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Abstract

Problem-solving ability embodies the practical wisdom and knowledge an individual acquires through life experience, education and a deeper intuitive understanding shaped by one's cultural and spiritual values, enabling them to address both anticipated and unforeseen challenges effectively. The present study examined the problem-solving abilities of higher secondary school students in Lunglei District, Mizoram, with a focus on variables including gender, academic stream, and school management type. Employing a descriptive survey approach, data were gathered from 284 students across four randomly chosen schools—comprising two private and two government schools. The findings of the study indicated that the majority of both male and female students demonstrated very low levels of problem-solving ability. Further, a significant difference was found between genders, academic streams, and school management type. Male students exhibited higher problem-solving abilities than their female counterparts, with science students displaying superior problem-solving skills compared to those in the arts stream. Additionally, students from private schools significantly outperformed those from government schools. These findings emphasize the need for to take required reforms which will incorporate critical thinking across all subjects and call for enhanced resources and teaching standards in government schools to promote equitable cognitive development.

Keywords: Problem-Solving Ability, Gender Differences, Streams of Studies, Type of School Management, Higher Secondary Students,

Introduction

The National Education Policy (NEP) 2020 in India envisions a transformative approach to education, aiming to develop students' problem-solving abilities as a key outcome. The relationship

ISSN 2395-731X

between problem-solving ability and NEP 2020 is intrinsic, as the policy recognizes the importance of nurturing critical thinking, creativity, and practical skills to prepare students for the challenges of the 21st century. The policy recognises that memorisation alone does not equip students to navigate the complexities of the modern world. Instead, it emphasizes the need for students to question, analyse, and evaluate information critically. Problem-solving is inherently tied to critical thinking, as individuals must assess situations, identify challenges, and formulate effective solutions. NEP 2020, by prioritizing critical thinking, indirectly enhances problem-solving abilities among learners.

Problem-solving ability is widely recognized as one of the most significant higher-order thinking skills, shaping not only academic performance but also personal and professional success. It refers to the cognitive and behavioural processes through which individuals attempt to move from a current situation to a desired goal when the solution is not immediately evident. As Mayer (1990) notes, problem-solving requires learners to actively process information, analyze contexts, and construct strategies, rather than simply recalling memorized facts. This dynamic quality makes it central to both intellectual growth and practical decision-making. Problem-solving ability embodies the practical wisdom and knowledge an individual acquires through life experience, education and a deeper intuitive understanding shaped by one's cultural and spiritual values, enabling them to address both anticipated and unforeseen challenges effectively. It is therefore not merely a technical skill but a holistic capacity that integrates reasoning, creativity, and contextual awareness. Sternberg (1999) describes this as a blend of analytical and practical intelligence, suggesting that effective problem-solvers adapt their knowledge to fit real-life situations rather than relying solely on abstract logic.

Within education, problem-solving is often seen as the bridge between theoretical understanding and real-world application. Students who develop strong problem-solving skills are more likely to engage deeply with subject matter and transfer their knowledge to new contexts. For instance, research in science education highlights that problem-solving promotes conceptual clarity and long-term learning (Adesoji, 2008; Dhir, 2014). Similarly, studies in psychology point out that problem-solving is tied to metacognition, meaning that learners must reflect on their own thinking, evaluate strategies, and make adjustments when necessary (Flavell, 1979). This reflective quality ensures that problem-solving is not a one-time act but an iterative process that evolves with experience.

The development of problem-solving has been explained through multiple theoretical lenses. Constructivist perspectives, drawing on Piaget and Vygotsky, argue that problem-solving emerges when learners interact with their environment and collaborate socially, gradually building more sophisticated strategies. Cognitive models, such as those of Newell and Simon (1972), describe problem-solving as a step-by-step sequence involving identification, strategy selection, and

ISSN 2395-731X

evaluation. These approaches agree that problem-solving is both structured and flexible, requiring a balance of logic, creativity, and adaptability.

The National Education Policy (NEP) 2020 in India provides a timely response to these challenges. By emphasizing multidisciplinary learning, critical thinking, and experiential pedagogy, the policy shifts the focus away from rote learning toward inquiry and application. In doing so, it positions problem-solving ability as one of the most important educational outcomes for the twenty-first century, aligning with global frameworks that view it as a core life skill for navigating uncertainty and complexity.

The problem-solving ability of higher secondary school students is crucial for their education and personal development. This study explores the core skills students need to confront the complex challenges of the 21st century and prepares them for a future full of uncertainty. The move from secondary school to higher education or employment is a critical point in every student's journey. Success in this transition depends not just on academic knowledge, but also on the capacity for critical thinking and independent problem-solving. Research in this area helps us understand how well students are equipped to handle future academic and professional challenges. With ongoing technological advances and global shifts, adaptability and innovation are more important than ever. Strong problem-solving abilities nurture adaptability and encourage students to approach novel situations with flexibility. Innovation is closely linked, as it requires creative thinking and solutions for new problems. Studying problem-solving skills among secondary students sheds light on their ability to innovate and adapt in a rapidly changing world.

Review of the Related Literature

Problem-solving ability is a multidimensional skill shaped by several demographic and educational factors, with gender, academic stream, and type of school management emerging as particularly significant. Some studies indicate no gender differences (Adesoji, 2008; Gakhar et al., 2004; Ghorai & Mohakud, 2024), while others suggest variations, with girls often benefiting from metacognitive strategies (Kousar, 2011) or showing higher achievement in science contexts (Zuali & Lalrintluanga, 2024). Academic streams also influence cognitive styles: science students tend to use analytical and structured approaches, whereas arts students employ creative and interpretive methods (Abdullah et al., 2018; Arora, 2023; Mishra, 2018). Evidence from Mizoram reinforces these differences, with science students consistently outperforming arts students (Zuali & Lalrintluanga, 2024). School type further contributes to variation, as private school students generally demonstrate stronger problem-solving skills than government school students due to more supportive

ISSN 2395-731X

environments (Gupta, 2014; Kumar et al., 2014; Verma & Kaur, 2020). Recent research in Mizoram confirms this pattern, with Lalduhawma et al. (2023) reporting private school advantages shaped by gender and location, while Dawngliani et al. (2020) observed weaker outcomes in government schools. Taken together, these findings suggest that problem-solving ability is influenced by an interplay of gender, stream, and school management, supporting the transformative vision of the National Education Policy (NEP) 2020.

Rationale of the Study

A review of the literature revealed that several studies have been conducted across the nation and abroad, using problem-solving ability as an independent variable and examining various demographic variables, including gender, field of study, and type of school. They found mixed results with regard to gender specifically as a demographic variable. There are very few studies conducted in Mizoram with the same variable. The investigators found that only the students from Aizawl district were covered in terms of problem-solving ability, which is the capital of Mizoram. Lunglei is popular as the second capital of Mizoram. There are no such research studies conducted to explore the level of problem-solving ability of students in Lunglei so far, which is equally essential; therefore, the present study is conducted to examine the level of problem-solving ability with the following objectives.

Objectives of the Study

1. To find out the level of the problem-solving ability among higher secondary school students in Lunglei district of Mizoram.
2. To compare the problem-solving ability of higher secondary school students with respect to gender, stream of studies and type of school management.

Hypotheses of the Study

1. There is no significant difference between the problem-solving ability of male and female higher secondary school students.
2. There is no significant difference between the problem-solving ability of science and social science higher secondary school students.
3. There is no significant difference between the problem-solving ability of government and private higher secondary school students.

ISSN 2395-731X

Methodology

Research Method

A descriptive survey method was an appropriate method to address the objective of the study; therefore, a quantitative survey method was used to collect the data from higher secondary school students with respect to demographic variables.

Sampling

There are eleven districts in Mizoram. The present study was conducted in Lunglei district. All the higher secondary school students of Lunglei district were considered as the population of the study. A sample of 284 students from four secondary schools was randomly selected. Out of which, 119 students belonged to two government schools and 165 students to two private schools.

Research Instrument

Problem-Solving Ability Test (PSAT) developed by L.N. Dubey (2006) was used to collect the data. There are 20 items in the test. The highest scored is counted as 20 and lowest is zero as score 1 is assigned to each right answer. The reliability coefficient of the test was calculated by Spearman-Brown formula (Split-half method) 0.78 and Kudar-Richardson formula (Rational equivalence method) 0.76. The coefficient of validity was calculated by correlating the scores with Group Intelligence Test (R.K. Tandon) 0.68 and the Test of Reasoning Ability was found to be 0.85.

Statistical Technique Used

In the present study, descriptive statistics specifically means and standard deviations were calculated to summarize students' problem-solving scores. Given the ordinal nature of the PSAT rankings and the absence of normal distribution in score distributions, inferential comparisons across gender, stream, and school management type were conducted using the non-parametric Mann Whitney U-test. All analyses were performed at a significance level of 0.05.

Results

A score system was used to classify, tabulate, and analyse the respondents' responses. To arrive at a relevant result, the data was examined in accordance with the hypotheses of the current study. Objective wise analysis is presented below.

ISSN 2395-731X

Objective 1: To find out the level of the problem-solving ability of higher secondary school students in Lunglei District.

The criterion to find the level of problem-solving ability among male and female students differs as per PSAT; therefore, to address objective no. 1, the levels for females(N=154) and males(N=130) are shown separately.

1.1 Level of Problem-Solving Ability of Higher Secondary School Students (Female)

The scores of female higher secondary school students on the 'Problem Solving Ability Test' were classified according to established norms into five categories presented in Table 1 along with the score distribution of female higher secondary school students.

Table 1

Level of Problem-Solving Ability Among Higher Secondary School Students (Female)

Classification	Range of Scores	No. of Students	Percentage(%)
Very High Ability	16 & Above	Nil	Nil
High Ability	14 – 15	3	1.95
Average Ability	12 – 13	5	3.25
Low Ability	10 – 11	7	4.55
Very Low Ability	9 & below	139	90.25
Total		154	100

Table 1 shows that among the female higher secondary students, a very few (1.95%) demonstrated high problem-solving ability, and a small percentage of them (3.25%) had average ability. Most of them (90.25%) were categorised as having very low ability, and a small percentage of them (4.55%) fell under the category of low ability. None of them possessed a very high problem-solving ability. These findings suggest that most female students demonstrated a very low problem-solving ability.

1.2 Level of Problem-Solving Ability of Higher Secondary School Students (Male)

Table 2

Level of Problem-Solving Ability of Higher Secondary School Students (Male)

Classification	Range of Scores	No. of Students	Percentage

ISSN 2395-731X

Very High Ability	17& above	Nil	Nil
High Ability	15 – 16	Nil	Nil
Average Ability	13 – 14	3	2.31
Low Ability	11 – 12	9	6.92
Very Low Ability	10 & below	118	90.77
Total		130	100

Table 2 presents the level of problem-solving ability among male students in higher secondary school. It indicates that a very few students (2.31%) demonstrated average ability, and none of them showed high or very high problem-solving ability. Whilst, a small percentage of them (6.92%) possessed a low ability, and the most of them (90.77%), very low ability.

It is concluded that most male and female higher secondary school students possessed a very low level of problem-solving ability, which suggests a need for educational reforms to improve their levels.

Objective-2 To compare problem-solving ability of higher secondary school students with respect to gender, stream and management.

The problem-solving ability of higher secondary school students with respect to gender, stream and school management is presented in Table 3 . The test of significance of difference is calculated through Mann Whitney U-test.

Table 3

Problem-Solving Ability of Higher Secondary School Students with respect to Demographic Variables

Demographic Variable		**N**	**Mean Rank**	**U**	**p-value**	**Level of Significance**
Gender	**Male**	148	139.05	8550.0	0.011	Significant
	Female	154	121.37			

ISSN 2395-731X

Stream of Study	**Science**	88	161.42	6789.5	0.005	Significant
	Arts	196	124.89			
School Management Type	**Private**	110	193.22	3120.0	< 0.001	Significant
	Government	174	108.67			

Table 3 shows the problem-solving ability of higher secondary school students with respect to gender, stream of study, and school management type. It shows that the p-value is less than 0.05 in all three cases; therefore, the null hypotheses are rejected. It means there is a significant difference in problem-solving ability among students based on these demographic variables. The mean rank of male higher secondary school students' problem-solving ability is more than their counterparts, therefore it may be concluded that problem-solving ability in male students in Lunglei is higher than female. Similarly, the mean rank of science stream students' problem-solving ability is more than their counterparts, therefore it may be concluded that problem-solving ability in science stream higher secondary school students in Lunglei is higher than arts stream students. Likewise, the mean rank of private higher secondary school students' problem-solving ability is more than their counterparts, therefore it may be concluded that problem-solving ability in private school students in Lunglei is higher than government school students.

Discussion

The findings revealed that most students, both male (90.77%) and female (90.25%), demonstrated very low levels of problem-solving ability, exposing a critical gap in secondary education in Lunglei. This mirrors Dawngliani et al. (2020), who also reported poor outcomes in Mizoram's government schools, suggesting systemic weaknesses in pedagogy and learning environments.

While a small gender difference favored male students, both groups were overwhelmingly in the very low category, supporting earlier claims that inadequate educational contexts diminish gender effects (cf. Adesoji, 2008; Ghorai & Mohakud, 2024). More pronounced differences were observed across academic streams and school management. Science students outperformed arts students, consistent with Abdullah et al. (2018), Sharma (2016), and Arora (2023), reflecting the structured nature of science curricula. Private school students also showed stronger performance than government school peers, confirming prior research attributing such differences to superior resources and teaching quality (Gupta, 2014; Kumar et al., 2014; Verma & Kaur, 2020).

ISSN 2395-731X

Overall, the study underscores that problem-solving ability is shaped less by gender than by curricular design and institutional context. To realise the goals of the NEP, 2020, reforms must strengthen critical thinking and problem-solving through interdisciplinary learning, improved infrastructure, and teacher capacity-building, particularly in government schools.

The findings of the study carry important suggestions for curriculum planning and instructional practices in secondary education. The widespread low problem-solving ability among both male and female students suggests a need for more effective teaching methods that actively engage students in critical thinking and real-world problem-solving tasks. The significant difference in performance based on academic streams indicates that science curricula may better promote analytical thinking, highlighting the need to integrate similar skill-building strategies into arts education. Additionally, the performance gap between private and government school students points to disparities in educational resources, teacher quality, and learning environments. Therefore, targeted interventions, such as teacher training, curriculum enhancement, and improved infrastructure, particularly in government schools, are essential to foster equitable cognitive development and enhance problem-solving competence across all student demographics.

Conclusion

The study found that higher secondary students in Lunglei District, regardless of gender, generally possessed very low problem-solving ability. However, significant differences emerged across academic streams and school types: science students outperformed arts students, and private school students demonstrated stronger abilities than their government school counterparts. These results highlight systemic gaps in curriculum and resource distribution. In line with NEP 2020, there is an urgent need to integrate critical thinking and problem-solving across all subjects, strengthen teacher training, and improve learning environments in government schools to ensure equitable cognitive development.

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