

Influence of Critical Thinking on the Problem-Solving Ability of Secondary School Students

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Abstract

The rapid advancement of knowledge-based societies has transformed the objectives of modern education. Contemporary educational systems emphasize the development of higher-order thinking skills that enable learners to analyze complex situations and make informed decisions. Among these skills, critical thinking and problem-solving ability are considered essential competencies for academic success and real-life adaptability. The present study investigates the influence of critical thinking on the problem-solving ability of secondary school students. A quantitative descriptive survey research design was adopted for the study. The sample consisted of 600 Class IX students selected through stratified random sampling from government and private secondary schools. Data were collected using the Murthy Critical Thinking Scale (MCTS) and the Problem-Solving Ability Test (PSAT-D). Descriptive statistics and regression analysis were used to analyze the data. The findings revealed that secondary school students generally demonstrate moderate levels of both critical thinking and problem-solving ability. Regression analysis indicated a statistically significant positive impact of critical thinking on problem-solving ability. The results suggest that students who exhibit stronger analytical reasoning and evaluative thinking skills are more capable of identifying problems, generating alternative solutions, and selecting effective strategies. The study highlights the importance of incorporating critical thinking-oriented instructional strategies into school curricula to enhance students' problem-solving competence. The findings provide valuable implications for teachers, curriculum designers, and educational policymakers seeking to strengthen higher-order cognitive development in secondary education.

Keywords: *Critical thinking, problem-solving ability, secondary education, higher-order thinking skills, cognitive development*

1. Introduction

Education plays a crucial role in shaping the intellectual and social development of individuals. In recent decades, educational systems across the world have undergone significant transformation due to the increasing demands of the knowledge-based economy. The focus of education has gradually shifted from memorization of information to the development of analytical and reasoning abilities that enable learners to apply knowledge in real-life contexts.

Critical thinking has emerged as one of the most important competencies required for effective learning and decision-making. It involves the ability to analyze information, evaluate evidence, and draw logical conclusions. Critical thinking enables students to question assumptions, identify inconsistencies, and engage in reflective reasoning.

Problem-solving ability is another essential cognitive skill that allows individuals to deal with challenging situations effectively. It involves identifying problems, analyzing relevant information, generating alternative solutions, and selecting appropriate strategies to resolve issues.

Researchers have argued that critical thinking serves as the foundation for effective problem solving. Students who develop strong critical thinking skills are better equipped to approach problems systematically and evaluate possible solutions logically.

Secondary school education represents a crucial stage in the cognitive development of students. During this period, learners begin to develop abstract thinking abilities and analytical reasoning skills that enable them to engage with complex concepts.

However, many educational systems still rely heavily on traditional teaching methods that emphasize rote memorization rather than analytical reasoning. As a result, students often face difficulties in applying their knowledge to solve real-life problems.

Understanding the relationship between critical thinking and problem-solving ability is therefore essential for improving educational practices. The present study aims to examine the influence of critical thinking on the problem-solving ability of secondary school students.

2. Review of Literature

2.1 Critical Thinking in Education

Critical thinking has been widely recognized as a fundamental objective of modern education. Ennis (2015) defined critical thinking as reflective and rational thinking focused on deciding what to believe or do. According to Facione (2016), critical thinking involves cognitive skills such as analysis, interpretation, inference, and evaluation.

Halpern (2014) emphasized that critical thinking enhances students' ability to analyze information and solve problems effectively. Similarly, Paul and Elder (2019) argued that critical thinking promotes intellectual independence and encourages learners to question assumptions.

2.2 Problem-Solving Ability

Problem-solving ability refers to the process through which individuals identify problems, generate potential solutions, and evaluate the effectiveness of those solutions. Mayer (2013) described problem solving as a cognitive process that involves transforming a given situation into a desired outcome.

Polya (2014) proposed a four-step model of problem solving consisting of understanding the problem, planning a solution, implementing the plan, and reviewing the result.

2.3 Relationship between Critical Thinking and Problem Solving

Previous research has highlighted a strong relationship between critical thinking and problem-solving ability. Sternberg (2018) emphasized that analytical thinking skills play an essential role in solving complex problems.

Studies conducted by Saadé and Bahli (2017) revealed that students with higher levels of critical thinking demonstrate better problem-solving performance.

The literature suggests that critical thinking may act as a predictor of students' ability to analyze problems and develop effective solutions.

3. Objectives of the Study

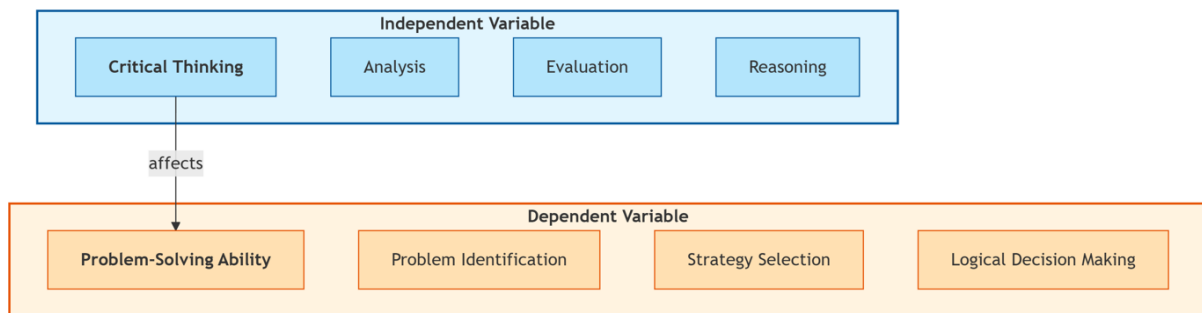
The primary objective of the study is:

To examine the influence of critical thinking on the problem-solving ability of secondary school students.

4. Hypothesis

H₀: There will be no significant impact of critical thinking on the problem-solving ability of secondary school students.

5. Conceptual Framework



The conceptual model assumes that students with higher levels of critical thinking are more likely to demonstrate stronger problem-solving abilities.

6. Methodology

6.1 Research Design

The present study employed a descriptive survey research design to investigate the influence of critical thinking on the problem-solving ability of secondary school students. Descriptive survey research is widely used in educational and psychological studies to examine existing conditions, relationships, and patterns among variables without manipulating them. This research design is particularly appropriate when the objective is to describe and analyze the current status of certain characteristics within a defined population.

The descriptive survey method enables researchers to collect data from a large group of participants and analyze the relationships among variables in their natural setting. In the context of the present study, the research design was selected because the variables under investigation—critical thinking and problem-solving ability—are psychological attributes that cannot be experimentally manipulated in a classroom environment. Instead, these variables must be measured through standardized assessment tools and analyzed statistically to identify patterns and relationships.

The design also allows the researcher to examine how variations in one variable are associated with changes in another variable. Since the primary purpose of this study was to examine the predictive influence of critical thinking on students' problem-solving ability, the descriptive survey design provided an appropriate methodological framework. The collected data were analyzed using statistical techniques such as mean, standard deviation, and regression analysis to determine the nature and strength of the relationship between the variables.

6.2 Population of the Study

The population of the present study consisted of secondary school students studying in Class IX in Hyderabad city. Secondary school students represent an important stage of cognitive development where learners begin to engage with more complex academic content and develop higher-order thinking skills.

At the secondary level, students are required to analyze information, apply logical reasoning, and solve academic as well as practical problems. Therefore, this stage of education is particularly suitable for studying the development of cognitive competencies such as critical thinking and problem-solving ability.

The choice of Class IX students as the target population was based on several considerations. First, students at this level have already developed basic cognitive skills through earlier schooling and are capable of participating in standardized psychological assessments. Second, they are exposed to a wide range of academic subjects that require analytical reasoning and problem-solving abilities. Third, this stage of education plays a crucial role in preparing students for higher secondary education and future academic pursuits.

The population included students from both government and private secondary schools, thereby ensuring representation of learners from diverse socio-economic and educational backgrounds. Including both categories of schools allowed the researcher to obtain a more comprehensive understanding of students' cognitive abilities across different institutional contexts.

6.3 Sample of the Study

From the defined population, a total sample of 600 secondary school students was selected for the study. The sample was chosen using a stratified random sampling technique to ensure balanced representation of different groups within the population.

Stratified sampling was considered appropriate because it allows the population to be divided into meaningful subgroups or strata, and participants are then selected randomly from each subgroup. In the present study, the population was divided into two major strata based on school management type, namely government schools and private schools.

A total of 300 students were selected from government schools and 300 students from private schools, ensuring equal representation of both categories. Within each school category, students were selected randomly to avoid sampling bias and to ensure that each student had an equal probability of being included in the study.

The selected sample also included an equal representation of male and female students. This balanced distribution allowed the study to capture diverse perspectives and cognitive abilities among secondary school learners.

The final sample distribution is presented in Table 1.

Table 1

Distribution of the Sample

Category	Number of Students	Percentage
Government School Students	300	50%
Private School Students	300	50%
Male Students	300	50%
Female Students	300	50%
Total	600	100%

The sample size of 600 students was considered adequate for statistical analysis and ensured sufficient variability in the data for examining the relationship between critical thinking and problem-solving ability.

A larger sample size enhances the reliability and generalizability of research findings. By including students from multiple schools and different educational backgrounds, the study aimed to obtain a representative sample that reflects the broader characteristics of the secondary school student population.

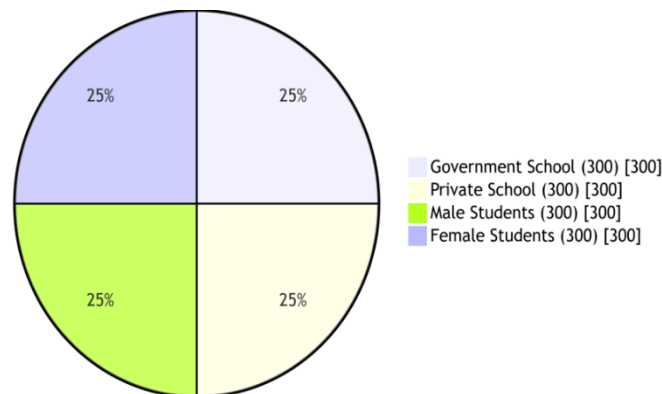
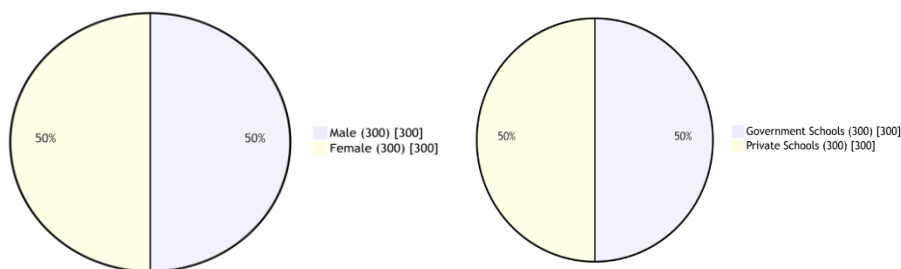


Table 2

Demographic Distribution of the Sample

Category	Frequency	Percentage
Male	300	50%
Female	300	50%
Government Schools	300	50%
Private Schools	300	50%
Total	600	100%



6.4 Sampling Technique

Stratified random sampling technique was used.

6.5 Tools Used

1. Murthy Critical Thinking Scale (MCTS)
2. Problem-Solving Ability Test (PSAT-D)

6.6 Data Collection Procedure

1. Permission was obtained from school authorities.
2. Students were informed about the study.
3. Tests were administered in classroom settings.
4. Responses were scored according to scoring guidelines.

6.7 Statistical Techniques

- Mean
- Standard Deviation
- Regression Analysis

7. Results

Table 3

Mean and Standard Deviation of Critical Thinking Scores

Variable	N	Mean	SD
Critical Thinking	600	68.42	14.37

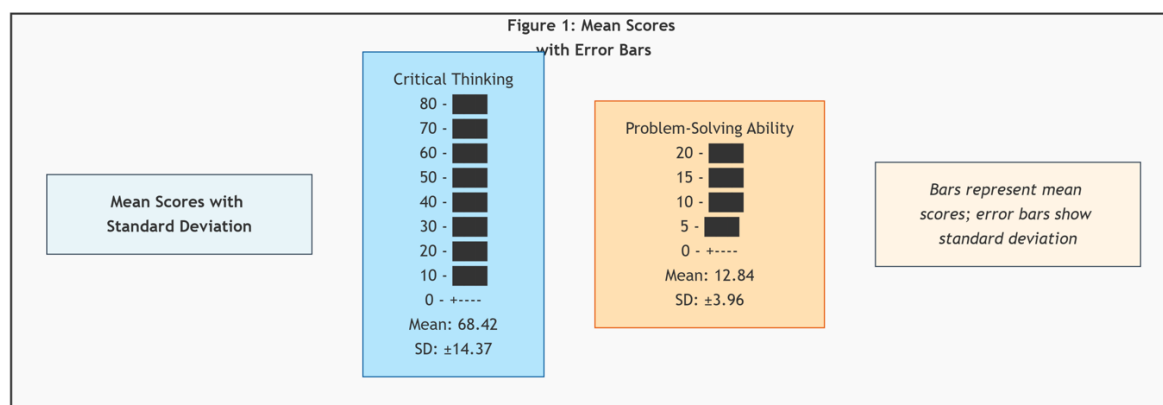


Table 4

Mean and Standard Deviation of Problem-Solving Ability Scores

Variable	N	Mean	SD
Problem Solving Ability	600	12.84	3.96

Table 5

Regression Analysis

Predictor	R	R ²	Beta	t	p
Critical Thinking	0.58	0.34	0.58	17.92	<0.001

Interpretation:

The regression results indicate that critical thinking significantly predicts problem-solving ability. The coefficient of determination shows that 34% of the variance in problem-solving ability is explained by critical thinking.

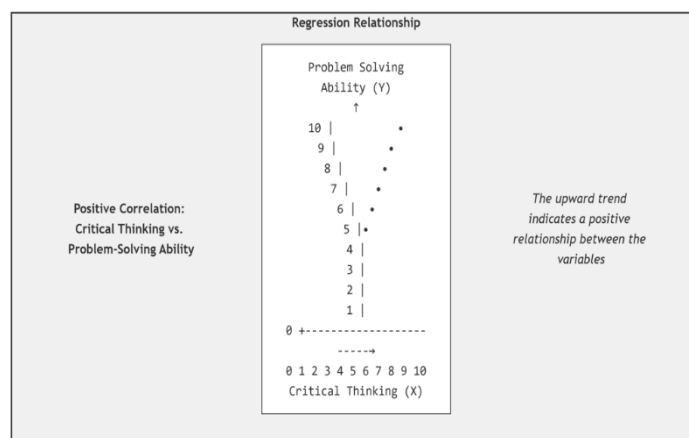


Figure 1

Regression Relationship

9. Discussion

The findings reveal that critical thinking has a significant positive influence on the problem-solving ability of secondary school students. Students who demonstrate stronger analytical reasoning skills are more capable of identifying problems and generating effective solutions.

These findings are consistent with previous research emphasizing the importance of higher-order thinking skills in academic achievement.

10. Conclusion

The study concludes that critical thinking significantly contributes to the development of problem-solving ability among secondary school students. Students who possess higher levels of critical thinking are better equipped to analyze problems and develop appropriate solutions.

Educational institutions should therefore emphasize the development of critical thinking skills through innovative teaching strategies.

11. Educational Implications

The findings suggest several implications:

- Teachers should encourage inquiry-based learning.
- Curriculum designers should include higher-order thinking activities.
- Classroom instruction should emphasize reasoning and analysis.
- Teacher training programs should focus on critical thinking pedagogy.

12. Suggestions for Future Research

Future research may focus on:

- Experimental studies on critical thinking interventions
- Comparative studies across different educational levels
- Longitudinal research on cognitive development

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