ISSN: 2583-7354

International Journal of Emerging Knowledge Studies

Publisher's Home Page: https://www.ijeks.com/

Fully Open Access Research Paper

Creative Thinking in Education: Assessing Problem-Solving Ability in High School Learners

Ms. Ajitha. M[1*] Dr. M. Vakkil[2]

[1]Research Scholar, Department of Education, Periyar University, Salem-11, India.

[2]Professor & Head, Department of Education, Periyar University, Salem-11, India.

DOI: https://doi.org/10.70333/ijeks-04-04-017

*Corresponding Author: smajithaedu@gmail.com

Article Info: - Received : 28 January 2025 **Accepted** : 25 March 2025 **Published** : 30 March 2025

Abstract

This study investigates the creative problem-solving abilities of high school students in relation to various demographic and institutional factors, including gender, medium of instruction, school location, school type, and management structure. Using a descriptive survey method, data were collected from a randomly selected sample of 100 students with the aid of the Creative Problem-Solving Ability Scale developed by Haseen Taj. Results reveal that while the majority of students exhibit a moderate level of creative problem-solving ability, significant differences emerge across gender, medium of instruction, and type of school. Specifically, female, English-medium, and urban students tend to outperform their counterparts. Additionally, students in co-educational and private schools show higher average problem-solving skills. These findings highlight the importance of implementing specific educational strategies to foster creative thinking and reduce disparities in student development. The study concludes by offering practical recommendations for schools and highlighting areas for further academic inquiry.

Keywords: *Creative Problem-Solving, High School Students, Educational Demographics, Cognitive Skills, School Environment.*

1. INTRODUCTION

Education is a dynamic process that promotes the growth and overall development of learners. Its core objective is to help individuals achieve self-fulfillment, continuous improvement, and personal excellence. **Dean (1968)** emphasized that education is not a luxury to be pursued after development, but a fundamental and inseparable part of the development process itself. Carl Rogers introduced the concepts of congruence and incongruence, explaining that congruence occurs when a person's self-image is closely aligned with reality. Conversely, incongruence arises when there is a mismatch between one's self-concept and actual experiences often rooted in early childhood experiences.

Problem solving is a cognitive activity embedded within a broader framework that includes identifying and framing problems. As one of the most advanced intellectual processes, problem solving requires the regulation of fundamental mental skills and is considered a higher-order cognitive function.

The Simplex model outlines an eight-step process: identifying problems, gathering facts, clearly defining the issue, generating ideas, selecting and evaluating those ideas, planning, implementing solutions, and taking action. This model emphasizes a continuous improvement cycle in both individual and organizational contexts.

Appreciative Inquiry adopts a positive lens by identifying strengths and successful practices within a system to inspire solutions.

Soft Systems Methodology (SSM) is particularly useful for tackling complex, ill-structured problems. It involves four stages aimed at exploring the context of a problem and identifying effective interventions.

Employing such tools can significantly improve one's problem-solving strategies, enhancing individual effectiveness and organizational success. These methods also contribute to building a reputation for thoughtful and strategic decision-making.

Effective problem-solving generally follows a series of steps, often referred to as the problem-solving cycle. This cycle helps in devising strategies and organizing relevant knowledge. Although these steps are usually presented in a linear order, in real-life scenarios, individuals often revisit earlier stages or skip some altogether.

- **Problem Identification:** Recognizing the problem is a crucial first step, though it can be deceptively difficult. Incorrectly identifying the root problem can result in solutions that are ineffective or unrelated.
- **Problem Definition:** Once identified, the problem must be clearly and thoroughly defined for it to be effectively addressed.
- **Strategy Formation:** The next phase involves devising a method or plan tailored to the specific nature of the problem and the problem solver's cognitive style.
- **Information Organization:** Gathering and structuring existing knowledge about the issue helps in making informed decisions. Clarifying what is known versus unknown strengthens the decision-making process.
- **Resource Allocation:** Time, finances, and other resources must be prioritized based on the significance of the problem. More critical issues deserve greater resource commitment, while minor problems require less.
- **Progress Monitoring:** Skilled problem solvers keep track of their progress. If results are unsatisfactory, they reassess their strategy and explore alternative methods.
- **Solution Evaluation:** After a solution has been applied, it is essential to review its effectiveness. This could involve immediate feedback—like checking a math answer—or long-term assessment, such as evaluating a program's success over time.

2. SCIENTIFIC METHOD OF SOLVING PROBLEMS

There are various interpretations of the scientific method, with different models listing between three and seven steps. Regardless of the number, the fundamental principles remain consistent. Scientists frequently deviate from a strictly linear sequence of stages in their work. The approach is fluid, allowing room for adjustments based on the research context. One researcher might emphasize observation throughout their career, while another may prioritize experimentation. This adaptability is a core characteristic of scientific inquiry.

3. RATIONALE OF THE STUDY

Problem solving tests are designed to evaluate how quickly and accurately individuals can approach new challenges. These assessments may include both numerical and verbal components. The numerical part typically features number sequences and both simple and complex calculations. Meanwhile, the verbal section covers analogies, logical reasoning, antonyms, and conceptual relationships.

Such evaluations help in analyzing an individual's reasoning ability and mathematical competence. Understanding these capabilities is vital for determining suitable training sequences and educational interventions. In the context of today's education, problem solving is a fundamental skill. As modern learning theories, changing academic standards, and evolving

workplace requirements reshape education, there is a growing emphasis on higher-order thinking and integrative learning environments.

This study is especially important given the scarcity of research on problem-solving abilities among higher secondary students. It also aims to fill a research gap by offering insights into the current status of these abilities and providing a foundation for evidence-based educational decisions aligned with clearly defined research objectives.

4. OBJECTIVES

The current study was carried out with the following specific objectives:

- To assess the level of Creative Problem-Solving Ability among high school students.
- To examine differences in Creative Problem-Solving Ability based on gender among high school students.
- To analyze the Creative Problem-Solving Ability of high school students with respect to the medium of instruction.
- To explore the variation in Creative Problem-Solving Ability among students attending different types of schools.
- To investigate Creative Problem-Solving Ability in relation to school management (government vs. private).
- To study the influence of the school's geographical location on students' Creative Problem-Solving Ability.

5. SAMPLE

The word “sample” describes a smaller, representative portion selected from a larger group or population. According to **Good (1973)**, a sample is a limited number of observations or instances selected from a larger universe, often presumed to reflect the characteristics of the total population.

In this study, a sample of 100 high school students was chosen using the random sampling technique.

6. METHOD

Every research study requires a clearly defined methodology, with structured steps and appropriate tools. The present investigation adopted the descriptive survey method to collect and analyze relevant data.

7. TOOLS USED

To gather significant data, appropriate research tools must be chosen. The effectiveness of a research project largely depends on the choice of tools used for data collection.

In this study, the Creative Problem-Solving Ability Scale, developed and standardized by **Haseen Taj (2001)**, was employed as the primary tool for gathering data.

8. DELIMITATIONS

This investigation was confined within the following boundaries:

- The study was delimited to high school students only.
- It included students from both government and private schools.
- The variables considered included gender, medium of instruction, school location, type of school, school management, academic streams, and geographical area (district level).

9. REVIEW OF RELATED LITERATURE

In **2015, Ehtesham Anwar** carried out a study titled “Problem Solving Ability of Secondary School Students in Relation to Their Attitude Towards Mathematics,” focusing on class IX students from multiple secondary schools in Lucknow. A total of 250 students from six different schools participated. The study explored whether students' attitudes toward mathematics influenced their problem-solving abilities. The results indicated only a marginal correlation between the two. It concluded that a student’s high or low ability in problem solving does not necessarily reflect a corresponding attitude toward mathematics.

E. Elhan Ozus, Mine Celikoz, Melek Tufan and Filiz Erden (2015) conducted a study titled “Interpersonal Problem-Solving Abilities of Students in the Professional Education Faculty Dressing Programme at Selcuk University.” The study involved a sample of 328 students.

Two tools were used for data collection: a personal information form and the Interpersonal Problem-Solving Inventory developed by **Cam, Tumkaya, and Yerlikaya (2009)**. The data were analyzed using SPSS, with t-tests and descriptive statistics applied. The study found that these future educators lacked adequate interpersonal problem-solving skills, and no significant

differences were observed based on certain demographic variables.

10. STATISTICAL TECHNIQUES USED

Statistics are important for methodically organizing, analyzing and interpreting numerical data. The procedure entails gathering, organizing, examining and interpreting data to extract valuable insights.

To fulfil the objectives of the study and test the hypotheses, data from 100 high school students were compiled into a master table and analyzed using the following statistical techniques:

- Descriptive Statistics: Mean and Standard Deviation (S.D.)
- Inferential Statistics: t-test and F-test were employed to examine significance levels.

11. TESTING

11.1 The extent to which high school students demonstrate problem-solving skills.

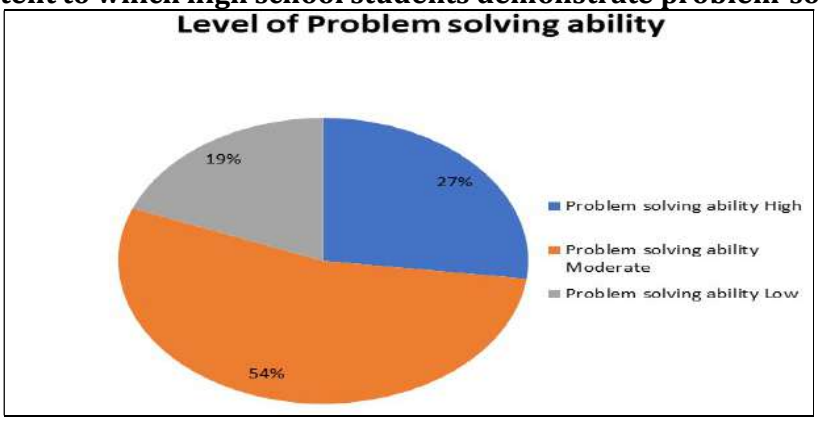


Fig-1

❖ **Interpretation**

- Moderate Problem-Solving Ability: This is the largest group, comprising 54% of the students. It indicates that more than half of the students possess a moderate level of problem-solving skills.
- High Problem-Solving Ability: About 27% of the students fall into this category, showing that a little over a quarter of the students demonstrate strong problem-solving skills.
- Low Problem-Solving Ability:19% of students exhibit low levels of problem-solving ability.

The data reveals that the majority of high school students have a moderate level of problem-solving ability, followed by a smaller proportion with high ability, and an even smaller group with low ability. This suggests a need to foster more advanced problem-solving skills through targeted educational interventions, especially for the 19% who are lagging behind.

11.2 Creative Problem-Solving Ability based on gender

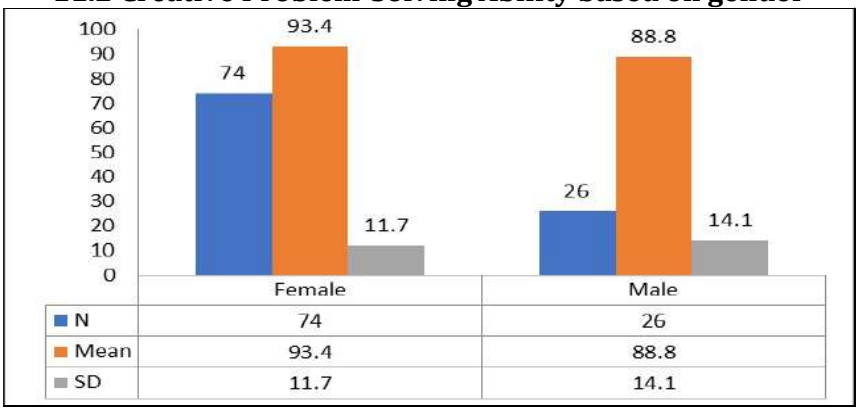


Fig-2

❖ **Interpretation**

❖ **Sample Size (N):**

- Female students (N = 74) form a significantly larger part of the sample.
- Male students (N = 26) are fewer in number.

❖ **Mean Score (Creative Problem-Solving Ability):**

- Females: Mean = 93.4
- Males: Mean = 88.8

This indicates that female students scored higher on average in creative problem-solving ability compared to male students.

❖ **Standard Deviation (SD):**

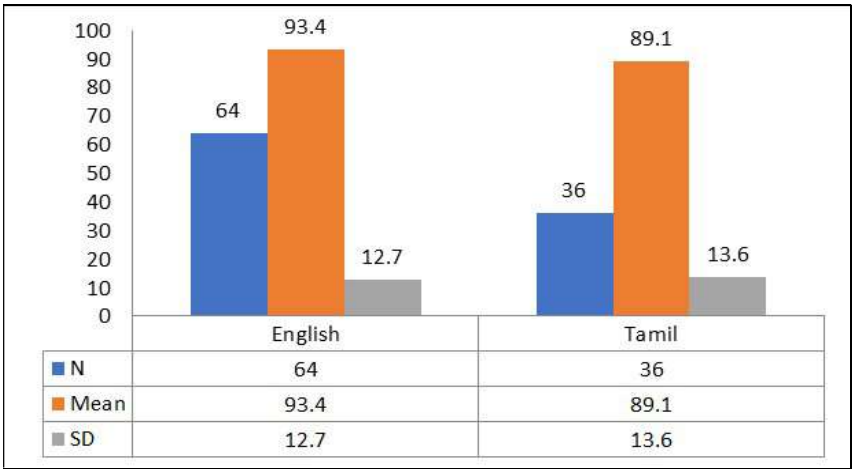
- Females: SD = 11.7
- Males: SD = 14.1

The higher standard deviation in males suggests that their scores are more spread out or variable, whereas female students' scores are more consistent around the mean.

❖ **Conclusion:**

- Female high school students demonstrate a slightly higher average level of creative problem-solving ability than males.
- However, the interpretation of statistical significance (e.g., a t-test) would be needed to confirm whether this difference is statistically meaningful or occurred by chance.
- Based on the visual data alone, gender appears to have some influence on creative problem-solving ability, with females performing better and more consistently.

11.3 Creative Problem-Solving Ability based on their medium of instruction — English and Tamil.



	English	Tamil
N	64	36
Mean	93.4	89.1
SD	12.7	13.6

Fig-3

❖ **Interpretation**

❖ **Sample Size (N):**

- English Medium Students: 64
- Tamil Medium Students: 36

The English medium group is nearly twice the size of the Tamil medium group.

❖ **Mean Score (Creative Problem-Solving Ability):**

- English Medium: 93.4
- Tamil Medium: 89.1

On average, English medium students scored higher in creative problem-solving than Tamil medium students, suggesting better performance in this domain.

❖ **Standard Deviation (SD):**

- English Medium: 12.7
- Tamil Medium: 13.6

The slightly higher SD in Tamil medium students indicates greater variability in their scores compared to English medium students, whose scores are slightly more consistent

❖ **Conclusion:**

- Students studying in the English medium exhibit a higher average level of creative problem-solving ability compared to their Tamil medium counterparts.
- Score consistency is marginally better in the English medium group.
- Although the difference in mean scores exists, statistical testing (e.g., t-test) would be needed to determine if this difference is significant or due to random chance.

ISSN: 2583-7354

11.4 Creative Problem-Solving Ability based on their residential background — Rural and Urban

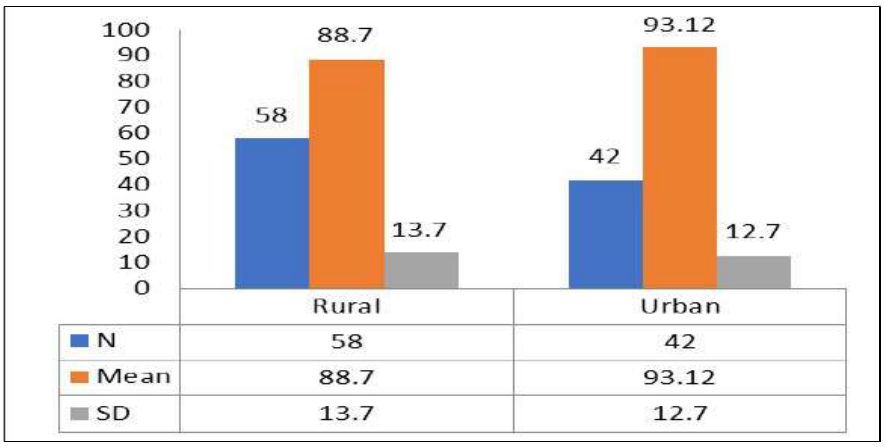


Fig-4

- **Interpretation:**
- **Sample Size (N):**
  - Rural Students: 58
  - Urban Students: 42

The rural group is larger than the urban group.

- **Mean Score (Creative Problem-Solving Ability):**
  - Rural: 88.7
  - Urban: 93.12

Urban students scored higher on average, indicating better creative problem-solving ability.

- **Standard Deviation (SD):**
  - Rural: 13.7
  - Urban: 12.7

Rural students' scores are more spread out, showing greater variability, while urban students' scores are slightly more consistent.

- **Conclusion:**
  - Urban high school students exhibit a higher average level of creative problem-solving ability than their rural counterparts.
  - Consistency is slightly better among urban students (lower SD).
  - The difference suggests that residential background may influence creative problem-solving ability — with urban students potentially having more exposure to diverse learning opportunities.
  - Again, a statistical test would be needed to determine if the difference is significant or just due to chance.

11.5 Creative Problem-Solving Ability based on type of school — Boys', Girls', and Co-Educational (Co-Ed)

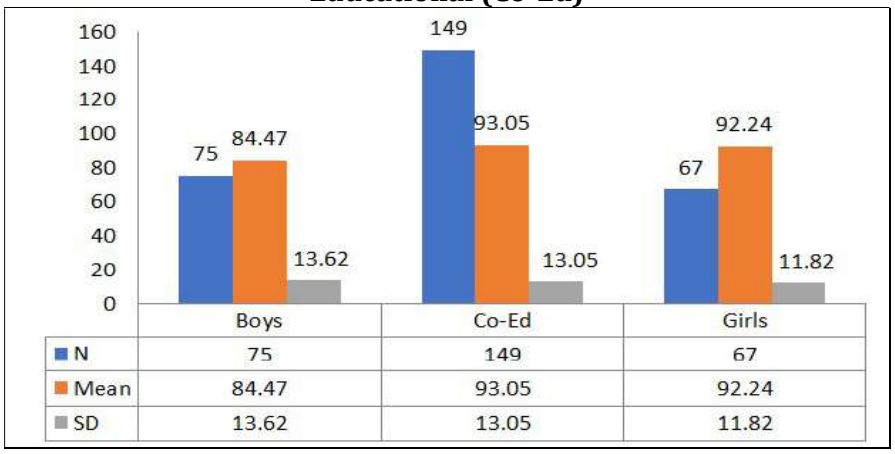


Fig-5

❖ **Interpretation:**
❖ **Sample Size (N):**
- Boys' Schools: 75 students
- Co-Ed Schools: 149 students
- Girls' Schools: 67 students

Co-Ed schools have the largest representation.

❖ **Mean Score (Creative Problem-Solving Ability):**
- Boys: 84.47
- Co-Ed: 93.05
- Girls: 92.24
- Students from Co-Ed schools scored the highest on average, followed closely by Girls' schools.
- Boys' school students had the lowest average in creative problem-solving.

❖ **Standard Deviation (SD):**
- Boys: 13.62
- Co-Ed: 13.05
- Girls: 11.82
- Girls' school students had the most consistent scores (lowest SD), while Boys' school students showed the greatest variability.

❖ **Conclusion:**
- Co-Educational school students demonstrated the highest creative problem-solving ability on average.
- Girls' school students were nearly equal in performance to Co-Ed students but showed greater score consistency.
- Boys' school students had the lowest average scores and the widest score variation.
- This suggests that school type may play a role in shaping students' creative thinking skills.

11.6 Creative Problem-Solving Ability based on the type of school management — Aided, Government, and Private

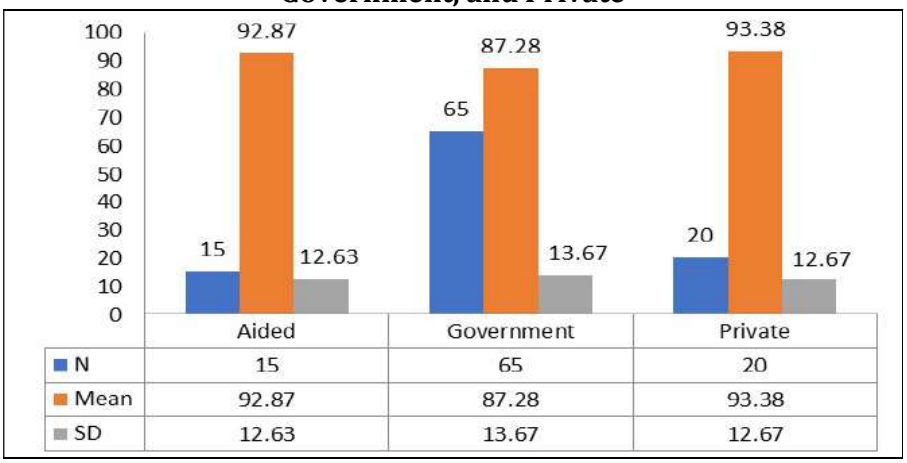


Fig-6

❖ **Interpretation:**
❖ **Sample Size (N):**
- Aided Schools: 15 students
- Government Schools: 65 students
- Private Schools: 20 students
- Government schools have the largest representation in the sample.

❖ **Mean Score (Creative Problem-Solving Ability):**
- Aided: 92.87
- Government: 87.28
- Private: 93.38
- Students from private schools scored the highest on average.
- Students from government schools recorded the lowest mean score.

❖ **Standard Deviation (SD):**
- Aided: 12.63
- Government: 13.67
- Private: 12.67
- Government school students showed the most variability in scores.
- Aided and Private schools showed nearly equal and lower variability.

❖ **Conclusion:**
- Students from Private schools demonstrate the highest creative problem-solving ability, followed closely by Aided school students.

- Government school students scored the lowest in terms of average performance and showed the highest inconsistency.
- This suggests that school management type may significantly influence students' ability to engage in creative problem-solving.

12. FINDINGS

- Among the total sample, 27% of high school students exhibited a high level of creative problem-solving ability, 54% demonstrated a moderate level, and 19% showed a low level. Thus, the overall level of creative problem-solving ability among high school students is considered moderate.
- A statistically significant difference was observed in creative problem-solving ability among high school students based on gender at the 0.01 level of significance.
- A significant difference was also found based on the medium of instruction at the 0.01 level.
- The location of the school showed a significant impact on students' creative problem-solving ability at the 0.01 level.
- The type of school also exhibited a statistically significant difference in students' problem-solving ability at the 0.01 level.
- The type of school management was found to significantly influence creative problem-solving ability at the 0.05 level.

13. EDUCATIONAL IMPLICATIONS

Based on the study's outcomes, the following recommendations are put forward.

- Every school should establish a guidance cell to support students in navigating their academic journey effectively.
- Gaining insight into students' family context and school conditions is vital for enhancing their academic outcomes.
- Both teachers and parents can contribute by creating a conducive atmosphere that fosters students' academic progress.

14. SUGGESTIONS FOR FURTHER RESEARCH

Based on the current study's outcomes, the following areas are suggested for future research:

- As this study focused solely on high school students, similar research could be extended to other educational levels.
- Though this research was limited to high school, it can be further expanded to include higher secondary students.
- Future studies could include a wider range of grade levels for broader insights.
- The scope of this research may be widened to cover the secondary education stage.
- Further investigations can explore methods to enhance creative problem-solving ability among high school students.
- Similar studies could be conducted involving parents and teachers.
- This research may also be pursued at higher academic levels such as Ph.D.

15. CONCLUSION

The main objective of the current study was to examine the creative problem-solving ability among high school students in relation to specific variables, including gender, medium of instruction, school location, type of management, type of school, and annual household income. The findings revealed notable differences across various school management types (Boys, Girls, and Co-Ed), as well as school categories. In summary, the study finds that high school students exhibit a moderate degree of creativity in their problem-solving capabilities.

REFERENCES

Adeyemo, D. A., & Bola, O. (2006). Emotional intelligence and self-efficacy as predictors of occupational stress among academic staff in a Nigerian university. [Unpublished manuscript].

Ansari, W. E., & Stock, C. (2010). Is the health and wellbeing of university students associated with their academic performance? Cross-sectional findings from the United Kingdom. International Journal of Environmental Research and Public Health, 7(2), 509–527. https://doi.org/10.3390/ijerph7020509

Austin, E. J., Saklofske, D. H., & Egan, V. (2004). Personality, wellbeing and health correlates of trait emotional intelligence. Personality and Individual Differences. https://www.sciencedirect.com

Bandura, A. (1989). Multidimensional scales of perceived self-efficacy [Unpublished test]. Stanford University.

Berardi-Coletta, B., Dominowski, R. L., Buyer, L. S., & Rellinger, E. R. (1995). Metacognition and problem solving: A process-oriented approach. Journal of Experimental Psychology: Learning, Memory, and Cognition, 21(1), 205–223. https://doi.org/10.1037/0278-7393.21.1.205

Berman, S. L., Weems, C. F., & Stickle, T. R. (2006). Existential anxiety in adolescents: Prevalence, structure, association with psychological symptoms and identity. Journal of Youth and Adolescence, 35(3), 303–310. https://doi.org/10.1007/s10964-006-9032-y

Bhagat, K. R., & Sharma, Y. P. (2014). A comparative study of emotional competencies, mental health & self-perception among male & female athletes. Academic Sports Scholar, 3(3), 1–5.

Emin Aydın. (2005). The use of computers in mathematics education: A paradigm shift from "computer assisted instruction" towards "student programming". The Turkish Online Journal of Educational Technology.

Edgell, L. J. (1998). Computer assisted instruction versus classroom instruction [Master's thesis, Salem Teikyo University].

Good, C. V. (1981). Dictionary of education (2nd ed.). McGraw-Hill.

Khangholi, M., Goodarzi, B., &Mahdipoor. (2014). The role of problem-solving skills training in the amount of aggression control in athletic performance. Asian Journal of Multidisciplinary Studies, 2(7), 170–172.

Kothari, C. R. (1997). Research methodology: Methods and techniques (14th ed.). New Age International Publishers.

Kariya, L. H. (2001). Effectiveness of computer-aided learning as a self-learning technique [Master's thesis, Saurashtra University].

Kumar, K. L. (1996). Educational technology. New Age International Publishers.

Gupta, R. (2013). Problem solving ability and academic achievement among the students belonging to scheduled tribe and scheduled caste categories. International Journal of Research Pedagogy and Technology in Education and Movement Sciences, 1(3), 95–107.

Senduran, F., & Amman, T. (2015). Problem-solving skills of high school students exercising regularly in sport teams. Physical Culture and Sport: Studies and Research, 67(1), 42–52. https://doi.org/10.1515/pcssr-2015-0008

ERIC. (n.d.). https://www.eric.ed.gov/

ResearchGate. (n.d.). https://www.researchgate.net/

Academia.edu. (n.d.). https://www.academia.edu/

American Psychological Association. (n.d.). https://www.apa.org/

International Journal of Advanced Research. (n.d.). https://www.journalijar.com/

Wikipedia contributors. (n.d.). Wikipedia. https://www.wikipedia.org/

Cite this article as: Ms. Ajitha. M and Dr. M. Vakkil., (2025). Creative Thinking in Education: Assessing Problem-Solving Ability in High School Learners. International Journal of Emerging Knowledge Studies. 4(3), pp. 450- 458. https://doi.org/10.70333/ijeks-04-04-017