



# A Study on Effects of Thinking Skill on Performance of School Students in Mathematics at Secondary Level

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## Abstract

The purpose of the study was to examine effects of thinking skill on performance of school students in Mathematics at secondary level. In this study Quasi-experimental design was adopted. Purposive sampling was applied to select a sample of 100 students. The result of the study revealed that there was a significant difference in effects of thinking skill on performance of school students in Mathematics at secondary level. The study also found out that Mathematics performance mean scores among the experimental groups was high rather than Mathematics performance mean scores of control group. Therefore, it was advised that in order to increase student performance in mathematics, thinking skills should be incorporated into the curriculum for teachers training.

**Keywords:** Thinking Skill, Performance, Mathematics, Secondary level.

## Introduction

Calculation is a skill that has been for as long as there have been humans, and thinking is a skill we use every day to deal with obstacles that are necessary for our existence. People have to make judgments every day that involve thinking, comprehension, interpretation, analysis, and evaluation of the information at hand. Thinking is required in this process in order to make solid judgments, behave morally, and be able to adapt to changes in any situation.

Because thinking is a complicated subject including both cognitive abilities and emotional traits, it has had an impact on how some teachers teach it to their pupils. Additionally, it seems that some teachers find it challenging to integrate the concept into their instruction so that students can learn how to think critically as well as what to think, which makes it difficult for students to understand the concept and causes them to perform beneath average on math tests and exams. Since thinking entails using logic, logic-based reasoning, interpreting, analyzing, and evaluating information to help one make judgments that are trustworthy and legitimate, thinking has been one of the tools we utilize in our daily lives to address various difficulties.

Thinking is making an attempt to gather, understand, analyze, and evaluate data in order to reach a trustworthy and correct conclusion. Thinking has to be incorporated and prioritized in the curriculum while teaching mathematics in schools so that students may acquire the skills and use them to enhance their performance and reasoning ability. In this context, teacher education programmes should include more courses in thinking if teachers are expected to incorporate thinking skills into the teaching of mathematics in their classrooms. This will help aspiring teachers become role models for effective thinking and, in turn, make the subject easier for the students.

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Before accepting or rejecting ideas and questions in regard to the subject at hand, thinking may also entail logical reasoning, the capacity to distinguish between facts and opinion, and the ability to critically evaluate material with support. To put it another way, it encourages people to reflect, challenge assumptions, come up with solutions to concerns, and make wise judgements when presented with obstacles (Semil, 2006). In addition to open reception of many ideas, thinking also entails in-depth deliberation and examination of what we have been given (Mansoor and Pezeshki, 2012). This implies that opinions and recommendations made by others regarding a phenomena cannot be fully accepted if the truth is not discovered via a methodical and logical approach. It is important to acquire thinking abilities in order to apply thinking in educational contexts because critical thinkers are better equipped to recognise frequent reasoning errors, build and assess arguments, and solve issues methodically. Six cognitive abilities were noted by Facione (1990) as being essential to the idea of thinking. These included inference, analysis, evaluation, explanation, self-control, and interpretation. Therefore, thinking abilities are those that allow a person to examine and combine knowledge in order to find solutions to issues in a variety of contexts (Facione, 1990). Facts will be gathered, analysed, and reviewed to ensure good arguments, and conclusions will be drawn based on the information at hand.

Thinking skills play a proactive role in advancing and improving pupils' academic achievement. The majority of students find that attending lectures in class is a passive activity since they are unable to ask questions while the lectures are in progress, which dulls the class. The cognitive abilities of thinking, such as analysis, synthesis, reflection, etc., must be practised in order to be taught. According to Schafersmen (1991), educators should use the following classroom activities and thinking skills- exams, term papers, assignments, and classroom instruction. Therefore, when teaching mathematics, the instructor should emphasise the pupils' active intellectual participation.

In today's world, maths is a crucial topic that helps with decision-making in the job, in schools, and in enterprises. Whether in the workplace, classroom, or even at home, maths is considered as a language to be used frequently. In order to comprehend science, engineering, technology, and economics, mathematics is essential to a country's success (Kulbir, 2006). The Nigerian government may have made this topic a requirement for entrance to higher institutions and made it a required subject in basic education and senior secondary schools due to its significance. Maduabum and Odili (2006) noted that some students lack enthusiasm in the subject and do badly in it, despite the significance put on mathematics by society. For instance, the May/June

results for the West African Senior Secondary School Certificate Examination (WASSCE) from 2006 to 2012 reveal that, on average, fewer than 50% of pupils completed Mathematics at the credit level. This may be due to a variety of reasons that may be traced to the students, teachers, policymakers, curriculum content, and test quality. According to Osarenren and Asiedu (2007), among other things, the students' incapacity to think critically and analyse mathematical concepts methodically is to blame for the pupils' continuous low performance in mathematics. This demonstrates even more vital critical thinking skills are to improving performance across the board, but particularly in mathematics.

## Literature Review

- **Duru, D. (2023)** studied on Critical Thinking Ability as a Correlate of Students' Mathematics Achievement: A Focus on Ability Level and concluded that Critical thinking proficiency and academic success in mathematics for all pupils are found to have a weakly positive and significant association. But although there was a strong but insignificantly positive link between critical thinking skills and success among low achievers, there was no relationship at all among high performers.
- **Ahmet (2021)** conducted an examination of the relationship between secondary school students' abstract thinking skills, self-efficacy perceptions and attitudes towards mathematics and found that The correlations between students' abstract thinking abilities, beliefs of their own efficacy, and attitudes towards mathematics were substantial, and these factors accounted for 37% of the variation in math success. In contrast to the findings regarding the scores of the students' abstract thinking abilities, attitude towards mathematics, and self-efficacy perceptions, it was discovered that there was no significant difference in mathematics achievement between the groups according to the type of school. Additionally, there was no discernible difference between the groups in terms of the children' math proficiency based on their boarding status. Regarding the other three factors, it was discovered that there were considerable disparities.
- **Juatina (2020)** examined the Effects of Study Skills Training on Achievement in Mathematics of Low Achieving Upper Basic Students in Plateau State, Nigeria and revealed that the Upper Basic Students' study skills and maths achievement were low before to intervention, but both factors increased as a result of study skills instruction.

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### Objective of the Study

1. To study the effects of thinking skill on performance of school students in Mathematics at secondary level.
2. To study the effects of thinking skill on performance of school boys in Mathematics at secondary level.
3. To study the effects of thinking skill on performance of school girls in Mathematics at secondary level.

### Hypothesis of the Study

### Research Methodology

The research designs for this study were Quasi-experimental pre-test/ post-test control group design. The population for this study was secondary level students from selected schools in Jaipur. Purposive sampling was used to select the 100 secondary level students (50 boys and 50 girls). A self-developed academic achievement scale has been used. The collected data have been analyzed through

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3. There will be no significant difference in the effects of thinking skill on performance of school girls in Mathematics at secondary level.

percentage and correlation. For analyzing the data, critical ratio has been used.

### Data Analysis and Presentation

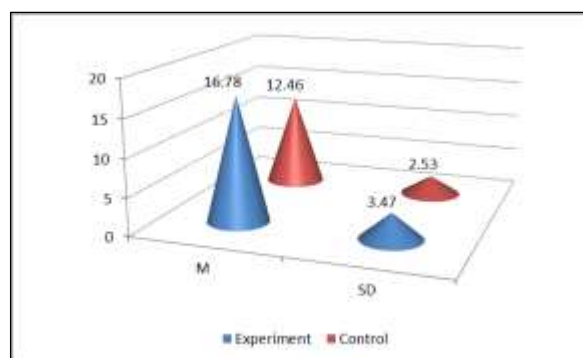
H<sub>01</sub> - There will be no significant difference in the effects of thinking skill on performance of school students in Mathematics at secondary level.

Table : 1 Effects of thinking skill on performance of school students in Mathematics at secondary level

Groups	N	M	SD	CR	Result
Experiment	50	16.78	3.47	7.11	Rejected
Control	50	12.46	2.53		

The table 1 revealed that the mean score and S.D of Experiment group is 16.78 and 3.47 respectively and mean score and S.D of control group is 12.46 and 2.53 respectively. The CR-value comes out to be 7.11 which is significant at 0.01 and 0.05 level of significance. Hence, the hypothesis no.1" There will be no significant difference in the effects of thinking skill on performance of school students in Mathematics at secondary level" is rejected. The mean scores of the experimental group (M = 16.78) is high, whereas that of the control group (M = 12.46) is low. The possible reason for this could be that students were taught to develop thinking skills, which had a positive impact on their academic performance.

Graph : 1 Mean and SD of thinking skill on performance of school students in Mathematics at secondary level



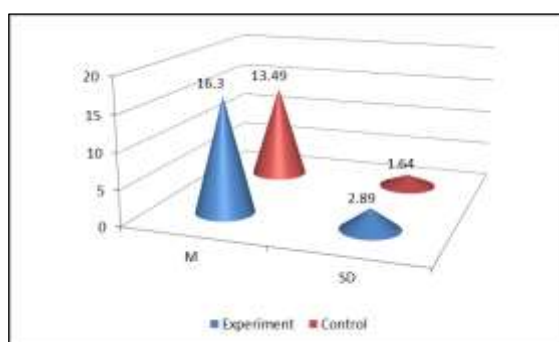
H<sub>02</sub> - There will be no significant difference in the effects of thinking skill on performance of school boys in Mathematics at secondary level.

Table : 2 Effects of thinking skill on performance of school boys in Mathematics at secondary level

Groups	N	M	SD	CR	Result
Experiment	25	16.30	2.89	4.23	Rejected
Control	25	13.49	1.64		

The table 2 revealed that the mean score and S.D of Experiment group is 16.30 and 2.89 respectively and mean score and S.D of control group is 13.49 and 1.64 respectively. The CR-value comes out to be 4.23 which is significant at 0.01 and 0.05 level of significance. Hence, the hypothesis no.2" There will be no significant difference in the effects of thinking skill on performance of school boys in Mathematics at secondary level" is rejected. The mean scores of the experimental group (M = 16.30) is high, whereas that of the control group (M = 13.49) is low. This could possibly be because the thinking skills training were effective in improving students' performance.

Graph : 2 Mean and SD of thinking skill on performance of school boys in Mathematics at secondary level



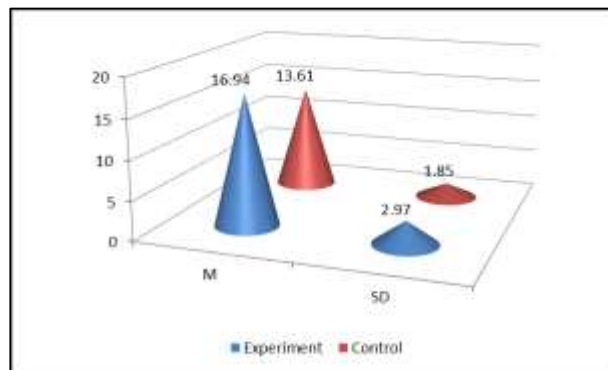
H<sub>03</sub> - There will be no significant difference in the effects of thinking skill on performance of school girls in Mathematics at secondary level.

Table : 3 Effects of thinking skill on performance of school girls in Mathematics at secondary level

Groups	N	M	SD	CR	Result
Experiment	25	16.94	2.97	4.76	Rejected
Control	25	13.61	1.85		

The table 3 revealed that the mean score and S.D of Experiment group is 16.94 and 2.97 respectively and mean score and S.D of control group is 13.61 and 1.85 respectively. The CR-value comes out to be 4.76 which is significant at 0.01 and 0.05 level of significance. Hence, the hypothesis no.3" There will be no significant difference in the effects of thinking skill on performance of school girls in Mathematics at secondary level" is rejected. The mean scores of the experimental group (M = 16.94) is high, whereas that of the control group (M = 13.61) is low. The possible reason for this could be that thinking skills are an effective factor in the mathematical achievement of female students.

Graph : 3 Mean and SD of thinking skill on performance of school girls in Mathematics at secondary level



### Conclusion and Suggestions

After the analyzed the data it was found that the thinking skill has play a significant role in improving the performance of school students in Mathematics at secondary level. That is, it can be said that the sharper their thinking skills, the better mathematical student are able to solve problems and to formulate arguments by drawing on a wide base of knowledge. When teaching mathematics options for solving problems or during computations, teachers can assist students by expanding those math reasoning skills associated with advanced mathematics, which require a higher level of thinking, thinking or thinking about thinking (often referred to as metacognition). Based on its findings, the study suggests, among other things, that thinking skill training be introduced early in school years in order to help students develop effective study habits. It also suggests that educational administrators of schools should organize seminars and workshops for school teachers on training in study skills for maximum output in the subjects taught in classrooms. The study suggested that mathematics teachers add thinking development into their lesson plans to help pupils build their critical-thinking abilities, which can increase academic performance, particularly among low achievers.

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