A STUDY OF RELATIONSHIP BETWEEN META-COGNITIVE SKILLS AND ACADEMIC ACHIEVEMENT OF MATHEMATICS STUDENTS

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Abstract

The purpose of this study was to examine the relationship between meta-cognitive skills and academic achievement among secondary level students of Jaipur. The research was purely descriptive in nature. The sample of the investigation was 100 secondary level students (50 male and 50 female) who were selected through simple random sampling. The findings of the study revealed that most of secondary level students found average level of meta-cognitive skills. Moreover, a positive correlation was found between meta-cognitive skills and academic achievement among secondary level students of Jaipur.

Keywords: *Meta-Cognitive Skills, Academic Achievement, Secondary Level Students.*

Introduction

Education is vital for personal and social advancement. Through education, kids can develop their positive thinking, deductive reasoning, problem-solving abilities, intelligence, aptitude, and positive values and attitudes. It takes a lifetime to complete. A person becomes a logical, competent, and responsible individual through education. Technically speaking, education is the intentional transmission of the accumulated information, abilities, and values of society from one generation to the next. In this perspective, education is the positive process that rescues a person from ignorance, destitution, and misery and guides him towards enlightenment, prosperity, and happiness through holistic growth, which includes his physical, mental, emotional, and social development (Sodhi, Suri & Sodhi 2012).

To ensure that our students learn the fundamentals they need to read critically, write persuasively, think rationally, and solve complicated issues, classroom instruction must be enhanced. It's crucial for students to possess the organisational skills necessary to identify, assess, and apply new content knowledge in a variety of contexts. The contemporary educational system seeks to teach students how to learn, structure their thought processes to solve issues, and develop competences to address future difficulties in addition to delivering knowledge. The information and abilities that today's students must possess include critical thinking, analytical skills, problem-solving,

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creativity, an inventive mindset, an aptitude for research, computer skills, communication skills, soft skills, leadership, teamwork, and positive attitudes. These competences and abilities are developed by a learner with the use of metacognitive abilities.

Metacognition is a relatively new idea in cognitive psychology. Almost everyone engages in metacognitive tasks daily and most of the time. The process of considering one's own cognitive processes is known as metacognition. It outlines the procedures used to organise, keep track of, and assess a person's knowledge and performance in a certain field. A deep grasp of one's own thoughts and learning is also necessary.

Metacognition was coined by John Flavell in the 1979 and refers to "cognition about cognitive phenomena" or, in simpler terms, "thinking about thinking." Metacognition is the capacity to comprehend and control one's own cognitive processes. It also refers to the capacity to monitor one's development and formulate learning strategies based on projections of one's performance and learning. Metacognitive awareness, according to Schraw and Dennison (1994), is defined as "the ability to reflect on, understand, and control one's learning." Metacognition plays an important role in learning and is a strong predictor of academic achievement (Dunning, Johnson, Ehrlinger and Kruger, 2003). Meta cognition is usually divided into two components: metacognition knowledge and metacognition regulation. Metacognitive knowledge, alternatively referred to as metacognitive awareness, is "individuals' awareness of their own knowledge and cognitive activities" (Flavell,1979). Declarative knowledge, procedural knowledge, and conditional knowledge are just three examples of the several types of metacognitive awareness that are included. Metacognitive regulation: This phrase describes the systems that help one control their learning and thinking. Three key abilities are required to manage one's thinking or learning process: The capacity to manage one's cognition involves the ability to evaluate one's work both as it is being accomplished and as it is being assessed while it is being completed.

ACADEMIC ACHIEVEMENT

Academic achievement refers to knowledge gained and skills developed in school subjects, which are typically designed by teachers or both. Academic achievement is a criterion for selection, promotion, or recognition in many fields. Academic achievement' importance cannot be emphasized. Academic achievement is more crucial for a student's learning and personality development, as well as for determining what has been done in order to measure a student's progress. Exams and other forms of continuous evaluation are frequently used to assess academic success, but there is little consensus regarding the most effective methods or the relative importance of procedural knowledge (such as skills) and declarative knowledge (such as facts).

For educators and others, achievement at all educational levels is a key cause of concern. In reality, the entire educational programme is focused on upholding excellent academic

achievement, and the design of the educational system was carefully considered with this objective in mind. In order to assess a student's level of mastery of a subject, piece of content, or ability, achievement tests are frequently utilised. The contemporary educational system seeks to teach students how to learn, how to order their thought processes to solve diverse problems, how to develop skills to meet future difficulties, in addition to imparting knowledge. A student must learn information, apply knowledge, judge ability, use critical thinking and analytical abilities, solve problems, and have creativity and an inventive mindset, have an affinity for research, and other talents in today's educational system. Through the use of metacognitive skills, a student can improve these competencies and talents.

REVIEW OF RELATED LITERATURE

- **Toraman, C. (2021)** studied on Analysis of the Relationships between Mathematics Achievement, Reflective Thinking of Problem Solving and Metacognitive Awareness. The main objective of this study was to find out the level reflective thinking towards problem solving skills and metacognitive awareness explained maths course achievements of the students and the relationships among these variables were studied. Relational survey model was applied. The study included 412 seventh grade students from two different secondary schools within each of the three central districts located in Ankara. In this study, "Reflective Thinking Skill Scale to Problem Solving (RTSSPS)" and "The Metacognitive Awareness Inventory for Children (MAI-C)" and the scores of "Maths Course Achievement" were used. "Pearson Momentler Correlation Coefficient" and "Multiple Linear Regression Analysis" were used in the correlational and regression analysis. It was determined that there was a strong positive significant correlation between students' maths achievement, reflective thinking towards problem solving and metacognitive awareness. It was also determined that there was a strong positive significant correlation between reflective thinking towards problem solving and metacognitive awareness.

- **Derren (2017)** studied on Metacognitive Strategies: Their Effects on Students' Academic Achievement and Engagement in Mathematics. This study investigated the effects of metacognitive strategies on student's academic achievement and engagement in Mathematics. It was conducted in Aplaya National High School, Schools Division of Misamis Oriental, Philippines, during the school year 2015-2016. A total of 60 Grade 9 students were the participants of the study. Pretest-Posttest Quasi-Experimental research design was used. The data were gathered using the researcher made academic achievement test and engagement scale in Mathematics. Mean and standard deviation were used to describe the data. One-way analysis of co-variance (ANCOVA) was utilized to test if the significant differences existed between the experimental and the control

groups, while Pearson Product Moment Correlation was used to test if there is a significant relationship between the two groups. Findings revealed that the academic achievement of Grade 9 students when taught using metacognitive strategies was Very Satisfactory; while the students taught with the conventional teaching strategies was Fairly Satisfactory. There was a significant difference in the academic achievement of students in Mathematics in favor of the experimental group. Moreover, the engagement in Mathematics of both groups was on the average level, but there was no significant difference between them. In addition, there is a significant relationship between students' academic achievement and engagement in Mathematics.

OBJECTIVES OF THE STUDY

- To explore the levels of meta-cognitive skills among secondary level students of Jaipur.

- To find the relation between meta-cognitive skills and academic achievement among secondary level students of Jaipur.

HYPOTHESIS OF THE STUDY

1 There is no significant relationship between meta-cognitive skills and Academic Achievement among secondary level students of Jaipur.

2 There is no significant relationship between meta-cognitive skills and Academic Achievement among secondary level male students of Jaipur.

3 There is no significant relationship between meta-cognitive skills and Academic Achievement among secondary level female students of Jaipur.

METHODOLOGY OF THE STUDY

The study has been designed on descriptive survey research method, which provides the opportunity to describe, explain and validate the research findings of non-quantitative issues of the selected problem.

In the present study, 100 students of secondary level (50 male and 50 female) have been selected for the sample of the study and the researcher has used simple random sampling for selecting the students from Jaipur district of Rajasthan. A self-developed academic achievement scale has been used. The collected data have been analyzed through percentage and correlation. For analyzing the data, percentage and correlation has been used.

ANALYSIS AND INTERPRETATION OF DATA

Table : 1 Frequency and Percentage of different levels of meta-cognitive skills among secondary level students of Jaipur.

Sr. No.	levels of meta-cognitive skills	Percentage
1	High	6.00%
2	Above Average	19.00%
3	Average	66.00%
4	Below Average	7.00%
5	Low	2.00%
Total		100%

Table 1 represents the various levels of meta-cognitive skills among the total respondents. According to the table, 6.0 percent of respondents have high level of m meta-cognitive skills, 19.00 percent have an above average level of meta-cognitive skills, and 66.00 percent have an average level of meta-cognitive skills, 7.00 percent have a below-average level of meta-cognitive skills, 2.00 percent have a low level of meta-cognitive skills. Overall it can be said that most of the secondary level students have an average level of metacognitive skills.

Figure 1: Pie Chart showing different levels of meta-cognitive skills of total respondents.
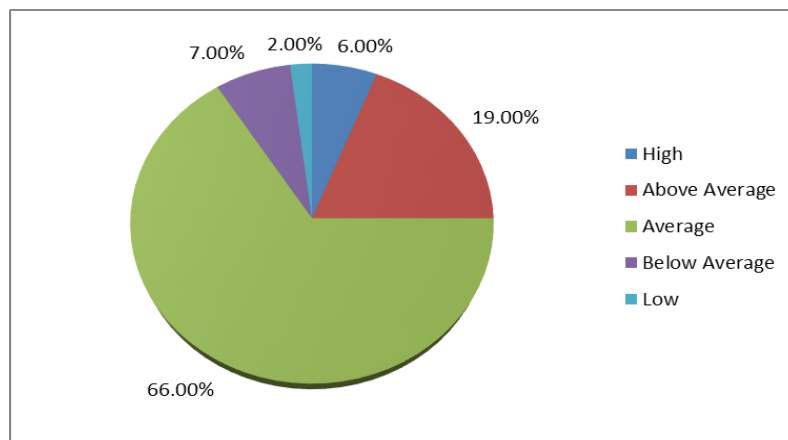
(N=100).

Table : 2 Showing the Pearson's correlation coefficient(r) between meta-cognitive skills and Academic Achievement among secondary level students of Jaipur

Variables	r	Levels of Significance

Metacognition		
vs.	0.46*	0.01
Academic Achievement		

*Significant at 0.01 level

Table 2 shows that there is a significant positive correlation between meta-cognitive skills and academic achievement (r =0.46), indicating that "the higher the meta-cognitive skills's level, the higher the academic achievement." As a result, our null hypothesis H01 There is no significant relationship between meta-cognitive skills and academic achievement among secondary level students of Jaipur is rejected.

Table : 3 Showing the Pearson's correlation coefficient(r) between meta-cognitive skills and Academic Achievement among secondary level male students of Jaipur

Variables	**r**	**Levels of Significance**
Metacognition		
vs.	0.49*	0.01
Academic Achievement		

*Significant at 0.01 level

Table 3 shows that there is a significant positive correlation between meta-cognitive skills and academic achievement (r =0.49), indicating that "the higher the meta-cognitive skills's level, the higher the academic achievement." As a result, our null hypothesis H02 There is no significant relationship between meta-cognitive skills and academic achievement among secondary level male students of Jaipur is rejected.

Table : 4 Showing the Pearson's correlation coefficient(r) between meta-cognitive skills and Academic Achievement among secondary level female students of Jaipur

Variables	**r**	**Levels of Significance**
Metacognition		
vs.	0.52*	0.01
Academic Achievement		

*Significant at 0.01 level

Table 4 shows that there is a significant positive correlation between meta-cognitive skills and academic achievement (r =0.52), indicating that "the higher the meta-cognitive skills's level, the higher the academic achievement." As a result, our null hypothesis H03 There is no significant relationship between meta-cognitive skills and academic achievement among secondary level female students of Jaipur is rejected.

Conclusion

The result findings have shown that 6.00%, 19.00%, 66.00%, 7.00, and 2.00% High, Above Average, Average, Below Average and Low levels of meta-cognitive skills have been found among secondary level students of Jaipur respectively. Moreover, a positive correlation was found between metacognition and academic achievement among secondary level students (both male and female) of Jaipur. It can be concluded that variable meta-cognitive skills are the strongest predictor of academic achievement. Probably this might be due the reason that Metacognition is a self-monetary process which helps the individual to find out strategies to learn and memorize. This ability helps the students to gain achievement orientation, either mastery or performance, which in turn results in academic success. Accordingly, it can be said that teaching and learning processes in the school should be include the instruction of metacognitive skills. This is in line with many studies that confirmed that teaching metacognitive skills to students may lead to some improvement in their academic achievement.

This finding is similar to the findings of (Dunning, Johnson, Ehrlinger, and Kruger, 2003; and Kruger and Dunning, 1999), who discovered that metacognition was the most powerful predictor of academic success. This result is supported with Ghiasvand's (2010) finding that meta-cognitive strategies better predict academic achievement.

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