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Exploring the Role of Metacognition in Academic Achievement: A Correlational Analysis of Higher Secondary School Students in Assam

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ABSTRACT

Metacognition is the ability to recognise, assess, and make sense of one's own learning processes. Additionally, it entails understanding the most effective strategies for the students. Metacognition is one of the motivating factors that influences students' academic achievement. Hence, a correlational study has been conducted to examine the relationship between metacognition and academic performance among higher secondary school students in the Kamrup district of Assam. The present study employed the descriptive survey method. A simple random sample of 921 students studying in class XII has been selected from the higher secondary schools in the Kamrup district of Assam. The data are gathered with the Metacognition Scale, which was developed by Mubarak Singh and Ana Bali in 2017. The gathered data have been analysed using relevant statistical procedures, including percentage and Pearson's co-efficient of correlation. The findings of the study reveal that there is a significant relationship between metacognition and academic achievement of higher secondary school students in Kamrup district, Assam.

Key words: Academic Achievement, Higher Secondary School, Knowledge of cognition, Regulation of cognition, metacognitive experiences, Relationship.

INTRODUCTION

Metacognition is a key concept in the field of educational psychology. Metacognition is the term used to describe the act of 'thinking about thinking' or 'cognition about cognition'. It is a cognitive process that combines cognitive control and the observation of fundamental cognitive processes. The terms 'meta' and 'cognition' respectively denote the concepts of 'beyond' and 'to know'. In the field of developmental and educational psychology, 'metacognition' is a recently popularised term that refers to the study of cognitive processes and is currently an area of extensive investigation. The concept of metacognition was originally brought to the field of psychology as a new topic of study by John Flavell of Stanford University in 1979. The term 'metacognition' is credited to John Flavell as its originator and father. John Flavell (1979) defines metacognition as the combination of metacognitive knowledge and metacognitive regulation or experiences. Metacognitive knowledge pertains to the knowledge which is gained about cognitive processes, which is utilised to regulate and manage these processes. Since then, a plethora of theoretical and empirical investigations on metacognition have been carried out.

Metacognition refers to the cognitive processes involved in actively controlling and managing one's own learning. Metacognitive activities involve tasks such as strategizing how to approach a learning activity, keeping track of understanding, and assessing progress towards completing a task. Metacognition is the capability to consciously understand and monitor one's own learning processes, as well as having knowledge of the most effective strategies for oneself. It is the student's ability to accurately assess his/her own learning, study effectively, and implement strategies to enhance learning. Metacognition, in simple terms, denotes to an individual's understanding and awareness of their cognitive processes. Cognitive psychology is the systematic acquisition of knowledge regarding one's own mental processes, particularly the processes of thinking. Self-awareness facilitates an individual's understanding of their own cognitive processes, fostering a reflective mindset and personality.

Metacognition, as described by Schraw and Moshman (1995), consists of two primary elements: metacognitive knowledge and metacognitive control. Metacognitive knowledge encompasses understanding and awareness of cognitive processes, including knowledge of one's own effective capabilities and strategies for learning, as well as information on how and when to use these strategies and skills to enhance learning. Metacognitive regulations pertain to the cognitive mechanisms that persons employ to manage and control their own thinking and learning. These processes include tasks such as planning, monitoring, comprehension, and assessment. (Artzt and Armour-Thomas, 1992; Baker and Brown, 1980; Schraw and Dennison, 1994). Metacognition is highly valued in the realm of learning due to its significant role in predicting academic achievement (Dunning, Johnson, Ehrlinger, & Kruger, 2003; Kruger & Dunning, 1999). Metacognition is crucial in education since it enables learners to effectively establish a plan, monitor their progress, and evaluate the effectiveness of their learning. This means that metacognition helps learners become more actively engaged in the learning process (Costa and Kallick, 2001). Additionally, it suggests the individual's ability to engage in higher-level thinking, which encompasses the management of cognitive elements within the process of learning (Livingston, 2003).

Components of Metacognition

According to Mubarak Singh and Ana Bali, there are three (3) major and thirteen (13) minor areas in metacognition. The major areas are- ***Knowledge of Cognition***- as cognitive processes, it refers to the knowledge that persons have about themselves and others, ***Regulation of Cognition-*** it regulates cognition and learning through activities that assist individuals control their learning and ***Metacognitive Experiences***- these are the experiences that are relevant to the present cognitive endeavour. The minor areas of knowledge of cognition are- self-concept, study habits, attention, self-intelligence and self-memory; the minor areas of regulation of cognition are- evaluation/monitoring, planning/orientation, reflecting and repairing as well as the minor areas of metacognitive experiences are- feeling of knowing/familiarity, judgement of learning, feeling of difficulty and feeling of satisfaction/confidence.

REVIEW OF RELATED LITERATURE

Coutinho (2007) showed that metacognition was related to academic success. Vrugt and Oort (2008) indicated that the use of surface cognitive strategies had a negative consequence on the academic achievement. Gul and Shehzad (2012) found that there was a weak relationship between metacognition and academic achievement. Amzil and Stine-Morrow (2013) revealed that both metacognitive monitoring and control are good predictors of academic performance in college. Neeru (2014) revealed that students who had high metacognitive skills showed better academic achievement than the students with low metacognitive skills.

Other studies found that there was a significant relationship between metacognitive awareness and academic achievement (Vinitha, 2016; Sonowal and Kalita, 2019). Kaur (2017) showed that the students of senior secondary schools with high metacognitive abilities were found more academically confident and more motivated to get goal than the students with low and average metacognitive abilities. Nongtodu and Bhutia (2017) revealed that the relation between metacognition and academic achievement was high in all streams of students, among female as compared to male students and urban students as compared to rural students.
Ohtani and Kaur and Kaur (2017) showed that no relationship was found between metacognition and achievement of students in secondary schools belonging to medical stream. Hisasaka (2018) found that metacognition was weakly correlated with both academic performance and intelligence. Conversely, Iqbal et al., (2019) revealed that there was a strong correlation between metacognition and academic achievement of medical students.

Kaur et el. (2018) showed that metacognition was significantly positively contributing towards the academic achievement of students. Further, it was showed that significant relationship was found between academic achievement and metacognition (Landine and Stewart, 1998; Khan and Panth, 2017; Madanagopal, 2019; Tiwana, 2019).

In a study of the academic motivation and metacognitive awareness and their impact on academic achievement of Ajman university students, Abdelrahman (2020) indicated that metacognitive awareness is a main contributor to academic achievement and represents an excellent instrument for the assessment of academic performance. Ozcakmak et el. (2021) showed that metacognitive awareness was positively influenced the students' academic achievement. Pradhan and Das (2021) revealed that significant difference was found between metacognition and academic achievement of the undergraduate students of School of Humanities and Social sciences (HSS), School of Engineering (SOE), and School of Sciences (SOS) of Tezpur University.
Rani (2022) indicated that the students of government and private schools having high metacognitive skills had alike academic achievement and the students of both government and private schools fall at the low category of meta-cognitive skills and had same academic achievement. Nguyen et el. (2023) revealed that medical students in Vietnam Military Medical University had high metacognitive awareness. Those students who had high metacognitive awareness, might have better academic achievement. Bao et el. (2024) indicated that metacognitive skills contributed to enhancing the achievement of motor skills and knowledge.

SIGNIFICANCE OF THE STUDY

Students that engage in metacognition generally perform better academically. Students can also use it to plan their studies strategically. Students can use metacognitive processes to map out new material to be learned, assess their comprehension of subject subjects, and make distinctions. Participating in metacognitive tasks, such as self-explanation, self-assessment, and revision or monitoring, can improve students' learning and aid in their academic advancement.

Landine and Stewart (1998), Zulkiply (2006), Coutinho (2007), Amzil and Stine-Morrow (2013), Khan and Panth (2017) Madanagopal (2019), Iqbal et al., (2019), Sonowal and Kalita (2019) showed the relationship between metacognition and academic achievement of the students.

Numerous studies on metacognition have been conducted in India, with a few of them focusing particularly in the state of Assam. For example, Sonowal and Kalita (2019) investigated on the students' metacognitive awareness in the Dibrugarh district of Assam. Pradhan and Das (2021) carried out a study on the influence of metacognition on academic achievement and learning style of undergraduate students in Tezpur university. However, no research on metacognition has been done in the district of Kamrup, Assam. Thus, an attempt has been initiated to study the metacognition of higher secondary school students in relation to academic achievement.

The study has been delimited to the students of higher secondary schools, i.e., class XII, studying in provincialized and private schools under the Assam Higher Secondary Education Council (AHSEC) of Kamrup district, Assam.

OPERATIONAL DEFINITIONS

a. **Metacognition:** Metacognition is the term used to describe the act of actively controlling the cognitive processes that are involved in the process of learning. It refers to three dimensions i.e. the knowledge of cognition, regulation of cognition and metacognitive experiences. The knowledge of cognition includes self-concept, study habits, attention, self-intelligence, and self-memory. The regulation of cognition includes monitoring, planning, reflecting and repairing. The metacognitive experiences include feelings i.e. feeling of knowing, judgement of learning, feeling of difficulty and feeling of satisfaction. (Singh and Bali, 2017).
b. **Academic Achievement:** Academic achievement refers to the percentage of marks obtained aggregately by the higher secondary school students in the final examination of class XI.
c. **Higher Secondary School Students:** The students enrolled in class XII of the Arts, Science, and Commerce streams are studying under the Assam Higher Secondary Education Council (AHSEC).

OBJECTIVES

The following are the objectives of the present study:

1. To find out the level of metacognition of higher secondary school students in Kamrup district, Assam.
2. To study the relationship between metacognition and academic achievement of higher secondary school students in Kamrup district, Assam.
3. To study the relationship between academic achievement of higher secondary school students and the components of metacognition namely-knowledge of cognition, regulation of cognition and metacognitive experiences.

HYPOTHESES

The following are the null hypotheses of the present study:

1. There is no significant relationship between metacognition and academic achievement of higher secondary school students in Kamrup district, Assam.
2. There is no significant relationship between academic achievement of higher secondary school students and the components of metacognition namely-knowledge of cognition, regulation of cognition and metacognitive experiences.

METHODOLOGY

Descriptive survey method has been used in the present study. The population consists of 3067 students from 67 senior secondary schools in Kamrup district, Assam. The researchers have adopted the simple random sampling technique to select both the schools and the student sample. Hence, a total of 921 students has been selected as a sample from 20 provincialized and 14 private higher secondary schools of Kamrup district, Assam. Metacognition Scale developed by Mubarak Singh and Ana Bali (2017) has been used for collecting the data. The relevant statistical methods have been applied in order to analyse the data that has been gathered such as-percentage and Pearson's co-efficient of correlation (r).

Metacognition Scale (MCS): Metacognition scale is a tool which comprises of 50 statements. It consists of three major (3) areas namely, knowledge of cognition, regulation of cognition- and metacognitive experiences.

The validation of this scale was done through the utilization of both 'Construct' and 'Content' validity methods. The scale's reliability was established through the usage of the test-retest method.

ANALYSIS AND INTERPRETATION OF DATA

Level of Metacognition of Higher Secondary School Students in Kamrup district, Assam: The level of metacognition of higher secondary school students in Kamrup district, Assam has been sorted and shown in Table No-1.

Table No-1: Level of Metacognition of Higher Secondary School Students in Kamrup District

Range of Raw Scores	Range of z-Scores	Frequency	Percentage	Levels
204 and above	+2.01 and above	22	2.4	Extremely High
189-203	+1.26 to +2.00	70	7.6	High
173-188	+0.51 to +1.25	196	21.3	Above Average
153-172	-0.50 to +0.50	349	37.9	Average/Moderate
137-152	-1.25 to -0.51	194	21.1	Below Average
122-136	-2.00 to -1.26	56	6.1	Low
121 and below	-2.01 and below	34	3.7	Extremely Low
Total		**921**	**100**	

From the table no-1, it is found that 37.9% of the total higher secondary school students have the average metacognition, 21.3% above average metacognition, 21.1% below average metacognition, 7.6% high metacognition, 6.1% low metacognition, 3.7% extremely low metacognition and 2.4% extremely high metacognition.

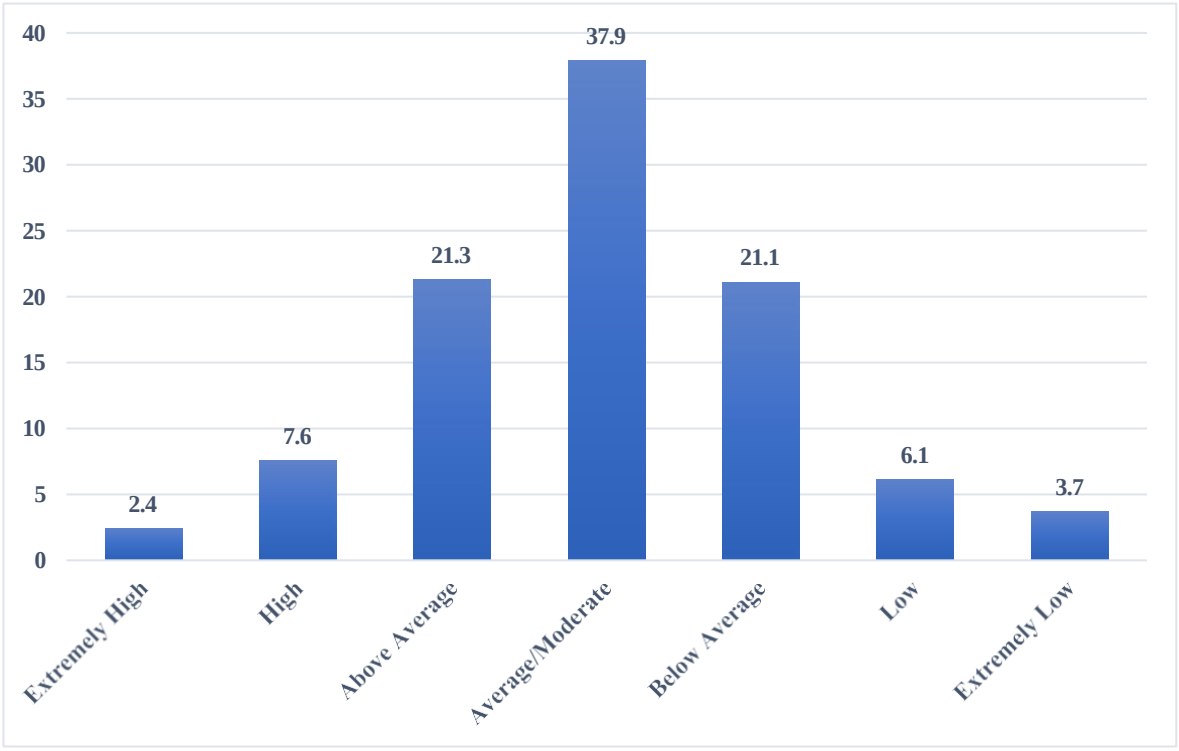

Fig.-1: Level of Metacognition of Higher Secondary School Students in Kamrup District

Relationship between Metacognition and Academic Achievement of Higher Secondary School Students: The relationship between metacognition and academic achievement of higher secondary school students has been given in the Table No-2.

Table No-2: Relationship between Metacognition and Academic Achievement of Higher Secondary School Students in Kamrup District

Variables	N	df	'r'	Table Value	Interpretation
Metacognition	921	919	.771	.062	Significant
Academic Achievement					

It has been found from the table no-2 that the computed 'r' value between metacognition and academic achievement of higher secondary school students is .771. The 'r' value .771 with df 919 is more than the table value .062 which is significant at 0.05 level. Hence, the null hypothesis 'there is no significant relationship between metacognition and academic achievement of higher secondary school students in Kamrup district, Assam' is rejected. Therefore, there is a significant relationship between metacognition and academic achievement of higher secondary school students in Kamrup district, Assam.
Further, the result reveals that there is a positive and high correlation between metacognition and academic achievement of higher secondary school students in Kamrup district, Assam.

Relationship between Academic Achievement of Higher Secondary School Students and the components of Metacognition namely- Knowledge of Cognition, Regulation of Cognition and Metacognitive Experiences: The study attempts to study the relationship between academic achievement and the components of metacognition and is shown in the following table.

Table-3: Relationship between Academic Achievement and the components of Metacognition

Variables		N	df	'r' Value	Table Value	Interpretation
Academic Achievement	Knowledge of Cognition	921	919	.73	.062	Significant
	Regulation of Cognition			.66		Significant
	Metacognitive Experiences			.65		Significant

From the table no-3, it has been found that the calculated values of 'r' between academic achievement and knowledge of cognition, academic achievement and regulation of cognition as well as academic achievement and metacognitive experiences of higher secondary school students are found to be .73, .66 and .65 respectively. The values of 'r' with df 919 are higher than the table value .062 which is significant at 0.05 level. Hence, the null hypothesis 'there is no significant relationship between academic achievement of higher secondary school students and the components of metacognition namely-knowledge of cognition, regulation of cognition and metacognitive experiences' is rejected. Therefore, it is concluded that there is a significant relationship between academic achievement of higher secondary school students and the components of metacognition.
Further, the result reveals that there is a high and positive correlation between academic achievement and knowledge of cognition of the students of higher secondary schools. Again, there is a moderate and positive correlation between academic achievement and regulation of cognition; as well as academic achievement and metacognitive experiences of the students of higher secondary schools.

MAJOR FINDINGS AND DISCUSSIONS

1. The finding reveals that metacognition is at the average level. Most of (69.2%) the higher secondary school students have average and above metacognition. Some (30.9%) of the students fall below average level. The majority of students have average and above metacognition levels, as they may have the ability to be aware of their learning processes and knowledge of what types of learning methods and techniques are best for them. Further, they have also the abilities to recognise their learning processes and know how to improve them.
2. The result of the study indicates that there is a significant relationship between metacognition and academic achievement of higher secondary school students in Kamrup district, Assam. This implies that Metacognition exerts a substantial influence on students' academic achievement. Further, the finding reveals that there is a positive and high correlation between metacognition and academic achievement of higher secondary school students in Kamrup district, Assam. The correlation is positive and high, indicating that those students with high metacognition are also academically high.
3. It has been found from the result that there is a significant relationship between academic achievement of higher secondary school students and the components of metacognition namely-knowledge of cognition, regulation of cognition and metacognitive experiences.

Further, the result shows that there is a high and positive correlation between academic achievement and knowledge of cognition of the students in higher secondary schools. Again, there is a moderate and positive correlation between academic achievement and regulation of cognition; as well as academic achievement and metacognitive experiences of the students in higher secondary schools.

RECOMMENDATIONS

1. Academic achievement is higher for students who exhibit high metacognition. Importance should be given on different aspects in all the subjects such as- learning by doing, experiential learning, group discussions, project work, problem solving etc. with a view to enhancing metacognition of the students.
2. Students should be taught about how to set a certain goal and encourage them for reflective thinking in the learning process so that they can develop their ability to understand and effectively utilize their acquired knowledge in various tasks and situations.
3. Academic achievement is most greatly predicted by metacognition. Therefore, greater focus should be placed on the amalgamation of metacognitive skills into the curriculum so as to further boost students' academic achievement.

CONCLUSION

Metacognition, as an integral motivational factor in students' academic achievement, entails knowing the most effective strategies for their learning. The results reveal that the majority of higher secondary school students in Kamrup district, Assam have an average/moderate level of metacognition. There is a significant relationship between metacognition and academic achievement of higher secondary school students in Kamrup district, Assam. This means students' metacognition has a major impact on their academic achievement. Therefore, considering the findings, it can be asserted that teachers may adopt new teaching strategies in classes to develop the best tactics for learning on the part of the students.

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