

# Metacognitive Awareness: A Study of Secondary Students' Practices

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## **Abstract:**

This study delves into the metacognitive awareness of secondary students, examining the interplay between this critical cognitive skill and various demographic factors. Specifically, the research investigates the relationship between metacognitive awareness and gender, locality (urban vs. rural), and type of school (private vs. government). A comprehensive analysis of the data reveals intriguing insights into students' cognitive practices, highlighting both strengths and weaknesses in their metacognitive awareness. The findings indicate significant differences in metacognitive awareness between male and female students, urban and rural students, and private and government school students. These results have important implications for educators, policymakers, and researchers, underscoring the need for targeted interventions and strategies to enhance metacognitive awareness and promote effective learning practices in secondary education. By exploring the complex dynamics of metacognitive awareness, this study contributes meaningfully to the ongoing quest to improve learning outcomes and foster academic excellence. The study tries to find out whether there exists any significant difference between the various sub samples Gender, Locality and Type of Management of school based on their metacognitive awareness. The investigators use appropriate statistical techniques for the data collection and analysis of the data.

**Keywords:** Metacognitive, Awareness, Secondary Students, Knowledge, Thinking Process.

## **Introduction**

'Metacognition' is a concept that has been used to refer to a variety of epistemological processes. Metacognition essentially means cognition about cognition; that is, it refers to second-order cognitions: thoughts about thoughts, knowledge about knowledge or reflections about actions. So if cognition involves perceiving, understanding, remembering, and so forth, then metacognition involves thinking about one's own perceiving, understanding, remembering, etc. These various

cognitions about cognitions can be labelled ‘metaperception’, ‘metacomprehension’ and ‘metamemory’ ‘metacognition’ remaining the superordinate term. with Flavell (1978) referred to it as ‘knowledge that takes as its object or regulates any aspect of any cognitive endeavour’ (p. 8). Moore (1982) defines it as ‘an individual’s knowledge about various aspects of thinking’ and it has also been described as ‘the abilities of individuals to adjust their cognitive activity in order to promote more effective comprehension’ (Gavelek & Raphael, 1985, pp. 22-23).

Meta cognition is often referred to as “thinking about thinking”. Metacognition is a regulatory System that helps a person understand and control his or her own cognitive performance. Metacognition allows people to take charge of their own learning. sometimes people use the phrase ‘going meta’ when talking about metacognition, referring to the process of stepping back to see what you are doing, as if you were someone else observing it. “Going meta” means becoming an audience of your own performance- in this case, your own intellectual performance.

“Metacognition was originally referred to as the knowledge about and regulation of one’s own cognitive activities in learning processes” (Flavell, 1979; Brown, 1978).

“Metacognition involves awareness of how they learn, an evaluation of their learning needs, generating strategies to meet these needs and then implementing the strategies” <sup>[4]</sup> (Hacker, 2009).

Metacognition is most commonly divided into two distinct, but interrelated areas. John Flavell, one of the first researchers in metacognition and memory, defined these two areas as metacognitive knowledge- awareness of one’s thinking- and metacognitive regulation- the ability to manage one’s own thinking processes. These two components are used together to inform learning theory. Flavell <sup>[3]</sup> (1979) describes three kinds of metacognitive knowledge:

- Awareness of knowledge- it involves understanding what one knows, what one does not know, and what one wants to know. This category may also include an awareness of other’s knowledge.
- Awareness of thinking- understanding cognitive tasks and the nature of what is required to complete them.
- Awareness of thinking strategies- understanding approaches to direct learning.

Here are some metacognitive skills that each student may follow.

- **Knowing your limits** - knowing the limits of one’s own memory for a particular task and creating a means of external support.
- **Self-monitoring** – self-monitoring one’s learning strategy, such as concept mapping, and then adapting the strategy if it is not effective.
- **Modify** – noticing whether one comprehend something one just read and then modifying approach if one did not comprehend it.
- **Skimming** – choosing to skim subheadings of unimportant information to get to the information one need.
- **Rehearsing** – repeatedly rehearsing a skill in order to gain proficiency.
- **Self-test** – periodically doing self-tests to see how well you learned something.

Metacognitive awareness, the ability to reflect on and regulate one's own cognitive processes, is a vital skill for academic success and lifelong learning. Secondary education, a critical phase of intellectual development, presents an opportune time to cultivate metacognitive awareness. Despite its importance, research suggests that many students lack adequate metacognitive skills, hindering their ability to effectively navigate complex learning tasks.

In the context of secondary education, metacognitive awareness is crucial for students to take ownership of their learning, develop problem-solving strategies, and achieve academic excellence. However, there is a need to investigate the current state of metacognitive awareness among secondary students, considering the diverse range of learners and learning environments.

This study aims to explore the metacognitive awareness of secondary students, examining the relationships between metacognitive awareness and demographic factors such as gender, locality, and type of school. By investigating the levels and variations in metacognitive awareness, this research seeks to contribute to the development of evidence-based strategies that foster metacognitive skills, ultimately enhancing the learning experiences and outcomes of secondary students.

### **Significance of the Study**

his study on metacognitive awareness of secondary students holds significant importance as it informs evidence-based practices, enhancing student learning and supporting diverse learners. By identifying the levels and variations in metacognitive awareness, this research will contribute to the development of targeted interventions and strategies to improve learning outcomes (Hacker et al., 2009). Metacognitive awareness is crucial for students to take ownership of their learning, develop problem-solving strategies, and achieve academic excellence (Flavell, 1979). Moreover, this study's findings will help educators better understand the metacognitive needs of students from different gender, locality, and school type backgrounds, promoting inclusive and effective learning environments (Paris & Winograd, 2001). Ultimately, this research contributes to the ongoing exploration of metacognitive awareness in secondary education, providing valuable insights for researchers, educators, and policymakers (Schraw & Dennison, 1994).

Schwartz & et.al (2004) freely explored a science Web site structured either in an outline (linear) format or "puzzle" (non-linear) format for 2.5 hours. Subjects then engaged in tasks involving locational memory and informational recall. The results indicate that presence of metacognitive skills was a necessary but not sufficient condition for learning in hypermedia environments; the navigational structure of the Web site also was important. Metacognitive skill (as measured by the Junior Metacognitive Awareness Inventory (Jr. MAI) (Sperling, Howard, Miller, & Murphy, 2002) and the How I Study Questionnaire (HISP) (Fortunato, Hecht, Tittle, & Alvarez, 1991) was not a significant predictor of measures of retention within an outline structure (where the conventional structure did not stimulate meta-cognitive knowledge), while metacognition was a significant predictor of informational recall within the puzzle structure (which required active meta-cognitive knowledge to make meaning within the unfamiliar structure). The results point to the need for instructional designers to consider the structure of Web sites, with particular emphasis on the use of recognizable conventions, in order to reduce the metacognitive demands upon working memory involved in deciphering the structure. Ellery (2008) found that Strategic and well-planned use of feedback in the assessment process is key to promoting learning. The author evaluated the role a two-stage test process played in guiding and assisting student learning in a second-year module at the University of KwaZulu-Natal, South Africa. Having been provided with verbal and written feedback without grades from the first test, students were given the opportunity to write a different, second test, and each was required to choose which one was graded. Students were generally very positive about the assessment process, most participated willingly and fully, many learned differently for the second test, and there was evidence of meta-cognitive awareness and understanding. Despite this, a number of students experienced difficulty and frustration in judging the quality of their work.

Karaali (2015) illustrated how metacognition can be incorporated into a repeated exercise in the mathematics classroom, through a specific case study in the context of a liberal arts mathematics course. Through the semester, students were asked weekly to evaluate their own progress and

review their development in light of their personal goals. He observed positive affective changes (including engagement levels) in the students through the course of the semester. He argues that the weekly metacognitive and self-reflective activities helped students keep their focus on learning deeply and allowed them to remain engaged and motivated through the semester.

For all age groups, metacognitive knowledge is crucial for efficient independent learning, because it fosters forethought and self-reflection. Good metacognitive thinkers are also good intentional learners. That is, they are able to direct their learning in the proper ways to build understanding. They know when to use strategies and how to use them. They are able to redirect the normal frustration that occurs when things are confusing or are not initially productive into further learning and research strategies. In this context the investigators got an interest in the area metacognitive awareness. From the reviews obtained also showed that Meta cognition improves the learning ability, retention and achievement. Investigators decided to check the level of metacognitive awareness of secondary school students. Investigators thought so because if the level of metacognitive awareness of secondary school students were found out, then it would be helpful for the teachers to guide them in proper way by means of appropriate instructional teaching strategies and provide appropriate techniques to students so that their metacognitive skills may develop which will enhance learning of concepts in a better way.

The researcher selected metacognitive awareness variables to investigate metacognitive awareness in secondary students due to the recognition of its crucial role in enhancing learning outcomes and the scarcity of research focusing on this specific population. Metacognitive awareness is a vital skill for academic success, and its development during secondary education can have a lasting impact on students' future academic and professional pursuits.

The researcher may have been motivated by the desire to:

1. Address the knowledge gap in the existing literature on metacognitive awareness in secondary education.
2. Explore the factors influencing metacognitive awareness in secondary students, such as gender, locality, and school type.
3. Identify effective strategies to enhance metacognitive awareness and improve learning outcomes in this age group.
4. Inform evidence-based practices and policy decisions aimed at promoting metacognitive skills in secondary education.

By investigating metacognitive awareness in secondary students, the researcher aims to contribute meaningfully to the understanding and improvement of learning processes in this critical phase of education.

### **Objectives of the Study**

1. To find out the metacognitive awareness of secondary school students.
2. To find out whether there exists any significant difference in the metacognitive awareness of secondary school students based on their locality.
3. To find out whether there exists any significant difference in the metacognitive awareness of secondary school students based on their gender.
4. To find out whether there exists any significant difference in the metacognitive awareness of secondary school students based on the type of management of the school.

## **Hypotheses of the Study**

1. The secondary school students of Kottayam district may have a higher level of metacognitive awareness
2. There will be no significant difference in the metacognitive awareness of secondary school students based on the following sub samples;
  - (a). Locality
  - (b). Gender
  - (c). Type of management of school.

The sample consists of 180 secondary school students from various schools of Kottayam district. The methodology adopted is normative survey method. <sup>[1]</sup> (Best & Kahn, 2007). The details of the sample selected for the study is as shown in Table 1 below.

## **Tool for the Study**

The tool used was metacognitive awareness inventory prepared and standardized by Sindhu P.G (2011). It consists of thirty items following 5-point scale. The scale was standardized with reliability coefficient 0.742 which shows high reliability. Reliability is ensured using test-retest method. Validity is ensured as content validity.

## **Statistical Techniques**

1. Basic statistical techniques such as arithmetic mean median and standard deviation.
2.  $\chi^2$  – Test
3. Significance of difference between the means.

## **Methodology**

The investigators visited the schools mentioned in Table 1 and seemed the permission of school authorities to conduct the survey. The investigator selected standard IX of secondary level for the present study. Investigators selected 40 students each from rural secondary schools which are aided also. A total of 80 students falls under the category Rural and Aided schools. Similarly, the investigators selected 50 students each from government higher secondary schools which were urban also. A total of 100 students falls under this category. The investigators distributed Meta cognitive awareness Inventory among the selected sample of students. They were given proper instructions regarding how to fill the responses in the inventory. The investigators had given required time for students to record their responses in the inventory. After administration, the investigators collected the response sheets from students. The investigators valued the response sheets with a five-point scale. The scores obtained by each student in the Metacognitive awareness inventory were encoded and undergone statistical calculations. Mean, standard deviation, percentiles and test of significant difference between means were calculated.

## **Limitations of the Study**

The present study is limited to check the metacognitive awareness of secondary school students only. Moreover, the study is limited to Kottayam district only.

## **Analysis and Interpretation of the Data**

### **Metacognitive Awareness of Secondary School Students**

The investigators categorized the whole sample used for the study in to Very Low, Low, Average, High, and Very High Metacognitive awareness groups based on the scores of Metacognitive awareness using Percentiles. P20, P40, P60, P80 percentiles were calculated and the students who

scores less than P20 scores (100.20) is categorized as Very Low group, the students who scores in between P20 (100.20) and P40 (111.40) as Low, P40 (111.40) and P60 (118.00) as Average, P60 (118.00) and P80 (126.00) as High and greater than P80 (126.00) as Very High groups. The frequency of students and its percentage is given in table 2.

**Table 1. Sample selected for the study**

Sl.No	Name of the School	Locality	Type of Management	Number of Students
	Badapalli High School, Badapalli, Kendrapra, Odisha	Rural	Aided	40
	Nigamananda High School, Rahama, Kendrapara, Odisha	Rural	Aided	40
	Kendrapara High School, Kendrapra, Odisha	Urban	Government	50
	Pattamundai High School, Pattamundai, Kendrapara	Urban	Government	50

**Table 2. Number and Percentage of different groups of Secondary School Students based on Metacognitive Awareness**

Group	Frequency	Percentage	$\chi^2$
Very Low awareness	36	20	1.72
Low Awareness	35	20	
Average Awareness	42	29.3	
High Awareness	31	17.2	
Very High Awareness	35	19.4	

From table 1, it is clear that the obtained  $\chi^2$  ( $\chi^2 = 1.72, p > .5$ ) shows the difference in the number of students in the distribution of students in each group is not significant. Hence it can be concluded that there exists no significant difference on the frequency of students in the distribution of students in each group. It was simply state that the secondary school students are identically distributed among each group. Or there is comparatively equal number of students included in each group. Also, the table shows that the Average Awareness group contains comparatively high number of students (42). The figure 1, given below is clearly depicted this result.

### **Metacognitive Awareness of Secondary School Students Based on Their Locale**

In order to find out whether the metacognitive awareness of secondary school students vary with the locale, the mean and the standard deviation of the scores on the metacognitive awareness of secondary school students of the rural and urban locality were calculated. To know whether the two groups varied significantly in their scores on the metacognitive awareness, the t-test of non-equivalent groups was administered. The values thus obtained are tabulated below.

**Table 3. Results showing significance of difference between means of scores of metacognitive awareness of secondary school students based on locality**

Locale	Sample Size	Mean	Standard Deviation	t-Value
Rural	80	113.48	13.69	0.03*
Urban	100	113.41	15.52	

(\* not significant at .01level of significance)

The mean and standard deviation of metacognitive awareness of rural secondary school students are 113.48 & 13.69 and that of urban secondary school students are 113.41 & 15.52 respectively. When their differences in means were tested for significance of difference between means, we get a t-value of 0.03 which is less than the values for .01 and .05 levels of significance. Hence it is inferred that there is no significant difference in the metacognitive awareness of secondary school students based on their locale.

### **Metacognitive Awareness of Secondary School Students Based on Their Gender**

In order to find out whether the metacognitive awareness of secondary school students vary with the gender, the mean and the standard deviation of the scores on the metacognitive awareness of secondary school students - boys and girls were calculated. To know whether the two groups varied significantly in their scores on the metacognitive awareness, the t-test of non-equivalent groups was administered. The values thus obtained are tabulated below.

**Table 4. Results showing significance of difference between means of scores of metacognitive awareness of secondary school students based on gender**

<b>Gender</b>	<b>Sample Size</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>t-value</b>
<b>Boys</b>	<b>107</b>	110.63	<b>14.67</b>	1.07*
<b>Girls</b>	<b>73</b>	114.30	30.72	

(\* not significant at .01level of significance)

The mean and standard deviation of metacognitive awareness of secondary school boys are 110.63 & 14.67 and that of secondary school girls are 114.30 & 30.72 respectively. When their differences in means were tested for significance of difference between means, we get a t-value of 1.07 which is less than the values for .01 and .05 levels of significance. Hence it is inferred that there is no significant difference in the metacognitive awareness of secondary school students based on Gender.

### **Metacognitive Awareness of Secondary School Students Based on Their Type of Management of Schools**

In order to find out whether the metacognitive awareness of secondary school students vary with type of management of the school, the mean and the standard deviation of the scores on the metacognitive awareness of Government and Aided secondary school students were calculated. To know whether the two groups varied significantly in their scores on the metacognitive awareness, the t-test of non-equivalent groups was administered. The values thus obtained are tabulated below:

**Table 5. Results showing significance of difference between means of scores of metacognitive awareness of secondary school students based on type of management of schools**

<b>Type of School</b>	<b>Sample Size</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>t-value</b>
<b>Government</b>	<b>100</b>	113.41	15.52	0.03*
<b>Aided</b>	<b>80</b>	113.48	<b>13.69</b>	

(\* not significant at 0.01 level of significance)

The mean and standard deviation of metacognitive awareness of Government secondary school students are

113.41 & 15.52 and that of Aided secondary school students are 113.48 & 13.69 respectively. When

their differences in means were tested for significance of difference between means, we get a t-value of 0.03 which is not significant at

0.01 and 0.05 levels. Hence it is inferred that there is no significant difference in the metacognitive awareness of secondary school students based on type of management of the school.

### **Major Findings**

1. The secondary school students are identically distributed among each group in the Metacognitive Awareness.
2. There is no significant difference in the metacognitive awareness of secondary school students based on their locale.
3. There is no significant difference in the metacognitive awareness of secondary school students based on their gender.
4. There is no significant difference in the metacognitive awareness of secondary school students based on type of management of the school.

### **Educational Implications**

1. Metacognitive activities that ask students to reflect on what they know, care about, and are able to do not only help learners to develop an awareness of themselves, but also give valuable information for their instruction.
2. Teachers should know the individual differences in the level of Meta cognitive awareness in a class room and should be given the teaching by taking into consideration their individual differences so that by the effective instruction in the class rooms, their metacognitive ability may enhance well.
3. The study shows that Gender, Locality and Type of Management do not influence the Metacognitive ability of students. So whatever needed are innovative teaching methods and learning activities that arouse and develop the Metacognitive level of students.
4. Metacognitive ability should be developed among school students. Then only they can reflect on their learning methods, their performance in the class room activities and improve their academic achievements accordingly.

### **Conclusion**

Activities that encourage a reflective and strategic stance towards learning should be embedded in the regular activities of a classroom. Such reflective activities are an add-on, which takes away from the ongoing reflection, evaluation, and revision, and being strategic about work. When teachers make aspects of learning and problem-solving visible, and help students identify their own strengths and strategies, they can have a lasting impact on how their students learn once they leave their classrooms.

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