A Study of Metacognitive Skills of Secondary School Students

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Abstract

Through planning activities like learning tasks, monitoring comprehension, and assessing progress toward task completion, metacognition involves active control over the mental processes involved in learning. It is significant for both students and teachers and plays a crucial role in successful learning. The main goal of the current work is to examine secondary school students' metacognitive skills levels. A sample of 240 secondary school students from the Haryana district of Kaithal was randomly selected for this study. The data was obtained using the metacognitive skills (MCSS) scale developed by Madhu Gupta & Suman (2017). The findings indicate that the majority of students 26.25% had average metacognitive skills, followed by above average metacognitive skills at 24.6%, and high metacognitive skills at 16.25% and there is no significant difference in metacognitive skills of students based on their gender and locale.

Keywords: Metacognitive Skills, Metacognition, Secondary School Students.

Introduction:

It is the need of the hour that we should nourish metacognitive skills in order to control person's learning process so that he or she can get a desired level of learning. Only those students can gain their concentration level in learning who are having good metacognitive skills and who can differentiate between relevant or unimportant information. Students with good metacognitive skills know very well how to use the strategies in an effective way in order to keep the information and use it when needed. Students can "learn how to learn" with the support of metacognition, which is frequently referred to as "thinking about thinking". Students who are taught metacognitive techniques have a greater awareness of their own thought processes and are more likely to be engaged, in-depth learners. Some of the words we frequently use in relation to metacognition include metacognitive knowledge, metacognitive experience, metacognitive awareness, metacognitive beliefs, metacognitive talents, and higher-order skills. The portion of students (or a child's or adult's) stored world information that is related to persons as cognitive beings and to their various cognitive tasks, goals, behaviors, and experiences is known as metacognitive knowledge. Metacognition is the ability to analyze one's own thoughts and the techniques they employ. Students are better equipped to comprehend

what they are doing and how to apply the abilities they are learning in various contexts. It is a procedure which helps students in learning, managing, and using their own cognitive capacities.

Metacognition, often known as thinking about one's thinking, was first described by Flavell (1979) as awareness of one's own cognitive processes or related aspect. Metacognition is, in other words, the knowledge and awareness of one's own mental or cognitive processes. Strong metacognitive abilities enable students to enhance their learning processes while some students improve their metacognitive abilities. According to Paul (2009), metacognition helps students learn actively by helping them to comprehend their own learning process, problem-solving stages, and activities without the need for explicit teaching. Students who are strong in metacognitive skills can better comprehend when, why, where, and how to apply their knowledge to solve issues (Carr & Jessup, 1995) and play a crucial part in monitoring and controlling cognitive processes (Chan & Mansoor, 2007). The metacognitive theories of Schraw & Moshman (1995) define metacognition as having two domains: knowledge of cognition and management of cognition. Learning techniques, self-awareness as a learner, and understanding the justification and application of a particular approach are all components of cognition. The ability to organize, monitor, control, and evaluate the learning process is a component of cognition regulation. Student self-regulation abilities can be developed with the use of metacognitive methods, which can also be used to help students think critically about the material being covered in class. The deliberate application of strategies to regulate cognition is referred to as metacognitive skills. According to Brown (1987), cognitive and executive controls work together. Executive control, which is related to metacognitive regulation, consists of planning, resolving conflicts, identifying errors, using working memory, and inhibitive control. Both managing and monitoring are done using it. Metacognitive skills belong to the capability to think in a strategic way and to find out the solution of the problem, to set targets, to systemize different suggestions, proposals and to evaluate the known to unknown things. It also includes the capacity to instruct others and demonstrate one's own thought process. The capacity to reflect on one's own thought processes is known as metacognition. 'Meta' implies beyond, while 'cognition' refers to thinking. Therefore, metacognitive skills require analyzing and controlling your thought processes (Chris Drewivenit, 2023).

Metacognitive Strategies: Students can use metacognitive strategies to increase their awareness of, and quality of, their own learning and thinking. Every time a learner attempts to learn something new, metacognitive strategies are always used. Applying metacognitive strategies helps us learn more effectively. Both our ideas and our behaviors are considerably easier for us to control. By assisting them in focusing their attention and engaging with the information being delivered, this strategy helps learners in enhancing their learning. However, individuals could experience some difficulty employing the most efficient strategy for every sort of learning scenario. Below are a few strategies for students to use: -

Figure 1. Metacognitive strategies

Figure 1 show some metacognitive strategies for the use of the students i.e self-questioning, self-explanation, self-assesment, self-monitoring, self-confidence etc. to enhance future abilities for studying, learning, and thinking.

1. **Self- questioning**: Self- questioning is one of the main strategies of metacognitive to ask questions from your inner self before, during and after learning in order to judge your grasp and progress about that topic which you have learnt. By assisting them in focusing their attention and engaging with the information being delivered, this strategy helps learners in improving their learning. Researcher looked to find out if self-questioning (Alison King, 1991) affected how much students learned. Some self-questioning strategies for using that each student may follow are given below: -

- During the presentation, students can quiz themselves; thereafter, they can interact with their classmates by asking and answering questions. Students can self review the lecture material.
- Students can ask self-questions during and after lectures.
- Students can discuss lecture material in small classmate groups.

Students must first comprehend the value of and the operation of self-questioning before their metacognitive ability may be tested. Then, teachers might provide students with question stems that can be utilized to create useful self-questions as a way of encouraging students to ask themselves questions. Students are prompted by self-questioning to combine newly acquired knowledge with knowledge they have already acquired. This method, which involves giving students lots of time and chances to practice self-questioning while also checking their responses for correctness and understanding, will be beneficial.

2. **Self-Explanation**: This is another metacognitive strategy to explain your ideas for what you want and how you are solving problems. We can better study comprehension processes by using self-explanation and think aloud, which both offer a moving image of reading and metacognitive processes (McNamara, D. S., & Magliano, J. P., 2009).
3. **Self-Assesment**: Self-Assesment is a useful metacognitive strategy for testing yourself on how much do you have learned and how much do you need to learn for reviewing your answers and feedback. Self-assessment has a good effect on students' ability to learn and regulate their behavior (Amy Siegesmund, 2017). Students' capacity for metacognition determines their capacity to successfully self-regulate their learning (Fig. 2). Metacognition is the "awareness of one's own learning or thinking process," according to Merriam-Webster (merriam-webster.com).

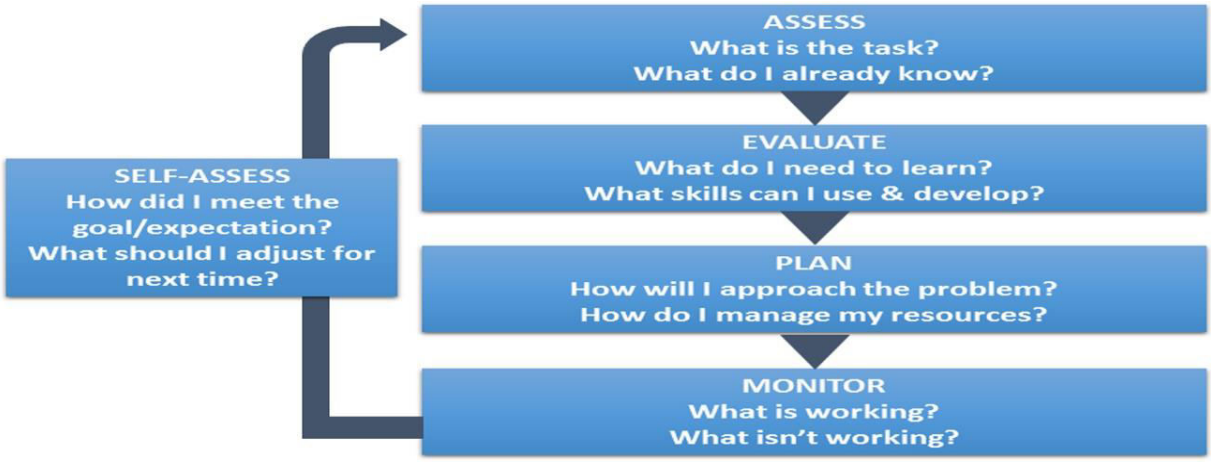

Figure2. Self-Assessment learning cycle's steps and related questions

Students' critical thinking abilities can be improved through the application of metacognitive strategies in the classroom. They can also learn new ways to organize their thoughts while working on schoolwork and learn the value of having a growth mindset. Students access criteria to assess their performance and decide how to improve in a reflective process known as self-assessment. It's critical to distinguish between self-assessment and self-evaluation, where students have a voice in determining their own grades (Andrade, 2007). Student self-evaluation is intended to be formative and help in future performance improvement. Students have the chance to self-reflect and improve their metacognitive abilities using this method. Additionally, it ought to give students an opportunity where they can examine their talents and flaws in a way that gives them confidence. It improves students in comprehending the decisions they make in the classroom. Additionally, learning communities in the classroom, as defined by Siegemund (2017), help students discover more about who they are as learners. Self-assessment in the classroom will assist learners in developing into self-regulated, lifelong learners who are capable of facing any challenge.

4. **Self-Monitoring:-** Self-monitoring is a useful strategy for check students ability to track what they are doing and how or why they are doing it. Self-monitoring is important for all of us, it is especially essential for students. Self-monitoring skills is to improve their awareness of their own strengths and challenges. Self-monitoring strategies provide personalized plans that help adults perform more independently in the social, intellectual, behavioral, and self-help domains. The goal of self-monitoring tools is to improve proper conduct rather than to decrease a student's undesirable behavior. By maintaining a check on themselves, students raised their hands more often, participated in class appropriately, and spoke less throughout class. Self-monitoring helps children become more proficient and productive readers. Parents and instructors may assist learners in understanding what they are reading when they first begin to read for meaning. Students substitute self-monitoring for those external monitors as they improve as readers. They can ask themselves questions like:
    - What will I learn from this and why am I reading it?
    - Do I recognize the information's presentation?
    - Does this relate to what I already know?
    - Do I comprehend the concepts and language? Or do I need to pause so I can look them up or get assistance?
5. **Self-Regulation**:- Self-regulation is a metacognitive strategy that involves managing your time, motivation, emotions, and environment to optimize your learning. Self-regulated learning is defined by Schunk (2007) as "the process by which students activate and regulate their thoughts and actions systematically directed toward achieving of their learning goals." Successful students typically develop the ability to self-regulate how they learn promptly on; they're aware of how, when, and why to use a particular strategy. On the other hand, a lot of learners with difficulties with learning forget to use learning techniques or tend to use the same, frequently ineffective strategy for all academic work. Students can take charge of their learning and become self-aware solve problems with the help of metacognitive skills. When studying, you can be methodical by employing metacognitive skills. You will be able to assess your current knowledge, areas that require improvement, and the most effective strategy for learning new content. The techniques of metacognitive skills, according to Steinbach (2010), include planning, problem-solving, monitoring effectiveness, self-assessment, self-correction, and progress-oriented evaluation. These metacognitive processes are capable of being applied by students while they are learning. Diaz (2015) states that students who struggle to learn and recall new words can benefit from metacognitive skills. This study was qualitative, and participants initially received training in metacognitive skills to help them become aware of learning strategies. Students then participated in a series of five treatments based on the cognitive academic language learning method teaching model. They were taught how to apply the metacognitive abilities of planning,

evaluating, self-questioning, self-explanation, and self-monitoring using these interventions in conjunction with recording their progress. The results demonstrated that training in metacognitive strategies had a favorable impact on participants' vocabulary acquisition abilities by helping them become more aware of particular learning strategies and how to apply metacognitive techniques to improve vocabulary learning. Gourgey (1998) stated that metacognitive skills should encourage students to use their own ideas, own strategies and self-questions. The curriculum should be designed according to the learning level of the students. When student wants learn something new information, it becomes essential to set the events properly with the learning process. It informed them how to learn topic and make them more successful. Thus, to make aware students of his own cognitive process in learning and to demonstrate the information is called metacognitive skill. The idea that this ability is effective in enabling the individual to obtain self-learning skills is the cause for the appearance of metacognition in such a foreground in the learning process (Akpunar, 2011). Suman (2017) conducted a study on academic achievement in relation to meta-cognitive skills learning and thinking styles among higher secondary school students. A sample of 500 students of 9th class was randomly selected from Haryana state. It was concluded that rural male students with low meta-cognitive skills had significantly lower academic achievement than urban male students with low meta-cognitive skills. There was a significant effect of meta-cognitive skills on academic achievement of school students. Rathore & Manju (2018) found that students studying in government schools have good knowledge about cognition as compared of the private ones. Boys and Girls do not have approximate equivalence in their meta-cognition scores, urban area students have good cognition knowledge inspire of rural & government schools students. Narang and Saini (2013) analysis of the collected data further showed knowledge of cognition and regulation of cognition as components of meta-cognition significantly contributed towards the academic performance of rural adolescents. The researcher found that the major proportion of subjects having high level of meta-cognition also preferred above average in academics.

Meta-cognitive skills can be applied to almost any problem or direction, or whenever there is a desire to learn something new. This is critical due to the fact that a lot of students' research on a given problem is the most applicable to that particular problem. Once students have learned meta-cognitive skills, any problem can be solved. In terms of time, training your meta-cognitive abilities can be very environmentally friendly as it can lead to improvements in a variety of subjects. Planning a technique to master is one of the extra critical meta-cognition talents; it's far and away the final approach for self-directed mastering. Unfortunately, making plans isn't always something that comes easily to everyone. Before starting any mastering challenge, time has to be spent making plans for the exceptional technique. Meta cognitive skill is very important for students because they help individuals understand their learning process and how they learn effectively. They have the capacity to focus their study in ways that will help them develop comprehension. They understand how and when to employ strategies. When things are unclear or initially ineffective, they are able to channel the usual irritation that results in greater learning and investigation techniques. This situation sparked the researcher's curiosity in the field of metacognitive abilities. According to the reviews we gathered, students' learning capacity, retention, and achievement are all enhanced by metacognitive skills.

Need and Significance of the study:

It usually happens that sometimes when we do something, we don't know what we are doing. But it's not in our control to improve this process. We get so engaged in that activity that we become unconscious while doing that thing. If the target of schooling is to make students the lifelong learner, then it becomes necessary to make them aware about themselves so that they can control themselves while doing their own

activities. For this reason, majority of students choose to receive metacognitive knowledge and skills from their parents, mentors, peers and particularly from teachers. It is noticed that learners often revealing increase in self-confidence when they start using metacognitive skills. Students who learn metacognitive strategies are more aware of their own thinking and more likely to be active learners who learn more deeply.

Objectives of the study:

The objectives of the present study are: -

1. To study the levels of metacognitive skills of secondary school students.

2. To compare the metacognitive skills of government secondary school students with respect to gender and locale.

Hypotheses:

1. There is no significant difference in the metacognitive skills of government secondary school students with respect to gender.

2. There is no significant difference in the metacognitive skills of government secondary school students with respect to locale.

Operational Definition of Variables:

1. **Metacognitive Skills**: Metacognitive skills defined as the skills of a student in terms of self-planning, self-problem-solving, self-regulation, self- awareness, self-monitoring, self-evaluation, and self-reflection. These are the skills used to understand and analyses learning, especially when it is influenced by education and previous experience. For the purpose of the present study, "meta cognitive skills" has been operationally defined as the score that the investigator got on the "meta cognitive skills scale" (MCSS) developed by Gupta M., and Suman (2017).
2. **Secondary Students:** Students studying in class X are considered as secondary school students.

Sample: A sample of 240 secondary students of district Kaithal of Haryana state was selected randomly. These students were selected from government schools from urban and rural areas. The details of the sample selected for the study is as shown in Table 1 below:-

Table 1. Sample selected for the study

Sr. No.	Name of the School	Locality	Number of Students
1	Government Girls Senior Secondary School, Jakholi Adda Kaithal	Rural	40
2	Government Girls Senior Secondary School, Kaithal	Urban	40
3	Government Senior Secondary School, Choushala	Rural	40
4	Government Senior Secondary School, Kalayat	Urban	40
5	Government Senior Secondary School, Teontha	Rural	40
6	Government Senior Secondary School, Pundri	Urban	40

Delimitations of the study

a) The study is delimited to the Haryana State of Kaithal district only.
b) The study is delimited to only Government high/senior secondary schools affiliated with Haryana School Education Board.
c) The study is delimited to Xth class students.
d) The study is delimited to the variable metacognitive skills.

Tool Used:

Students in secondary schools have their metacognitive skills examined by the Meta Cognitive Skills Scale (MCSS-GMS), which was developed by Dr. Madhu Gupta and Suman (2017). It is a five-point Likert scale with 42 items broken down into the four categories of planning skill, implementing skill, monitoring skill, and evaluation skill. Reliability was determined to be 0.763 and 0.949 using the Test-Retest technique and Split-Half method, respectively. From 0.709 to 0.924 was the range of the scale's construct validity.

Procedure:

A survey strategy has been used for this study as part of a descriptive research methodology. From government secondary schools in rural and urban areas, the researcher chose 40 students from each. The researcher gave the chosen sample of students the Metacognitive Skills Inventory. They received appropriate guidance on how to complete the inventory's responses. Data collection from school students was done with the heads of the institution's separate departments' consent. Before the Instrument was used, the students were told that their data would only be used for research. Students were given the necessary amount of time to record their

responses in the inventory by the researcher. Following administration, the researcher gathered the students' response sheets. The response sheets were given a five-point rating scale by the researcher.

Statistical Techniques: Mean, standard deviation & t-test were calculated for the analysis of present study.

Data Analysis and Interpretation

The percentage of metacognitive skills of 240 students in different level (Very High, High, Above Average, Average, Below Average, Low, Very Low) were calculated. To analyze the data, percentage statistics were used. The obtained values from all 240 students are presented in Table 2.

Table 2: Percentage of secondary students on different levels of metacognitive skills (N=240)

Sr. No	Level of Metacognitive Skills	No. of Students	Percentage of students
1	Very High	20	8.3%
2	High	39	16.25%
3	Above Average	59	24.6%
4	Average	63	26.25%
5	Below Average	35	14.6%
6	Low	9	3.75%
7	Very Low	15	6.25%
Total		**240**	**100%**

Table no. 2 shows us the percentage distribution of secondary school students on different levels of metacognitive skills. Highest percentage of students (26.25%) has average level of metacognitive skills followed by above average level (24.6%). 16.25% of students have high level of metacognitive skills followed by below average (14.6%). 8.3% of students have very high level of metacognitive skills followed by very low (6.25%). 3.75% students have low level of metacognitive skills. From the table, it is clear that majority of the secondary students have Average Metacognitive Skills (26.25%), Above Average Metacognitive Skills (26.25%) while very few percent of students have Low Metacognitive Skills (3.75%) students only.

Hypothesis 1:- There is no significant difference in the metacognitive skills of government secondary school students with respect to gender.

In this section the study of significant difference between the metacognitive skills of girls and boys of secondary students. The student's t-test was applied to test this hypothesis and the obtained results are presented in the following table:

Table 3: Mean, Standard Deviation and t-value of Girls and Boys Secondary Students

Gender	Sample Size	Mean	Standard Deviation	t-value
Girls	112	136.16	14.07	0.149*
Boys	128	130.38	13.68	

(*not significant at 0.01 level of significance)

The above table 3 shows that the mean score and S.D. of girls are 136.16 and 14.07 respectively and the mean score and S.D of boys are 130.38 and 13.68 respectively. The t-value of metacognitive skills between boys and girls is 0.149 which is less than the values for 0.01 and 0.05 levels of significance. So, we accept the null hypothesis that "There is no significant difference in the metacognitive skills of girls and boys of government secondary school students."

Hypothesis 2:- There is no significant difference in the metacognitive skills of government secondary school students with respect to locale.

In order to find out whether the metacognitive skills of secondary school students differ with the locale, mean and standard deviation of the scores on the rural and urban locality were calculated. To analyze the data, t-test were used. The obtained results are presented in the following table:

Table 4: Mean, Standard Deviation and t-value of Girls and Boys Secondary Students

Locality	Sample Size	Mean	Standard Deviation	t-value
Rural	120	130.15	13.57	0.133*
Urban	120	135.95	14.14	

(*not significant at 0.01 level of significance)

Table 4 shows that there is no significant difference in metacognitive skills of rural students and urban students, t = 0.133, even though rural students (M = 130.15, SD = 13.57) and urban students (M =135.95, SD =14.14). Hence it may be assumed that locale does not influence the metacognitive skills of secondary school students; both rural and urban students possess similar levels metacognitive skills.

Major Findings

The main purpose of the present study was to analyze the level of metacognitive skills of secondary students belonging to different types of gender and locale. The major findings of the study are:

1. The study found that the levels of metacognitive skills of secondary school students according to percentage are Average (26.25%), Above Average (24.6%), High (16.25%), Below Average (14.6%), Very High (8.3%), Very Low (6.25%), Low (3.75%). Further, it is found that the percentage of maximum no. of the students have Average Metacognitive Skills (26.25%) while Low Metacognitive Skills (3.75%) students only.

2. There exists no significant difference in the metacognitive skills of secondary school students with respect to gender. This finding is consistent with the findings of Jaleel & Premachandran (2016), Maneesha & Jasim Ahmad (2021).
3. There exists no significant difference in the metacognitive skills of secondary school students on the bases of locale. This finding is consistent with the findings of Sonowal & Kalita (2019), Eriyani (2020) and Acharya (2021).

Educational Implications

In this study, metacognitive skills of secondary school students were studied. The results of the study can improve the education system and use in practical life. This study will help thinkers, psychologists, teachers and others who are concerned with the sphere of education. Using metacognitive skills by the students, they become gain confidence. It will also help to be active learners of their own learning. Teacher training programmed should include self-regulated learning strategies which enable the teachers to teach effectively. It will also help teachers developed on their learning methods, their performance in the class room activities of students. The curriculum should be designed according to the learning level of the students. So, metacognitive skills will help teachers learn information quickly and retain information for their educational or professional development. Students who have low meta-cognitive skills, Schools should promote the classroom activities which help students to analyze the content they are learning and reflect on the learning process. The regular classroom activities should include exercises that promote a strategic and reflective approach to learning. Teachers can have a significant impact on how their students learn by making elements of learning and problem-solving visible and by helping students understand their own strengths and solutions.

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