Metacognitive Awareness Inventory (MAI) Students in Online Learning

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Abstract: This study is a descriptive qualitative study that aims to describe the Metacognitive Awareness Inventory (MAI) of online learning students. This study's sample size was 236 students. The sampling technique used is non-probability sampling of the convenience type. In this study, data is gathered through the use of a questionnaire. The data was analyzed by calculating the score and percentage of each statement item. The calculation data is then described per aspect and indicator to produce a representative conclusion. The findings revealed that students' metacognitive regulation was metacognitive knowledge in online learning.

Keywords: Metacognitive Awareness Inventory, Students, Learning, Online

The world has been plagued by the Covid-19 pandemic since the beginning of 2020. This condition causes significant changes in various community life structures, one of which is the world of education (Giatman, Siswati, & Basri, 2020). To prevent the spread of the disease, schools and universities were temporarily closed. The government then decided to replace traditional learning with online learning from home (Febrianto, Mas'udah, & Megasari, 2020; Giatman et al., 2020).

By utilizing technology assistance, media and learning systems are beginning to shift from traditional learning to cutting-edge learning processes. Educators strive to incorporate digital learning media so that they can be more creative, and the learning becomes more effective and applicable (Febrianto et al., 2020).

Online learning is a type of learning that is used today in which learning can take place without the need for face-to-face interaction. Online learning has its own set of benefits. One of them is adaptability, which allows teachers and students to set their own learning pace through online learning. Furthermore, teachers and students can plan their schedules based on their respective agendas (Hamid, Sentryo, & Hasan, 2020).

Online learning has both advantages and disadvantages in the world of education, particularly in universities. Universities with the ability to use high-quality technology will be able to easily adapt to the implementation of online learning. The opposite occurs in universities that are not yet ready. Many universities find it difficult to implement online learning. Their students are not prepared to make the transition from traditional learning to online learning quickly (Giatman et al., 2020). It is feared that this will have a negative impact on student academic achievement.

Metacognitive awareness is an important aspect of the learning process. Metacognitive awareness is critical not only for elementary and middle school students, but also for students at higher levels (Panchu, Bahuleyan, K, & Thomas, 2016). Metacognition is a fundamental ability that every student must possess and develop because it is one of the most important indicators in teaching and learning activities (Aglina, Rohmatillah, & Syamsiah, 2020; Novia, Kaniawati, Rusli, & Rusdiana, 2019). Metacognition is the cognitive ability required for profound and meaningful learning (Novia et al., 2019). As a result, metacognition is an important aspect of student intelligence (Hamid et al., 2020). Metacognition is also crucial because it is one of the factors that influence academic performance and success (Novia et al., 2019).

If the online learning is of high quality, students' metacognitive awareness will grow. Unfortunately, this has not occurred optimally. Students believe that the online learning implementation during the Covid-19 period was ineffective (Hamid et al., 2020). There are also

teachers who are less capable of incorporating online media into the learning process (Febrianto et al., 2020).

Online learning necessitates the use of high-quality information technology infrastructure (Azmi & Rukun, 2020). Teacherrs and students must be well-versed in the principles and methods of online learning. As a result, the occurrence of chaos in the online learning process at the start of this pandemic period is, of course, normal (Murphy, 2020).

The above explanation of theory and facts implies the significance of research on students' metacognitive awareness in online learning. Two important study materials to identify are metacognitive awareness and online learning. Awareness of metacognition is an important indicator in the teaching and learning process (Ramdani, Syukur, Gunawan, Permatasari, & Yustiqvar, 2020). Students are still in the process of learning and making assumptions about what they have learned thus far. Because students have varying levels of metacognitive awareness (Panchu et al., 2016). Students with a high level of metacognitive awareness will improve significantly and faster if theoretical and practical studies can be conducted to determine the most effective components associated with the increase (Masoodi, 2019).

Several researchers have previously conducted research on metacognitive awareness and online learning. A number of studies have found that metacognition is critical in learning. This is due to the fact that metocognition influences how students apply what they have just learned to their knowledge. The learning process encourages awareness of the learning and thinking processes (Novia et al., 2019).

There is also metacognition research that looks at metacognition, particularly in language skills. Hou (2015) discovered that metacognitive awareness influenced text comprehension but had no effect on reading comprehension. Furthermore, research Aglina, Rohmatillah, & Syamsiah (2020) indicates that metacognitive awareness plays an important role in improving students' writing performance by reducing anxiety during writing activities.

Ramdani et al. (2020) create integrated inquiry-based teaching materials in the areas of Science, Environment, Technology, and Society (SETS). This teaching material is thought to be an effective method for increasing students' metacognitive awareness. There is also research that

shows an increase in metacognitive awareness after learning self-assessment skills (Savira & Laksmiwati, 2017). Masoodi (2019) also investigates problematic areas in metacognitive awareness and determines what types of metacognitive knowledge and regulatory skills can be useful and required while learning.

Many previous researchers have also conducted research on online learning. According to El-Seoud, Taj-Eddin, & Seddiek (2014), using interactive e-learning features increases student motivation in the learning process. Megan (2015) discovered that various universities are attempting to increase their resources by developing the digital skills of prospective graduates through learning media. Social media can be used to establish a positive online reputation and increase your chances of finding work after graduation. This implies that students are prepared for knowledge skills as well as mastery of technology and information in order to apply that knowledge.

There's also research on how people react to online learning. According to Hamid et al. (2020), the level of student dissatisfaction with online learning was relatively high during the covid-19 period. Many factors influence this, including teacherrs' lack of preparation in carrying out learning. This is due to the fact that most teacherrs still use face-to-face learning. According to Giatman et al. (2020), in order to improve the quality of better learning outcomes, network infrastructure must be improved, instructional learning with teacherrs must be improved, and credit subsidies must be provided to students.

This study aims to investigate and describe students' Metacognitive Awareness Inventory (MAI) in online learning. This research will certainly be important in providing an overview of students' metacognitive awareness in online learning that is currently being carried out, where students do not have face-to-face meetings with teacherrs. This will be useful for teacherrs in making decisions regarding appropriate learning strategies to be used in online learning so that they can be carried out optimally according to the conditions of students.

METHOD

Research Design

This research is a descriptive quantitative research. This study aims to describe the Metacognitive Awareness Inventory (MAI) of students in online learning. The sample in this study

were 236 students. The sampling technique used is non-probability sampling with the type of convenience sampling. Sampling was carried out by taking student closest to the researcher, both close to regional reach and online access.

Data collection technique in this study was through the MAI questionnaire sourced from Gregory Schraw & Dennison (1994). The questionnaire contains 52 closed statements. In the questionnaire there are 2 answer choices, namely true or false. Respondents will answer true if they feel that the statement is experienced and answer false if they feel that the statement is not experienced. The true answer will be given a score of 1 and the false answer will be given a score of 0.

Data analysis was carried out by calculating the score and percentage of each statement item. The calculation data is then described per asoect and per indicator to get a representative conclusion.

RESULT AND DISCUSSION

Result

Overall, cognitive regulation obtained higher results than cognitive knowledge. Cognitive regulation has an average percentage of 86% while cognitive knowledge has an average percentage of 83%.

In the aspect of cognitive knowledge, conditional knowledge has very high results (85%). The lowest percentage is on declarative knowledge (82%). The order of the highest results to the lowest on cognitive knowledge are: (1) Conditional knowledge, (2) Procedural knowledge, (3) Declarative knowledge.

In the aspect of cognition regulation, the debugging strategy has a very high yield (92%). The lowest percentage is the information management strategy (83%). The order of the highest to lowest results on cognition regulation are: (1) Debugging strategy, (2) Planning, (3) Knowledge monitoring, (4) Evaluation, (5) Information management strategy.

If we look more specifically at each statement item, the largest percentage (96%) is in the aspect of cognition regulation. The largest percentage gain is found in 3 statements, namely each on the indicators of planning, information management and debugging strategy. The first statement is a statement that indicates that students think about what they really need to learn before starting to do the assignment. The second statement is a statement that indicates that students pay close attention when they find important information. The

third statement is a statement that indicated that students asked others for help when they did not understand something and students reevaluated their assumptions when they were confused.

The smallest percentage gain overall, which is 64%, is in the aspect of cognitive regulation, especially in the indicators of information management strategy. The statement indicates that students draw a diagram to help them understand when learning. This means that there are still quite a lot of students (36%) of students who do not use a diagram to help them understand what they are learning when they are studying.

Metacognitive Awareness Inventory (MAI) on Cognitive Knowledge Aspect

This aspect consists of three indicators, namely declarative knowledge, procedural knowledge and conditional knowledge. In this aspect, the largest percentage gain (94%) was on indicators of declarative knowledge, especially on statements indicating that they learn more when they are interested in the topic. The smallest gain (69%) is also found in the declarative knowledge indicator, especially in statements indicating that students are good at organizing information. The following describes the explanation of student responses per aspect in more detail.

Table 1. Responses to Aspect of Knowledge about Cognition : Declarative Knowledge

Item	Pernyataan	Total Skor	Persentase (%)
5	I understand my intellectual strengths and weaknesses	217	92
10	I know what kind of information is most important to learn	212	90
12	I am good at organizing information	162	**69**
16	I know what the teacher expects me to learn	197	83
17	I am good at remembering information	168	71
20	I have control over how well I learn	183	78
32	I am a good judge of how well I understand something	184	78
46	I learn more when I am interested in the topic	222	94
	Rata-rata	**193**	**82**

Table 1 shows that the highest percentage (94%) is on the declarative knowledge indicator, namely the statement indicating that students learn more when they are interested in the topic. The results that are not much different (92%) are in statements indicating that students understand their

intellectual strengths and weaknesses. The lowest percentage (69%) is in the statement which indicates that students are good at organizing

Table 2. Responses to Aspect of Knowledge about Cognition : Procedural Knowledge

Item	Pernyataan	Total Skor	Persentase (%)
3	I try to use strategies that have worked in the past	187	**79**
14	I have a specific purpose for each strategy I use	207	**88**
27	I am aware of what strategies I use when I study	197	83
33	I find myself using helpful learning strategies automatically	187	**79**
	Rata-rata	**195**	**82**

Table 2 shows that the largest percentage (88%) is in statements indicating that students have specific goals for each strategy they use. The lowest percentage (79%) is in the two statements. The first statement indicates that students often try to use powerful strategies. The second statement indicates that students use learning strategies that help automatically. This states that there are still 21% of students who have not often tried to use powerful strategies. In addition, there are also 21% of students who have not used learning strategies that help automatically.

Table 3. Responses to Aspect of Knowledge about Cognition : Conditional Knowledge

Item	Pernyataan	Total Skor	Persentase (%)
15	I learn best when I know something about the topic	211	89
18	I use different learning strategies depending on the situation	202	86
26	I can motivate myself to learn when I need to	212	**90**
29	I use my intellectual strengths to compensate for my weaknesses	201	85
35	I know when each strategy I use will be most effective	179	**76**
	Rata-rata	**201**	**85**

Table 3 shows that the largest percentage (90%) is in statements indicating that students can

information. This means that there are still 31% of students who feel they have not been able to organize information properly.

motivate themselves to learn when they need it. A not very significant difference (89%) is found in the statement which indicates that students learn very well when they know something about the topic. The lowest percentage (76%) was in statements that indicated students knew when each strategy they used would be the most effective. This explains that there are still 24% of students who do not know when the strategy they use will be the most effective.

Metacognitive Awareness Inventory (MAI) on Regulation on Cognition Aspect

This aspect consists of five indicators, namely: (1) Planning; (2) Information management strategy; (3) Monitoring understanding; (4) Debugging strategy, and (5) Evaluation. The largest percentage gain (96%) was found in three statements, namely each on indicators of planning, information management and debugging strategy. The first statement is a statement that indicates that students think about what they really need to learn before starting to do the assignment. The second statement is a statement that indicates that students pay close attention when they find important information. The third statement is a statement that indicates that students ask for help from others when they do not understand something and students reevaluate their assumptions when they are confused.

The smallest percentage gain, which is 64%, is in the information management strategy indicator. The statement indicates that students draw a diagram to help them understand when learning. This indicates that there are still quite a lot of students (36%) of students who do not use a diagram to help them understand what they are learning when they are studying.

Table 4. Responses to Aspect of Regulation of Cognition : Planning

Item	Pernyataan	Total Skor	Persentase (%)
4	I pace myself while learning in order to have enough time	206	87
6	I think about what I really need to learn before I begin a task	226	**96**
8	I set specific goals before I begin a task	204	86
22	I ask myself questions about the material before I begin	198	**84**

23	I think of several ways to solve a problem and choose the best one	218	92
42	I read instructions carefully before I begin a task	222	94
45	I organize my time to best accomplish my goals	213	90
Rata-rata		**212**	**90**

In table 4 it can be seen that the largest percentage (96%) is in statements indicating that students think about what they really need to learn before starting to work on assignments. A not very significant difference (94%) was found in the statement which indicated that students read the instructions carefully before doing the assignment. The lowest percentage (84%) is found in statements indicating that students ask themselves about a material before they study. This states that there are still 16% of students who start learning activities without first asking themselves about the material they are going to learn.

Table 5. Responses to Aspect of Regulation of Cognition : Information Management Strategies

Item	Pernyataan	Total Skor	Persentase (%)
9	I slow down when I encounter important information	227	**96**
13	I consciously focus my attention on important information	200	85
30	I focus on the meaning and significance of new information	204	86
31	I create my own examples to make information more meaningful	184	78
37	I draw pictures or diagrams to help me understand while learning	152	**64**
39	I try to translate new information into my own words	211	89
41	I use the organizational structure of the text to help me learn	191	81
43	I ask myself if what I'm reading is related to what I already know	213	90

47	I try to break studying down into smaller steps	191	81
48	I focus on overall meaning rather than specifics	177	75
Rata-rata		**195**	**83**

Table 5 shows that the largest percentage is in statements indicating that students pay close attention to the important information they find. The lowest percentage (64%) was in statements indicating that students drew a diagram to help them understand what they were learning. This means that there are still quite a number of students (36%) who do not use diagrams to help them understand what they are learning.

Table 6. Responses to Aspect of Regulation of Cognition : Comprehension Monitoring

Item	Pernyataan	Total Skor	Persentase (%)
1	I ask myself periodically if I am meeting my goals	199	84
2	I consider several alternatives to a problem before I answer	224	**95**
11	I ask myself if I have considered all options when solving a problem	193	82
21	I periodically review to help me understand important relationships	213	90
28	I find myself analyzing the usefulness of strategies while I study	182	**77**
34	I find myself pausing regularly to check my comprehension	212	90
49	I ask myself questions about how well I am doing while learning something new	210	89
Rata-rata		**205**	**87**

In table 6 it can be seen that the largest percentage (95%) is in statements which indicate that students consider several alternatives before they answer. The lowest percentage (77%) was found in statements indicating that students analyzed the usefulness of strategies while they were studying. This means that there are still 23% of students who do not analyze the usefulness of strategies when they study.

Table 6. Responses to Aspect of Regulation of Cognition : Debugging Strategies

Item	Pernyataan	Total Skor	Persentase (%)
25	I ask others for help when I don't understand something	227	**96**
40	I change strategies when I fail to understand	216	92
44	I re-evaluate my assumptions when I get confused	227	**96**
51	I stop and go back over new information that is not clear	205	**87**
52	I stop and reread when I get confused	209	89
	Rata-rata	**217**	**92**

This indicator obtained very positive results when compared to other indicators. Table 7 shows that the largest percentage (96%) is in two statements. The first statement is a statement that indicates that students ask for help from others when they do not understand something. The second statement indicated that students reevaluated their assumptions when they were confused. The lowest percentage (87%) was found in statements indicating that students stopped and re-examined new information that was not clear. This means that there are still 13% of students who do not pay close attention to new information that is not clear.

Table 7. Responses to Aspect of Regulation of Cognition : Evaluation

Item	Pernyataan	Total Skor	Persentase (%)
7	I know how well I did once I finish a test	198	84
19	I ask myself if there was an easier way to do things after I finish a task	209	89
24	I summarize what I've learned after I finish	171	**72**
36	I ask myself how well I accomplish my goals once I'm finished	218	**92**
38	I ask myself if I have considered all options after I solve a problem	197	83
50	I ask myself if I learned as much as I could have once I finish a task	204	86
	Rata-rata	**200**	**84**

Table 8 shows that the largest percentage (92%) is in statements indicating that students ask themselves how well they achieved their goals after they finished studying. The lowest percentage (72%) is on statements indicating that students summarize what they have learned after they finish studying. This states that there are still 28% of students who do not carry out activities to summarize what they have learned after they study.

Discussion

Overall the results obtained are very good. This indicates that students' metacognitive awareness in online learning is very good. Masoodi (2019) states that metacognition is easy to form, especially at a relatively older age, both in conventional classes and online classes.

Cognitive regulation obtains better results than cognitive knowledge. This finding is consistent with Anumudu, Adebayo, Gboyega-Tokunbo, Awobode, & Isokpehi, (2019) who found that metacognitive regulation scores higher than metacognitive knowledge. There are also studies that get results that are in contrast to this study. Research Panchu et al. (2016) is a study conducted before the Covid-19 pandemic where the majority of learning was carried out conventionally. This research was conducted during the Covid-19 pandemic where learning was carried out online. Thus it can be stated that in online learning, the regulation of cognition is found to be better than knowledge of cognition.

This study found that online learning also made a positive contribution to students' metacognitive awareness. This is because e-learning provides a highly structured context that engages students successfully and supports their attainment of skills, problem solving, and teamwork. By using various platforms and social media, teachers and lecturers can provide various assignments (Kirkwood & Price, 2013). This condition certainly further trains students' metacognitive awareness. The more students are given tasks or problem solving activities, the more their cognitive awareness increases. This is because there is a positive correlation between metacognitive awareness and problem solving skills (Dulger & Bekiroglu, 2018).

A high score on the self-assessed Metacognitive Awareness Inventory (MAI) scale directly indicates that students will rate themselves very well in their ability to control their own abilities in the learning process (Anumudu et al., 2019). This can be seen from the responses of most of the students who rated them very well.

In the aspect of cognitive knowledge, conditional knowledge has very high results (85%). The lowest percentage is on declarative knowledge (82%). Order of highest to lowest results on cognitive knowledge, namely: (1) conditional knowledge, (2) procedural knowledge, (3) declarative knowledge.

In the aspect of cognition regulation, the debugging strategy has a very high yield (92%). The lowest percentage is the information management strategy (83%). The order of the highest to lowest results on cognition regulation are: (1) Debugging strategy, (2) Planning, (3) Knowledge monitoring, (4) Evaluation, (5) Information management strategy. This finding is different from Masoodi (2019) who found that evaluation was found to be better than the debugging strategy. Masoodi (2019) stated that students did not use adequate strategies to correct conceptions and errors in their learning process. In online learning found the opposite. Students can use strategies to better correct their understanding and mistakes.

The debugging strategy obtained excellent results on cognitive regulation. The debugging ability of students always increases from year to year. Students increasingly understand what to do when they face difficulties (Anumudu et al., 2019).

Students do not allocate enough time for various activities that require more application of different strategies (Masoodi, 2019). This is in line with the findings in this study where the statement "I analyze the usefulness of strategies as I learn" obtained the lowest results in the aspect of understanding monitoring. This fact shows that there are still many students who do not focus too much attention on the strategies used in learning.

If students face more demanding tasks, they can be more active metacognitively (Masoodi, 2019). This activity can be seen where a lot of students (95%) stated that they considered several alternatives before they answered the questions. The alternatives they make are facts that explain their activity.

Neither students nor students with low metacognition can self-monitor performance or use information to determine task difficulty. Both students and academically successful students use metacognitive strategies, identify their goals, and are able to monitor and self-assess (Hong et al., 2015; Schraw, 1998; Schellenberg et al., 2011). Individuals with high metacognitive awareness are better at planning, managing information, monitoring, identifying errors, and evaluating compared to individuals with low metacognitive awareness (Tosun & Senocak, 2013).

CONCLUSION

Metacognitive Awareness Inventory (MAI) of students in online learning is very good. Cognitive regulation of students obtained higher results than cognitive knowledge. The increasing number of assignments given in online learning encourages students to increasingly recognize their abilities and how they manage and evaluate their learning.

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