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Description of Metacognitive Awareness of Chemistry Education Students on Basic Chemistry Teaching Skill

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Keywords

Metacognitive Awareness, Chemistry Education, Basic Teaching Skills

Abstract

This study seeks to describe the metacognitive awareness of prospective chemistry teacher students in learning. This study aims to describe the metacognitive awareness of chemistry education students in the basic ability to teach chemistry subject. This type of research is descriptive research with a quantitative approach. This research questionnaire is a modified MAI instrument. The result of the validity test and reliability test of the instrument found that 50 of the 52 MAI instrument statements were valid (the reproducibility coefficient value was 0,90 and the scalability coefficient value was 0,79) and quite reliable (with a value of (0,458). The results of the research data analysis showed that the overall proportion of students' metacognitive awareness was 82,825% in the good category. This indicates that students are aware of their own thinking and can distinguish the stages of elaboration input and output of their own thoughts.

Introduction

Metacognitive knowledge is a new dimension of knowledge in the revised taxonomy. According to Anderson & Krathwhol (2001), knowledge metacognition is the highest level aspect of knowledge in Bloom's Taxonomy after factual, conceptual,

and procedural. Metacognitive knowledge is knowledge about cognition in general and awareness of and knowledge about one's own cognition (Anderson & Krathwhol, 2010).

According to Flavell (1979), metacognition is described as 'thinking about thinking' which means thinking about their own thinking (Zulfiani et al., 2018). Metacognition is a person's awareness of how he learns, the ability to assess the difficulty of a problem, the ability to observe his level of understanding, the ability to use various information to achieve goals, and the ability to assess his own learning progress (Indarini et al., 2013). Metacognition can be improved if prospective teacher students have excellent metacognitive awareness.

Metacognitive awareness is awareness of the ability to think in carrying out cognitive processes (Sugiharto et al., 2020). Metacognitive awareness is an ability that can support one's success in learning. Metacognitive awareness is a very important aspect for prospective teachers to have because, with metacognitive awareness, a teacher can later guide students well and process the learning process appropriately in order to meet the demands of the 21st century.

The definition of the 21st century, according to Makrakis and Kostoula-Makrakis in their study, takes as its starting point the basic skills "4C" (critical thinking, collaboration, communication and creativity) (Hairida et al., 2021). These skills can train students to be ready to face the world of society, 21st century through learning in everyday life. According to Hampson et al.,(in Hairida et al., 2021) improving 21st century skills in students is influenced by teachers. Teachers are an important factor in the success of education. Therefore, teachers need to design and implement the right learning model or learning strategy (Mahanal, 2017). Teachers need to make changes to learning that can improve student skills in the 21st century. Teachers need to have the knowledge and ability to deliver material (Hairida et al., 2021). Thus, basic teaching skills are one of the abilities that must be mastered by prospective chemistry teacher students.

The basic teaching skills course is one of the compulsory courses in the chemistry education study program. This course presents theories about basic teaching skills. There are eight basic teaching skills: opening and closing skill, explaining skills, questioning skills, reinforcement skills, variety skills, small group discussion skills, class management skills and small group and individual teaching skills (Sutrisno, 2019). But that's not all that is learned in the basic chemistry teaching skills course. Prospective chemistry teacher students also learn about assessment skills and skills in developing learning scenarios.

Studying all the material on the basic skills of teaching chemistry requires prospective chemistry teacher students to be able to deepen their understanding of chemistry knowledge. Have a way or strategy to access knowledge and new information and be able to practice basic teaching skills. Thus, the metacognitive awareness of prospective chemistry teachers plays an important role in understanding

and mastering basic chemistry teaching skills. Because of metacognitive awareness, prospective student teachers can realize their ability to master the concepts of basic teaching skills, choose the right learning strategy, monitor what is understood and not understood, determine when and how to use the chosen strategy so that it is effective, have the skills in planning and organizing needed to complete tasks in a timely manner, know the weaknesses and strengths in mastering basic teaching skills, and can evaluate themselves after carrying out the learning process in class. This is in line with the opinion of Fathiah (2022) that it is important for tachers to train metacognitive awareness so that they can apply metacognitive ability in teaching and learning (Fathiah & Mahmud, 2022). According to Pintrich (in Ulfah et al., 2013), the more students know about the learning and thinking process, the greater the metacognitive awareness in themselves, so the better the learning process and achievement will be achieved. Thus, metacognitive awareness is very important to assess because it can support the success of prospective teacher students in the lecture process (Angraini et al., 2021).

Assessment of prospective teachers' metacognitive awareness can be done using the MAI instrument developed by Schraw & Dennison in 1994. The MAI instrument covers all aspects of metacognition, which consist of two major parts: knowledge about cognition (consisting of declarative knowledge, procedural knowledge, and conditional knowledge) and control or regulation of cognition (consisting of planning, information management strategy, comprehension monitoring, debugging strategy, and evaluation) (Abdullah & Soemantri, 2018).

The difference between this research and previous research lies in analyzing the metacognitive awareness of chemistry education students in chemistry teaching basic skills courses (Wardana et al., 2020; Angraini et al., 2020; Sitompul, 2022). In addition, there has been no research on the metacognitive awareness of prospective chemistry teacher students in these courses. Research on metacognitive awareness in basic chemistry teaching skills courses seeks to describe the metacognitive awareness of prospective chemistry teacher students in their learning. Thus, this study aims to describe the metacognitive awareness of chemistry education study program students who have participated in learning in the chemistry teaching basic skills course.

Method

Research design

The research adopts the type of description research with a quantitative approach. This study aims to describe the metacognitive awareness of chemistry education students in the basic skills of teaching chemistry by using percentages on each indicator of metacognitive awareness.

Research sample

The subjects in this study were all chemistry education study program students who had taken the chemistry basic teaching skills course. The students in question are 2020 batch students, totaling 42 people. These subjects were chosen because they had not participated in PPL II and had taken the course under study.

Research procedure

Instruments used in the study are the Metacognitive Awareness Inventory (MAI) instrument developed by Schraw & Dennison (1994). The instrument consists of 52 statements spread into two components: knowledge about cognition (consisting of declarative knowledge, procedural knowledge, and conditional knowledge) and control or regulation cognition (consisting of planning, information management strategy, comprehension monitoring, debugging strategy, and evaluation) (Abdullah & Soemantri, 2018).

The MAI instrument was translated into Indonesian and adapted to the needs of the study. Then, the instrument was validated by the validators. The validation results showed that the instrument was in the valid category with a value of 1. Then, validity and reliability tests were carried out by distributing questionnaires to respondents. The results of the validity test and reliability test of the instrument were 50 valid instrument statements (obtaining the Kr value, or reproducibility coefficient, of 0,90 and the Ks value, or scalability coefficient, of 0,79) and quite reliable (with a value of 0,458), where the instrument consisted of 26 positive statements and 24 negative statements. Scoring of the MAI instrument is guided by a Guttman scale with “true” and “false” options. The scoring of respondents’ answers in the MAI instrument is as follows:

Table 1. Scoring of Questionnaires with Guttman Scale

Statement Positive	Statement Negative	Score
True	False	1
False	True	0

The metacognitive awareness instrument that has gone through a series of validity and reliability tests is packaged in the form of a Google Form and then distributed online via the WhatsApp application. The metacognitive awareness data obtained is then processed using the Microsoft Office Excel 2016 application.

Data analysis

Metacognitive awareness data obtained after being filled in by the research subject will be separated based on metacognitive indicators. Then, calculated using the formula below:

$$\text{Score} = \frac{\text{Score Total Actual Indicator}}{\text{Score Total Ideal Indicator}} x\ 100$$ (Sitompul, 2022)

The results of the calculation of each indicator of metacognitive awareness are then categorized based on the table below:

Table 2. Metacognitive Awareness Category

Interval Score	Level	Category	Description
0-16	0	Not Yet	Not yet leading to cognition
17-33	1	At-risk	Appears to have no awareness of thinking as a process
34-50	2	Can not really	Unable to separate what one thinks from how one thinks
51-67	3	Developing	Can be helped toward awareness of own thinking if prompted or supported
68-84	4	OK	Is aware of his own thinking and can distinguish the input elaboration and output of his own thoughts. Sometimes they use this model to organize her own thinking and learning.
85-100	5	Super (Very good)	Able to use metacognitive skills regularly to organize their own thinking and learning process. Aware of many kinds of thinking possibilities, able to use them fluently and reflect on the process thinking.

(Source: Adapted from Green in Ulfah et al.,2013; Tibrani, 2017)

Results and Discussion

Results

The metacognitive awareness of chemistry education students in the basic skills of teaching chemistry is identified in the data obtained from the metacognitive awareness questionnaire, which has been distributed to 42 students in class 2020 through Google Form. The questionnaire distributed consists of 8 indicators of metacognitive awareness, which are translated into 50 statements and filled out by students.

Metacognitive awareness data collection starts on April 10, to May 8, 2023. The following is an explanation of the percentage of metacognitive awareness of chemistry education study program students in the basic chemistry teaching skills course:

Table 3. Overview of Metacognitive Awareness of Chemistry Education Students Class of 2020

Dimensions	Indicator	%Score	Category
Knowledge Metacognitive	Declarative Knowledge	84,2	OK
	Procedural Knowledge	90,5	Super
	Conditional Knowledge	85	Super
Regulation Metacognitive	Planning	81	OK
	Information Management Strategy	82,4	OK

	Comprehension Monitoring	76,5	OK
	Debugging Strategy	80	OK
	Evaluation	83	OK
Overall Average			
Metacognitive Awareness		82,825	OK

Table 3. shows that the percentage of metacognitive awareness is in the good category (OK) with a percentage of 82,825 %. Means that chemistry education students who have taken a basic chemistry teaching skills course have good metacognitive awareness. Students are aware of their own thinking and can distinguish the stages of elaboration, input, and output of their thoughts on their own. Sometimes they use this model to organize their own thinking and learning.

Discussion

The following is a presentation of the percentage of each indicator of metacognitive awareness of chemistry education students class of 2020:

Declarative Knowledge

The indicator first in metacognitive knowledge is declarative knowledge. According to Lai (in Asy'ari et al., 2018), declarative knowledge is knowledge about oneself as a learner. Declarative knowledge in learning the basic skills of teaching chemistry is the ability of students to understand the basic skills of teaching chemistry based his own knowledge and skills while learning basic teaching skills material. The percentage of metacognitive awareness on declarative knowledge indicators can be seen in Table 4 below:

Table 4. Declarative Knowledge Indicator

No	Statement	Actual Score	Ideal Score	Percentage (%)
1	I understand my strengths and weaknesses in master all basic skill materials.	41	42	97,6
2	I don't know the most important type of information in basic teaching skills materials to learn.	34	42	81
3	I am not good at managing the information obtained during following learning ability basic chemistry teaching skills.	31	42	73,8
4	I don't know what the lecturer expects me to learn in the basic teaching skills course chemistry.	40	42	95,2
5	I can't remember the material well learned in the basic chemistry teaching skills course.	25	42	59,5
6.	I am able to control how well I study in each basic teaching skill material.	34	42	81
7	I am able to assess my ability to understand the material basic teaching skills.	39	42	93

8	I learn more when I am interested in learn basic teaching skills.	39	42	93
Average Indicator		84,2		

Based on the table above, the declarative knowledge of chemistry students is in the good category (OK) with a percentage score of 84,2 %. The student is aware of his own thinking and distinguish the stages of elaboration input and output of his own thoughts. Sometimes they use this model to organize their own thinking and learning. However, there are some students who cannot remember the basic teaching skills material well. This is evidenced by the low percentage of scores obtained in statement 5, namely "I cannot remember well the material that has been learned in the basic chemistry teaching skills course" of 59,5 %. This means that the material has been learned not stored in the long term memory is likely due to a lack of understanding of the material and not connecting new information with existing information. This is in line with the opinion of Putranto & Fahuzan (2017), who say that information is stored in long term memory by interpreting the information received and then understanding the information (Putranto & Fahuzan, 2017). Thus, students need to realize how good they are as a learner, factors that effect the learning process and memory, skills and strategies and know what to do in the task (Asy'ari et al., 2018).

Procedural Knowledge

Procedural knowledge is an indicator related to the selection of strategies or methods in the problem solving process or knowing how to use these strategies (Angraini et al., 2021; Asy'ari et al., 2018). Procedural knowledge in learning skills the basic of teaching chemistry is the ability of students to choose the right learning and problem-solving strategies in learning. The percentage of metacognitive awareness on procedural knowledge indicators can be seen in Table 5 below:

Table 5. Procedural Knowledge Indicator

No	Statement	Actual Score	Ideal Score	Percentage (%)
9	I tried the strategies that I had used in completing the lesson plan assigment given by the lecturer.	42	42	100
10	I don't have a specific goal for each strategy that I used in the completion of the learning scenario assigment across all basic teaching skills materials.	38	42	90,5
11	I don't know what strategies I used while studying in the basic chemistry teaching skills course.	34	42	81
12	I am able to choose the right learning strategy to improve my understanding of the skills material the basic of teaching chemistry.	38	42	90,5
Average Indicator		90,5		

The procedural knowledge of chemistry education students is in the very good category (super) with a percentage score of 90,5 %, where these students are able to

use metacognitive skills regularly to regulate their own thinking and learning process. Aware of the many kinds of thinking possibilities, able to use them smoothly and reflect on their thinking process. This is evident in the actual scores obtained, where most students kno the strategies and how to use these strategies in learning basic teaching skills. However, it does not rule out the possibility that there are also some students who do not know what strategies are used during learning in the basic chemistry teaching skills course, do not have a specific purpose for each strategy used in solving the problem tasks and unable to choose appropriate learning strategies.

Conditional Knowledge

According to the opinion of Novita, Widada & Haji (2018), conditional knowledge is knowledge about when to usea procedural, strategy or skill and when not to use it, why procedures can be used and under what conditions, and why these procedures are more appropriate than other procedures (Tanti et al., 2018). Conditional knowledge in learning basic teaching skills is the ability of students to choose the right strategy, both in the learning process and problem solving in very condition. The following is a description of the percentage of students' metacognitive awareness on the conditional knowledge indicator.

Table 6. Conditional Knowledge Indicator

No	Statement	Actual Score	Ideal Score	Percentage (%)
13	I did not study well even though I knew about the topic of basic teaching skills.	34	42	81
14	I always use different strategies depending on the conditions when doing assigments in the course basic teaching skills.	31	42	73,8
15	I can motivate myself to learn skill materials teaching basic when needed.	39	42	93
16	I never use my intellectual abilities to cover my shortcomings in learning basic chemistry teaching skills.	34	42	81
17	I can know that the strategies I use can give effective results when I present assignment given by the lecturer.	40	42	95,2
Average Indicator		85		

Conditional knowledge of students is in the very good category (super) with a percentage score of 85%. **Table 6** shows that, the lowest percentage of students' conditional knowledge in statement 14 with a percentage of 73,8 % items. This show that there are some students who use the same strategy during basic chemistry teaching skill learning. The use of the same strategy can be used if the conditions faced are the same as the previous conditions. As in doing assignments, sometimes students are required to use different strategies or methods depending on the situation type of task given. Therefore, conditional knowledge is very instrumental in taking actions taken by students.

Planning

Planning indicator is one of the indicators in the metacognitive regulation compenent. According to Iskandar (in Putera et al., 2021), planning is related to setting goals, estimating learning time and determining appropriate strategies. Planning in learning basic teaching skills is the ability of students in planning, from learning activities to problem solving. The following is a description of the percentage of metacognitive awareness on planning indicators:

Table 7. Planning Indicator

No	Statement	Actual Score	Ideal Score	Percentage (%)
18	In order to have enough time to study, I speed up the learning process.	29	42	69
19	I think about what I really need learn before completing the chemistry learning scenario assignment given by the lecturer.	39	42	93
20	Before creating a learning scenario assignment, I set a target that I must create a scenario real learning so that it can train skills the basis of my teaching.	39	42	93
21	I never ask myself questions about the material which will be learned at the next meeting.	27	42	64,3
22	I think about what learning model I should use when creating lesson plan tasks on different chemistry materials.	42	42	100
23	I never organize my study time to achieve a goal.	25	42	59,5
24	I never read the instructions carefully before doing the assignment given by the lecturer.	37	42	88,1
Average Indicator		81		

Students planning indicators are in the good category (OK) with a percentage of 81 %. Based on Table 7 above, it can be seen that there are some students who do not have good learning planning for basic chemistry teaching skills. This can be seen from the low scores of items 18,21 and 23, where students do not speed up the learning process so that learning time is sufficient, never ask themselves about the material to be learned and never manage their own learning time in order to achieve a goal, so that the learning process so far is just listening to class learning without repeating what has been learned.

Planning is one of the steps that must be owned by a prospective teacher. Because with planning, learning basic chemistry teaching skills becomes more effective and efficient. This is supported by Pujiank, Jamaluddin & Hadiprayitno (2016) who said that planning skills are needed so that learning can be directed and learning objectives can be met so that it has an impact on improving learning outcomes (Pujiank et al., 2016).

Information Management Strategy

Indicators of information management strategies are indicators related to the way or strategy of students in managing new information and old information. So, the strategy of managing information in learning basic teaching skills is the ability of students to manage the material received by using the right strategy. The following is a description of the percentage of metacognitive awareness on the indicator of the strategy of managing information:

Table 8. Information Management Strategy Indicator

No	Statement	Actual Score	Ideal Score	Percentage (%)
25	I never read carefully when find important information in each basic chemistry teaching skill material.	36	42	86
26	I consciously focus my attention on important information delivered by the lecturer.	40	42	95,2
27	I never make my own examples for each basic teaching skill material in order to obtain information that is meaningful to me.	29	42	69
28	I never try to translate every material basic teaching skills in my own words for easy recall.	32	42	76,2
29	I always read the powerpoint material, given by the lecturer accompanied by the notes I have for the lecture.	39	42	93
30	I never asked myself if the scenario the lessons I designed were in accordance with the basic teaching skills material.	30	42	71,4
31	I tried to understand the basic teaching skills material one by one in my spare time.	36	42	86
32	I focused on the meaning of all the basic teaching skills materials as a whole rather than on things that are specific to the material.	25	42	83,3
Average Indicator		82,4		

The information management strategy indicator is in the good category (OK) with a percentage of 82,4 %. Base on Table 8, it can be seen that chemistry education students have the lowest percentage of items in statement 27, where there are some students who do not make their own examples of the information received in learning basic chemistry teaching skills. This mean that these students are not willing to manage the information received becoming less meaningful to them. According to OLRC News (2004) (in Pujiank et al., 2016), said that the ability to manage information strategies is the ability to process information, strengthen information in memory and manage information using effective strategies in making information meaningful.

Comprehension Monitoring

Comprehension monitoring indicators are indicators related to the ability of students to assess the learning process or the use of their strategies. So, comprehension monitoring in learning basic teaching skills is the ability of students to assess the extent of their understanding of the material that has been delivered and

how well the strategies used in learning. The following is a description of the percentage of metacognitive awareness on the indicator of comprehension monitoring:

Table 9. Comprehension Monitoring Indicator

No	Statement	Actual Score	Ideal Score	Percentage (%)
33	I never asked myself if I have achieved the learning objectives of basic chemistry teaching skills.	28	42	66,7
34	I consider several alternative answers in solving problems given by lecturers in learning basic chemistry teaching skills.	41	42	97,6
35	I never asked myself whether I had consider alternatives which right when completing tasks given by lecturers.	28	42	66,7
36	I periodically review what I have learned. Learn to help me understand each basic teaching skill material.	33	42	78,6
37	I am able to analyze the benefits of the learning strategies I use when learning skills the basic of teaching chemistry.	38	42	90,5
38	I never check my understanding of basic teaching skills material that has been delivered by the lecturer.	30	42	71,4
39	I never ask myself how well I learned the new material when basic chemistry teaching skills lecture.	27	42	64,3
Average Indicator		76,5		

The indicator of monitoring understanding is in the good category (OK) with a percentae of 76,5 %. Based on Table 9, it can be seen that the lowest percentage lies in statements 33, 35 and 39, where students never ask themselves whether they have achieved learning objectives, they have considered alternatif answers and how well they have learned the material of basic chemistry teaching skills.

Comprehension monitoring is very important to do in the learning process, because with the monitoring of understanding , student realize the extent to which they understand the material they have learned. According to Sumampouw's opinion (in Wardana et al., 2020), who said that monitoring activities include one's attention when reading and testing oneself by answering questions. These activities can help students understand the material and integrate it with prior knowledge.

Debugging Strategy

Debugging strategy is an indicator related to the strategy used to correct work errors. So, the debugging strategy in learning basic teaching skills is the ability of students to apply strategies used to correct mistakes during learning. The following is a presentation of the percentage of metacognitive awareness on the debugging strategy indicator:

Table 10. Debugging Strategy Indicator

No	Statement	Actual Score	Ideal Score	Percentage (%)
40	I ask my friends to help me re-explain material that I don't understand.	37	42	88,1
41	I change learning strategies when I fail to understand the basic teaching skills material.	40	42	95,2
42	I will rethink my assumptions about the task if I am cunfused.	40	42	95,2
43	I always skip over new and unclear information on basic teaching skills.	26	42	62
44	I rarely reread basic teaching skills materials even if I am confused about them.	25	42	59,5
Average Indicator		80		

Indicators of student debugging strategy are in the good category (OK) with a percentage of 80 %. Based on Table 10, it can be seen that the percentage of the lowest debugging strategy items in statements 43 and 44, where some students always skip new information that is not clear in the basic teaching skills material even though they are confused about the material.

Debugging strategy can cause students to be able to take appropriate action if they experience failure in learning. However, if students are lazy in carrying out correction strategies, it can result in low learning outcomes. This is in line with the opinion of Sugiharto (2020) who said that the debugging strategy is a strategy used in correcting wrong behaviors (Sugiharto et al., 2020).

Evaluation

Evaluation is the last indicator in metacognitive regulation. According to Sugiharto (2020), evaluation is the ability of students to analyze the effectiveness of learning strategies used during the learning process (Sugiharto et al., 2020). So, evaluation in learning basic teaching skills is the ability of students to analyze the extent of their understanding of the material being studied. The following is a description of the percentage of students' metacognitive awareness on the evaluation indicator:

Table 11. Evaluation Indicator

No	Statement	Actual Score	Ideal Score	Percentage (%)
45	I know my ability to do the midterm test in the basic teaching skills course chemistry when I had finished working on it.	40	42	95,2
46	I asked myself if there was a better way I found it easy to apply basic chemistry teaching skills after I performed in front of the class.	38	42	90,5
47	I never summarize the basic teaching skills material that has been delivered by the lecturer.	32	42	76,2

48	I never asked myself about my succes in achieving goals after learning of basic chmistry teaching skills has been completed.	39	42	93
49	I asked myself if I had consider the choice of that right after I finished the end of semester exam.	39	42	93
50	I never ask myself if I have learned the basic teaching skills to the fullest after I have completed the learning scenario assignment.	30	42	71,4
Average Indicator		83		

The student evaluation indicator is in the good category (OK) with a percentage of 83 %, which indicates that students are aware of their own thinking in the process learning evaluation. Based on the Table 11, almost all students carry out the evaluation process well, although there are some students who are lacking in carrying out the learning evaluation process basic skills of teaching chemistry. The evaluation process in the learning can make students realize how well they have learned the basic skills of teaching chemistry. This is in line with the opinion of Cohors-Fresen borg and Kaune (2007) (in Wardana et al.,2020) that in this process students make reflections to find out how a student's skills, value and knowledge are mastered by the student. Why is it difficult or easy for students to master it and what kind of action or improvement should be done.

Based on the discussion above, we can see that metacognitive awareness greatly affects all actions taken by a learner.there are students who cannot manage the information received and there are also students who cannot remember the material that has been studied properly. Whereas as a prospective teacher, all the knowledge we gain in lectures must always be remembered. This is because the main abilities that must be mastered by teachers are "mastering material and mastering methodologies or ways to teach students" (Wahyulestari, 2018). Therefore, students must have good metacognitive awareness in order to process the information obtained well, be able to use metacognitive knowledge skills well and be able to carry out metacognitive regulation during learning and when becoming a teacher in the future. So far, chemistry students have always consciously used their metacognitive in learning. However, the metacognitive level of each student is different so that students' metacognitive awareness is also different. Because, each student has a different process and time in realizing their metacognitive (Tibrani, 2017). Thus, students are expected to be able to increase their metacognitive awareness, especially in basic teaching skills and in other learning. Then, it is also expected that lecturers can assist chemistry students in increasing metacognitive awareness though learning with metacognitive approaches and metacognitive strategies (Waskitoningtyas, 2015; Asnawati & Dewi, 2016; Pranomo et al., 2021).

Conclusion

Based on the results of the study, it can be concluded that the overall metacognitive awareness of Chemistry Education students is in the good category (OK) with a percentage of 82,825 %. The declaratif knowledge indicator has a percentage of 84,2 % in the good category. The procedural knowledge indicator has a percentage of 90,5 % with the super category. The conditional knowledge indicator has a percentage of 85 % with the super category. The planning indicator has a percentage of 81 % with the good category. The information management strategy indicator has a percentage of 82,4 % with the good category. The comprehension monitoring indicator has a percentage of 76,5 % with the good category. The debugging strategy indicator has a percentage of 80 % with the good category. The evaluation indicator has a percentage of 83 % with the good category. Thus, the percentage students' overall metacognitive awareness indicates, that students are aware of their own thinking and can distinguish the stages of elaboration input and output of their own thoughts. Sometimes they use this model to organize their own thinking and learning.

References

Abdullah, R., & Soemantri, D. (2018). Validation of metacognitive awareness inventory in academic stage of undergraduate medical education. Ejournal Kedokteran Indonesia, 6(1). https://doi.org/10.23886/ejki.6.8621.

Anderson, Loring W. & Krathwhol, David R. (2010). Foundational Framework for Learning, Teaching and Assesment. Yogyakarta: Student Library.

Angraini, L., Juita, D., & Yusmaridi. (2021). Analysis of Awareness Metacognitive Awareness of Biology Department Students toward Lola Biology Learning. Natural Science: Journal of Research in Science and Science Education, 7(2), 2477-6181.

Asnawati, S., & Dewi, I. L. K. (2016). The Use of Metacognitive Approach Murder Technique to Improve Mathematical Reasoning of Mathematics Education Students in Analytical Geometry Subject. TEOREMA: Mathematics Theoary and Research, 1(1), 1. https://doi.org/10.25157/teorema.v1i1.535.

Asy'ari, M., Ikhsan, M., & Muhali. (2018). The validity of the metacognitive ability characterization instrument for prospective physics teacher students. Prima Sains: Journal of Mathematics and Science Learning and Science Studies of IKIP Mataram, 6(1), 18-26.

Fathiah, D. N., & Mahmud, M. S. (2022). Metacognitive Awareness Proficiency of Mathematics Teachers and Trainers: Systematic Literature Highlights. Malaysian Journal of Social Sciences and Humanities (MJSSH), 7(11), e001856. https://doi.org/10.47405/mjssh.v7i11.1856.

Fitriani, Ella., Rahmawati, Yuli., & Muhab, Sukro. (2021). Integration of CoRe Framework and Metacognitive Strategies in Developing Pedagogy Content Knowledge of Chemistry Teacher Candidates in Chemistry Curriculum Review Learning. Journal of Chemical Education Research, 11(1), 11-24.

Hairida, H., Marmawi, M., & Kartono, K. (2021). An Analysis of Students' Collaboration Skills in Science Learning Through Inquiry and Project-Based Learning. Tadris: Journal of Teacher Training and Tarbiyah Science, 6(2), 219-228. https://doi.org/10.24042/tadris.v6i2.9320

Indarini, E., Sadono, T., & Onate, M. E. (2013). Metacognitive Knowledge for Educators And Learners. Satya Widya, 29(1), 40. https://doi.org/10.24246/j.sw.2013.v29.i1.p40-46

Mahanal, S. (2017). The Role of Teachers in Generating the Golden Generation with 21st Century Skills. National Seminar on Education FKIP Halu Oleo University, 1 (September 2014), 1-16.

Pujiank, S., Jamaluddin, & Hadiprayitno, G. (2016). Metacognition Ability of Biology Education Study Program Students. Journal of Education: Theory, Research and Development, 1(10), 2016-2022.

Putera, D. B. R. A., Hidayah, R., Suarningtyas, S., & Mitasari, R. A. (2021). Profile of Metacognitive Skills of Students at Trunojoyo University Madura in the Science Education Study Program. JPPMS: Journal of Research on Mathematics and Science Education, 5(2), 84-91.

Putranto, S., & Fahuzan, K. (2017). Implications of Cognitive Load Theory in Designing Meaningful athematics Learning. Uny Mathematics and Mathematics Education Seminar 2017 M-101,697-702.

Sitompul, L. R. (2022). Metacognitive Awareness of Biology Education Study Program Students at Pelita Harapan University in the Biology Learning Assessment Strategy Planning Course. Educative: Journal of Education Science, 4(2), 2482-2490. https://doi.org/10.31004/edukatif.v4i2.2378

Sugiharto, B., Malinda, E. R., Azizzah, H., Anugerah, J. F., Rani, M. J. M., Padmi, N. R. C., & Alifah, N. (2020). Differences in Metacognition Awareness of High School Students in Villages and in Cities. Indonesian Journal of Science Education, 8(1), 78-91. https://doi.org/10.24815/jpsi.v8i1.15354.

Tanti, N., Widada, W., & Haji, S. (2018). Students' metacognition in mathematical problem solving of high school students in Rejang Lebong ethnomathematics-oriented mathematics learning. Journal of Raflesia Mathematics Education, 3(1), 41-54.

Tibrani, M. M. (2017). Metacognitive Awareness of Biology Education Study Program Students at Sriwijaya University in Human Physiology Lecture. Journal of Science Learning. 1,19-23.

Ulfah, M., Erlina, & Kurniawan, R. A. Analysis of Metacognition Awareness and Its Relationship with Student Learning Outcomes in Organic Chemistry Course, Chemistry Education Study Program, UM Pontianak.

Wahyulestari, M. R. D. (2018). Basic Teaching Skills in Elementary School. Procedings of the National Seminar on Research, Education and Application of Mathematics and Natural Science UMJ, 199-210.

Wardana, R. W., Prihatini, A., & Hidayat, M. (2020). Identification of Learners' Metacognitive Awareness in Physics Learning. PENDIPA Journal of Science Education, 5(1), 1-9. https://doi.org/10.33369/pendipa.5.1.1-9.

Waskitoningtyas, R. S. (2015). Learning Mathematics learning with metacognitive skills based problem solving contextua problem solving education mathematics education students of University of Balikpapan. Math Didactic: Journal Mathematics Education, 1(3), 211-219. https://doi.org/10.33654/math.v1i3.21.

Zulfiani, Z., Herlanti, Y., Rosydatun, E. S., Hasiani, S., Rohmatulloh, G., & Zuqistya, N. (2018). Developing Metacognitive Skill Instrument on Fungus Concept. *Edusains*, *10*(2), 243–253. https://doi.org/10.15408/es.v10i2.7919.