Usability of M-PA21 Module to Improve Teachers' Metacognitive Regulation in Teaching and Application of 21st Century Basic Skills

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Abstract—Teachers face the challenges in producing students with 21st-century basic skills encompassing communication, collaborative, critical and creative thinking, as well as values and ethical. The reasons are the teachers do not have enough knowledge and skills to implement student-centered teaching, applying 21st-century basic skills, and teachers' thinking skills which are metacognition is at a low level. To overcome this problem, the Metacognitive Skills Training Module in the Teaching and Application of 21st Century Basic Skills (M-PA21) was developed. The training module needs to be evaluated for usability to see if it can solve the teachers' existing problems. Therefore, the study aims to evaluate the usability of the M-PA21 module to improve the teachers' metacognitive regulation in teaching. Evaluation of module usability was conducted through field test involving 16 respondents consisting of secondary school teachers. The data collection was done through module usability questionnaire, micro-teaching observation, and document analysis. The questionnaires of module usability were analyzed using SPSS version 24.0 by determining mean value, while observation data was analyzed thematic. Document analysis supports the evaluation of questionnaires and observation findings. Overall, the findings show that the M-PA21 module can enhance teachers' metacognitive regulation in the teaching and application of basic skills of the 21st century.

Keywords—Metacognition, Cooperative Learning, 21st-Century Skills

1 Introduction

Teacher quality is one of the outcomes stated in the Education Development Plan of Malaysia 2013 – 2025 to drive education transformation. Unfortunately, Malaysia faces the challenges in producing quality teachers to produce 21st-century skilled students. Understudies are still not acing the 21st century essential aptitudes incorporates correspondence, communitarian, basic and imaginative intuition, just as qualities and moral [1],[2];. One of the reasons for these issues is instructors have

deficient learning and aptitudes in educating. They need examination that led found that instructors did not have enough information and abilities to apply 21st-century fundamental aptitudes in understudy focused showing approach [3],[4]. Educators are less adroit in applying the understudies focused instructing and the primary abilities in executing educating successfully. Furthermore, the instructors additionally don't ace metacognition learning. [5]-[7], expressed that the low degree of information in metacognition impacts the showing practices of educators. Accordingly, instructors encouraging techniques don't enable understudies to obtain the aptitudes viably [8]-[10].

Therefore, the teachers need to master the knowledge, skills and thinking skill which is metacognition in the implementation of student-centered teaching to produce 21st-century skilled students. To overcome this problem, the teachers' metacognitive skills training module (*M*-PA21) has been designed and developed. This training module needs to be evaluated on usability to see if the module can solve the problems, [11]. In other words, evaluation needs to be done to see whether the objectives of the module is achieved or not, and to know whether training activities can solve the teachers' existing problems. The usability test was chosen because the study involved only sixteen respondents. This study was conducted to achieve the following objectives:

To evaluate the usability of *M*-PA21 training module to improve teachers' metacognitive knowledge in the teaching.

To evaluate the usability of *M*-PA21 training module to improve teachers' metacognitive regulation in the teaching.

2 Literature Review

The literature review discusses the basic skills of the 21st century, the constructivism and cooperative learning as well as metacognition.

2.1 21st-century basic skills

The knowledgeable generation, having a high level of thinking and can compete globally is a characteristic of students who need to be produced by the country to meet the challenges of the 21st century. Students must master the main skills encompassing communication, collaborative, critical and creative thinking skills to form human resources that contribute to the highly skilled workforce, and responsive to the changes and development of the current industry. The 21st Century Learning (PAK-21) conceptualized student-centered learning is a platform to generate the expected human capital. Some organizations, for example, Partnership for 21st Century Learning (P21), have drafted the PAK-21 concept that emphasizes communication, collaborative, critical thinking and creative, [12]. In Malaysia, Ministry of Education (MOE) defines PAK-21 as a student-centered learning process based on communication, collaborative, critical and creative thinking as well as values, which

is in line with the National Education Philosophy,[13]. These elements are introduced as the 21st Century Skills Standard known as 4K1N.

2.2 Cooperative learning

21st-century aptitudes ought to be connected through understudy focused learning situations, for example, venture-based learning (Project BL), issue-based learning (Problem BL), request based learning (IBL), helpful learning (CL) and other gathering based learning. The learning strategy depends on constructivism hypothesis in which understudies manufacture important information through a functioning learning knowledge. Agreeable learning is the fundamental focal point of this study. The helpful learning is a cooperative learning strategy that expects understudies to cooperate to learn and be in charge of the learning of their gathering of companions, just as their learning, [17]-[19]. This technique is likewise also called gathering based getting the hang of comprising of understudies of all degrees of accomplishment, adapting together, helping each other to accomplish learning objectives. This method can be combined with Project BL, Problem BL, IBL, and others. Cooperative learning is categorized into two, namely formal cooperative and informal cooperative. Formal cooperative techniques such as STAD, JIGSAW and small group-based teaching techniques. While informal cooperative techniques include Think-Pair-Share, Three-Step-Interview, Round-Robin Brainstorming, Three-Minute Review, Two Minute Paper, Lecture-Write-Share-Learn, and others. The 21st-century basic skills can be applied effectively in teaching through the application of the cooperative learning characteristics encompassing positive interdependence, individual accountability, equal involvement, simultaneous interaction, and teamwork skills [18],[19].

2.3 Metacognition

Metacognition is likewise a factor influencing instructors' showing rehearses in the classroom,[5],[6]. Educator instructing includes a decent variety of exercises, for example, points of view that help them in understudy learning,[20]. Learning about arranging, observing and assessing is basic for instructors to be capable in characterizing showing procedures, screen these techniques in the encouraging procedure and after that assess their very own educating. Arranging, checking and directing are three parts of metacognition that impact instructing rehearses. Metacognition has a place with abnormal state thinking and some portion of this is the familiarity with the methodology that prompts that sort of thinking,[21],[22]. According to Zohar and David,[22], explain that this thinking is more in-depth than the cognition required for teaching. Educator instructing includes the assorted variety of exercises, for example, the reasoning procedure that causes them in understudy learning, [20]. Subramaniam,[23], accentuates that pondering being associated with showing arranging, usage, and change of techniques in real circumstances are a significant component in observing, assessing and supporting the educating procedure.

Teaching should give meaning to students and teachers capable of creating and maintaining a learning environment in the classroom that promotes critical thinking,

in turn, improves student performance. Many researchers believe that today's teaching requires the teacher to clearly teach the necessary skills and strategies for the performance of metacognitive activities,[24]-[26]. Therefore, every teacher needs to metacognitive so that teaching can be implemented,[21],[27].

In teaching, teachers provide explanations on assignments or tasks, guide and ask questions, assess students' understanding and support students when they face problems in learning. Teachers should be flexible in lessons have planned to meet the needs of students. Flexible styles and pace are one of the criteria of creative pedagogy. This flexibility is described as an adaptation of metacognition, adaptive teaching, adjustment expertise and response to learning.

According to Lee, Teo & Chai,[24] in arranging and educating, instructors should know about their reasoning so they can connect with and screen understudy learning. This metacognitive mindfulness can enable instructors to comprehend about profoundly arranging and unpredictability of the procedure. Also, they should know about the decent variety of techniques and kinds of information that can be utilized to improve their practice of teaching,[28]. Duffy et al.[20] stated that teachers need to metacognitive to implement modifications during classroom instruction due to unexpected and non-routine. Duffy et al.[20] stated that although teachers can plan well in teaching, teachers should also be able to modify lesson plans according to the situation in the classroom to meet the needs of their students. Monitoring and awareness on the level of involvement and interest of students allow teachers to tailor their teaching more quickly to the needs of their students. Monitoring on student learning, helping teachers draw on teaching methods to meet their students' needs.

Student's prior knowledge is an advantage to influence student learning. Teachers should monitor and evaluate the prior knowledge of the students and make connections with the knowledge delivered to enhance their understanding and achievement,[29]. The barrier factors that cause difficulty and misunderstanding of students in learning should be identified and there should be a solution. Therefore, teachers need to acquire skills in how to identify, monitor and evaluate students' understanding and misunderstanding. In determining how and when to include these spontaneous scaffolding, teachers must control their knowledge, thinking, and actions,[20]. When teachers face unexpected challenges, problems, or situations, metacognition allows them to play a role to meet the needs of the circumstances.

Flavell,[30] and Brown,[31] grouped metacognition into two noteworthy classes called metacognitive information and metacognitive regulation,[32]. Metacognitive information alludes to the learning of intellectual assignments and procedures, just as the information that people have about themselves and others,[33]. Metacognitive learning incorporates revelatory information, procedural learning, and restrictive information. The metacognitive guideline includes exercises in directing their very own instructing that incorporatethree subcomponents which are arranging, checking and assessing.

3 Methodology

This study uses the Design and Development Study method based on the ADDIE model (Analyze, Design, Develop, Implement, Evaluate) which involves the Implementation and Evaluation Phase. In this phase, the evaluation of module usability is done through a field test. A total of 16 respondents from secondary school teachers were involved in this study. Table 1 shows the respondents profile.

Table 1. Respondents profile

Teacher (T)	Gender	Teaching Exp. (Year)	Academic Qual.	School
T1	Female	19	Bachelor	SMK A
T2	Female	18	Masters	SMK J
T3	Female	6	Bachelor	SMK L
T4	Female	8	Bachelor	SMK I
T5	Male	2	Bachelor	SMKD
T6	Male	2	Bachelor	SMKD
T7	Female	8	Bachelor	SMK A
T8	Female	11	Bachelor	SMK C
T9	Female	22	Bachelor	SMK C
T10	Female	4	Bachelor	SMK G
T11	Female	3	Bachelor	SMK L
T12	Female	10	Bachelor	SMK I
T13	Female	2	Bachelor	SMK M
T14	Female	7	Bachelor	SMK D
T15	Female	1	Bachelor	SMK N
T16	Female	8	Bachelor	SMK D

This study involved data collection through the module's usability questionnaires and triangulation through observation and analysis of documents. The module usability questionnaire consists of two sections: (1) Respondents' information and backgrounds, such as age, gender, organization and working experience, and (2) Statements related to module usability in the aspect of knowledge and regulation of metacognitive. The total number of items in the questionnaire is 2. The questionnaire has been reviewed, evaluated and validated by six field experts. The module usability questionnaire was analyzed using SPSS (Statistical Package for Social Science) version 24.0. Methods of data analysis for module usability evaluation using the Likert scale min calculation method proposed by Tschannen-Moran, M. & Gareis, C.R.[34]. Table 2 shows the mean value from 1.00 to 5.00 with very low to very high interpretation. The mean value of five Likert scores is divided into five points according to the level as in Table 2.

Table 2. Likert scale mean of five levels

Mean Value	Interpretation
1.00 - 1.80	Very low
1.81 - 2.60	Low
2.61 - 3.40	Moderate

3.41 - 4.20	High
4.21 - 5.00	Very high

Source: Tschannen-Moran, M. & Gareis, C.R. 2004 [34]

The module usability evaluation results are strengthened by triangulation methods to improve data reliability. This method is made by conducting micro-teaching observations and through the analysis of micro-lesson plan documents. Anecdotal records are used to record observations on micro-teaching during training programs. The researcher noted the observation of micro-teaching in writing and then typed into the anecdotal record. Anecdotal records are then reviewed and signed by the respondents to ascertain and verify the information. The anecdotal record is a brief note of an event or important behavior recorded, unique and significant to the study. Data collected from direct observation can provide rich information and can add credibility to the study conducted,[35]. The purpose of the anecdotal record is to obtain feedback on the issues, events and behaviors observed. Evaluation of the reliability of the observation theme using the Cohen Kappa Index method, which is the value of determining the degree of coding approval done by a field expert. In this study, the researcher selected three field experts to evaluate the level of the consent of the observation theme to determine the reliability of the data. The fields include experts of the pedagogical, module and educational psychologists. After a theme evaluation by the experts, the researcher calculates the value of the experts' approvals to obtain the Cohen Kappa Coefficient Index. The Cohen Kappa Index method is used to evaluate the reliability of the observation theme. Table 3 shows the results of calculations of Cohen Kappa on the level of expert consensus for the theme of micro-teaching observation.

Table 3. The results of Cohen Kappa's calculations on the level of experts consent for the theme of micro-teaching observation

Field Experts	Cohen Kappa Formula Application	Approval Value of Cohen Kappa Coefficient	Approval average of Cohen Kappa Coefficient
Expert 1	18 - 10 20 - 10	0.80	
Expert 2	19 - 10 20 - 10	0.90	0.83
Expert 3	18 - 10 20 - 10	0.80	

The calculated value of Cohen Kappa on the level of expert consent is 0.83. Based on the scale of Cohen Kappa's interpretation proposed by [36], this value shows the very good average expert approval of the theme produced. A micro-lesson plan document is used to support the evaluation of the usability of the training module and observation data. According to [37], the document is as support or additional data (supplementary). Supplementary by [38], is an important source of data to support data of interview and observation. According to him, document data can provide useful information to help the researcher understand phenomena that occur and can be evidence of actual data that can be seen, felt and held. In the context of the study, the researcher analyzes the lesson plan of the micro-teaching of the respondents in the

training program. In the analysis of document data, the researcher chooses the desired data and typing all notes written in field notes. Researchers provide specific codes for indexing purposes. The content in each document is reviewed to see its relevance and match the study question. The source of the document is sufficient if the document data has answered all the research questions.

4 Findings and Discussion

Metacognitive regulation encompasses planning, monitoring, and evaluating is a metacognitive subcomponent that affects teachers' teaching practices. To evaluate the usability of the module in this aspect, the data were obtained through module usability questionnaires, micro-teaching observation, and lesson plan document. Microteaching was conducted by dividing respondents into four groups of four members. The groups are named Diamond, Sakura, Super Girls, and Jenahu. Analysing the observation data produced 6 themes:

- Teaching method of group activity
- Teaching method of presentation
- Implementation of group activity
- Implementation of presentation
- Application of 21st century basic skills in group activity
- Application of 21st century basic skills in presentation

Here are the themes produced for data observation:

a. The teaching method of group activity

Four groups of respondents carried out teaching method of group activity. For example, a Diamond Group anecdotal record (DG):

DG: Do teaching methods of group activity…

b. The teaching method of presentation

Four groups of respondents carried out teaching method of presentation activity. For example an Sakura Group anecdotal record (SG):

SG: Group members return to their homegroup and present to their respective information according to their expertise.

c. Implementation of group activity

For the implementation of the activity group, the respondents used the Jigsaw model in teaching. The cooperative learning characteristics of equal involvement, individual accountability, positive interdependence, and teamwork skills are applied in the teaching. Here is an example of anecdotes record of group activity implementation of Diamond Group (DG):

DG: *Jigsaw model is used ...*
randomly pick colored ice cream stick.
each individual posted on sticker paper.

d. Implementation of presentation

For the implementation of the presentation activities, the respondents used the Jigsaw model and conducted a learning walk in teaching. *Here's an example of anecdotes for the implementation of presentation activity for Sakura Group (SG):*

SG: *Group members return to their home group and present their information accordingly to their expertise.*

e. Application of 21st-century basic skills in group activities

For the application of 21st-century basic skills, respondents applied communication skills through group discussion activity. Here's an example of anecdotes record for Diamond Group (DG):

DG: *Participants discuss and write on paper sticker individually ...*

f. Application of 21st-century basic skills in presentation activity

For the application of 21st-century basic skills, respondents carried out a presentation session in their respective groups. Communication and collaborative skills are applied in the activity. Here's an example of anecdotes record for Sakura Group (SG):

SG: Group members return to their home group and present their information accordingly to their expertise.

Document analysis presents the application of cooperative learning characteristics and the application of 21st-century basic skills in group activities and presentations. Respondents used the Jigsaw model in the implementation of group activities. Here's an example of an analysis document of the Diamond Group (DG) and Sakura Group (SG).

4.1 Application of cooperative learning characteristics in group activities and presentations

DG: Each member is required to pick a stick and move to the expert group according to the same color of the stick.

SG: Group form, each group is given a different colored stick.

Pupils who get the same color stick will form a group of experts.

4.2 Application of 21st - century basic skills in group activities and presentations

DG: The expert group goes back to the homegroup to discuss and paste the sticker on the prepared card.

SG: The group members return to the homegroup and present the character that has been discussed.

Analyzing of observation data and documents are categorized into two main aspects, namely (1) teaching methods, and (2) implementation of teaching methods and application of 21st-century basic skills. The first aspect covers the activities of respondents in micro-teaching. While the second aspect is the implementation of the activities and the application of 21st basic century skills.

Teaching methods: The findings of the observation and documents analysis show that all groups carried out teaching methods of group activity and presentation. Table

4 shows observation findings and document analysis for the aspects of teaching methods.

Table 4. Observation findings and document analysis for teaching methods

No	Teaching Methods			Group		
		DG	***SG***	***SGG***	***JG***	***%***
1	Group activity	✓	✓	✓	✓	100
2	Presentation	✓	✓	✓	✓	100

The observation findings and document analysis show that respondents applied student-centered teaching which is group activity and presentation.

The implementation of the teaching and application of the 21st-century basic skills: For this aspect, the application of cooperative learning characteristics and the application of basic skills is focused on teaching observation. Table 5 shows observation findings, and document analysis for the aspect of teaching and applying 21st-century basic skills.

Table 5. Observation findings and document analysis of teaching implementation and application of 21 st century basic skills

			Group			
		DG	***SG***	***NG***	***SGG***	***%***
Teaching methods	Group activity	✓	✓	✓	✓	100
	Presentation	✓	✓	✓	✓	100
Cooperative learning characteristics	Positive interdependence	✓	✓	✓	✓	100
	Individual accountability	✓	✓	✓	✓	100
	Simultaneous interaction	✓	✓	✓	✓	100
	Equal involvement	✓	✓	✓	✓	100
	Teamwork skills	✓	✓	✓	✓	100
21 st century basic skills	Communication	✓	✓	✓	✓	100
	Colaborative	✓	✓	✓	✓	100
	Critical thinking	✓	✓	✓	✓	100
	Creativity	✓	✓	✓	✓	100
	Values and ethical	✓	✓	✓	✓	100

The observation findings and documents analysis show that all groups carried out group activity and presentation with the application of cooperative learning characteristics which are positive interdependence, individual accountability, simultaneous interaction, equality involvement, and teamwork skills. For the application of the 21st-century basic skills, respondents applied the skills of communication, collaborative, critical thinking, values and ethical through the activities carried out. However, creativity still needs to be emphasized especially in presentation sessions and assignments.

Here is an example of observation findings and document analysis of Sakura Group focusing on aspects of metacognitive regulation. Anecdotal record and document are

analyzed by emphasizing the aspects of teaching methods, the implementation of teaching with the application of cooperative learning characteristics, and 21st-century basic skills. Table 6 and Table 7 show observation findings and document analysis on the aspects of metacognitive regulation in the teaching and application of 21st-century basic skills.

Table 6. Analysis of Sakura Group's micro-teaching observations for metacognitive regulation aspects

Anecdotal Record	Metacognitive Regulation in Teaching and Application of 21 st Century Basic Skills
Komsas book is provided for each group.	Respondents plan educational resources by providing a komsas book. (Planning)
Members of the Sakura group reprimand participant	Respondents monitor participants' behavior. (Conditional knowledge and monitoring)
Members of the Sakura group rewarded with a smiley sticker to the participants.	Respondents increase participants' motivation through a reward system. (Conditional knowledge and monitoring)
The members of the Sakura group give a suggestion to improve the micro-teaching such as the implementation of assessment in teaching.	Respondents evaluated their teaching with a suggestion of improvement. (Evaluate)

Table 7. Document Analysis of Sakura Group for Metacognitive Regulation Aspect

Micro Teaching Planning	Metacognitive Regulation in Teaching And Application of 21 st Century Basic Skills
each group is given different colored of sticks. Pupils who get the same color of sticks will form an expert group.	Respondents provide teaching aids. (Planning)
In an expert group, pupils need to study the character given. The group members return to the homegroup and present the character that has been discussed.	Respondents plan activity of Jigsaw model. (Planning)
Each group produces a mind map for all five characters	Respondents plan the application of creative thinking skills. (Planning).
Poison box activity will be performed and pupils are asked to play the character given and the members guess the character played.	Respondents plan game activities to apply characteristic of equal involvement. (Planning)

In addition to teaching observation and document analysis, the module usability questionnaire was used to obtain teachers' perceptions of module usability for improving metacognitive regulation in the teaching. Table 10 shows the mean and standard deviation of module usability questionnaire for the aspects of metacognitive regulation in the teaching and application of 21st-century basic skills.

The mean value obtained is 4.22 putting the level of consensus at a very high level that the respondents agree this training program can increase metacognitive regulation in the teaching and application of 21st-century basic skills. The mean value before the training program is 1.17. This shows that respondents acquired knowledge that sought to apply metacognition regulation which is planning, monitoring, and evaluating the teaching and application of 21st-century basic skills.

Table 8. Mean dan standard deviation of metacognitive regulation in teaching and application of 21st-century basic skills

No	Question Item	Likert Scale Frequency					Mean	Std. Dev.
		1	*2*	*3*	*4*	*5*		
1.	I can apply metacognitive regulation to carry out cooperative learning.			1	7	8	4.13	0.342
2.	I can apply metacognitive regulation to apply the 21st basic skills in teaching.			2	12	2	4.00	0.516
	Overall mean						4.22	

Respondents metacognition regulation in the teaching and application of 21st-century basic skills has been enhanced through training program conducted. Through Session 1 to Session 7, respondents acquire knowledge that enables them to plan, monitor and evaluate the teaching and application of 21st-century basic skills. Session 6 particularly contains training that enables respondents to plan their teaching while Session 7 seeks respondents to monitor and evaluate teaching through micro-teaching activities. The *M*-PA21 training modules consist of seven training sessions developed based on constructivism learning theory, 21st-century basic skills model and meta-cognition theory. This theory and model were developed in seven training sessions consisting of session objectives with specific procedures. In general, each training session consists of K-W-L activities that respondents express their existing knowledge, state the knowledge they want, and express the learning outcome they get from the training session. At the end of each training session, respondents give their comments in terms of strengths, weaknesses, and suggestion of improvements in training sessions by using reflection forms. In addition, the methods used for each training session are group activity and presentation that require active involvement. The next section explains in detail the procedure of Session 1 to Session 7 to discuss the findings of the study.

4.3 Session 1: Introduction of cola & copa

Beginning with Session 1, respondents were given exposure to the concepts and principles of collaborative and cooperative learning, as well as the characteristics of cooperative learning. In this session, respondents were asked to review the circulated picture. Based on the picture, respondents and group members discussed possible teaching and learning activities. Each respondent wrote their opinions and views using a sticky note. The next procedure namely the Game of Colour Separating ie the first group isolated the ice cream stick by color moving forward to unload the ballot paper. Each ballot paper contains a cooperative learning characteristic. The participants then return to their respective groups and perform the Matching Game activity which completes the statement of the cooperative learning characteristics obtained by matching the correct card. This training session also consists of Who's Fast which requires respondents to move in a large circle (classroom) with music accompanying. When music is stopped, participants will sit at the nearby desk. Based on the cooperative learning characteristics on the desk, the respondents discussed and provided the

presentation materials. The next activity is a group presentation session and activities that require respondents to elaborate on the benefits of collaborative and cooperative learning. The activities carried out in Session 1 enable respondents to explain the concepts and principles of collaborative and cooperative learning and differentiate the two learning methods. Knowledge of cooperative learning characteristics gives input to respondents on the application of these characteristics in group-based learning. Through this session, the respondents can also elaborate on the benefits of collaborative and cooperative learning.

4.4 Session 2: Formal and informal cooperative learning

Session 2 exposes respondents to formal and informal cooperative learning and procedures such as Jigsaw model, STAD, think pair share, rally robin and others. In this session, the participants are distributed by subject and they have devised teaching and learning procedures or activities based on formal and informal cooperative learning techniques. The procedure is based on concepts, principles, and characteristics of cooperative learning. Next, the group presentation session is implemented. Through activities in this session, respondents can list formal and informal cooperative learning and its procedures. The acquired knowledge enables respondents to formulate teaching and learning procedures or activities based on formal and informal cooperative learning techniques, as well as applying the cooperative learning characteristics in the procedure.

4.5 Session 3: 21st-century basic skills

This session exposes respondents on21st-century basic skills that include communication, collaborative, critical and creative thinking, as well as values and ethical. This session also exposure to respondents about the basic skills required in everyday life and the application of those skills in teaching and learning. In this session, question and answer session are carried out based on a video related to 21st-century basic skills. Through this activity, the respondents explain the importance of skills in everyday life. The next activity is that the respondents labeled the application of 21st-century basic skills in the teaching and learning procedures that were made in Session 2. In the group, the respondents discussed the application of basic skills. Overall, this session allows the respondents to describe each of the 21st-century basic skills and elaborate their importance in life. Respondents are also able to identify the application of 21st-century basic skills in teaching and learning.

4.6 Session 4: Metacognition

Session 4 exposure to respondents on metacognition and its subcomponents - metacognitive of knowledge and regulation. Respondents were also given exposure to the importance of metacognition in life, especially for teaching. In this session individually, respondents complete the diagram of Metacognition Components. Furthermore, Remember Me activity was done which respondents matched the cards with correct

statements. The cards contain terminology of component and subcomponents of metacognition and their description. Next, the Hot Seat and Total Physical Response activities are performed. Activities in this session allow respondents to state the definition of metacognition, describe the subcomponents of metacognition and express their importance in life particular in teaching.

4.7 Session 5: The Application of Metacognitive Knowledge and Regulations In Cooperative Learning And Application of 21st Century Basic Skills (Case Study)

This session reinforces respondents' knowledge of the thinking and practice of teaching in implementing the teaching and application of 21st-century basic skills. In this session, each group is given a different material of case studies. The case study relates to the situation of teaching and learning in the classroom. This activity requires respondents to discuss the metacognitive knowledge and regulation in the case study. Group presentations, question and answer activity are conducted. Overall, this session reinforces the knowledge of respondents in the application of metacognitive knowledge namely declarative, procedural and conditional knowledge in the teaching and application of 21st-century basic skills. In addition, respondents are knowledgeable in regulating teaching involving planning, monitoring, and evaluation.

4.8 Session 6: Applying of Metacognitive Knowledge and Regulation In Cooperative Learning And Application of 21st Century Basic Skills (Micro Teaching Plan)

This session gives exposure to respondents on constructive alignment and reflection for applying in the planning of the lesson. In this session, the respondents provided a lesson plan with a rubbing paper and free to use the Jigsaw model, STAD or another group-based method. The respondents then expressed their metacognitive knowledge in the teaching and application of 21st-century basic skills by labeling them on rubbing paper. In addition, the respondents also stated the assessments in the lesson plan. Various resources or materials are provided for respondents in planning a lesson. However, they are given the option of preparing their own materials of teaching according to their creativity in the process of planning. Among the materials provided in this training program are sticky note, multi-color sticks, rubber bands, pen markers, smiley stickers, small envelopes, rubbing paper, and small notebooks. Overall, through this session, the respondents can explain the constructive alignment, reflection and applying the knowledge in the planning of lessons. In the planning of lesson activities, respondents used a method of group activity, especially Jigsaw model and presentation. The method is based on constructive alignment, the characteristics of cooperative learning and the 21st-century basic skills. Overall, the activities in this session reinforce the metacognitive knowledge of respondents in teaching. In addition, the respondents can also plan their lessons based on the knowledge acquired throughout the training program which is to apply the characteristics of cooperative learning and the basic skills of the 21st century in planning student learning activities.

4.9 Session 7: Applying of Metacognitive Knowledge And Regulation In Cooperative Learning And Application of 21st Century Basic Skills (Micro Teaching)

This session provides exposure to respondents for teaching and applying basic skills of the 21st century through the application of metacognitive knowledge and regulation. In this session the respondents presented the lesson plan according to their respective groups and question and answer session was implemented. Subsequently, micro-teaching is carried out in turn by the group. The activities in this session reinforce the metacognitive knowledge of respondents in teaching. The micro-teaching that conducted is enabled the respondents to apply cooperative learning characteristics and 21st-century basic skills in teaching especially in group activity and presentation. This session also enables the respondents' thinking skills in teaching so that the characteristics of cooperative learning and the 21st basic skills can be applied effectively in teaching. Respondents can regulate their teaching, which is monitoring to ensure the participants acquire knowledge and skills in line with the objectives set. In addition, respondents also can suggest improvements in their teaching for better implementation.

The knowledge of constructivism learning and basic skills of the 21st century enable individuals to know the extent of their knowledge can be used in teaching. Through this training program, the respondents learned about the constructivism learning based on student-centered teachings such as project-based learning, problem-based learning, inquiry-based learning, cooperative learning, and other group-based learning can apply,[39],[40]. For example, project-based learning and problem-based learning using inquiry-based approaches can address problem-solving skills, collaborative skills and creativity while inquiry-based learning can foster 21st-century skills such as science literacy, information literacy, learning methods, metacognitive, social skills and creativity,[41-[43]. In addition, this knowledge also enables individuals to implement the effective teaching of 21st-century skills that can be applied to students. Group activities that emphasize cooperative learning characteristics ie positive interdependence, individual accountability, equal involvement, simultaneous interaction, and teamwork skills can apply the 21st-century basic skills effectively in teaching. This is because students can work together to learn and be responsible for the learning of their group of friends,[17]-[19] and social interaction that led to increased self-potential through collaborative partnerships,[44],[45].

Overall, the *M*-PA21 module contains training sessions that can increase respondents' metacognitive regulation that includes planning, monitoring, and evaluating. The findings of this study are supported by several studies such as thinking about thinking being involved in teaching planning, implementation, and strategy modification, as well as evaluation, to achieve teaching goals.[23]. Planning requires awareness about thinking to engage and monitor student learning,[24]. This requires knowledge that can help in understanding the teaching planning in-depth and the complexity of the process. Through this training program, respondents can plan their lessons based on the knowledge of constructivism learning with the application of cooperative learning with the characteristics as well as 21st-century basic skills. This planning process

involves the use of teaching approaches, identifying difficulties or barriers, [45] and making anticipation,[46]. Among the activities involved are using existing knowledge, managing resources, planning time, identifying and selecting appropriate procedures, and setting goals, [47]. Monitoring emphasizes continuous control over the teaching process, identifies barriers and changes actions or goals,[48]. Through this training program, respondents are able to create and maintain a teaching environment that can apply skills such as giving explanations, guiding, questioning, evaluating the understanding and supporting students who have problems in learning. Monitoring of student engagement allows adjustment of teaching and helps in designing of teaching method to meet the needs of students. Evaluation allows respondents to reflect their teaching through review of teaching, goals as well as expectations involved. In the evaluation, respondents will be able to identify the strengths and improvement needed in teaching. Overall, previous studies support the study of the development of the *M*-PA21 training module which contains constructivism learning, 21st-century basic skills, and metacognition to improve metacognition regulation in the teaching and application of 21st-century basic skills.

5 Conclusion

The *M*-PA21 module has been designed to implement a training program to improve teachers' metacognitive regulation in teaching and application of 21st-century basic skills. Therefore, this study is conducted to evaluate the usability of the module to improve the teachers' metacognitive regulation in teaching. Evaluation of module usability was conducted through field test involving 16 respondents consisting of secondary school teachers. The data collection was done through module usability questionnaire, observation of micro-teaching, and document analysis. The findings show that *M*-PA21 module can increase the level of respondents' metacognitive regulation in teaching. This is because the training module contains characteristics that meet the needs of respondents, especially in teaching and aspect of thinking skills which is metacognition. The *M*-PA21 training module contains seven training sessions constructed based on constructivism learning theory, 21st-century basic skills model and metacognition theory. This theory and model were developed in seven training sessions containing session objectives with specific procedures. In addition, the methods used for each training session are group activities and presentations that require active involvement in line with the principles of constructivism learning. These activities seek respondents' metacognitive regulation to apply cooperative learning and the main skills in teaching. The findings suggest that the *M*-PA21 module can improve teachers' metacognitive regulation in the teaching and application of 21st-century basic skills.

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