

# Design and Development of Teachers' Metacognitive Skills Training Module in Teaching and Application of 21st Century Basic Skills

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## Abstract

Teachers were found to have no knowledge and skills in applying 21st century basic skills in student-centered teaching approach and the teachers' metacognitive skills was at low level. Based on these problems, teachers development needs to be implemented by developing appropriate training module. Therefore, the design and development research is conducted to address existing problems. This study involves the development and evaluate the module validity. The development of module based on needs analysis, theory, model, and related literature review. Based on the need analysis, the constructivism learning theory, the 21st century skills model and metacognition theory are taken into account in drafting the module. The questionnaire of the module validity was develop based on a Likert scale of ten points: (0) strongly disagreed, until (10) strongly agree. The questionnaire was initiated before being submitted to six field experts. This study produced a module consisting of two parts: (A) Introduction, Theoretical Basis and Training Session Objectives, and (B) Procedures of 7 Training Sessions. The field experts find that this module has a good validity. This study suggests that the teachers' metacognitive skills training module in the teaching and application of 21st century basic skills can be used in the context of actual training in the next phase.

**Keywords:** Training module; 21st century skills; Metacognitive skills.



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## 1. Introduction

Pupil Aspiration through the Education Development Plan of Malaysia 2013 - 2025 is one of the alternatives to implementing education transformation to meet the challenges of the 21st century. Nevertheless, the expected success in this aspiration has yet to reach its goal because the students are still not mastering 21st century basic skills encompasses communication, collaborative, critical and creative thinking, as well as values (Talent Corp Malaysia Trends in Graduate Employability, 2014; [Bank Negara Annual Report, 2016](#)).

Teachers play a key role in ensuring students acquire basic skills through teaching and learning in the classroom. Unfortunately, teacher teaching methods do not allow students to acquire the skills effectively ([Eow et al., 2015](#)); ([Kementerian Pendidikan Malaysia, 2012](#)); ([Zamri, 2012](#)).

Needs analysis has been conducted to identify the challenges and problems faced by teachers. The study found that teachers did not master the knowledge and skills to apply 21st century basic skills in student-centered teaching approach. Teachers are less skillful in applying the cooperative learning characteristics and 21st century skills for the effective implementation of the approach. In addition, the need analysis also found that the teachers' metacognitive skills were at low level. This is occurs because the teacher do not master the metacognition knowledge. The findings of this study correspond to [Efendi \(2014\)](#); [Bachtiar \(2015a\)](#); [Wilson and Bai \(2010\)](#); which states that the low level of knowledge in metacognition influences the teaching practices of teachers.

Based on these problems, the training module need to be designed and developed to solve the teachers existing problem through appropriate training programs. Therefore, the objective of this study is to develop, evaluate the content and training session suitability of the teacher's metacognitive skills module in the teaching and application of 21st century basic skills. The next discussion is to answer the study question which is how the training module is designed, developed and evaluated the module validity.

## 2. Literature Review

Literature review discusses design and development research, module development and module validity. Design and development research is the approach used in this study. The theory of constructivism, the 21st century basic

skills model and metacognition theory are the basis of the design and development of teachers training module. The validity of the content and training sessions suitability are used to ensure the accuracy of the concepts and module contents.

## 2.1. Design and Development Research

This study uses Design and Development Research (DDR) approach. DDR is a systematic approach used to develop curriculum, model, product instruction and not instruction. Among DDR products are models, techniques, modules or training programs (Saedah Siraj *et al.*, 2013). DDR is a pragmatic research that gives researchers the opportunity to test the theory in practice. This method has been widely used in education and training (Richey and Klein, 2007). According to Richey and Klein (2007), the DDR approach has two types, Type 1 and Type 2. Type 1 focuses on product development that involves specific phases such as analysis phase, design phase, development phase, implementation phase and evaluation. While Type 2 focuses on the creation of new knowledge in the form of model development. The Type 1 was used in this study to produce products in the form of training modules for teachers. The ADDIE model (Analyze, Design, Development, Implementation, Evaluation) is used as a guide for the development of the training module.

The development of the training module is one of the initiatives to implement the teacher development program. Module is a unit of teaching and learning that details a topic systematically and sequentially to help individuals to master learning units easily and accurately (Sidek Mohd Noah and Ahmad., 2005). According to Leo (1999), the module is a unit of learning or teaching about a topic or part that is learned and mastered within a certain period of time either alone or with the teacher guidance (Leo, 1999). The effective way in the teacher development program is the same as the process used in student learning (Saavedra and Opfer, 2012) so that teachers understand it through real experience throughout the training process.

## 2.2. Module development drafting

The needs analysis shows that teachers need training that encompasses aspect of basic aspects of 21st century skills, cooperative learning and metacognition. The next section explains more about these aspects.

### a. 21st Century Skills

21st century skills are the skills needed by students to meet the challenge of globalization. For this purpose, some organizations have been devised the concept of 21st Century Learning such as the American Association of Colleges and Universities (AACU), Organization for Economic Cooperation and Development (OECD) and Partnership for 21st Century Learning (P21).

The Ministry of Education (Malaysia) has used the 21st century conceptual framework by P21. The 21st century learning concept drawn up by P21 encompasses student-centered learning strategies through the emphasis of learning features such as communication, collaborative, critical and creative thinking known as 4Cs. Values are applied in the 21st century skills framework in Malaysia, which is in line with the National Education Philosophy. Table 1 shows the framework of the 21st century basic skills by MOE (Malaysia) with its description.

Table-1. 21st century skills and values of Ministry of Education (Malaysia)

21st Century Skills	Definition
Communication	Interaction occurs between teacher-student, student-student and student-materials through verbal and non-verbal to deliver knowledge they are familiar with and share knowledge with friends.
Collaborative	The collaboration and consensus occurs between teacher-student and student-student actively and comprehensively enabling the exchange of ideas and views between students.
Critical Thinking	Exploration of thinking to judge an idea logically and rationally to make reasonable judgments using reason and evidence.
Creativity	Idea generation process occurs to produce innovative material, as well as new, unique and quality of activities and project.
Values	Applying and nurturing values and ethical towards the formation of national identity in accordance with Malaysian standards.

Source: KPM, 2017

### b. Cooperative Learning Group Characteristics

21st century skills should be applied through student-centered learning environments such as project-based learning, problem-based learning, inquiry-based learning, cooperative learning and other group-based learning. The learning method is based on constructivism theory in which students build meaningful knowledge through an active learning experience. The skills can be applied in teaching through the application of the cooperative learning groups characteristics that include positive interdependence, individual accountability, equal involvement, simultaneous interaction and teamwork skills. Johnson *et al.* (1990) and Kagan (1992) have identified several interrelated features with effective cooperative learning. Here are the characteristics of the cooperative learning group and their description:

## 1. Positive Interdependence

The success of a group is strengthened through shared goals, materials or rewards. Students should believe that they are mutually dependent on each other and they will not succeed unless all members of the group are successful. Positive interdependence structures comprise members should agree with one answer, ensuring that any member can represent the group and the diversity of member roles and rewards or materials sharing.

## 2. Individual Accountability

The purpose of co-operative learning is that in the end every individual can acquire what is learned individually. To achieve this goal, it is necessary to ensure that every process of each member contributes to the learning process that occurs through individual performance. Some of the structural examples of individual accountability are to call individuals in groups randomly to answer questions or to ask individual tasks as part of a group's assignment.

## 3. Equal Involvement

Equal involvement is a task restructuring that involves the involvement of each member and there is a mechanism to ensure equality of engagement. For example, distributing roles, steps that require input from each member or procedure by turn.

## 4. Simultaneous Interaction

Ensure more than one student is actively involved at one time. For examples, students working in pairs or asking each individual to write individually first before discussing in groups to ensure simultaneous interaction.

## 5. Teamwork Skills

Among the key factors that contribute to the success of cooperative learning are teamwork skills. Students must have and use communication skills, leadership, decision-making, building trust among members and conflict management.

Slavin (1982); Johnson *et al.* (1990) and Kagan (1992), co-operative learning is a collaborative learning method that requires students to work together to learn and be responsible for the learning of their group of friends, apart from self-learning or better known as group-based learning which consists of students from all levels of achievement, learning together, helping each other to achieve a learning goal. This clearly demonstrates communication, collaborative, critical and creative thinking, and values can be effectively implemented through a student-centered teaching approach with the application of cooperative learning groups characteristics.

## c. Metacognition

In addition to the lack of knowledge in applying student-centered teaching approaches, the low metacognition knowledge level is also a factor affecting teachers' teaching practices in the classroom. Metacognition is an aspect of thinking skills that influence teacher teaching practices Efendi (2014); Bachtiar (2015b). Teacher teaching involves the diversity of activities such as thought processes that help them in student learning (Duffy and Lent, 2009). (Subramaniam, 2009) emphasizes that thinking about being involved in planning lessons, implementing and modifying strategies when actual situations and assessments are an important element of monitoring, evaluation and justification of the teaching process. According to Lee *et al.* (2010), in planning and teaching, teachers need to be aware of their thinking so they can engage and monitor student learning. This metacognitive awareness can help teachers understand about deeply planning and complexity of the process. To develop or improve teaching practices, teachers need to be aware of the thinking, understanding and knowledge of their teaching. Teachers also need to be aware of their knowledge of the teaching content, including the strengths and weaknesses to master the content. In addition, they need to be aware of the diversity of strategies and types of knowledge that can be used to improve their teaching practices Doganay and Demir (2011); Lee *et al.* (2010).

Flavell (1976b) and Brown *et al.* (1987) classified metacognition into two major categories called metacognitive knowledge and metacognitive regulation (Schraw *et al.*, 2006). Metacognitive knowledge refers to the knowledge of cognitive tasks and strategies, as well as the knowledge that individuals have about themselves and others (Flavell, 1976a). Table 2 shows subcomponents of metacognitive knowledge namely declarative knowledge, procedural knowledge and conditional knowledge.

Table-2. Metacognition knowledge subcomponents

Metacognitive knowledge	Discription
Declarative knowledge	Knowledge of what we know. This includes knowledge about us as learners as well as factors that limit achievement and performance during the assignment (Schraw <i>et al.</i> , 2006)
Procedural knowledge	Knowledge of strategies and procedures in problem solving or in achieving goals (Schraw <i>et al.</i> , 2006). Thus, there is a knowledge of how to use certain skills and strategies during cognitive tasks (Thomas and Mee, 2005) and how it affects performance (Misailidi, 2010).
Conditional knowledge	Why and when using strategy according to the suitability of the situation (Schraw <i>et al.</i> , 2006) (Thomas and Mee, 2005). Conditional knowledge allows us to better evaluate the demands of the learning situation and alter the behavior accordingly (Schraw <i>et al.</i> , 2006).

In the context of the study, declarative knowledge is concerned with teachers as teachers and knows the factors that influence the achievement of their teaching. When teachers are able to identify the skills they have, then teaching can be based on the knowledge they have. Procedural knowledge is the knowledge of cognitive strategies and conditional knowledge is to use a strategy according to the suitability of time and situation.

Metacognitive regulation involves activities in overseeing their own teaching. Table 3 shows the sub-components of metacognitive regulation ie planning, monitoring and evaluation (Hargrove, 2013a);.

**Table-3.** Metacognitive regulation subcomponents

Metacognitive regulation	Discription
Planning	Refers to how individuals use approaches in completing assignments, identifying difficulties or obstacles (Hargrove, 2013b) and making estimates (Iiskala <i>et al.</i> , 2011). Activities involved such as managing resources, identifying and selecting appropriate procedures, setting goals, using existing knowledge and planning time; (Schraw <i>et al.</i> , 2006).
Monitoring	Emphasize constant control over the learning process, identify barriers and modify behavior or goals (Flavell, 1979); (Jacobse and Harskamp, 2012).
Evaluation	This is a retrospective process where learning regulation outcomes and procedures are reviewed where activities such as reviewing the initial goals and studying the expectations involved in the procedure (Schraw <i>et al.</i> , 2006).

In the context of the study, the knowledge of the three subcomponents is essential to the teacher so they can define the teaching strategies, monitor the strategies in the teaching process and then evaluate their own teaching.

### 2.3 . Module Validity

Validity refers to the extent to which the instrument used can accurately measure the characteristics studied in the study (Pallant and Tennant, 2007). The purpose of validity is to determine whether the measure or indicator used contains all the features that must be present in the aspects measured in the study. This means that the instrument can be considered valid if it can measure what is supposed to be measured. The validity of the module refers to the accuracy of the concept and module content. Module validity should have five things: (1) Meeting the target population, (2) The module's implementation is appropriate, (3) The time allocated for the module implementation is sufficient, (4) The module succeeds in causing an increase in the aspect which is targeted, and (5) The module succeeds in changing attitudes in a excellent direction (Russell, 1974). Hence, feedback and expert views need to determine the validity of the module (Mohd Majid Konting, 2000). The validity of the module content is considered good if it can accurately and quantify all its contents. In the context of the study, assessing the validity of module contents and validity of training sessions are used to ensure the accuracy of the concepts and module contents so that modules are more effective and achieve the overall objectives of the module.

## 3. Methodology

This study uses the DDR approach in which the module development process involves the module draft development, the validity evaluation of the content and the training sessions suitability. Module development based on need analysis, theories, models, and literature reviews. The needs analysis findings is used to determine module specification and design the module contents (DeWitt, 2010). These finding is useful in producing a module that meets the needs and solves the teachers' existing problems in the context of this study. The need analysis study found that teachers lacked of knowledge and skills to apply the 21st century basic skills in a student-centered teaching approach with the application of the cooperative learning characteristics and teachers' metacognitive learning skills at a low level. Based on these problems, the appropriate theories and models used in the design and development of the training module. The theories are the constructivism learning theories of the cooperative learning group characteristics, the 21st century skills model, and metacognition theory. Literature review is used for drafting module and identifying suitable model used in design and development research. Table 4 shows the development process of the module according to certain steps in design and development research.

**Table-4.** Module development process

No	Procedure	Activity
1.	Design and drafting the module	Drafting the module based on needs analysis, theory / model, and literature review
2.	Determine the overall objectives of the module.	Develop the overall objectives of the module based on problem statement and needs analysis.
3.	Write and develop module contents.	Develop module contents based on needs analysis, theory / model and literature review.
4.	Membangunkan cadangan aktiviti dan objektif spesifik bagi setiap aktiviti. Develop suggestion activities and spesifik objectives for each activity.	Develop 7 specific training sessions and the objectives based on needs analysis, theory / model and literature review.
5.	Develop teacher evaluation materials.	Produce teacher's activity evaluation materials.



The draft module has developed then determined the validity of the contents and the training sessions suitability by six field experts comprising various fields of education psychology, module and pedagogy. Table 5 displays expert profiles for each field.

Table-5. Field expert profile

Field Experts (E)	Field	Highest Academic Qualification	Occupation	Teaching Experience (year)
E1	Educational Psychology	Doctor of Philosophy	Lecturer	33
E2	Educational Psychology	Doctor of Philosophy	Lecturer	5
E3	Module	Doctor of Philosophy	School Improvement Specialist Coach+	30
E4	Module	Doctor of Philosophy	School Improvement Specialist Coach+	26
E5	Pedagogy	Doctor of Philosophy	School Improvement Specialist Coach+	22
E6	Pedagogy	Bachelor	School Improvement Specialist Coach+	21

Evaluation of the module contents validity and the training sessions validity is conducted to ensure the accuracy of the module's concepts and contents so that modules are more effective and achieve the overall objectives of the module. The module content validity questionnaire was built based on [Russell \(1974\)](#) and the training session suitability questionnaire based on [Mohammad Aziz and Mohamed Arip \(2010\)](#). The validity of the content and the module training sessions suitability are evaluated by six field experts by completing a validity questionnaire. The module content validity questionnaire contains 16 items which contain statements that measure the level of module contents evaluation. This evaluation covers three aspects: (1) Delivery and presentation module, (2) Module content, and (3) Language presentation.

There are 4 items for delivery and presentation module, 8 items for module content aspect and 4 items for presentation aspects of language. (2) Session 2: Formal and Informal Cooperative Learning, (3) Session 3: 21st Century basic skills, (4) Session 4: Metacognition Introduction, (5) Session 5: Metacognitive Knowledge Application for Implementing Cola & Copa Learning, (6) Session 6: Metacognitive Knowledge Application To Applying 21st Century Basic Skills, and (7) Session7: Application of Metacognitive Regulations n for Implementing Cola & Copa Learning and Application of 21st Century Basic Skills (Micro Teaching). The questionnaire was initiated, revised and confirmed by excellent teachers for improvement before being handed over to field experts.

The module set is provided to six field experts for review of the contents and suitability of the module training sessions. The questionnaire requires the field experts to give a reply in the form of a Likert scale of ten points ie from (0) strongly disagree, until (10) strongly agree. In the space provided, experts are asked to provide a view or suggestion for module improvements so that modules can be further refined.

The validity of the module content and the training sessions suitability were evaluated using the calculating method of the [Tuckman and Waheed \(1981\)](#) constructed based on [Russell \(1974\)](#). This method states that the achievement level of 70 percent is considered the module has a high level of achievement. The level of achievement of the validity of the module content and the suitability of the training session is calculated by its percentage value using the following formula:

$$\frac{\text{Total of Expert Score}(x)}{\text{Maximum score}} \times 100\% = \text{Content Validity Achievement}$$

## 4. Results and Findings

This section discusses the findings of the study to answer the research question, how the teachers' metacognitive skills training module is designed, developed and the content and training sessions suitability validity evaluated. The findings of this study are divided into three aspects: (1) module drafting, (2) Evaluation of the module contents validity, and (3) Evaluation of the training session validity.

The construction of the training module should be done to plan the entire contents of the module. The planning of module content is a design process based on needs analysis, theory, model, and literature review. The draft module was determined based on the teachers' problems that were detected in the needs analysis study where teachers were found lacking of knowledge and skills to apply the 21st century basic skills through a student-centered teaching approach and teachers' metacognitive skills at low level. Based on these problems, the constructivism learning theory, the 21st century skills model, and the metacognition theory are the basis of the module content planning. Planning is done by formatting the module into two main sections: (A) Introduction, Theoretical Basis and Training Session Objectives, and (B) Procedures of 7 Training Session. Table 6 shows the format and division of topics in the module.

**Table-6.** Format and training module topic division

<b>SECTION A: INTRODUCTION, THEORETICAL BASIS AND TRAINING SESSION OBJECTIVE</b>	<b>SECTION B: PROCEDURES OF 7 TRAINING SESSIONS</b>
<b>Introduction</b>	Pre Session: About Me
Purpose of the module	
Objectives of the module	
Module Type	
<b>Theoretical Basis</b>	
Constructivism Learning Theory	
Students-centered teaching method: Project Based Learning Problem Based Learning Inquiry Based Learning Colaborative Dan Cooperative Learning Cooperative Learning Methods Cooperative Learning Group Characteristics	Session 1: Cola & Copa Introduction Session 2: Formal & Informal Cooperative Learning
21st Century Learning Model: <i>Partnership for 21st Century Skills</i> (P21) framework Century Skills in Malaysia	Session 3: 21st Century Basic Skills
Metacognition Theory:	Session 4: Metacognition Introduction
Metacognitive Component	Session 5: Application of Metacognitive knowledge and Metacognitive Regulation for Implementing Cola & Copa Learning and Applying 21st Century Learning (Case Study)
Metacognitive Knowledge	Session 6: Application of Metacognitive knowledge and Metacognitive Regulation for Implementing Cola & Copa Learning and Applying 21st Century Learning (Micro Teaching Planning)
Metacognitive Regulation Constructive Alignment Reflection	Session 7: Application of Metacognitive knowledge and Metacognitive Regulation for Implementing Cola & Copa Learning and Applying 21st Century Learning (Micro Teaching)
Summary of Theoretical Basis	
<b>Training Session Objectives</b> Session 1 - Session 7	

Module contents of Part A and B are developed after formatting and topic are identified. The overall objectives of the module are determined so that the development of the module will address the objectives and objectives based on the problems to be resolved. Overall, the module consists of 3 main objectives: (1) Improving teachers' metacognitive knowledge in the teaching and application of 21st century basic skills, (2) Improving teachers' metacognitive regulation in teaching and application 21st century basic skills, and (3) Improving the teachers' metacognitive skills in teaching and application 21st century basic skills.

The development of Part A is done by expanding the topics identified based on constructivism learning theory, 21st century skills model and metacognition theory. The topics cover the introduction of modules, theoretical basis which consists of constructivism learning theory, 21st century skills model and metacognition theory. This section also contains topics about the objectives of each training session. The objectives of the training sessions are determined based on the 3 main objectives of the module. All of these topics are related to the implementation or procedure of the 7 training sessions contained in Part B of the module. The procedures for each training session based on active and fun learning concept. The aim is to provide teachers with real experience in applying 21st century skills through a student-centered learning approach. This is in line with the theory of constructivism learning that humans build knowledge and skills through experiences such as physically or mentally active interaction during the learning process (Piaget, 1972). The metacognition is also applied in the procedure so that teachers can understand clearly the knowledge of metacognition. This developed procedure helps teachers apply theory in the form of teaching practices. Layouts are then determined so that the presentation modules become more systematic and interesting. Training procedures are labeled with the principles and characteristics of cooperative learning groups, 21st century basic skills and metacognition to provide clear information on the application of the theory and model in training session procedures.

Constructivism learning theories, the 21st century skills model and the metacognition theory are taken into account in this study based on the problems detected through the needs analysis. Constructivism learning theories focus on student-centered teaching approach such as project-based learning, problem-based learning, inquiry-based learning, and collaborative and cooperative learning. The principles and characteristics of the cooperative learning group need to be applied in the group-based learning so that each student is through an effective learning process to well achievement of the learning objectives. According to Vygotsky's view of the Zone of Proximal Development (ZPD), group activities seek to collaborative learners to enhance their potential in learning (Hammond *et al.*, 2001);

(Schunk, 2008). The activities of this group also enable students to work together to achieve their own learning goals as well as their colleagues (Slavin, 1982); (Johnson *et al.*, 1990); (Kagan, 1992).

The 21st century basic skills model encompasses communication, collaborative, critical and creative thinking, as well as values gives teachers the exposure to their definitions and needs. The skills can be effectively applied through a student-centered teaching approach that students are given the opportunity to profess the skills during the learning process (P21, 2009); Pukelis and Pileickiene (2010); Rian Vebrianto and Osman. (2014); and Kamisah Osman *et al.* (2013)

In addition to the constructivism theory and the 21st century skills model, metacognition theory is also the basis of the module content. This is because the need analysis finds that teachers' metacognitive skills in teaching are at low level. The low metacognition knowledge influences teachers' teaching practices (Efendi, 2014); (Bachtiar, 2015a); (Wilson and Bai, 2010). Therefore, teachers need to be exposed to metacognition comprising two components namely metacognitive knowledge and metacognitive regulation so that teachers are aware of their thoughts and practices in teaching. According to Flavell (1976a), if human beings know how the mind operates, humans can control and direct their thinking towards achieving goals. Metacognitive skills also help teachers deal with problems and obstacles in teaching and to do modifications (Iiskala *et al.*, 2011). This training module also gives exposure to teachers about reflection which is a metacognitive regulation subcomponent. Reflection allows teachers to evaluate and improve their teaching practices. The constructive alignment contained in this module gives teachers an overview of the three aspects in the planning and teaching process such as objectives, activities and assessments. Knowledge of constructive alignment is necessary so that teachers can determine the learning objectives to be achieved, plan and implement constructive activities and assessments to achieve those objectives.

### **a. Module validity evaluation**

Validity evaluation of module contents is done to ensure the module is more effective and meets the needs of experts and users. The validity of the module content was evaluated by six field experts by completing the module content validity questionnaire form. This evaluation covers three aspects: (1) Delivery and presentation module, (2) Module content, and (3) Language presentation. Overall, the findings indicate the lowest level of consent is in points 6 and highest in points 10. There are no experts who disagree or strongly disagree with any statement. The following is a description of the findings of the content validity based on the three aspects:

#### **i. Delivery and Module Presentation**

This aspect contains features about the module title, the text used, the composition of the module and the presentation of the module. The findings show that 2 experts give the level of consent on every point 8, 9 and 10 that agree the module title according to the purpose of the module. 6 experts give a level of consent with points 8 and 9 that agree the texts used in the module are clearly delivered. For the composition of the module content, 5 experts provide an agreement level with points 8 and 9, and one expert with 10 points is strongly agree that the order of the module contents is very easy to follow. The findings also show that 6 experts agree that modules are suitable for teachers. In conclusion, the experts agree that this module contains a good way of delivering and offering a good module with approval level is 8 to 10 points.

#### **ii. Module Contents**

There are 8 features of the module content that are summarized into four main features: (1) Composition of activity suggestion, (2) Activity proposed in increasing knowledge, (3) Activity proposed in skill enhancement, and (4) Period. The findings show that 4 experts have agreed level agreements with points 8 and 9, and 2 experts with 10 points which is strongly agreed that the content of the activity is arranged from easy to hard. In addition, 3 experts agree that activities are able to increase knowledge in collaborative and co-operative learning with 6, 7 and 8 points, and 3 more with 9 points. For teachers' knowledge of how to apply the basic skills of the 21st century, 4 experts put the level agreement with points 8 and 9, 2 experts with points 10. The findings also show that 5 experts put the level of consent with points 8 and 9, and an expert with 10 points of agreeing training can improve teacher skills how to implement collaborative and cooperative learning. In addition, 5 experts agree that the activity is capable of improving the teachers' skills of how to apply the 21st century basic skills with points 8 and 9, and another expert with 10 points that is strongly agreed. In terms of the teachers' metacognitive skills in conducting collaborative and cooperative learning, as well as the application of 21st century basic skills, 5 experts put the level of consent with points 8 and 9, and an expert with 10 points. Finally in the aspect of module content, 2 experts agreeing to put the level of consent at level 7 that the period of the proposed activity implementation is in line with the activities carried out and 4 experts put the level of consent at the level of agreement 8, 9 and 10. It is concluded that experts agree that the contents of this module well meet the eight features level of agreement between points 6 to 10.

#### **iii. Language Presentation**

The features contained in the aspect of language presentation are the style of writing, spelling, language and writing. The findings show that 4 experts agree that the writing style of the module is easy to read with points 8 and 9, and 2 experts with 10 points that are strongly agree. For the rt aspect of the word spelling, 5 experts agree with points of consent 8 and 9, an expert agrees with 10 points of consent. Additionally, 5 experts agreed with agreements level at points 8 and 9, and one strongly agrees with 10 points which is the language used in the module is easy to understand.

Meanwhile for the module writing is appropriate for teachers, 5 experts agree with the level of agreement at 8 and 9 points, and one expert agrees with the points 10. In conclusion, experts agree on the language presentation of the training module is meet the four characteristics with the level of agreement between points 8 to 10. Table 7 shows an analysis of the level of 6 field experts approval (n) on the module contents.

Table-7. Expert approval analysis on module contents

No	Aspect/Description	Agree (n=6)				Strongly Agree
		6	7	8	9	10
	<i>Delivery and Presentation of Modules</i>					
1.	The title of the module corresponds to the purpose of the module.			2	2	2
2.	The text used in this module is clearly delivered.			2	4	
3.	The composition of module contents is easy to follow.			1	4	1
4.	Persembahan modul ini mesra pengguna. Presentation of this module is user-friendly.			3	3	
	<i>Module Contents</i>					
5.	The arrangment of the activities suggestion are organized from easy to difficult.			2	2	2
6.	The activities suggestions are able to enhance teachers' knowledge of how to implement collaborative and cooperative learning.	1	1	1	3	
7.	The activities suggestions are able to enhance teachers' knowledge of how to apply 21st century basic skills.			3	1	2
8.	The activities suggestions are able to enhance teachers' skills of how to implement collaborative and cooperative learning.			3	2	1
9.	The activities suggestions are able to enhance teachers' skills of how to apply 21st century basic skills.			3	2	1
10.	The activities suggestions are able to enhance teachers' metacognitive skills of how to implement collaborative and cooperative learning.			3	2	1
11.	The activities suggestions are able to enhance teachers' metacognitive skills of how to apply 21st century basic skills.			3	2	1
12.	The implementation period of the activity suggestion is in line with the activities carried out.		2	2	1	1
	<i>Language Presentation</i>					
13.	The writing style of the module is easy to read.			2	2	2
14.	The words used in the module is in correct spelling.			1	4	1
15.	The language used in the module is easy to understand.			3	2	1
16.	The writing in the module is suitable for teachers.			2	3	1

To determine the level of achievement of module content validity, calculations are made based on the Likert scale value obtained. The computation results of the module contents validity level by six field experts show a percentage value greater than 70% is 83.3%. This finding shows that the module has mastered a high level of achievement (Tuckman and Waheed, 1981). The mean counts show the validity value of the module content obtained from 6 field experts is 87.2 percent. Table 8 shows the computation value of the module contents validity.

Table-8. Module contents validity calculation

Field Expert	Mean (%)	Content Validity Level
1	82	Good
2	82	Good
3	96	Good



4	94	Good
5	83	Good
6	86	Good
Overall total (Mean)	87.2	

In conclusion, this module obtains the high level of field expert approval and high level of content validity achievement. This shows that this module has good contents value and meets the target of the field experts.

### **b. Validity Evaluation of Training Session Suitability**

In order to ensure the accuracy of the concept and module content, the validity of the training session is evaluated by the same 6 experts in the validity of the content. Overall, this findings indicate that the level of expert consent at the lower level is at points 6 and the highest is 10 points. No experts disagree or strongly disagree with any statement. Here is a description of the findings based on 7 training sessions:

#### **i. Session 1: Cola & Copa Introduction**

The findings show that an expert gives the level of agreement agreeing with the consent points 7, 3 experts with points 8 and one with points 9, and one with points 10 is strongly agreed that this session is appropriate to be implemented.

#### **ii. Session 2: Formal & Informal Cooperative Learning**

For this session, 4 experts give the level of consent agree with the consent points 8, and one with points 9, and one with points 10 is strongly agreed that this session is appropriate to be implemented.

#### **iii. Session 3: 21st Century Skills**

While for session 3 of the 21st Century Skills, one gives the level of consent agree with the points 7, 4 experts with points 8 and 9, and one with points 10 is strongly agreed that this session is appropriate.

#### **iv. Session 4: Metacognition Introduction**

The findings show that one gives the level of agreement agreeing with the points 7, and 5 experts with points 8 and 9.

#### **v. Session 5: Metacognitive Knowledge Application for Implementing Cola & Copa Learning**

For this session, one agree with points 6, 4 experts agree with the consent points 7, 8 and 9, and one with 10 points is strongly agreed that this session is appropriate.

#### **vi. Session 6: Metacognitive Knowledge Application To Applying 21st Century Basic Skills**

Meanwhile for session 6, 2 experts agree with points 7, 3 experts with points 8 and 9, and one with points 10.

#### **vii. Session7: Application of Metacognitive Regulations for Implementing Cola & Copa Learning and Application of 21st Century Basic Skills (Micro Teaching)**

The findings show that 2 experts agree with the points 7, 3 experts with points 8 and 9, and one strongly agrees that this session is appropriate. To give a clearer picture, [Table 9](#) shows an analysis of the field experts approval analysis on training session suitability.

**Table-9.** Field Expert approval analysis on training session suitability

No	Aspects/Description	Agree	(n=6)			Strongly Agree
		6	7	8	9	10
1.	Session 1: Cola & Copa Introduction		1	3	1	1
2.	Session 2: Formal & Informal Cooperative Learning			4	1	1
3.	Session 3: 21st Century Skills		1	2	2	1
4.	Session 4: Metacognition Introduction		1	4	1	
5.	Session 5: Applying of Metacognitive Knowledge To Implement Cola & Copa Learning	1	1	1	2	1
6.	Session 6: Applying the Metacognitive Knowledge To Applying Basic 21st Century Basic Skills In Cola & Copa Learning		2	1	2	1
7.	Session 7: Implementation of		2	1	2	1

Metacognitive Regulations for Implementing Cola & Copa Learning and Application of 21st Century Basic Skills (Micro Teaching)					
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To determine the level of training session validity, the level of training session validity achievement calculating is based on the Likert scale value obtained. The results of computation of the achievement level of the training sessions by six field experts show a percentage value of more than 70% is 83.3%. This finding shows that the module has mastered a high level of achievement (Tuckman and Waheed, 1981). The mean counts show the validity value of the training session suitability obtained from 6 field experts is 83.3%. Table 10 shows the validity value of the training session suitability.

**Table-10.** Training session suitability validity calculation

Field Experts	Mean (%)	Session Suitability Validity Level
1	80	Good
2	71	Good
3	97	Good
4	90	Good
5	86	Good
6	76	Good
Overall total (Mean)	83.3	

In conclusion, this module obtains the high level of field expert approval and the high level of training session suitability validity achievement. This shows that this module has the good validity of training session suitability and meets the target of field expert.

In addition to evaluating the module content validity and the training sessions suitability validity, field experts have also provided recommendation in the space provided in the assessment form. Table 11 presents an analysis of training module improvements based on expert recommendation. In conclusion, diversity of activities and materials is an aspect that needs to be focused on module improvements.

**Table-11.** Analysis of training module improvements based on expert recommendation

No	Expert recommendation (E)	E1	E2	E3	E4	E5	E6	Frequency
1	Perform active and fun activities.	✓	✓				✓	3
2	Various activities perform.		✓		✓	✓	✓	4
3	Diversify materials for activities.		✓					1
4	State the aspect of co-operative learning and basic 21st century basic skills in the procedures or activities undertaken.	✓				✓		2
5	Use of terms and languages needs to be refined.	✓		✓				2
6	Evaluation and assessment should be emphasized.				✓	✓		2
7	Review collaborative or cooperative learning. Choose one to focus on.		✓					1

Overall, the findings of this phase study show that field experts agree that this module is suitable for use and can be implemented in the context of actual training in the next phase.

## 5. Conclusion

The Design and Developmental Research (DDR) is the approach used in this study to develop a teachers' metacognitive skills training module in the teaching and application of basic 21<sup>st</sup> century skills. The specifications of training module are based on an need analysis that have been conducted where the teachers were found lack of knowledge and skills to apply basic 21st century skills in student-centered teaching approach, as well as teachers' metacognitive skills at a low level. Based on this problem, the constructivism learning theory, the 21<sup>st</sup> century skills model and the metacognition theory are the basis of the drafting of the module. This study produced a module consisting of two parts: (A) Introduction, Theoretical Basis and Training Session Objectives, and (B) Procedures of 7 Training Sessions. The module then evaluates by 6 field experts comprising fields of education psychology, module and pedagogy for the module validity encompasses the content and training sessions suitability. Expert recommendations are also taken into account in the improvement of the module where the diversity of activities and materials is an aspect that should be emphasized. Findings on the module validity, this module obtains the high level of field experts approval as well as high achievement for both the content validity and the training sessions suitability validity. This shows that this training module is appropriate and feasible in the context of actual training in the next phase.

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