DEVELOPMENT OF THEMATIC LEARNING MODEL BASED ON HOTS TO IMPROVE CRITHICAL THINKING SKILL IN JEMBER INDONESIA

**Sri Astutik*, Nurima, Supeno, Siti M. Wardayati, Alfi Arif,
Nining I. Wahyuni & Senny W. Dinda**
(Researcher)
Faculty of Teacher Training and Education and Faculty of Science and Business
University of Jember, Kalimantan[st] no.37 Jember Indonesia

Corresponding Author*

Abstract

The independent learning policy that is currently implemented has a great opportunity to improve the quality of education in Indonesia, where students are directed to have 21st century competencies, namely communication, creativity, collaboration, and critical thinking. In the concept of independent learning at the early childhood education level, these competencies include learning outcomes in elements of stimulation of the basics of literacy, mathematics, science, technology, engineering and art. This study intends to develop a play activity-based learning model that stimulates early childhood creativity. The learning strategy that is considered suitable for cultivating students' critical thinking skills is HOTS. HOTS is intended to develop children's skills in knowing Science, Technology, Engineering, Art and Mathematics which in turn can foster students' creative abilities. Andini's learning model developed in this study is able to develop children's creativity because this model provides the widest possible space for initiatives and actions by creating an adequate learning environment for children. Andini's learning model was developed from the following steps: Play Orientation, Form Patterns, Evaluate and Celebrate which are applied to improve early childhood creativity skills. This type of research is development research using the Ploom and Nieven development research model. The data obtained are in the form of criteria for validity, effectiveness, and student responses. the Thematic learning model was declared valid by experts with a validation value of 80%, and effective for training creativity skills with a high effectiveness category of 0.75, student responses to learning were very good with a value of 85%. So that the Thematic learning model can be used as an innovative model that can be used by teachers to train early childhood critical thinking skills.

Introduction

Today's learning requires teachers and students to be able to master life skills, especially 21st century skills. The skills needed include critical thinking skills and problem solving, communication, collaboration, creativity and innovation. According to Astutik, (2021) higher thinking skills are complex thinking processes in describing material, draw conclusions, construct representations, analyze, and construct relationship by involving the most basic mental activity. These skills are known as 21st century skills (21st century skills) or commonly called the four-C's (4C's). The 4-C approach is an approach that is oriented towards higher order thinking skills (HOTS) which is thought to be able to improve student achievement and can improve students' higher order thinking skills. However, the obstacles that have been obtained so far are very difficult, how to train students' higher-order thinking skills at the basic level, which involve higher-order thinking skills, does not need to be limited to advanced students only, but must be applied early on, such as elementary school students. Therefor as an educator must have variety so that students are trained to think at a higher level.

Higher Order Thinking Skills (HOTS) are thinking skills that involve critical and creative thinking skills that can be assessed through problem solving or problem posing. HOTS should be trained and strengthened from an early age and elementary school. Critical thinking skills are related to the left brain while creative thinking skills are related to right brain function. Critical thinking skills are an intellectual process of activeness and conceptual skills, application, analysis, synthesis, and evaluation of information collected or generated from observation, reflection, and reasoning experience (Astutik, 2019). Creative thinking skills are related to the ability to solve or pose problems in a fluid, flexible and new way. Thinking critically and creatively allows students to study problems systematically, meet various challenges in an organized way, formulate innovative questions and design original solutions (Astutik, 2020). Critical thinking skills refer to convergent thinking while creative thinking skills refer to divergent thinking. So that the ability to think convergent and divergent can be owned in a balance. With this balance students can achieve high achievement. So that high-level thinking skills (HOTS) in learning need to be given and strengthened. HOTS can be started from elementary school, because HOTS training from the start will lead students to achieve optimal performance.

Many learning models are seen as suitable for fostering students' creative abilities including the Problem Based Learning (PBL) model (Arends, 2012), the IDEAL Model and the Creative Process model (Mumford, 2012), PBL Problem Based Learning) aimed at developing higher order thinking skills which in this case is the student's creativity skills. A form of learning that encourages cooperation in play and engages students in self-selected investigations, which enables them to interpret and explain real-world phenomena and build on those phenomena. Problem-Based Learning triggers students to solve complex and unclear problems (Moreno, 2010: 313), students work collaboratively to share information, evaluate and criticize each other when solving problems. However, the collaboration that is built does not yet require that the result of this collaborative work is a product of creativity (Awang & Ramly, 2008:19). The IDEAL model refers to student activities that direct students to think creatively but this model does not explicitly show how students play a role in exploring creativity. Referring to these learning models and their weaknesses, it is necessary to develop a learning model that is able to maximize student creativity.

High Order Thinking Skills (HOTS) is a thinking process of students at a higher cognitive level that is developed from various cognitive concepts and methods and learning taxonomies such as problem solving, bloom taxonomy, and learning taxonomy, and assessment (Saputra, 2016: 91). These high order thinking skills include problem solving skills, reasoning, creative thinking, critical thinking, argumentation skills, and decission making skills. According to King, HOTS includes critical, logical, reflective, metacognitive, and creative thinking, whereas according to Newman and Wehlage (Widodo, 2013) with high order thinking skills students will be able to distinguish ideas or ideas clearly, argue well, be able to solve problems, be able to construct

explanations, be able to hypothesize and understand complex things more clearly. According to (Astutik, 2020) HOTS will occur when a person associates new information with information already stored in his memory and associates and/or rearranges and develops this information to achieve a goal or find a solution to a difficult situation.

According to Ennis (1993) explains that critical thinking skills are skills to think logically to make a decision about what to believe and what to do. Jhonson (2007) explains that critical thinking is a skill that allows a person to evaluate or investigate the facts, assumptions, and logic that underlies the ideas of others. From the explanation it is concluded that critical thinking skills are students' skills in analyzing and evaluating information to make decisions so that they can be accounted for. According to Ennis (1993) critical thinking skills consist of five indicators, namely providing simple explanations (elementary clarification), building basic skills (the basic for decisions), concluding (inference), providing advanced explanations (advance clarification), and managing strategies and tactics (strategies and tactics). One of the factors that causes a lack of students' critical thinking skills is the learning model used by the teacher in teaching class (Ramadhan et al, 2018). So it is necessary to have a learning design that is able to train students' critical thinking skills, one of which is the learning model

Methods

This type of research is development research. This development research aims to develop the Thematic learning model in elementary school in accordance with valid, practical, and effective product development criteria. This research refers to the development model of Plomp and Nieveen (2007:15) the stages include: (1) Preliminary research, (2) Prototyping stage, and (3) Assessment stage (summative evaluation).

The data taken in this study are 1) validation data, 2) practicality data 3) effectiveness data. The data analysis technique used is descriptive qualitative analysis. Qualitative descriptive analysis was used to analyze quantitative data to be converted into qualitative data, qualitative data in the form of the validity category of the Thematic model, the category of effectiveness of the Thematic model, and the category of teacher responses to learning the Thematic model.

Prior to field trials, the Thematic learning model and its learning tools, namely the Learning Implementation Plan, were validated by an expert in the development of learning models, namely Jember University lecturers. Expert validation data is then represented by the formula:

$$Percentage\ value = \frac{\sum n}{\sum N} \times 100\%$$

Information:
n : the number of values obtained
N : the maximum number of values
After getting the percentage value, the validity level is categorized according to Table 1.

Table 1: Expert validity criteria

Percentage	Validity Category	Information
80% - 100%	Very Valid	Can be used without revision
61% - 80%	Valid	May be used with minor revisions
41% - 60%	Valid Enough	May be used with major revisions
21% - 41%	Invalid	Large revisions may not be used
0 – 20%	Invalid	Should not be used

(Akbar, 2013:78)

After the model and learning tools for the Thematic learning model have met the valid category, then a limited trial was carried out on the developed model. The data taken in the limited trial were data on the effectiveness of the Thematic learning model and student response data. Effectiveness data is in the form of an increase in students' creative skills obtained through playing pattern techniques by giving pre-tests before learning and post-test patterns after learning. Critical Thinking indicators developed by Astutik, et al (2020) include: *basic clarification*, *basic for the decision*, *inference*, *advance clarification*, *supporting and integration.* The pre-test and post-test data obtained were then analyzed using the formulated N-gain formulation.

$$g = \frac{S_f - S_i}{S_{max} - S_i}$$

Information:
g = gains
Sf = Post-test mean value
Si = Pre-test average value
$Smax$ = The highest score obtained by students

The N-Gain value obtained is then converted into effectiveness criteria as shown in Table 2 below.

Table 2: Level of students' critical thinking

Large coefficient	Criteria
$0,70 \leq$ normalized gain	High
$0,30 \leq$ normalized gain $< 0,70$	Currently
normalized gain $< 0,3$	Low

Hake (1998)

Student response data obtained through response questionnaires were analyzed using the following formula:

$$\%Rs = \frac{A}{N} \times 100\%$$

Information:
Rs : Percentage of student responses
A : Proportion of students who chose Yes or No
N : The number of students who filled out the questionnaire

Furthermore, from the results of the percentage of student responses, categorize them with the criteria as in Table 3.

Table 3: Student Response Criteria

Percentage of Student Response	Criteria for Student Response
0 - 20	Not good
21 – 40	Not good
41 – 60	Pretty good
61 - 80	Well
81 - 100	Very good

(Riduan, 2010)

Results

The Thematic Learning Model

Thematic Learning Model is a learning model that was built to provide alternative learning to be meaningful by orienting HOTS so as to produce elementary school critical thinking skills. The HOTS approach is aimed at developing children's skills in critical thinking, creative thinking, communication. and collaboration.

Higher order thinking skills which in common language are known as Higher Order Thinking Skills (HOTS) are triggered by four conditions:

    a. A particular learning situation that requires a learning strategy specific and cannot be used in other learning situations.

    b. Intelligence that is no longer seen as an ability that cannot be changed, but rather a body of knowledge that is influenced by various factors high consists of a learning environment, strategies and awareness in learning.

    c. Understanding views that have shifted from unidimensional, linear, or hierarchical spiral toward insight into a multidimensional and interactive view.

    d. More specific higher order thinking skills such as reasoning, ability analysis, problem solving, and critical and creative thinking skills.

The Thematic based HOTS learning model syntax consists of *Problematizing*, *HOTS Orienting*, *Thematic Learning, Assessing* and *Celebrating* as presented in Table 4 below.

Table 4: Syntax of the Thematic Learning Model based on HOTS

Syntax	Student activity	Lecture Activity
Stage 1: *Problematizing*	1. Prepare in an orderly manner to form a study group 2. In groups, children pay attention and study the problems given by the teacher. 3. Together with groups of students find problems that will be studied from Themes or Sub-Themes	1. The teacher prepares the formation of study groups 2. The teacher invites the children to prepare for that day's lesson and provides motivation to students. 3. The teacher guides students to find problems in the thematic material and at the same time conveys the day's learning objectives
Stage 2: *HOTS Orienting*	1. Students contribute creative ideas to groups according to the theme 2. Students collaborate in groups to analyze problems, make hypotheses according to HOTS (scientific work) 3. Working together with group members in finding solutions to problems (collaborating)	1. Orient HOTS to learning activities 2. Integrate HOTS in Themes
Stage 3: *Thematic Learning*	1. Students carry out activities to analyze, evaluate or create (problem solving) 2. Contribute in preparing and conducting activities to analyze, evaluate or create (contribution) 3. Cooperate with group members in analyzing, evaluating or creating (cooperating)	1. Accompanying students both individually and in groups in the process of preparing and exploring activities in the wild to analyze, evaluate or create. 2. Facilitating students in carrying out HOTS-based activities 3. Pay attention to working time.
Stage 4: *Assessing*	1. Listen to the feedback conveyed by the teacher 2. Together with the teacher make learning conclusions	1. Provide feedback to students 2. Encourage students to make conclusions

Syntax	Student activity	Lecture Activity
Stage 5: *Celebrating*	1. Convey the findings to other group members 2. Celebrate the results of work together	1. Guide the course of the discussion of presenting the findings 2. Give awards to students

Source: (Astutik, 2023)

The Model System

a. Social System

The social system in the Thematic learning model developed by researchers is in the form of teacher and student interaction in the learning process which is formed according to the syntax of the learning model. Some of the interactions that reflect the social system in the Thematic based on HOTS learning model include students working together in search activities in the wild, students actively discussing during search activities and presentation activities, students are active in question and answer activities with the teacher, and the teacher exercises control in the classroom to create an atmosphere effective and efficient learning

b. Support System

The support system in the Thematic based on HOTS learning model developed by researchers is the teacher providing worksheets for carrying out play activities, HOTS orientation, assessing and celebrating.

c. Reaction Principle

The principle of reaction in the Thematic based on HOTS learning model developed by researchers is that the teacher functions as a controller and facilitator in learning activities such as motivating students in learning activities, guiding students to make patterns, guiding students to play pattern activities, guiding students to get to know the environment, guiding students to make draw patterns, guide the course of play activities, and provide responses to student questions during learning activities.

d. Instructional Impact

The instructional impact of the Thematic based on HOTS learning model developed by researchers is increasing students' creative skills, increasing students' ability to know their environment, and increasing their ability to make patterns.

e. Companion Impact

The accompaniment impact that can be obtained from the developed Thematic based on HOTS learning model is increasing student collaboration skills and increasing scientific attitudes possessed by students,

Next is the design of the Thematic based on HOTS learning model guidebook, learning implementation plans, syllabus, and making data collection instruments. The model guidebook contains the background for making the Thematic based on HOTS model, syntax, social systems, reaction principles, support systems, instructional impacts, and accompanying impacts. The data collection instruments were validation sheets, practicality observation sheets, and creativity skills test questions

The Model Validation

Validation of the Thematic based on HOTS Learning Model was carried out to see the validity of the Thematic based on HOTS learning model before being tested in the field, validation was carried out by experts on learning tools, namely learning models, syllabus, lesson plans, and questions. The results of model validation and learning tools are presented in Table 5.

Table 5: Content Validity Results of the Thematic Learning Model based on HOTS

No	Thematic based on HOTS Model Components	Score Validation (%)	validity	Reliability Coefficient	Reliability
1	*(Need of development model)*	97,5%	Very Valid	94,63%	Reliable
2	*(State of the art of knowledge)*	96,75%	Very Valid	96,42%	Reliable
	Average	97,125%	Very Valid	95,53%	Reliable

From Table 5 above, it is obtained that the average value of model content validation is 97,125% which is classified as very valid criteria. Based on the results of expert validation that has been carried out on the Thematic based on HOTS learning model, syllabus, lesson plans, and questions are declared valid and can be used in elementary school learning.

Table 6: Construct Validity Results of the Thematic Learning Model based on HOTS

No	Component Model	Validation Score (%)	Validity	Coefficient Reliability	Reliability
1	Rational learning model	97,50	Very Valid	100,00%	Reliable
2	Theory support	93,50	Very Valid	89,28%	Reliable
3	Model syntax	95,25	Very Valid	91,83%	Reliable
4	Social system	95,75	Very Valid	91,42%	Reliable
5	Reaction principle	96,00	Very Valid	92,06%	Reliable
6	Support system	80,00	Valid	94,04%	Reliable
7	Instructional and accompaniment impact	83,50	Valid	90,47%	Reliable
	Average	91,64	Very Valid	92,71%	Reliable

From Table 6 above, it is obtained that the mean value of model construct validation is 91,64% which is classified as very valid criteria. Based on the results of expert validation that has been carried out on the Thematic based on HOTS learning model, it can be used in elementary school learning.

Critical Thinking Skills in the Thematic based on HOTS Learning Model

Students' critical thinking skills are obtained through tests of critical thinking skills questions before and after learning the Thematic based on HOTS learning model in elementary school. Small-scale trials were conducted to determine the learning implementation and the effectiveness of the Thematic based on HOTS learning model to improve elementary school critical thinking skills. From the trials that have been carried out, the learning implementation criterion values are obtained, namely as shown in Figure 1 below.
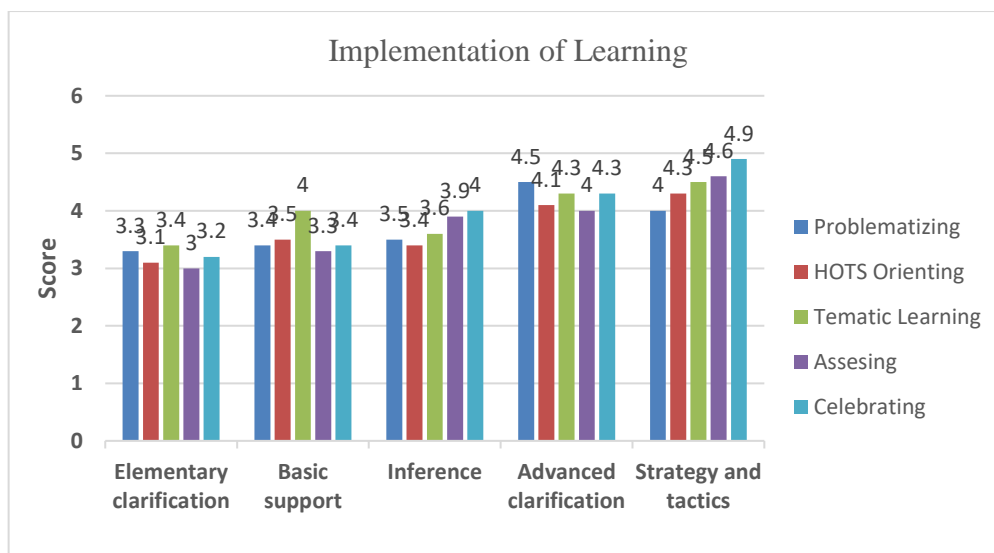
Figure 1: The Learning Implementation of Thematic Learning Model

Students' critical thinking skills are obtained through critical thinking skills tests before and after learning using the HOTS-based thematic learning model for elementary school children. Value were carried out to determine the effectiveness of the HOTS-based thematic learning model for improving the critical thinking skills of elementary school children. From the trials that have been carried out, the criteria for increasing N-Gain are obtained, namely as in Table 7 below.

Table 7: N-Gain Value Critical Thinking

No.	Crtical Thinking Indicator	N-Gain	Criteria
1.	Elementary clarification	0,71	High
2.	Basic support	0.83	High
3.	Inference	0.62	Currently
4.	Advanced clarification	0.74	High
5.	Strategy and tactics	0.62	Currently
Average N Gain		**0.70**	**High**

Based on the critical thinking skill data obtained by the Elementary clarification indicator, the N-Gain value of 0.71 is classified as a high criterion. The Basic support indicator obtained an N-Gain value of 0.83 which is classified as a high criterion. The Inference indicator obtained an N-Gain value of 0.62 which is classified as a currently criterion. The Advanced clarification indicator obtained an N-Gain value of 0.74 classified as a high criterion. The Strategy and tactics indicator obtained an N-Gain value of 0.62 which is classified as a currently criterion. The N-Gain of critical thinking skills obtained by students is equal to 0.70 which is classified as a high criterion, so the Thematic based on HOTS learning model can be said to be effective for improving Elementary School Critical Thinking skills.

There is an increase in students' critical thinking skills after learning because critical thinking skills cover every step in the Thematic based on HOTS learning model. Stage 1 Problematizing, can train indicators of critical thinking, namely by exploring on students' problems, guiding students to ask and answer questions. Stage 2 HOTS orienting, can train indicators of critical thinking. HOTS orienting, namely training students to observe answers by carrying out investigative activities, training students to conclude observations, training students to provide further explanations in class discussion activities and can train indicators of critical thinking. Stage 3 Thematic Learning can train Students carry out activities to analyze, evaluate or create problem solving, contribute in preparing and conducting activities to analyze, evaluate or create (contribution), Cooperate with

group members in analyzing, evaluating or creating (cooperating), Time management in analyzing, evaluating or creating activities (time management). Stage 4 Assessing, can train indicators of critical thinking, namely determining a follow-up action on other relevant problems through playing activities. Stage 5 Celebrating, namely congratulating and giving awards to students who produce the most performance and also celebrating the activities of all students.

The response is a response to students' learning by Thematic learning models. Student response data obtained through a questionnaire given to students after learning Thematic learning models. So we get the response data as shown in Table 8 below.

Table 8: Response Student Thematic learning model

No.	Question	Answering Yes/ Criteria	
1	At the beginning of the learning activities, teacher's explanation to my attention.	81.8%	Very Good
2	Motivation delivered stirs my spirit to learn.	72.7%	Good
3	Just learning process was very interesting.	63.6%	Good
4	I was motivated by their questions in early learning	90.9%	Very Good
5	I can understand better understand the material presented by the lab	72.7%	Good
6	Teachers often provide assistance to students if experiencing difficulty in learning.	90.9%	Very Good
7	The time given for discussions, presentations and other learning activities are in accordance with the needs.	72.7%	Good
8	Teachers give all students the opportunity to ask about the matter who do not understand	73.6%	Good
9	Teachers guide the students to draw conclusions learning materials.	81.8%	Very Good
10	I understand the material and are motivated by their exercises	81.8%	Very Good
	Total	**82.35%**	**Very Good**

Based learning student response data using model Thematic learning, found the percentage of the total score on all indicators say yes as much as 79.35% and fall into either category. Thus it can be concluded that learning with the learning model Thematic learning getting a good response from the student, the student is unbelievably enthusiastic in participating in learning activities, in students' learning tend to be active in conducting experiments outside the classroom. In learning activities are also a good interaction between students and teachers as well as students and other students in the study group. With his own students had given the problem-solving process, students can understand the concepts learned.

Conclusions

The Thematic based on HOTS learning model has syntax namely Problematizing, HOTS Orienting, Thematic Learning, Assessing, Celebrating. The Thematic based on HOTS learning model has a social system, reaction principle, support system, instructional impact, and accompaniment impact. Critical thinking skills in the Thematic based on HOTS learning model are found in every learning syntax. From the results of expert validation the Thematic based on HOTS learning model obtains valid criteria and can be used in learning activities. The results of field trials to measure the effectiveness of the Thematic based on HOTS learning model in improving critical thinking skills obtained high N-Gain criteria, the Thematic based on HOTS learning model can be said to be effective for improving the critical thinking skills of elementary school. The teacher's response to learning using the Thematic based on HOTS learning model is 85% and is categorized in the very good category. So that the Thematic based on HOTS learning model can be used by teachers as a fun model for students and is also able to train elementary school critical thinking skills in learning activities.

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