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The Development of a Thematic Module Based on Numbered Heads Together (NHT) Cooperative Learning Model for Elementary Students in Ambon, Moluccas-Indonesia

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Abstract

This study aimed to examine the effectiveness and practicality of modules used to teach the elementary students in Ambon, Moluccas, Indonesia and as a result generate a thematic module based on Numbered Heads Together (NHT) cooperative learning model. We adopted a 4D development model, which comprises four stages: *define*, *design*, *develop*, and *disseminate* to produce the module. A survey and interviews were conducted at the *define* stage and the results proved that the students used modules which only accommodate the traditional learning model. These modules did not provide the students with activities which could help improve their thinking skills. At the *define* stage, a thematic module was created and at the *develop* stage, it was revised based on suggestions from experts and the results of the field try-outs. The use of the module showed a significant improvement in student achievement. The final step of the development of the module was performed by providing teachers with a training program on teaching resources and lesson study. Future research is expected to be empirical so that it can investigate the effect of the thematic module on students' higher order thinking skills.

Keywords: *module, thematic, NHT, 4D*

Introduction

Globalization has affected all aspects of human life worldwide. It thus creates an opportunity for humans to compete in various fields, including education (Saavedra & Opfer, 2012:8). Student achievement in science and mathematics is its obvious example. Since it has been internationally recognized through International-Standardized Test for Science and Mathematics (PISA and TIMSS), every country in the world has struggled to make a track. Unfortunately, the results of a survey conducted by PISA (*Programme for International Assessment*) in 2014 put Indonesia into the category of lower ranked countries in mathematics and science performance. The majority of the students in this country did not achieve level 2 in mathematics (76 %) and science (67%). This miserable condition was indicated by the fact that 42.3% of the students were not even at the lowest skill level (level 1) in mathematics and 24.7% of the students were below level 1 in science. Similarly, *Trends in International Mathematics and Science Study* (TIMSS) reported that mathematics and science learning in Indonesia was low-ranked (OECD, 2015:138–139).

The Indonesian government, however, have made an effort to increase the quality of human resources in education. They have regularly revised the curriculum to meet students' needs. The curriculum has gone through some changes, from the education unit level curriculum (KTSP) to the curriculum of 2013 (K-13), which was signified by the integration of religious values, behaviour improvement, and cognitive and psychometric skills enhancement into compulsory subjects at schools. To meet the accumulation principles in learning, students' performance in affective and psychometric skills is organized horizontally through reinforcement and vertically based on the sustainability principle (Kemendikbud, 2012:10).

Since K-13 was implemented three years ago, teachers have been faced with the demands to be innovative and creative in developing their own teaching resources. The availability of the resources is vital to the learning process. Regulation No. 4/2007 on National Standard of Learning Process suggests lesson plans, teaching materials, and teaching media as the essence of learning for students. Professional teachers are expected to be able to provide their students with relevant learning resources. One way to meet this need is to generate a set of valid, effective, and practical learning tools.

One of the learning models that have been recently implemented in elementary schools in Ambon, Indonesia is the thematic learning model. This learning model reflects the connection between contents of some subjects integrated through certain competence standards. In 2014, a survey and interviews were conducted

in 25 elementary schools in Ambon to investigate the effectiveness of this learning model implementation. The results indicated that teachers actually faced some difficulties in designing the syllabus, lesson plans, and materials based on this learning model. The teachers admitted that they liked to copy-paste their colleagues' lesson plans developed on the topic similar to theirs. It was also found that their lesson plans did not mention the ABCD (*audience, behaviour, condition, and degree*). Besides, learning objectives stated in the lesson plans only covered the cognitive aspects of learning, and the learning process was not systematically arranged based on the learning model used. In addition, students were mostly required to do the paper and pencil test to assess their cognitive level. Ironically, their metacognitive and higher order thinking levels were not carefully improved or evaluated.

Teachers also had a tendency to only use textbooks which can be found in bookstores or provided by schools. They were not innovative in developing students' worksheets. Probably, teachers' ability to design a learning experience has not been optimized and they merely view learning as knowledge transfer. This, therefore, can result in teacher-centered learning.

A module is actually a book written for students to learn independently. It can be used by students at any time even when there is no guidance from the teacher (Sungkono, 2009:51). Mulyasa (2006:73) defines a module as an independent learning package which covers a set of learning experiences systematically planned and arranged to assist students in learning. A module contains important materials that allow students to learn and practice by themselves. Thus, an effective module makes learners feel at ease when using it. Since K-13 requires elementary school students to learn through the thematic approach (*webbed model*), it is necessary to look at the development of a module which is based on the thematic learning model.

Learning models help teachers to organize their teaching materials. In the 21st century, students can improve collaboration and teamwork (Laal et al., 2012:1696; Griffin & Care, 2012:11) through *cooperative learning* (Johnson et al., 2007:21). This constructivist learning model meets the 2013 curriculum requirements and 21st century learning demands (Schul, 2011:88). The following are the teaching steps of the NHT-cooperative learning model suggested by Hunter et al. (2016:189) and Haydon et al. (2010:224).

- *Numbering*, students are divided into some groups (each group can consist of 3 to 5 students) and are numbered.
- *Questioning*, all students get a module and each of them is responsible for a learning problem.

- *Heads together*, every student works on a problem and then shares the solution in a group. When they are in a group, they need to work together with their peers to make sure that every member of the group understands the material as a whole.
- *Answering*, the student whose number is called raises his/her hand to answer a question. Other students can provide responses to that.

The purpose of this study was to create an effective and practical thematic module based on the NHT cooperative learning model, which can be utilized in elementary schools. It was expected that this module could actively engage students in classroom activities and improve their thinking skills and as a result increase their achievement.

Research Methodology

The Development Model

This study belonged to the *Research and Development* study which was aimed to produce a thematic module that can be utilized by fifth graders in Ambon, Indonesia. This module was developed based on the 4D development model which comprises four stages: *define*, *design*, *develop*, and *disseminate* (Thiagarajaan et al., 1974:5).

The *define* stage was indicated by analysing learning goals and the limitation of the materials which would appear in the module. This stage covered five important steps, which are: a) front-end analysis, b) learner analysis, c) task analysis, d) concept analysis, and e) instructional objectives specification.

At the *design* stage, the module was composed to accommodate learning through NHT. On the complete lesson plan complementing the module, the teacher would find the following information: subject identity, theme/subtheme, core competence and basic competence, learning objectives, teaching materials, learning model/strategy, assessment, and learning resources used in the classroom (Kemendikbud, 2015:9).

The module underwent validation at the *develop* stage. The validation was performed by some experts in the educational *Research and Development*. At the *disseminate* stage, we provided training and lesson study for teachers from the K-13 pilot project schools and also for teachers from some partnership schools in Ambon.

Population and Sample

The population of this study was all the fifth grade students in Ambon and the sample was determined based on the needs of every stage in the product devel-

opment. At the *define* stage, we involved 15 teachers and 120 students in Ambon. It was intended to elicit some information related to the implementation of the recent K-13 curriculum and also to get feedback on learning objectives that should be achieved by the students. At the *develop* stage, we chose 15 elementary schools of the K-13 pilot project but only three of them were chosen as schools where we conducted try-outs. Four teachers or practitioners and 30 students were involved at this stage to revise and validate the product.

Instruments

The instruments of this study were questionnaires distributed to both teachers and students, validation sheets, and a cognitive test. The instruments were developed by the researchers and evaluated by some experts before they were used.

Findings

At the *define* stage, we conducted a survey, observation, and interviews with the principals and teachers at the schools which had implemented the K-13 curriculum. The results of this preliminary study successfully revealed some facts related to learning. Most of the teachers could not improve their students' thinking skills. Since classroom activities were dominated by the teachers and tests conducted at the schools only covered items at a low cognitive level, the students were found to have low cognitive ability (C1-C2).

In line with the findings, Leasa dan Matitaputty (2015:271) in their research on fifth graders' critical thinking skills mentioned that students' interpretation and analysis skills were at a moderate level while their evaluation and explanation skills were at the lowest level. The students still had some difficulty in answering problems at those stages due to lack of practice and domination of memorizing activities.

At the *design* stage, a thematic module was developed on two learning themes which covered three subthemes of each. The themes were simultaneously applied to the following subjects: *Bahasa Indonesia*, Mathematics, Natural Science, and Social Science.

Theme 1 : Things Around Us

Theme 2 : Life Events

The following are stages to drafting the thematic module:

- a. Review the Core Competence (KI) and Basic Competence (KD) of some subjects and then integrate them into the themes. Decide which cognitive, affective, and psychometric aspects should be put in balance.

- b. Formulate KI and KD in the syllabus.
- c. List aspects found in the syllabus and write them on the lesson plans. The components that should be found in both the thematic module and the lesson plans are: subject identity, standard of competence, basic competence, learning activities, learning resources, and assessment methods.
- d. Publish a thematic module and a teacher book.

Since this module contained two themes and each theme should be integrated into more than two subjects, this module had to undergo experts' validation at the *develop* stage. One expert in thematic and one expert in learning design were invited to evaluate the module. The results of the empirical validation are shown in Table 1.

Table 1 Experts' validation results

No	Validator	Average Score	Annotation
1.	Expert in thematic	80.20	very valid
2.	Expert in design	83.30	very valid
Final Score		81.75	very valid

Based on the information in Table 1, it can be concluded that the results of experts' validation reached the average score of 81.75, which showed that the module belonged to the *very valid* category. It proves that the module had met the requirements of a good module.

The next step was to conduct an individual try-out and a group try-out. The individual try-out involved six participants from various academic levels (high, middle, and low) and there were ten students who had different cognitive abilities participating in the small group try-out. The purpose of these try-outs was to check the attractiveness of the module and to identify any misspellings that might have occurred. To avoid ambiguity, we guided and assisted the students in filling in the questionnaires. The results of the try-outs are presented in Table 2.

Table 2. Try-out results

Categories	Average Score	Annotation
Individual	90	very interesting
Small group	88.25	very interesting

A large scale try-out was conducted in three sample schools with 30 participants. The participants were using the NHT module to learn and the teacher was present to guide them. Classroom activities would follow the steps of the NHT-cooperative learning model. Figure 1 shows students' achievement after the try-out.

Figure 1. Students' achievement

Figure 1 presents students' achievement after using the thematic module based on the NHT cooperative learning strategy. The students who got good scores (81–100) outnumbered those who got lower scores. This proved the effectiveness of the thematic module in improving the students' cognitive abilities. The students were motivated to find solutions to problems found in the module. This, thus, helped improve the students' creativity in thinking. They constructed their own knowledge by doing various learning activities such as reading, experimenting, observing, and counting.

The product of this research was also validated by teachers as learning practitioners. They were chosen to represent experienced teachers who had been teaching fifth grade students for about 2–3 years. The teachers had been in several training courses and been appointed national instructors of K-13 by the government. The teachers' responses to the thematic module are shown in Table 3.

Table 3 shows the teachers' good responses to the module by reaching the average percentage of 97.5%, which means that the product was well developed and was ready to use at schools.

At the *disseminate* stage, we held training and a lesson study for teachers who recently joined the local teachers' community (KKG). The training was aimed to improve the elementary school teachers' skills and knowledge on learning resources which were built on the constructivist learning principles. *Lesson study*

is a platform where teachers can practice using the learning model and learning module developed in this study. This lesson study provided an opportunity for the teachers to share their best teaching ideas and practices with other teachers in the community.

Table 3. Teachers' responses to the thematic module

No	Evaluated Aspects	Teachers			
		1	2	3	4
1	Appropriateness of learning plans with learning activities	4	4	4	4
2	Clarity of learning instructions	4	4	4	4
3	Appropriateness of learning objectives with core competences, basic competences, and indicators	4	4	3	3
4	Appropriateness of learning materials with learning objectives	4	4	4	4
5	Clarity of instructional materials	4	4	4	4
6	Clarity of learning examples	4	3	4	4
7	Clarity of independent learning activities (let's observe, let's read, let's try, let's count) in the module	4	4	4	4
8	Clarity of teaching steps based on learning model used	4	4	4	4
9	Appropriateness of pictures/illustrations with the content	4	4	4	4
10	Clarity of module description on thematic learning characteristics: holistic, active, authentic, and meaningful	4	4	4	4
11	Appropriateness of language used in the module. The language is motivating and elevating.	4	4	4	3
12	Appropriateness of language used in the module. The language encourages students to learn independently.	4	4	4	4
13	Appropriateness of language used in the module. The language reflects students' cognitive level.	4	4	4	3
14	Appropriateness of language used in the module. The language reflects students' emotional development.	4	4	4	3
15	The use of module. It supports religious values.	4	4	4	4
16	The use of module. It promotes honesty.	4	4	4	4
17	The use of module. It builds students' responsibility	4	3	4	4
18	Clarity of themes and subthemes	4	3	4	4
19	The use of module. It promotes independent learning	4	4	4	4
Total Score		76	73	75	73
Percentage (%)		100	96	98	96
Average percentage		97.5			

The cover pages of the students' thematic module and the teacher's book were both designed in an interesting. On both covers, the teacher and the students can see an illustration of a classroom in which students are learning with the use of the NHT strategy and inside the module, the students can find colourful pages with relevant pictures and eligible texts to ease the learning process. The module and the teacher's book were written in semi-formal language.

Discussion

The development of this thematic module is a crucial step to improving learning. The module can function as guidance to follow steps in NHT. It helps teachers to organize teaching materials and perform assessment. Besides, it can also assist students to learn independently and engage students in classrooms activities. As a result, the students are able to construct knowledge and get meaningful learning experiences because they regularly practice to connect one concept with another.

The development of a module should be based on student characteristics (Trianto, 2010:84). The elementary students who encounter the concrete operational stage should be served by learning by doing. They learn best by observing, reading, experimenting, and writing. This kind of learning is effective to improve students' cognitive abilities. In line with that, Leasa & Batlolona (2016:339) stated that the elementary students in Ambon were mostly kinaesthetic learners who like to get involved in physical activities either inside or outside of the classroom. They learn through direct experience. Therefore, the thematic module developed in this study was perfect to accommodate these needs.

The results of the large scale try-out indicated that the thematic module based on the NHT- cooperative learning model could improve students' cognitive achievement, not only at a low cognitive level but also at the highest one. The cognitive abilities gained by the students after using this module were the ability to analyse, to evaluate and to create. This result was surprisingly different from the previous learning condition, where the students only developed low cognitive ability (C1-C2), which is only to memorize a concept. NHT can be used to improve students' thinking skills and as a result students' achievement by integrating the simulation method, trial and error activities, and role play into learning. The previous research findings by Maheady et al. (2002:57) emphasized the importance of NHT as one of the cooperative learning models that allow the teacher to get students actively involved in learning by asking questions. This learning model has been proven effective to improve students' cognitive abilities and learning behaviours. It puts

slow learners in a friendly environment, in which they can actively participate in teams and group discussions and share ideas with fast learners. Mahaedy et al. (2006:37) found that NHT has potentials to increase the performance of a student as an individual in a heterogenic classroom, where students from various cognitive levels are put together.

Learning activities developed in the thematic module were intended to improve students' ability to read, write, and count. These activities in every part are labelled *ayo membaca* (let's read), *ayo mengamati* (let's observe), *ayo berhitung* (let's count), *ayo ceritakan* (let's share), and *ayo mencoba* (let's try). At the *ayo membaca* phase, students are encouraged to read a text or information and write a short story, answer comprehension questions to the text, search for new vocabulary items, make a summary, and find the main ideas of the text. The activities in *ayo mengamati* lead students to observe their surrounding or look carefully at the pictures provided in the module. In the *ayo berhitung* section, students are motivated to solve mathematical problems such as to solve circumference, fractions, and many others. The activities in *ayo menceritakan* section help students to write a short story, a recount, or a dialogue based on some pictures or direct field observation. In *ayo mencoba*, students are given a chance to perform in front of their peers, such as presenting the human respiration system, changes in nature, etc.

These guided learning activities are followed by a *question phase*. Each student will get one question. This is to make students more responsible for the tasks given either individually or in groups. Besides, students are also motivated to find a solution to every problem. Therefore, despite their different academic level, they are still given a chance to learn. Coutinho & Almeida (2014:3781) claim that through a question and answer section, students are engaged in deep, scientific, and creative thinking.

The *heads together* phase is one form of group responsibility to finish a task. They collaborate and make sure that every member of their group knows the answer to each question. It shows that there is an interaction between students in a group to help, respect, and accept one another. They need to reach a consensus in order to solve problems. As a result, they can achieve goals together through discussion. At this stage, the purpose of the NHT learning model can be fulfilled. This is in line with Kagan (1989:13), who suggests that the purpose of the NHT learning model is not only to improve students' understanding of a certain topic but also to build students' confidence to work in a group and develop the character of a leader.

Conclusions

The results of the study have indicated that the thematic module based on the NHT cooperative learning strategy has a potential to improve students' critical thinking skills and cognitive abilities. Further research on this topic, however, is needed to provide empirical evidence that this thematic module is effective in promoting elementary students' critical thinking skills. This development product can be a reference for teachers at elementary schools to develop another module which contains different learning contents and models.

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