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DEVELOPING OF NUMBERS LEARNING MODULE FOR PRIMARY SCHOOL STUDENTS BY CONTEXTUAL TEACHING AND LEARNING APPROACH

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Abstract. This study purposed to develop module of numbers learning by CTL approach. Through CTL strategies, students were expected to learn through 'experience', but not 'memorize'. This module included activities to create a meaningful relationship, presenting a problem in the form of open-ended, problem posing assembling, collaborating, presenting individually services through checking the understanding, and self-assessment. The development model used in this research were divided into three phases: (1) the initial investigation phase (2) the prototype phase, and (3) the assessment phase. The research instrument composed in this study consisted of; (1) questionnaire responses of experts and practitioners, (2) student questionnaire, (3) sheets and questionnaires observation, (4) the test sheet. This development product had fulfilled valid criteria by the achievement of the module validation was 3.31 (high criteria), Observation Students' Activities validation was 3.52 (high criteria), Students' Questionnaire Response validation was 3.27 (high criteria), and Test Learning Result validation was 3.44 (high criteria). Based on the validation results, it could be concluded that the module and instrument which were developed was valid.

Keywords: Integer, Module, CTL

I. INTRODUCTION

The development potential of learners is also in accordance with the orientation of the 2013 curriculum that improve and balance between competence and attitude, skills and knowledge. Thematic learning is a learning system that allows students, either individually or in groups actively explore and discover concepts and scientific principles in a holistic, meaningful, and authentic [4]. Integrated learning scheme is originated from the development of knowledge in the mind of the student. It is consistent with the philosophy of constructivism which cognitive conflict in students can be addressed by self-regulation. In this case, learn emphasizing that learning is not just memorizing, but students must constructing knowledge in their own minds. One of the main concept in constructivist learning theory is the vision of the ideal students as independent learners (self-regulated learner). Through the philosophy of constructivism foundation, CTL was promoted to a new alternative learning strategies. Through CTL strategies, students are expected to learn through 'experience', and not 'memorize' (Nurhadi, 2009).

Contextual Teaching and Learning (CTL) is a comprehensive system and consists of the parts that are

connected. If these parts intertwined each other, it will produce the exceed effect from the given result of its part separately. Contextual learning is a learning system that matches the brain that produce meaning by linking academic content to the daily life context of the students. Therefore, through contextual learning model, teaching is not only the transformation of knowledge from a teacher to a student by memorizing a number of concepts that seemed detached from real life, but more emphasis on facilitating students looking for the ability to live (life skills) on what they are learned.

Through contextual approach the learning process takes place naturally in the form of student work and experience activities, not transferring of knowledge from a teacher to a student. With the guiding principle developed in contextual approach, the students can be expected to

realize what they have learned is useful for life. In order, they will put themselves as a student who requires provision for their future life.

Researchers have found that high-achieving students are often the learners of self-regulation. (Alexander, 2006; Boekaerts, 2006; Schunk & Zimmerman, 2006; Wigfield, et al., 2006) (Santrock, 2009). Independent learning is in line by the shifting role of the teacher as the main source of

learning to become a learning facilitator. Maximizing the students' independence required a structured self-learning materials, one of them is achieved through the provision of quality learning module.

The module is one form of teaching material packed full and systematic. It contains a set of learning experiences which planned and designed to help learners mastering the specific learning objectives. The module serves as independent learning tool, in order the students are able to learn at their own celerity. Module can assist schools in achieving quality of learning. The application of module can adjust the learning activity is drafted better, independent, thorough and clear result (Suaidin, 2010). Developing quality module need to pay attention in required characteristics in the module (Anwar in Riadi) (Riadi, 2013), namely: (1) *Self instuction*, learners are able to do self-learning, they will not depend on other person; (2) *Self contained*, the entire learning material from one unit of competency studied contains in just one complete module; (3) *Stand alone*, module developed is not depending on any other media, or should not be used in conjunction with other media. Besides, in preparing the module also has several stages starting from the preparation stage, composing, validating and finishing.

This module includes activities by creating a meaningful relationship, presenting a problem in the form of *open-ended*, *problem posing* application, collaborating, presenting individually services through checking the understanding, and self-assessment. Activities within the module is supported by the provision of numbers line board media, red chips and black chips to help students for solving problem associated with integers. Chip media is also designed to develop students' creativity in arranging them according to the activities that have been designed in the module.

The numbers material is given to students in the fourth grade and fifth grade namely: the planting concept of numbers as well as the operation of addition; subtraction; multiplication and division of integers and fractions. This material is a basic one in teaching more complex concept of numbers. The results of the study on the teaching materials usually used in the field is still lacking in establishing the concept of integers operation, as well as the lack of creativity in developing students' independence. Besides, in the field, there is no learning numbers module by using CTL approach yet as a reference for learning. Therefore, it is necessary to develop numbers learning module by CTL approach.

The purpose of this study was to produce a valid integers learning module for students in fourth grade by developing eight elements in modified CTL approach, as well as to find out the results of module development after a validation expert.

II. RESEARCH METHOD

Development of learning module in this study followed the phases of development model proposed by Plomp [6]. There are three phases, namely: (1) the

initial investigation phase (*preliminary research*), (2) *prototyping phase*, and (3) *assessment phase*.

In the phase of initial investigation, investigators conducted: (1) the initial analysis was in the form of teaching material circulated in the field, specifically how the characteristics of teaching material used, assessing the availability of learning resources and learning situation. Also various facilities including supporting books and learning condition that were running, (2) the students' analysis through observation of how the students' independence in learning. (3) the material analysis toward the study of existing integers matter on teaching materials circulating in the field. (4) the task analysis toward the study that existed on teaching materials circulating in the field. After completing the preliminary analysis, analysis of students, material analysis, and analysis tasks would be performed (5) composing the learning indicator which was customized by basic competencies and core competencies that exist in 2013 curriculum.

Based on observation result, reflection and analysis of the preliminary observation result, in prototype phase prepared the resolution draft. The draft consists of: (1) design of learning module; (2) design of learning tools and (3) design of research instruments. Those three drafts were prepared simultaneously. Furthermore, the assessment phase was conducted the expert validation in the module, learning tools, and instruments. After validation, the researcher did the module tests and learning devices.

The data analysis was obtained from the product validity of the module questionnaire validation by the expert, the expert in mathematics education, as well as a practitioner was a teacher in primary school. This analysis was conducted to assess whether the module and research instruments compiled had met the criteria of validity. Inasmuch, the validity of module data and instruments had been converted into quantitative data, then these data were analyzed with descriptive analysis.

III. RESULT AND DISCUSSION

Development of module which was done was following the stages of development proposed by Plomp [6], namely: (1) preliminary research, (2) prototyping phase, and (3) assessment phase. In preliminary research, the researcher conducted preliminary observations on six different primary schools in sub-district Department of Education Lawang, Malang regency. The results of these preliminary observations could be written as follows:

The initial analysis that aims to identify the problems that occur during the learning of mathematics. The characteristics of teaching materials used, namely: contained a summary of the material; contained regularly questions and emphasized on numeracy skills only; less attractive appearance; the language used was not communicative; there was no feedback and presented a mathematical concept in thematic book in the field it was still lack. The used impact of those instructional materials, the students had difficulties for understanding the material

and the individual ability of the students were less developing.

In addition, the observations also acquired things, those were: the unavailability of mathematic learning books which were supporting learning integers by using CTL approach; some teachers at the school had not understood yet about learning by using CTL approach; the mathematic learning process to prepare students of primary schools still used conventional methods; it had not used the module in learning; and the questions in books and worksheets used as a handbook in those six schools had not contextual. By looking at the advantages of using the module, as well as the results obtained initial investigations indicated that it was necessary to develop numbers learning module by CTL approach in primary schools.

Based on the results of the previous analysis then drafted numbers learning module that were developed by using CTL approach for students in the fourth grade and fifth grade. The CTL elements outlined in the composed module were making meaningful linkages through example in daily life, giving a problem in the posing *problem form* and *open ended*, where the activities in the module required students to be independent. In order students could interact with their environment then inserted some activities that must be done in pairs.

For better understanding the operation of integers, the researcher was made the learning media namely the circle chip and cardboard boxes in red and black, as well as line numbers and toy cars made from paper. Following the concept of integers and fractional developed through activities using the media and then the students began to be directed to study the integers and fractional operation in abstract way (without using the media). In achieving that goal, then the researcher was formulated the indicators of learning results that were tailored to the core competencies and basic competencies of the General Directorate of Primary and Secondary Education.

In prototyping phase, which had been designed were learning numbers learning module. The specification of the products developed in this study was a numbers learning module by using CTL approach for primary students. Module draft designed was as follows: (1) description module and (2) the instructions for using the module. Description Module, contained core competencies and basic competencies which would be achieved. Specifically, the content of the material in this module consisted of learning integers and fractions. Instructions for using the module containing an introduction, a check early ability, activity sheets, conclusions, processing sheets, appraisal column, and an answer key.

Learning device that had been designed was the Lesson Plan as a guide for learning by using numbers module. This Lesson Plan was a guide for teachers to carry out the stages of learning. While the students would work on the existing orders in the module. Components in Lesson Plan followed the existing format in Ministry of National Education Rule 103/2014. The research instrument that had been designed was the Observation Students Activities Sheet, Student Response Questionnaire, Test Learning Results, Module

Validation Sheet, Validation Sheet for Students' Observation Activities Sheet, Questionnaire Response Validation Sheet for students, and test Validation Sheet for Learning Results.

In the assessment phase was to validate learning module, and research instruments. The results of the validation module was 3.31 (high criteria), validation of Observation Activities Students was 3.52 (high criteria), validation of Students' Questionnaire Response (high criteria) 3.27, and validation Test Learning Results of 3.44 (height criteria). Based on the average validation results, the score was more than 3, that was why could be concluded that the module and instruments developed had valid criteria. Although overall validator declared those were valid either the module or the instrument designed, but the researcher was still doing revised in accordance with the records provided by the validator.

IV. CONCLUSION

Developing of numbers learning module performed in this study followed the development stages presented by Plomp (Plomp, 20017), namely: (1) preliminary research, (2) prototyping phase, and (3) assessment phase.

In the initial phase of the investigation Preliminary Analysis conducted: (1) the initial analysis, to find out the problems that occur during the mathematics learning, and supportive availability mathematic book for learning numbers by using CTL approach; (2) analysis of the students, to know how the level of students' independence in learning; (3) analysis of the material, to determine the integers and fractions learning in primary school, (4) tasks analysis, to make a meaningful connection on the module through example in daily life, giving problem in the form of problem posing and open ended, where the activities in the module required the students to be independent, (5) arranging indicators of learning result tailored to the core competencies and basic competencies from General Directorate of Primary and Secondary Education.

In prototyping phase, which had been designed were: (1) The numbers learning module; (2) the learning device; and (3) research instruments. Learning device that had been designed was the lesson plan as a guide for learning by using number module. The research instrument that had been designed was the Observation Activities Students Sheet, Student Response Questionnaire, Test Learning Results, Module Validation Sheet, Validation Sheet for Students' Observation Activities Sheet, Questionnaire Response Validation Sheet for Students, and Test Validation Sheet for Learning Results.

In the assessment phase, the newly done in the first year were validating learning module, and research instruments. The results of the validation module was 3.31 (high criteria), validation of Observation Activities Students was 3.52 (high criteria), validation of Students' Questionnaire Response (high criteria) 3.27, and validation Test Learning Results of 3.44 (height criteria). Based on the validation results provided by the three validators

wereobtained that module and instrument which was developed was valid.

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