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DEVELOPING ADDITION AND SUBTRACTION OF INTEGERS LEARNING MODULE USING CTL (*CONTEXTUAL TEACHING AND LEARNING*) APPROACH BASED ON CURRICULUM 2013

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ABSTRACT

This study aims to develop a learning module for addition and subtraction of integers using Johnson's CTL approach with some necessary adjustments. The development model used in this study was designed based on Plomp who divided it into five phases. However, the development design of this module only adopted four phases. The research instrument prepared in this study consisted of; (1) the questionnaire for the experts and practitioners, (2) the student questionnaire, (3) observation sheets and questionnaires, (4) copies of the test. The subjects of this research were the students of class IVB in SDN Kotalama 1. The finding showed that it met the criteria for validity, practicality, and effectiveness. The percentage of validity reached 90, 46%, while the percentage of the students who succeeded in the daily test was 85 %, and the percentage of student responses was 80%. In terms of practicality, the average score for validation result was 3, 6 (high criteria) and the score from the observer's questionnaire was 3, 2 (high criteria). Since both results reached high criteria, it could be concluded that this developed module was practical.

INTRODUCTION

Developing the student' potential to become a faithful and pious person to God, has a noble character, healthy, educated, capable, creative, independent, and become a democratic and responsible citizen is in accordance with the orientation of Curriculum 2013 which is improving and balancing between attitude, skills, and knowledge.

Curriculum 2013 for elementary school is developed using an integrated thematic approach from class I to class VI which is implemented in stages.

Philosophically, Curriculum 2013 is basically a constructivism-oriented curriculum. In line with this philosophical foundation, the theoretical orientation of the curriculum development is no longer oriented towards content based or material based, but Competency Based instead. Based on the Graduate Competency Standards, the learning objectives cover the development of attitude, knowledge, and skills which are elaborated for each educational unit. In general, the chosen learning approach is based on the theory of taxonomy of educational objective, which is grouped into three domains: cognitive, affective and psychomotor. The learning process is entirely directed towards the development of the three domains in a holistic way, meaning that the development of one domain cannot be separated from others. Thus the whole learning process gives rise to personal qualities that reflect the wholeness of mastery of attitudes, knowledge, and skills developed through a scientific approach under these paradigms: observing, questioning - questioning, reasoning, trying, and communicating (Akbar, 2014). Curriculum 2013 also leads to the practice of learning in elementary schools with integrated thematic learning.

Thematic learning belongs to the integrated learning approach. Integrated learning is a learning system that enables students both individually and groups actively seek, explore, and discover scientific concepts and principles holistically, meaningful, authentic, and active. As what explained in the Regulation of Minister of Education and Culture No. 67 of 2013 that Curriculum 2013 for elementary schools is designed using integrated thematic learning.

Thematic learning is a learning system that enables students, both individually and groups actively explore and discover the scientific concept and principles holistically, meaningfully and authentically (Majid, 2014: 80). Integrated learning begins with the development of knowledge schemes that exist in the minds of the students. This is in accordance with the philosophy of constructivism in which cognitive conflict of the students can be overcome, among others, by self-regulation.

To develop constructivism in learning with Curriculum 2013, Contextual Teaching and Learning (CTL) is promoted to be a new alternative learning strategy. Through CTL strategy, students are expected to learn through 'experience', and not 'memorizing' (Nurhadi, 2009: 10). Contextual Teaching and Learning (CTL) is a comprehensive system and consists of interconnected parts. CTL system in Johnson (2002: 24) consists of 8 components, namely: (1) making meaningful connections; (2) doing significant work; (3) conducting self-regulated learning; (4) collaborating; (5) critical and creative thinking; (6) nurturing the individual; (7) reaching high standards; (8) using authentic assessment. Every component in the CTL system can be associated with a component in the scientific approach of Curriculum 2013.

The philosophical foundation of the CTL (Contextual Teaching and Learning) is constructivism, a philosophy of learning which emphasizes that learning is not just memorizing. Students must construct knowledge in their own minds. One of the main concepts in constructivist learning theory is the ideal student vision as an independent (self-regulated) learner. Researchers have found out that high achieving students are often self-regulated learners (Alexander, 2006; Boekaerts, 2006; Schunk & Zimmerman, 2006;

Wigfield, et al., 2006) (in Santrock, 2009: 334). This independent learning is in line with the shifting role of the teacher from her role as the primary source of learning into a learning facilitator. To maximize the independence of these students, a structured independent learning material is required, one of which is achieved through the provision of high-quality learning modules.

This module contained activities, such as making meaningful connections, open-ended problem presentation, implementation of problem posing, teamwork, individual service delivery through understanding checks, and self-assessment. Activities in the module were supported by integer board and red-black chips to help the students solve problems related to integers. These media were also designed to develop students' creativity in compiling it according to the activities that have been designed in the module.

Integer material is taught to fourth graders on theme 5 sub-theme 3 about heroism. The given material is the concept of negative numbers as well as the addition and subtraction operations on integers. This material becomes one of the basic in teaching a more complex concept of integers. The result of the study of students' books from the Ministry of Education and Culture which is commonly used in schools showed that the books are still lacking in developing the concept of addition and subtraction of integers and in developing the creativity of students independently. Based on the result of research conducted by Iskandar et al., it was found out that in the implementation, the integrated thematic learning is still lacking in the content or material. Moreover, there is also no learning module based on Curriculum 2013 which is practical and effective to be used as a reference in learning.

The purpose of this research was to produce an integer learning module for the fourth-grade students of SDN Kota Lama 1 Malang that was valid, effective, and practical by developing eight elements in modified CTL approach, and to know the result of module development through experts and practitioners validation, as well as the field test.

METHODS

The development model used in this research was a modified Plomp's model. Plomp (1997) (in Hobri, 2010: 17) provides a model in designing the development that is divided into five phases, namely: (1) preliminary investigation; (2) design; (3) realization/construction; (4) test, evaluation, and revision; (5) implementation.

Product testing aims to obtain the data used as the basis for improvements in order to achieve the validity, practicality, and effectiveness of the module. According to Nieveen (Hobri, 2010: 27), the validity is attributed to two things: (1) whether the module developed is based on a strong theory; (2) whether the internal consistency is obtained. Module practical aspects according to Nieveen (Hobri, 2010: 27) are also associated with two things, namely: (1) whether experts and practitioners state that the developed module can be applied; (2) significantly in the field, the developed model can be applied with good criteria. Module effectiveness aspect is associated with three things, namely: (1) mastery of the students' cognitive learning; (2) student activity; and (3) positive responses from the students. Students' learning activities in this study related to visual activities such as reading, taking pictures, understanding contextual problems, solving problems, discussing, and drawing conclusions.

The details of the trial subjects in this development were 5 students of Class IVA in SDN Kotalama 1 (2014/2015) as subjects in small group test and all students of Class

IVB in SDN Kotalama 1 (2014/2015) as subjects of the field test. Instruments used for data collection in this research were (1) questionnaire; (2) observation sheets; (3) test sheets.

Data analysis of the product's validity was obtained from the content experts, ie 2 lecturers of Mathematics with minimum criteria having a master's degree and from 2 practitioners, the Mathematics subject teachers with the minimum criteria having completed the bachelor degree. The effectiveness analysis was based on the average score of each student at each end of the basic competence and 80% of the final test results have met the standard minimum score of 75. Moreover, the effectiveness was also seen from the activities, responses, and perceptions of the students based on the criteria that have been set. The determination of module implementation was seen from the consistency of the result of two measurements, those are IP (Intended - Perceived) from the experts and practitioners and IO (Intended - Operational).

RESULTS AND DISCUSSION

As written in the background above, the impacts of using those teaching materials are the students found it difficult to understand them and their individual abilities were less developed. The characteristic of students at the age of 10-11 years is that they are mostly still at the concrete operational stage so that the materials would be easily understood if they were given concrete examples from the surrounding environment. In addition, the students of Class IVB in SDN Kotalama 1 are not independent learners. It was shown from their habits who would learn only when there was homework. Moreover, the learning in the classroom was still "traditional", so that the role of teachers was still very dominant.

The level of product feasibility that has been tested on content and material experts got the average score of 90,46% (very valid). Although the results of the questionnaire considered the module to be very valid, according to validators' input there were still some parts of the module that needs to be revised in order to produce more effective products. The prototype 2 that was generated from the validation results was then tested on the small group. In this group, the average score of the students' response was 3.2, meaning that the students found it easy or interested in using this module.

From this small group test then the prototype 3 was created which was then used for the field test. This module was tested with 20 students of Class IVB in SDN Kotalama 1. The field test was conducted to determine the effectiveness and practicality of the module. From the results of the competency test, it was found out that each student reached the standard minimum score of 75 with one student being an "outlier" so that he was not included in the data analysis. In addition to the competency test score, the effectiveness of the module was also obtained from the score of the students' achievement on the daily test which reached 85% and the result of the students' activities and responses obtained from the questionnaire score which reached 81.13%.

In terms of practicality of the product, data analysis was seen from the consistency of the score of the questionnaire from the validators and observers. The average score of the validation result was 3.62 (high criteria) and the questionnaire filling the score of the observers was 3.2 (high criteria). Since both results were considered to be high, it could be concluded that the integer module met criteria to be practical.

Although the module had been valid, practical, and effective, there was still room for improvement as the observers mentioned that the students still had difficulties in using the chips primarily to answer the problem of subtraction. Therefore this part needed to revised by writing down the steps of using the chips.

CONCLUSION

Product development in the form of integer module for the fourth grade produced in this research met the criteria for validity, practicality, and effectiveness as seen from the result of validator, observer, and student questionnaire. Problems that arose such as the use of chips to be one of the weaknesses of this module. In addition, the problem that may arise from the utilization of this module is for students who tend to be lazy to be actively involved in learning or less interested in Mathematics will find it difficult to complete the activities in this module.

Despite these weaknesses, this module has several advantages such as the formation of concepts and new knowledge of integers beginning with contextual problems presented through activities for the students to make their own conclusions. Problems are given in the form of open ended and problem posing help the students to develop their critical and creative thinking skills. Based on the observation, it was also found out that the chips can develop their creativity in developing the concept of numbers. In addition, the module was designed in such a way that it became attractive to the students so that their learning motivation increased.

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