

DEVELOPING INTERACTIVE CABRI 3D ASSISTANCE MEDIA IN THREE DIMENSIONAL SPACE FOR GRADE X STUDENTS OF SENIOR HIGH SCHOOL USING GUIDED INQUIRY LEARNING

Pasttita Ayu Laksmiwati

Yogyakarta State University, Indonesia

pasttitaayu@gmail.com

The aims of this study is to describe the developing of media as guided inquiry guidance with *Cabri 3D* assistance in three dimensional space for students of grade X of senior high school and to know students' interests in interactive media based on guided inquiry method.

This study is belonging to research and development with ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model. Analysis stage covers material, students and situation analysis. Design stage covers making grid and deciding media design. Development stage covers creating media, quality validation before trial, and revision base on the result of media validation. The implementation stage that is implementation the media to students of SMA N 1 Wonosobo. The last stage is evaluation, that is evaluated the developing and quality of media.

The result of the study is described as follows. The result of the material expert assessment base on the use of method, didactic, construction, technical, the worthiness of material and presentation has mean score 3, 21(good classification), the result of teacher assessment has a mean score 3,7 (very good classification), and the result of media expert assessment base on the aspect of simplicity, integrity, balance, and coloring has mean score 3,46 (very good classification). Base on the result of students' interest has mean score 78,91% (strong classification). While base on evaluation test, students have mean score 83,2 (very good classification). Thus, the result of the study shows the media is appropriate to be used as one of mathematics learning media.

Key words: cabri 3D, guided, inquiry

INTRODUCTION

Mathematics learning in schools cannot be separated from the nature of mathematics that is abstract. Mathematics has three strands: learning to solve problems both in real life and within mathematics itself; developing skills of communication using mathematical language and symbols; and developing the ability to reason in a mathematical way (Haylook & Thangata, 2007). According to Brumbaugh, Moch, & Wilkinson (2005: 246), "Mathematics is an essential way of expressing ideas and we all, at one time or another, communicate quantitative and qualitative ideas, arguments, concepts, or requirements." Learning is seen as a personal act to fulfill an individual's own potential and thus to meet their affective and cognitive needs in the round (Sriraman & English, 2010). According to Chambers (2008: 7), "Mathematics is objective fact; a study of reason and logic; a system of rigour, purity and beauty; free from societal influences; self-contained; and interconnected structure". This is why teachers have to pay attention to the characteristics of mathematics learning. In learning process students are aimed to arrive at the creating stage as one of the forms of creativity, so that a quality learning which helps students to be creative is highly needed in education.

Dick, Carey, & Carey (2001: 2) said, "Instruction is that it is a systematic process in which every component (i.e., teacher, learners, materials, and learning environment) is crucial to succesful learning". Gagne & Briggs (1978: 19) also said that, "Instruction is the means employed by teachers, designers of materials, curriculum specialists, and others whose purpose

it is to develop an organized plan to promote learning”. One of learning strategy that is suitable for mathematics learning is guided inquiry method. According to Brown, Wilson & Fitzallen (2007), the strategy is different from expository. In expository learning the material is taught in complete form and students are required to master it. In this case, teacher’s role is as an information conveyor. Inquiry is an approach to learning whereby students find and use a variety of sources of information and ideas to increase their understanding of a problem, topic, or issue (Kuhlthau, Maniotes, & Caspari, 2007). In another hand, learning through guided inquiry method has constructivism approach principles, which are students develop their own knowledge. In this situation, teacher’s role is as a guide and facilitator. Through guided inquiry students gain the ability to use tools and resources for learning in and beyond the information age while they are learning the content of the curriculum and meeting subject area curriculum standards (Kuhlthau, Maniotes, & Caspari, 2007). Duffy & McDonald (2010: 25) said, “An instructional event includes all the teaching methods and learning experiences created to support the learning process.” An instructional event includes all the teaching methods and learning experiences created to support the learning process (Duffy & McDonald, 2010: 25).

National Council of Teachers of Mathematics (Jarret, 1997), inquiry is one of the most important contexts in which students learn mathematical concepts and knowledge: by exploring, conjecturing, reasoning logically, and evaluating whether something makes sense or not. Inquiry learning implements a constructivist approach so that students interact with the content by asking questions to increase understanding and comprehension and at the same time construct their own knowledge (Coffman, 2009). Guided inquiry instructional help students develop research competency and subject knowledge as well as foster motivation, reading comprehension, language development, writing ability, cooperative learning, and social skills (Kuhlthau, Maniotes, & Caspari, 2007). The inquiry learning help students to learn, create, and create a hypothesis. Students actively involved discovering some information throughout the process of learning. Inquiry activities help students to develop critical thinking and provide students to apply, analyze, synthesize, and evaluate important concepts.

NCTM (2000: 11) said that, “The six principles for school mathematics address overarching themes: equity, curriculum, teaching, learning, assessment, and technology”. Technology tools are best integrated when they are student driven: for example, when the students gather relevant and timely data, then aid in analyzing and synthesizing that data, and later present the data in meaningful ways to the rest of the class (Coffman, 2009: 1). Computer software is an example of technology that useful in mathematics learning. One of computer software that can be used to help teacher in conducting mathematics learning especially in geometry subject with guided inquiry method is *Cabri 3D*. The software helps students to understand the material such as space in geometry. *Cabri 3D* is computer application software that can be used in mathematics learning in geometry subject. Through this software the position of dots, lines, and areas can be constructed easily. Technology integration in inquiry activities help students to creating engaging activities that would be impossible to achieve without technology tools.

Operationally, steps to use *Cabri 3D* programmed in student worksheet. The student worksheet is functioned as guidance for students tasks in using cabri 3D. The use of student worksheet allows teacher to teach more optimal, gives guide to students that have some difficulties, discover some problem, strengthening the material and teach students to handle problems. Furthermore, the media is expected to give positive contribution to students’ interests in using learning media *Cabri 3D*.

Base on those explanations, researchers are interested to develop student worksheet that students can use to guide on their learning. That is done in the study titled “developing student worksheet as guided inquiry guidance interactive *Cabri 3D* assistance media in three dimensional space subject for grade X”.

The aim of the study is to describe and to know students' interests on student worksheet as guided inquiry guidance with interactive *Cabri 3D* assistance media in three dimensional space subjects for grade X. The study is belong to Research and Development (R&D) and developed with ADDIE model. The authors would also like to acknowledge the contributions of Dr. Ali Mahmudi as guide lecturer.

RESEARCH METHOD

The study is done by using R&D (Research and Development) approach, which is developing student worksheet as guided inquiry guidance with *Cabri 3D* assistance media in three dimensional space subject for grade X. R&D model that will be used in the research is ADDIE model which consists of 5 stages: (1) analysis, (2) design, (3) development, (4) implementation, (5) evaluation. Research instruments that used are validation assessment questionnaires of student worksheet for media, material experts, and teacher, questionnaires of students' interests, and test. The quality of material that is developed then assessed base on classifications that are made by reference Widoyoko (2012), Riduwan (2011) and Arikunto (1997). The worthiness criteria of teacher and material experts is based on some aspects, which are the use of method, didactic, construction, technical, material and presentation. Worthiness criteria by media expert are the aspect of simplicity, integrity, balance, and coloring. While, criteria of students' interests are aspects of likes, curiosity, activeness and participations.

RESULT AND DISCUSSION

The developing of media uses ADDIE model that covers five stages. The results of each stage are explained here. First, analysis covers material, students and situation analysis. The results of material analysis propose to standard of competency. In students' analysis, existing knowledge of students about three dimension subjects is hardly seen from the pretest, 37% of the students got fail, 54% of the students got bad, 3% of students got enough, and 3% got very good. Base on situation analysis SMA N 1 Wonosobo has a good laboratory that is very suitable to be a place for the media trial.

Second, the results of design are making grid and deciding media design. Third, the result of the product that is student worksheet that is developed and compact disk that contains *Cabri 3D* tasks data files that will be manipulated by students development. The result of the product that is developed is assessed with the quality that covers the aspects of material (the use of method, didactic, construction, technical and material and presentation worthiness) and media (likes, curiosity, activeness and participations). Good classification of the assessment is assessed by material experts, very good classification is assessed by teachers and very good classification is assessed by media expert.

Fourth, the result of implementation stage is the process of trial that is conducted in 19, 20, 23, and 24 November 2012 in SMA N 1 Wonosobo that was participated by 30 students. Fifth, the result of the evaluation is assessed with the quality that covers the aspects of material (the use of method, didactic, construction, technical and material and presentation worthiness) and media (likes, curiosity, activeness and participations). Good classification of the assessment is assessed by material experts, very good classification is assessed by teachers and very good classification is assessed by media expert. Evaluation stage is conducted by the researchers after all the stages are completed. The result of the material experts assessment has mean score 3.21 (good) shown on Table 1; The result of teacher assessment has a mean score 3.7 (very good) shown on Table 2; And the result of media expert assessment has mean score 3.46 (very good)

shown on Table 3; The result of students' interest has mean score 78.91% (strong) shown on Table 4. While base on evaluation test, students have mean score 83.2 (very good). Thus, the result of the research shows the media is appropriate to be used as one of mathematics learning media.

Table 1
The Result of the Material Experts Assessment

| Aspects | Numbers | Score | Mean Score | Clasification |
|--------------------------------|---------|-------|-------------|---------------|
| The use of method | 4 | 14 | 3.5 | Very good |
| Didactic | 5 | 15 | 3 | Good |
| Construction | 8 | 25 | 3.125 | Good |
| Technical | 4 | 12 | 3 | Good |
| The worthiness of material | 4 | 13 | 3.25 | Good |
| The worthiness of presentation | 5 | 17 | 3.4 | Very good |
| | | | 3.21 | Good |

Table 2
The Result of the Teacher Assessment

| Aspects | Numbers | Score | Mean Score | Clasification |
|--------------------------------|---------|-------|------------|------------------|
| The use of method | 4 | 16 | 4 | Very good |
| Didactic | 5 | 19 | 3.8 | Very good |
| Construction | 8 | 29 | 3.625 | Very good |
| Technical | 4 | 12 | 3 | Good |
| The worthiness of material | 4 | 15 | 3.75 | Very good |
| The worthiness of presentation | 5 | 20 | 4 | Very good |
| | | | 3.7 | Very good |

Table 3
The Result of the Media Experts Assessment

| Aspects | Numbers | Score | Mean Score | Clasification |
|------------|---------|-------|-------------|------------------|
| Simplicity | 4 | 14 | 3.5 | Very good |
| Integrity | 3 | 10 | 3.33 | Good |
| Balance | 3 | 12 | 4 | Very good |
| Coloring | 2 | 6 | 3 | Good |
| | | | 3.46 | Very good |

Table 4
The Result of Students' Interest

| Aspects | Total Score | Maximum Score | Persentation (%) | Clasification |
|----------------|-------------|---------------|------------------|---------------|
| Likes | 389 | 480 | 81.04 | Very strong |
| Curiosity | 412 | 480 | 85.83 | Very strong |
| Activeness | 358 | 480 | 74.58 | Strong |
| Participations | 356 | 480 | 74.17 | Strong |

| | | | | |
|--------------|-------------|-------------|--------------|---------------|
| Total | 1515 | 1920 | 78.91 | Strong |
|--------------|-------------|-------------|--------------|---------------|

General students' interest in student worksheet as guided inquiry guidance with interactive *Cabri 3D* assistance media in three dimensional spaces for grade X has strong classification with 78.91%. The mean of all the result of evaluation test is 83.2 with very good classification and passing grade of students is 73.33% with good classification. The mean score 3.21 that is given by material experts, very good classification with mean score 3.7 that is assessed by teachers and very good classification with mean score 3.46 that is assessed by media experts. Then can be concluded that the developing media is appropriate to be used as one of mathematics learning media.

CONCLUSION

The student worksheet as guided inquiry guidance with interactive *Cabri 3D* assistance media in three dimensional space for grade X of senior high school observed from the aspects of on method, didactic, construction, technical, the worthiness of material and serving simplicity, integrity, balance, coloring, and students' interest. The results of student's evaluation test can be concluded that the developing media is appropriate to be used as one of mathematics learning media.

REFERENCES

- Arikunto, S. (1997). *Dasar-dasar evaluasi pendidikan*. Jakarta: Bumi Aksara.
- Brown, N., Wilson, K. & Fitzallen, N. (2007). *Using an Inquiry Approach to Develop Mathematical Thinking*. University of Tasmania: AARE, 12.
- Brumbaugh, D. K, Moch, P. L., & Wilkinson, M. (2005). *Mathematics content for elementary teachers*. London: Lawrence Erlbaum Associated, Publishers.
- Chambers, P. (2008). *Teaching mathematics: Developing as a reflective secondary teacher*. London: Sage Publication Inc.
- Coffman, T. (2009). *Engaging students through inquiry-oriented learning and technology*. Maryland: The Rowman & Littlefield Publishing Group, Inc.
- Gagne, R.M & Briggs, L.J. (1979). *Principles of Instructional Design*. New York, NY: Holt, Rinenart and Winston.
- Haylock, D., & Thangata, F. (2007). *Key concept in teaching primary mathematics*. London: SAGE Publication Ltd.
- Jarret, Denise. (1997). *Inquiry strategies for science and mathematics learning*. Oregon: Northwest Regional Educational Laboratory.
- Kuhlthau, C., Maniotes, L., & Caspari., A. (2007). *Guided inquiry: Learning in the 21st century school*. Westport, CT : British Library Cataloguing.
- NCTM. (2000). *Principles and standards for school mathematics*. Virginia, VA: NCTM Inc.

Riduwan. (2011). *Skala pengukuran variabel-variabel penelitian*. Bandung:Alfabeta.

Sriraman, B., & English, L. (2010). *Theories of mathematics education*. London: Springs.

Widoyoko, E., P. (2012). *Teknik penyusunan instrumen penelitian*. Yogyakarta: Pustaka Pelajar.