VALIDATION OF AN ICT LEARNING TOOL FOR QUADRATIC FUNCTIONS USING AUTOGRAPH SOFTWARE ASSISTED BY THE ANGRY BIRDS GAME

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Abstract
Indonesia considers the integration of IT curriculum integration is important in implementation of learning process in the classroom. Integrating IT can help teachers cultivate students' interest towards learning mathematics. Although the integration of IT in the learning of mathematics, ideas and learning devices are not yet available. t is difficult for teachers in implementing the learning process as expected. Integration of IT in learning mathematics can be done by utilizing the Autograph Software assisted Angry Birds Game in teaching Quadratic Functions. This paper some parts of the development process of the learning device by utilizing the Autograph Software assisted Angry Birds Game that is related to the content validity and construct a learning tool developed. At this stage, involves six; lecturers (mathematics and IT education), teachers, and peers. This research data in the form of Quadratic Functions learning device by using the Autograph Software assisted Angry Birds Game, comments of validators and improvements made. The results showed that the validators recommends that developed learning tools already valid the criteria, both from the aspect of content and construct. This recommendation is obtained after thorough discussion and improvements. The implication of this study is a learning device by utilizing the Autograph Software assisted Angry Birds Game can be tested to see the practicality and effectiveness.

Keywords: Learning tools, quadratic functions, integration, autograph software, Angry Birds Game.

INTRODUCTION

The new 2013 Curriculum sees information and communication technology (ICT) as important to be integrated into every lesson in the classroom to prepare students to adapt to the continuous innovation in technology in accessing knowledge. ICT is no longer taught explicitly, but is integrated into every subject (Kompasiana, 2013; GesCI, 2015). The integration of ICT can help teachers to implement interesting and innovative mathematics teaching-learning programs (Nandika, et al, 2007). It is expected that utilization of ICT can help students achieve the learning objectives in mathematics (UNESCO, 2011). This is because ICT can serve up learning materials that fulfill the content and learning objectives, and can serve as a medium for learning (Voogt & McKenney, 2008). It has been claimed by Pannen et al (2003) that the integration of technology and information can improve the quality of teaching-learning.

Although the use of ICT is mandated by the curriculum, the ability of teachers to implement use of ICT-supported learning is still inadequate (Anas, *et al.*, 2006). This is supported by Baron and Harrari (2005) and Fuglestad in Matthews, Cooper and Baturo (2007) who found that many teachers still lack the skills to integrate information technology into their teaching-learning processes because

of various reasons. Based on preliminary studies, the ICT materials-that can be used by teachers to support the teaching-learning of mathematics have not yet been provided. The low ability of teachers in implementing teaching-learning that integrates ICT and the unavailability of learning devices for teachers has caused difficulties to carry out the teaching-learning as expected by the syllabus and has resulted in the less than maximum achievements of students (Gaible & Burns, 2005).

Efforts to help teachers to improve mathematics teaching-learning using integrating ICT can be done by providing ICT-enabled mathematics teaching-learning devices. Therefore, it is necessary to develop these ICT-supported mathematics teaching-learning devices so that when they are available the teachers can immediately use them in their classrooms. ICT can be integrated into teaching-learning through the use of software and games. Software that can be used in the teaching-learning of mathematics includes Autograph, while a game that can be used is *Angry Birds*. Autograph software can be used for teaching-learning about Quadratic Functions which is in the syllabus for mathematics in the tenth (X) grade at high school. Students are expected to draw graph functions viz: (i) intersect the x axis at two points and through a certain point, (ii) allude to the x-axis at a point and through a certain point, (iii) through the peak point and a certain point, and (iv) through three points. Autograph Software helps students to paint with the right graphics functions that are expected and to show the graph functions properly.

The use of the Autograph software can be strengthened by playing games favored by students. According to Kebritchi, *et al.* (2010), using computers and games significantly helps high school students learn material for algebra. Sari, *et al*. (2013) explain that learning can use games to motivate students to understand the concepts being taught and to help teachers make learning fun. Angry Birds is a highly favored game that can be used to help students learn maths. This game depicts an angry bird. The emphasis of this game is to find a strategy for the bird to fly to destroy the enemy castle. The tracks the birds fly form a parabola that opens downwards thus iIt is easier for students to understand the concept of Quadratic Functions. Angry Birds can be categorized as a microworld game because the game directs the students to interact with nature, connections, and projectile motion applications (Lamb, 2014). These games play an important role supporting the students' understanding of Quadratic Functions through overcoming obstacles. The look and appeal of the game, "Angry Birds" can help students to explore mathematical concepts in ways that have a direct appeal (Lamb, ibid, p. 340).

The Quadratic Functions learning program uses Autograph software assisted by the Angry Birds Game; the program being developed includes the lesson plan (RPP), the student worksheet (LKS), an achievement test, and a teaching-learning CD. These learning tools have been developed to obtain a valid learning tool that can be used by teachers in the classroom.

This study is a portion of a larger study for Quadratic Functions software development by leveraging the Autograph software assisted by the Angry Birds Game. The purpose of this paper is to explain the processes and the results obtained with regard to the validity of the LKS Quadratic Functions program, leveraging the Autograph software assisted by the Angry Birds Game for use in the tenth grade at high schools.

METHODS

The data collection involved six validators consisting of two colleagues, two teachers and two lecturers. Two validators were chosen from students in the Masters Program in Mathematics Education at Syiah Kuala University who have been conducting research into software development for teaching-learning of mathematics using ICT. One teacher involved as a validator is a mathematics teacher at one of the state high schools in Banda Aceh. Another validator is a lecturer in Mathematics Education at Syiah Kuala University who lectures in relevant subjects: Algebra and Elementary Teaching and Learning Strategies (for Mathematics). Meanwhile, the other lecturer validator administers media courses in ICT and Programming. The research data was in the form of comments by the validators on the Quadratic Functions worksheets utilizing the Autograph software assisted by the Angry Birds Game, as well as improvements that were made. The research data was obtained through the validation sheets and notes made by the researchers themselves. Aspects assessed on the worksheets were the feasibility aspect of the content (24 points), the feasibility of the presentations (11 points), the feasibility of the language used (13points), and the feasibility of

the graphics (10 points). A worksheet was considered valid if more than 80% of the ratings given by each validator fit the criteria, appropriate and very appropriate.

RESULTS AND DISCUSSION

The worksheet for Quadratic Functions using the Autograph software assisted by the Angry Birds Game that was developed was called prototype I. Subsequently , this first prototype was validated by the first peer validator (1ˢᵗ validator). The results of this validation after repair and incorporating the recommendations for feasibility from the 1ˢᵗ validator was referred to as the prototype II. Prototype II was then validated by a practitioner validator/teacher (the 2ⁿᵈ validator). The results of this validation after repair incorporating recommendations for feasibility from the 2ⁿᵈ validator was referred to as prototype III. Prototype III was validated by an expert validator/lecturer (3ʳᵈ validator). The results of this validation after repair and incorporating the recommendations for feasibility of the 3ʳᵈ validator was referred to as prototype IV. Prototype IV was further tested but is not discussed in this paper.

The worksheet assessed the feasibility, contents of comprehensiveness, breadth and depth of the material (3 aspects), the accuracy of the material (seven aspects), recency of material (2 aspects), the potential to raise curiosity (3 aspects), and compatibility with the characteristics of problem solving (9 aspects). The eligibility of worksheet I fill in the judgment by validator 1 was; 3 aspects is very appropriate, 17 according aspects, and 4 aspects are reasonably fit. The eligibility of worksheet I fill in the judgment by the validator 2 are; 1 aspect is very appropriate, 19 according aspects, and 4 aspects are reasonably fit. While the validator 3 votes to 20 aspects is very appropriate, and the corresponding 4 aspects. The eligibility of worksheet II according to the assessment from validator 1 of the three aspects is very appropriate, 17 according aspects, and 4 aspects are reasonably fit. The eligibility of worksheet II fill in the judgment by the validator 2 are; 1 aspect is very appropriate, 19 according aspects, and 4 aspects are reasonably fit. While the validator 3 votes to 21 aspects is very appropriate, and 3 corresponding aspects. The eligibility of worksheet III according to the assessment from validator 1 of the three aspects is very appropriate, 17 according aspects, and 4 aspects are reasonably fit. The eligibility of worksheet III fill in the judgment by the validator 2 are; 4 aspects is very appropriate, and 20 corresponding aspects. While the validator 3 votes to 20 aspects is very appropriate, and the corresponding 4 aspects. Based on the assessment given by validators 1, 2, and 3 it can be said that the contents of the three worksheets meet eligibility requirements. The suitability of the worksheet activities with learning objectives in accordance with the opinion of Prastowo (2012) that the worksheet must agree with the learning objectives.

The worksheet assessed of the feasibility scored by the presentation techniques (2 aspects), supporting the presentation (5 aspects), and the presentation of learning (4 aspects). The eligibility of worksheet I presenting the first judgment from the the validator the 3 aspects is very suitable, 4 aspects as appropriate, and the 4 aspects are a reasonably fit. Validator 2 vote to 10 corresponding aspects, and 1 aspect is quite appropriate. While ratings for all aspects of the validator 3 is very appropriate. The eligibility of worksheet II presenting by validator 1, the 3 aspects is very appropriate, 4 aspects as appropriate, and the 4 aspects are a reasonable fit. Validator 2 voted 2 aspects as very appropriate, and 9 aspects corresponded. While ratings for all aspects by validator 3 were very appropriate. The eligibility of worksheet III presenting by validator 1 , the 3 aspects is very appropriate, 4 aspects as appropriate, and the 4 aspects are a reasonable fit. Validator 2 voted all aspects as compliant. While the ratings for all aspects by validator 3 was very appropriate. Based on the assessments given by the validators, 1, 2, and 3 it can be said that the three worksheets meet the requirements for eligibility. Clarity directives/instructions are fulfilled the worksheet as a portion of the feasibility of the presentation in accordance with the opinion of Prastowo (2012) that the directives/instructions and tasks in worksheets must be clear.

The worksheet assessed of the feasibility scored by the language of conformity with the rules of Indonesian (5 aspects), correct use of terms and symbols (2 aspects), conformity with the development of students (3 aspects), as well as communicative and interactive (3 aspects). The eligibility of worksheet I presenting the first judgment from the validator 1 are that 9 aspects are very suitable, 3 aspects are appropriate, and 1 aspect was less than appropriate. Validator 2 voted 10 aspects as corresponding, and 3 aspect as very appropriate. While ratings for all aspects by validator

3 were appropriate, and one aspect is quite appropriate. The eligibility of worksheet II presenting by validator 1, the 9 aspects of compliance, 3 aspects as quite appropriate, and the 1 aspect less appropriate. Validator 2 vote 2 aspects is very appropriate, and 11 corresponding aspects. While ratings for 10 aspects of the validator 3 were appropriate, and three aspects were quite appropriate. The eligibility of worksheet III presenting by validator 1 , the 9 aspects are appropriate, 3 aspects as quite appropriate, and the 1 aspect was less appropriate. Validator 2 voted for 1 aspect as very appropriate, and 12 aspects as appropriate. The validator 3 voted for 12 aspects as appropriate, and 1 aspect as quite appropriate. Based on the assessments given by validators 1, 2, and 3 it can be said that the three worksheets meet the eligibility requirements for language. This is consistent with the explanation from the Ministry of Education (2004) which states that one of the conditions for construction in developing a worksheet is that the language used in the worksheet must match the maturity level of the students.

The feasibility graphics of the worksheet assessed from the cover design and the design of the contents of each of the five aspects. The graphic eligibility of worksheet I the first judgment from the validator 1; the 2 aspects are very appropriate, 2 corresponding aspects, 5 aspects are quite appropriate, and 1 aspect is less appropriate. Validator 2 vote to 3 aspects are very appropriate, and 7 aspects of the suit. While the ratings for the 7 aspects of the validator 3 is appropriate, and 3 aspects are quite appropriate. The graphic eligibility of worksheet II the first judgment from the validator 1; the 2 aspects are very appropriate, 2 corresponding aspects, 5 aspects are quite appropriate, and 1 aspect is less appropriate. Validator 2 vote to 3 aspects is very appropriate, and the 7 aspects of the suit. While the ratings for the 8 aspects of the validator 3 is appropriate, and the 2 aspects are reasonably fit. The graphic eligibility of worksheet III the first judgment from the validator 1; the 2 aspects are very appropriate, 2 corresponding aspects, 5 aspects are quite appropriate, and 1 aspect is less appropriate. Validator 2 vote to 1 aspect is very appropriate, and 9 aspect are appropriate. While ratings for all aspects of the validator 3 is appropriate. Based on the assessment given by validator 1, 2, and 3 can be said that the three worksheets meet the graphic eligibility. The graphic eligibility of the worksheet developed in this study are met by the cover design and content. This is consistent with the explanations from the Ministry of Education (2004) and Widjajanti (2008) that the appearance should have the right combination between images and text, the goal in order to cultivate students' interest in learning. Appearance is very important in developing worksheets, because students will first be interested in a new look then at the contents.

Based on the judgment of the validators, the worksheet developed met the eligibility of content, presentation, and graphics. Therefore, it can be said that the worksheet functioned by utilizing the Autograph software assisted by the Angry Birds Game met the criteria to be valid.

CONCLUSIONS

The results showed that the worksheets prepared by utilizing the Autograph software assisted by the Angry Birds Game meet the criteria for validity. This is based on the assessments from the validators for each component of the worksheet. The teaching-learning work sheets for Quadratic Functions using the Autograph software assisted by the Angry Birds Game that had been developed were successful.

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