Mobile learning environment system (MLES): seeing android media development (gaident) as enhancement of critical thinking skills

Bimo Aji Nugroho

Faculty of Teacher Training and Education, Universitas Borneo Tarakan, Tarakan, Indonesia
bimoajinugroho29@borneo.ac.id*
*Corresponding author

ARTICLE INFO	ABSTRACT
	The current reality shows that the media used is still conventional and unable to improve critical thinking skills. Research to see the validity, practicality, and effectiveness of learning media. This research method uses Plomp and Nieveen which are limited to the prototyping phase, formative evaluation based on Tessmer which consists of self-evaluation, expert opinion, individual testing, small group testing, and field testing. The research subjects consisted of 3 experts and 30 students who had programmed the Invertebrates course for individual tests, small group tests and field tests. Data collection techniques were carried out by observation, questionnaires and tests. The results showed: the validation of the android media has shown that the media is feasible to use, the practicality test shows the ease of the learning process, the effectiveness test of using android media has an impact on the learning process and improving critical thinking skills. This shows that the developed android media can be used, then this research can be developed further by expanding its use.

Introduction

Advances in technology in the digital era is something that cannot be denied, one of which is the world of education. Technology promises potential in one's learning, obtaining information [1]. Learning media innovations are currently required to be morecreative and able to adapt to developments in science and technology [2]. Learning media has a contribution in the form of delivering material that is more controlled, more interesting and interactive, time can be shortened, but quality can be improved [3].

It is time for learning to use media to make it easier and more interesting [4,5]. One of the media that can be developed to help the learning process is mobile learning. Tortorella explained that the development of mobile learning must pay attention to the character of students [6]. Learning using mobile learning has many advantages such as profitability, wider reach, increased motivation and timely learning [7].

The Information and Communication Technologies (ICT) learning process must be able to be placed as an initial plan that is used as enrichment, or as remedial material, this is important because it will adapt to the content being created. This media connects the

communication that occurs on campus between lecturers and students, either during the learning process or delivering learning guides [8]. In this study mobile learning is placed as a supplement, students who use it certainly have additional knowledge or insight, the use of mobile learning in the learning process, especially in biology education study programs, can make it easier because every lecturer and student has a smartphone with the Android system. Android is software that is used on mobile devices to make it easier to use applications [9].

Android can be used as an alternative in the learning process because it can do learning anytime and anywhere, alternative learning supplements can provide opportunities for students to learn on their own [10]. The use of mobile learning in the learningprocess has a very good impact, Android-based mobile learning in Biology subjects has a good effect on learning[11]. The development of science in the 21st century is accelerating and requires students to be able to improvise by developing skills and knowledge [12,13].

Skills that must be developed in education are critical thinking skills [14-16]. Critical thinking is self-regulation in deciding (judging) something that results in interpretation, analysis, evaluation, and inference, as well as exposure using evidence, concept, methodology, criteria, or contextual considerationson which decisions are made [17]. Critical thinking skills are one of the factors that influence the effectiveness of developing learning tools [18].

The low critical thinking skills of students because learning in class generally only trains verbal thinking processes. Ennis explains that there are six basic elements of critical thinking that must be developed in learning, namely; focus, reason, conclusion, situation, clarity and thorough examination [19]. Critical thinking skills are able to change student learning patterns from initially conceptual to contextual [20-22]. The basis of this research is to use critical thinking, environmental learning patterns also affect students' motivation and way of thinking.

Invertebrate is a subject in biology education, this course discusses the sub-concept of gastropods. The learning process is carried out by delivering theory accompanied by practicum. Phenomena that arise during the student learning process are difficult to understand because the material is abstract in nature and is still constrained in the identification process. Seeing these problems, an android media was developed which would later help the identification process and see how students' critical abilities were

Method

The method used in carrying out this research follows the flow of research and development *(research development).* The initial product design was developed through formative evaluation according to the Tessmer Model [23]. Development research materials include formative evaluation which includes *self evaluation,* prototyping (expert reviews, one-to-one, and small groups), as well as field tests. The researchflow is in accordance with Figure 1 below;
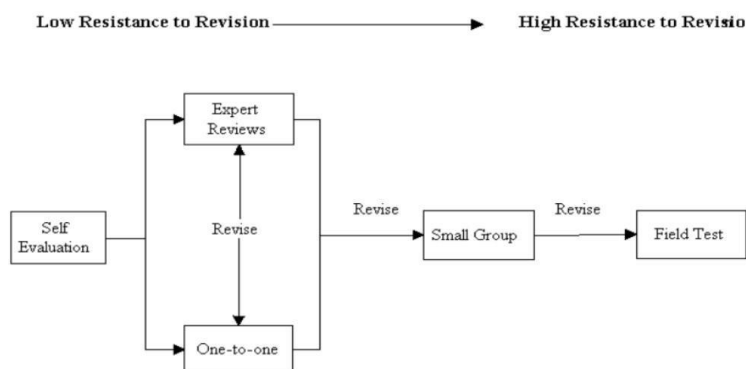

Figure 1. Formative evaluation design flow

Validation Stage

three learning media design validation tests, especially in the fields of language, material and display sothat the media created later will be in accordance with the objectives. The learning media validation instrument to determine validity uses the assessment rubric instrument.

Readability Test Stage

The readability test in the one to one try out learning media stage involved 3 Biology education studentswho had taken the Invertebrates course, getting a minimum grade of C which was randomly selected.

Practicality Test Stage

The practicality test of expectations and actuals in the small group try out test of learning media involved 7 biology education students who had taken invertebrate zoology courses and received grades (3 studentsscored A, 3 students scored B, and 1 student scored C) according to the passing grade order to get the same results representing graduating students and randomly selected, which includes. Test the implementation of the use of learning media is biology education students. The student response test was a biology education student.

Results and Discussion

The results of the learning media validation were carried out by 3 experts to examine the content, presentation,and language. Complete data is presented in Figure 2.
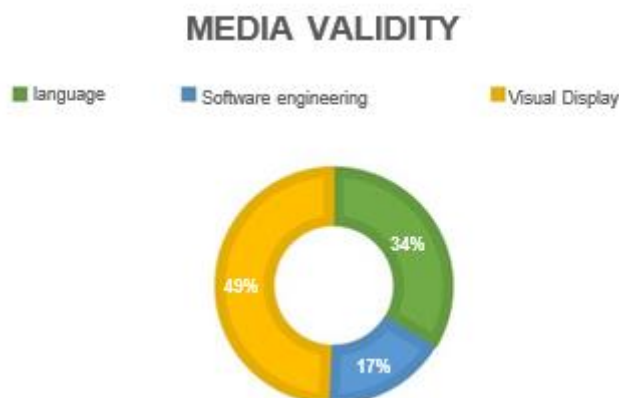

Figure 2. Results of validation Research

This media fulfills the content feasibility component, the presentation component, and the language component.Thus, theoretically learning media can be used well in learning. Rahman explained that linguistic aspects are a combination of one discourse structure and another [24]. In line with Wilson's research mobile learning in principle aims to make it easier for students to learn anywhere and anytime according to the time they Ade [25].

An interesting finding in this study, especially in the validation, is the high yield of the visual display. This is important because good media must show attractive data for students, in this case as users. Other research shows that interactive displays will attract students during the learning process. Kusmayadi said learning media is useful for helping convey material, besides that it can facilitate understanding of material [26].

The display of images on the Android media is also made as real as possible so that students will behelped when using it later. Choosing high-quality images will make students happy and enthusiastic about learning Activities [27]. Apart from that, with attractive visuals, students will easily understand abstract material, this is reinforced by Nurbaiti, with

visualization, material can be easier for students to understand [28]. Wahyuningsih also stated that students understand andremember material more quickly when supported with pictures [29].

The menu display in the application is no less important, this will make it easier for students to use learning media. Anggraeni & Kustijono said it is necessary to pay attention to the placement of animation and text on each Paget [30]. What is no less important is the placement of components. and harmonious so that the media becomes more beautiful and attractive. Supported by Wibawanto, the application of shapes, colors, characters, text, images, animations, and backgrounds can form a harmonious and attractive presentation to look at [31].

The results of the validity indicate that the developed media is feasible based on the assessmentof experts. In line with Putra's research, this shows that the media according to the material-based criteria is appropriate, and systematically arranged [33]. Other research conducted by Putra, Branchais, Ramdani, Panjaitan shows that the media is made valid and can be tested on students [2,32-34].

The practicality of learning media is divided into two, namely the practicality of expectations obtained from the results of the Small Group Test and the actual practicality obtained from the results of the FieldTest. The data is presented in Figure 3
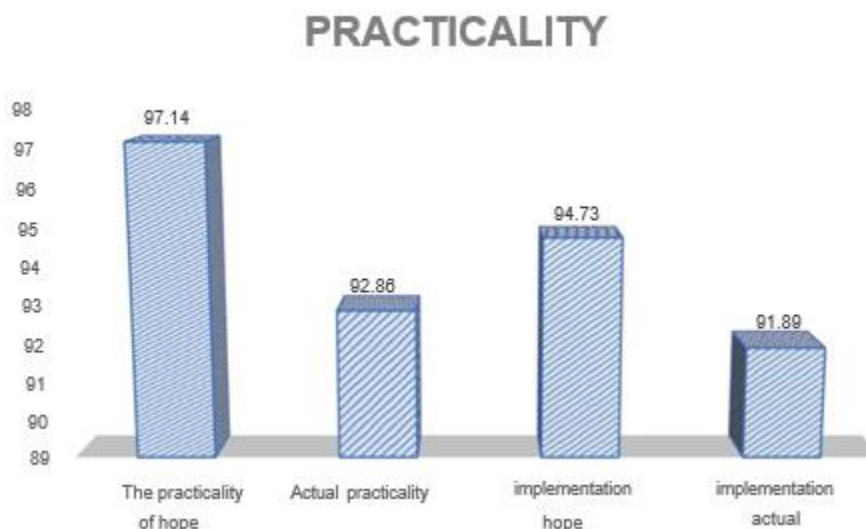
PRACTICALITY

Figure 3. Practicality research results

The practicality of the learning media seen from the implementation observed by the observer and the practicality of the content assessed by students is practical, based on this it means that the ongoing learning process has been accepted by students. This is supported by Sanger's research, stating that the media can influence the concept of learning Biology so thatstudents are more motivated to learn. Putra said that learning media is said to be practical if it is easy and useful for students to use. In other words, the developed media is practical[32].

Plomp namely a media is said to be practical if the teacher and students consider the learning device easy to use in the field (the material can be understood) and according to the researcher's design Plan [35]. An interesting finding in this study was that there was a decrease in actualpracticality and implementation, this was thought to have occurred due to the difference in the numberof students taking the test. The scores of the students who were the subjects of this study supportedthe differences in the scores obtained. Astuti Said that media can be used to accelerate learning material [36].

In addition, another view of Jusniar, Pramita & Agustini, and Rochmad, Practicality refers to the level that users a 50% of students give positive responses to at least 70% of the

number of aspects asked or are in the "good" category. "or"very good" [37-39]. The advantage of developed media is in disrupting the limitations of space and time, this is also what Arsyad stated states that the practical benefits of learning media can overcome the limitations of the senses, time and space [40].

Data on the effectiveness of learning media in the form of the effectiveness of expectations obtained from the results of the Small Group Test and the actual effectiveness obtained from the results of the Field Test. Based on the summary of students' critical thinking skills learning outcomes data analyzed from the assessment of student worksheets before being given learning media and afterbeing given learning media, the results obtained in the Small Group Test students' critical thinking skillsexpectations are as shown in Figure 4.
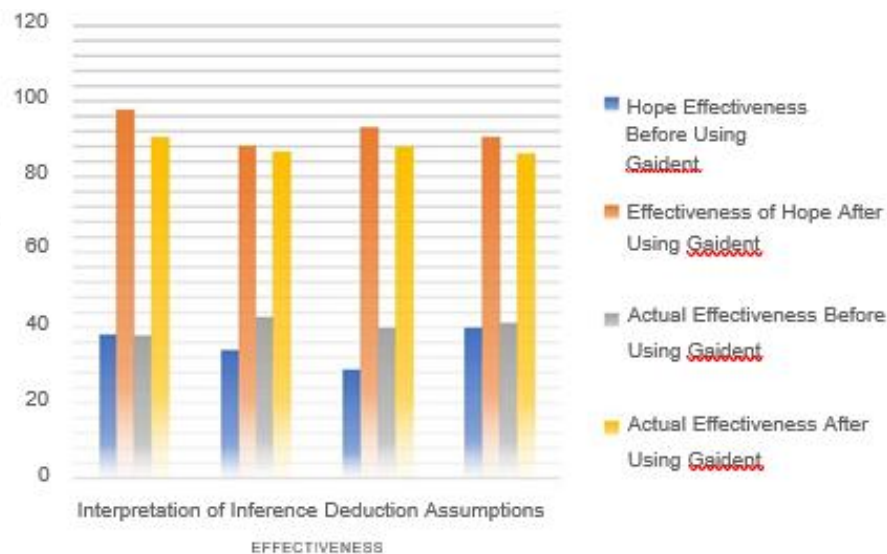

Figure 4. Results of effectiveness research

Expected and actual practicality data shows an increase in results. This shows that learning media is able to improve students' critical thinking skills. The effectiveness of E-Learning Media is stated to be effective in improving student learning outcomes in terms of achievement indicators of student learning outcomes [41,42]. Students' critical thinking skills were analyzed from the assessment of filling out Student Worksheets and answering evaluation questions before being given learning media and after being givenlearning media.

Interpretation skills carried out by students when working on LKM can be seen when reading discourse on LKM. Students are able to study a problem from the discourse then can formulate the problem appropriately. Active discussion can improve critical thinking skills such asinterpretation. Interpretation is able to collect and compile information and is able to test the conclusions drawn based on the information that has been collected [43].

Judging from the students' interpretation skills before using them, they are constrained when working on interpretation skills because there is no media used. After using the learning media, the effectiveness of the expectation has changed, this shows that this learning media has an impact on students' interpretation skills. This is reinforced by Fransisca, android mediahas succeeded in increasing student learning outcomes [41]. Agree with Haryani, who explainsthat critical thinking skills can be started from interpretation by using the thoughts or knowledge you have to understand a problem [44].

Students' skills in assuming get high scores because in the learning process students are trained to give their opinions on the interpretations made. Reinforced by Watson, critical thinking skills are skills in drawing conclusions, assumptions, deductions, interpreting information,and analyzing arguments [45]. Improving skills in assuming a high score because in

the learning process students are trained to give their opinion on the interpretations made. Students can do active and independent learning [46].

Learning that is arranged in group work effectively increases learning motivation and encourages students to discuss every assumption they Ade [47]. Assumption skills where students are able to assess the provisional assumptions or assumptions given. This assumption must be shown through the procedure to produce an answer. However, there are still students who have not been able to do it, so they cannot determine whether the assumptions given are true or false. This is not in accordance with Fisher, which States that one of the activities that reflects critical thinking skills is being able to identify and evaluate Assumption [43].

Improving students' skills in making deductions obtains high marks because in the learning process students analyze their observation data using the developed android media. This is supported by Sari, the deductive hypothesis cycle is the best way to develop critical thinking skills [48]. This is supported by Dewy, in learning activities it is better to use teaching media in order to help students understand lessons easily and provide concrete experiences [49].

A student's deductive analysis of a problem fosters a better conceptual understanding because the student's role is to find concepts that are appropriate to the problem to be solved. So that requires students to think critically. Other studies that are similar to Radityan' research that interactive media such as applications have an effect on learning outcomes [50]. Khuzaini & Sulistyo who say that based on [51]. The results of the evaluation test show that the developed Android-based learning media meets effective aspects, Handoyono said the results show that the use of Android mobile learning can streamline learning [52].

Conclusion

The development of learning media was stated to be very valid based on the results of expert validation and based on individual tests the learning media was stated to be very good. The developed learning media is very practical to use to improve critical thinking skills based on expected and actual practical results. The practicality of expectations and actual practicality shows that the learning media developed are effectively used to improve critical thinking skills based on the results of expected and actual effectiveness. Expected effectiveness and actual effectiveness of improving critical thinking skills. The next research that can be done is to do a larger test with more homogeneous subjects.

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