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# Development of e-LKPD biology concept to improve students critical thinking skills

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ABSTRACT

The development of electronic LKPD is an alternative innovation to meet the need for teaching materials that can prepare decisivereasoning. The reason for this study was to create the practicality and effectiveness of the e-LKPD concepts of Biology Science in SMP class VIII which were developed to train critical thinking skills. This investigation a Developmental navorsing study use written questions attached the Tessmer method. Improvement stages incorporate self assessment, master audit, individual test, little gathering test and ground test. The navorsing location for validity testing is at Lambung Mangkurat University, while practicality and effectiveness tests are carried out at MTsN 3 Hulu Sungai Tengah. The exploration persons were 3 learner for the singular test, 7 learner for the little gatheringtest and 20 learner for the ground test. Results the showed that the developed e-LKPD the practicality of the e-LKPD shows very practical criteria to be reviewed from the student's response indicating the models for unequivocally concurring ith the reasonableness of the e-LKPD in practicing decisive reasoning. Effectiveness of developed the e-LKPD is declared effective for training decisive reasoning abilities and understudy learning result are named high as seen from N-Gain the score.

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## INTRODUCTION

The process of learning science biology topics is an activity that includes observation, making hypotheses, planning and carrying out experiments, evaluating measurement data, and so on, while the product of learning science biology topics is the result of a process in the form of

facts, topics, principles, theories, laws, and so on (Cavus & Alhih, 2014). To master the science of biology topics, it is not enough just to get by learning from books or just listening to explanations from other parties, but requires a learning activity that involves a process activity to produce certain products. Science learning Biology topics in schools still tend to be focused on the form of formulation rather than emphasizing aspects of natural phenomena themselves. Even though the activities in science learning biology topics can be used to show natural events or phenomena so that students can be directly involved in making these observations (Serway & Jewett, 2009). Some basic standards in developing the science learning process on Biology topics are observing, measuring, experimenting, and processing data (Hodosyova & Safitri, 2015). The standard must start from elementary school students to the secondary level. As a supporter of the science learning activities on the topic of Biology, it is necessary to have a thinking skill in the science process for the topic of Biology, especially the material for public health. Deta & Meilon, (2013) stated that there is an interaction between learning methods, creativity, and students' science process skills.

Learning decisive reasoningis significant in light of the fact that throught decisive reasoning, learner will be prepared to notice what is going on bring up issues, formulate speculations mention observable facts and gather information, then give ends. Several studies that understudy figuring abilities can be worked on through learning exercises specually intended to foster decisive reasoning abilities (Jones & Charles, 2012). Anyway actually in learner basic it are still low to think abilities. The development of electronic LKPD is an alternative innovation to meet the need for good teaching materials, considering that the use of cellphones and laptops is quite high. The development of electronic LKPD is one of the alternative innovations to meet the need for instruction theory can train decisive reasoning skills.

Motivation behind this study was to evaluate practicability and effectiveness the e-LKPD which was developes to prepare decisive reasoning skills. Based on results the survey by Nielsen Company Indonesia in 2010 regarding mobile phone consumers in Indonesia by age, that group of teenagers (15-19 years) ranks at the top, and student cell phone users rank second compared to background. mobile phone users in Indonesia. The increasing number of students who have mobile devices (notebooks, tablets, smartphones and cellphones) can be used as alternative media to help them improve their mastery of subject matter. Multimedia aspects that are included in the LKPD are expected to provide more value for the LKPD and increase students' interest in learning

The advancement of showing materials as of LKPD needs to be continuously improved in a work to hone decisive reasoning skills. e-LKPD can be a supporting alternative to practice decisive reasoning abilities in learner, so learner can undoubtedly grasp an issue faced everyday life and then analyze the problem by identifying the problem, looking for relevant, clear, and accurate references to be able to answer question. problems that occur (Martini & Edy, 2014).

## RESEARCH METHODS

### Research Design

The research is a developmental assessment advancement research that utilizes Tessmer's (1998) design. Development the step incorporate (1) self assessment (self-evaluation); (2) expert review (emaster survey); (3) personal test (individual-to-one); (4) little group test (small group); (5) ground test. The validity, practicality and effectiveness (high quality intervention) of e-LKPD were determined based on Nieveen (1999). The advancement of e-LKPD materials build upon syllabus, while the design and components in the e-LKPD refer to Depdiknas (2008).

### Population and Samples

The research subjects were 30 students who had studied science material for Class VIII before (3 students for the one to one test, 7 learner for the small group examine, and 20 students on the field examination), while object of the research is the developed e-LKPD.

## Instruments

Practicality Instruments: Instruments to assess the common sense of content and common sense of assumption and genuine (from Tessmer (1998). Effectiveness Instruments: Instruments to assess effectiveness based on cognitive learning outcomes to assess aspects of critical thinking skills including interpretation, assumptions, deductions and inferences, through tests using multiple choice questions consisting of eight questions containing activities contained in the e-LKPD teaching materials. The tool for measuring the execution of e-LKPD teaching substance developed from Tessmer (1998) assessed aspects of the operation of teaching materials by students, by observers.

## Procedures

The common sense of the expectation e-LKPD developed was gotten from the eyewitness appraisal of the execution of learning and the reasonableness of assumptions is utilizing e-LKPD in the little gathering. Meanwhile, an actual common sense of the created e-LKPD was gotten from the eyewitness evaluation of the execution of learning and the genuine reasonableness of utilizing e-LKPD field test. Effectiveness of the created e-LKPD expectations was facile an evaluation valuation of results the critical thinking skills before being given e-LKDP and critical thinking skills after being given e-LKPD in the little gathering evaluation. Whilst actual the effectiveness of the created e-LKPD was acquired form an evaluation valuation of results the thinking skills before being given e-LKPD and critical thinking skills after being given e-LKPD in the field test.

## Data Analysis

Expected practicality and actual practicality. Toward the finish of the illustration, learner finish up a reaction questionnaire. The outcome got show how positive learner response to the utiization of teaching materials is. The reaction in the survey werebnalyzed graphically (Arikunto, 2012).

**Table 1.** Range an expected and actual practical value teaching materials electronic student worksheets

| Value Range | Catagories |
|---|---|
| 80.01 < Presentation Skills ≤ 100.00 | Very Practical |
| 60.01 < Presentation Skills ≤ 80.00 | Practical |
| 40.01 < Presentation Skills ≤ 60.00 | Less Practical |
| 20.01 < Presentation Skills ≤ 40.00 | Not Practical |

The data analysis of the expected effectiveness and actual effectiveness was carried out descriptively on the consequence of the typical learner scores facile from e-LKPD results the evaluation scores of critical thinking skills before being given e-LKPD and critical thinking skills after being given e-LKPD. Students' critical thinking skills include 4 indicators, namely interpretation, assumption, deduction and inference determined utilizing the standardized increase esteem formula (N-Gain or g) subsequents (Hake, 1999):

$$g = \frac{S_{postest} - S_{pretest}}{S_{maksimum} - S_{pretest}}$$

description :

g : Value Gain
s pretest : Skor pre test
s pos test : Skor post test

High and low normalize gain (N- Gain or g) can be characterized as in Table 2 (Hake, 1999):

**Table 2.** N-Gain classification

| Gain | Classification |
|---|---|
| Gain > 7 | Great |
| 0.7 > Gain > 0.3 | Medium |
| Gain < 0.3 | Weak |

The guidelines for determining the category of students' decisive reasoning skills are described in the Table 3 (Karim, 2015). The outcomeof students' critical thinking skills are gotten by checking out the evaluation outcome. This valuation utilize a rubric calculated by the following formula:

$$\text{Score Student: } \frac{\text{Total Score}}{\text{Score Maximal}} \text{ X 100\%}$$

**Table 3.** Decisive reasoning skills value range

| Value Range | Catagorie |
|---|---|
| 80 < Presentation Skills ≤ 100 | Very High |
| 60 < Presentation Skills ≤ 80 | High |
| 40 < Presentation Skills ≤ 60 | Currently |
| 20 < Presentation Skills ≤ 40 | Low |
| 0 < Presentation Skills ≤ 20 | Very Low |

## RESULT

The practicality data of e-LKPD for Biology Science concepts is is devided into two, in particular the reosanableness of assumptions got from the aftereffcts of the little gathering test and the genuine common sense got from the consequences of the ground test.

**Table 4.** Results of practicality test hope e-LKPD biology science concept

| No | Questions | % | |
|---|---|---|---|
| | | Y | T |
| 1. | This e-LKPD propels me to learn | 100.0 | 0.0 |
| 2. | I can advance effectively and freely with this tools | 100.0 | 0.0 |
| 3. | I can comprehend thesubstance introduced without any problem | 100.0 | 0.0 |
| 4. | With this e-LKPD I get extra material about science material, mainly public health | 100.0 | 0.0 |
| 5 | With this e-LKPD I can add material about additives and addictive substances | 85.7 | 14.3 |
| 6. | I can peruse the text in the e-LKPD effeffectively on the grounds that the sort and size of the letters be elacted are correct | 100.0 | 0.0 |
| 7. | I like the general look of the e-LKPD on the grounds that appropriate collor arrangement | 85.7 | 14.3 |
| 8. | I can figure out the substance with the assistance of the pictures have fine grad | 100.0 | 0.0 |
| 9 | I can learn agreeing to my own advancing necessities | 100.0 | 0.0 |
| 10 | I can utilize the menu button on the e-LKPD without any problem. | 100.0 | 0.0 |
| Total | | 971.4 | 28.6 |
| Average | | 97.14 | 2.86 |

Expected practicality in light of the consequences of the little gathering test in Table I regarding responses to student responses there are still a small number of students who state that they are not practical on the indicator "With this e-LKPD I can add material about additives and addictive substances" this is allegedly due to the euthanasia discourse and morphine are things that are still foreign to students so that there are some students who have difficulty understanding some new terms.

Table 5. Results of practicality test actual e-LKPD biology science concept

| No | Questions | % | |
|---|---|---|---|
| | | Y | T |
| 1. | This e-LKPD propels me to learn | 100.0 | 0.0 |
| 2. | I can advance effectively and freely with this tools | 85.7 | 14.3 |
| 3. | I can comprehend thesubstance introduced without any problem | 100.0 | 0.0 |
| 4. | With this e-LKPD I get extra material about science material, mainly public health | 85.7 | 14.3 |
| 5 | With this e-LKPD I can add material about additives and addictive substances | 85.7 | 14.3 |
| 6. | I can peruse the text in the e-LKPD effeffectively on the grounds that the sort and size of the letters be elacted are correct | 100.0 | 0.0 |
| 7. | I like the general look of the e-LKPD on the grounds that appropriate collor arrangement | 85.7 | 14.3 |
| 8. | I can figure out the substance with the assistance of the pictures have fine grade | 85.7 | 14.3 |
| 9 | I can learn agreeing to my own advancing necessities | 100.0 | 0.0 |
| 10. | I can utilize the menu button on the e-LKPD without any problem . | 100.0 | 0.0 |
| Total | | 928.6 | 28.6 |
| Average | | 92.86 | 2.86 |

Based on the data above, in general, practicality indicators are considered practical, but there are a small number of students who think they are not practical, one of which is indicators that are still considered impractical by a small number of students both at the small group test stage or at the field test stage on the "I am a total display on the learning media because it has the appropriate color composition. This is because students are disturbed by the colors used in the e-LKPD. The design of material content, images and colors on the media must be clear and attract the interest of students (Istiningrum & Lestari, 2016). A good learning media is media that has good display quality and image quality so i t can encourage higher learning inspiration. As reported by Rosen, (2009) which states that the impact of using media increases the ability to transfer knowledge and students' learning motivation, it shows that students change the perception of science, learning technology, and images as a whole so that they feel more involved in the educational experience.

Data on the effectiveness of the e-LKPD Science Biology Concept in the form of the expected effectiveness acquired from the aftereffects of the little gatherimg test and the real effectiveness Acquired from the consequencesof the ground test. In view of the summary the data the learning outcomes of learn critical thinking skills which were analyzed from the evaluation results before being given electronic student worksheets and after being given electronic student worksheets, the results obtained on the Small Group test.

**Table 6.** Results of the effectiveness test of Hope e-LKPD

| No | Indicator | Before Using e LKPD the Concept of Science Biology | | After Using e LKPD the Concept of Science Biology | |
|---|---|---|---|---|---|
| | | Total | Average | Total | Average |
| 1 | Interpretation | 76.2 | 38.1 | 195.2 | 97.6 |
| 2 | Asumsi | 67.9 | 33.9 | 176.2 | 88.1 |
| 3 | Deduction | 57.1 | 28.6 | 185.7 | 92.9 |
| 4 | Inferences | 79.8 | 39.9 | 181.0 | 90.5 |
| Total | | 281.0 | 140.5 | 738.1 | 369.0 |
| Average (%) | | 70.2 | 35.1 | 184.5 | 92.3 |

Based on the summary of students' critical thinking skills data analyzed from the LKPD assessment and answering evaluation questions before being given the e LKPD the Biology Science Concept and after being given the Biology Science LKPD Concept on the Field Test conducted twice (Observation 1 and Observation 2), the results obtained critical thinking skills of students' expectations and actual.

**Table 7.** Results of the test of the actual effectiveness of the e-LKPD IPA concept

| No | Indicator | Before Using e LKPD the Concept of Science Biology | | After Using e LKPD the Concept of Science Biology | |
|---|---|---|---|---|---|
| | | Total | Average | Total | Average |
| 1 | Interpretation | 75.4 | Medium | 90.0 | High |
| 2 | Asumsi | 85.4 | High | 91.2 | Very High |
| 3 | Deduction | 79.6 | High | 90.6 | Very High |
| 4 | Inferences | 82.1 | High | 90.5 | Very High |
| Total | | 322.5 | | 362.3 | |
| Average (%) | | 780.6 | High | 90.5 | Very High |

Data on the effectiveness of the e-LKPD Science Biology concept in the form of the expected effectiveness acquired from the outcomes of the little gathering test and the genuine effectiveness acquired from the consequences of the ground test seen from the learning outcomes of students. Judging from the practical data of expectations and actual results, it shows that the e-LKPD media of the Biology Science Concept can imorive learner decisive reasoning abilities. Like research (Fransisca, 2017; Islamadina, 2016) that the viability of E-learning content is proclaimed powerfiul in further developoing learner result lin terms of achievement a student learning outcome indicators.

## DISCUSSION

In general, practicality indicators are considered practical, but there are a small number of students who consider it not yet practical, one of which is indicators that are still considered impractical by a small number of students both at the small group test stage or at the field test stage on the indicator "I like the general look of the e-LKPD on the grounds that apppropriate collor arrangement". This is presumably because these students are disturbed by the colors used in the e-LKPD. The design of material content, images and colors on the media must be clear and attract the interest of students (Istiningrum et al. 2016). A good learning media is media that has good display quality and image quality so that it fosters higher learning motivation. As reported by Rosen, (2009) which states that the impact of using media increases the ability to transfer

knowledge and students' learning motivation, research shows that students change the perception of science, learning technology, and images as a whole so that students feel more involved in the learning process. .

Observations made by observers at the practical stage of expectation and actual in general e LKPD The concept of Biology Science is very practical in the practicality of expectations while in actual practicality it is very practical. There is a difference in the data between the practicality of expectations and the actual even though it does not affect the existing results, this happens because at the time of actual practicality the number of students involved is more so that the data is more homogeneous. This is in line with Sudjana, (2002) that every individual learner is extraodinary, each has their own scholaly person, capacities, gifts, interest, and character cocerning learning. Reinforced by (Gagne & Wagner, 1992) practical learning media if the teaching materials have varied affective impacts for students

In view of the portrayal above, it means that the normal reasonableness in utilizing the e-LKPD Biology Science Concept crated is as per the truth in the field. This happens because the superiority of the e-LKPD media. The Science Biology concept developed is that the content of the material contains discourse on problems found in learning locations complete with characteristics accompanied by pictures. It is vital to do an item advancement common sense test before the item is usee to quantify its adequacy. The zero in on the practicality trial of little gathering assessment is found in the databon the capacity of learner to guarantee the succes of further developing item results before ground testing (Tessmer, 1998).

The improvement of students' interpretation skills is also influenced because the learning process is oriented to identify problems that are sought to solve the problem. Students' interpretation skills make it simpler for them to decide issues with respect to public health. Students can find the problem correctly, then students make predictions or hypotheses correctly too. Agree with Haryani, (2011) who make sense of the decisive reasoning abilities can be begun from translation by utilizing the considerations or information had to figure out an issue.

Based on the results of these interpretation skills, it has an effect on expanding learner responsiveness to see the issues that frequently emerge in their day to day routines. Moreover, in the event that learner are touchy to these problems, students can of course also provide good hypotheses to deal with a problem.

Improved skills in assuming high scores in the grounds that in the learning system learner are trained give their opinion on the interpretation made. After that, to prove their point of view, students must assemble their own way of solving the problem. Assumption skills where students are able to assess a given provisional assumption or assumption. This assumption must be demonstrated through a procedure to produce an answer. However, there are also students who have not been able to work, so they cannot determine whether the assumptions given are right or wrong. This is not in accordance with Fisher, (2014) which states that one of the activities that reflects critical thinking skills is being able to identify and evaluate assumptions

The expansion in learner abilities in deduction on effectiveness the expectations with a low average score and a very high increase this increase occurred because students had used the e LKPD of Biology Science Concepts to carry out data collection and analysis. This is supported by Dewy & Ahwar, (2016) in learning activities it is better to use teaching media in order to help students understand lessons easily and provide concrete experiences.

Deduction skills can be used by students to determine solutions to problems found during the analysis process. A student's deductive analysis of a problem fosters a better understanding of the concept because the student plays a role in finding the concept that fits the problem to be solved. So that it requires students to think critically.

The involment of learner in the ecological schooling process improves decisive reasoning abilities, with the goal that the content is straight forward and recall. That is, expanding critical thinking skills can improve students' cognitive abilities. This is in line with Zulfiani & Suartini, (2009) students are trained to critically understand further the science issues that are expressed related to the material being taught. Expanding learner mental capacities can increase Indonesia's training ranking which is still low in view of the 2013 Learning Curve planning. The use of android media can increase students' interest and understanding including increasing cognitive outcomes (Wahyudin, 2010).

## CONCLUSION

The e LKPD Biology science concepts developed are stated to be extremely reasonable to use to improve decisive reasoning abilities based on expected and actual practical results. e LKPD Biology Science Concepts that have been developed are pronounced to be actually used to move along critical thinking abilities in light of the expected and actual effectiveness results. With an increase in the expected Effectiveness the improvement of critical thinking skills is categorized as high.

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