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Validity of E-LKPD to Train Students' Critical Thinking Abilities

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ABSTRACT
Changes in the development of science and technology (IPTEK) mean that teachers are obliged to continue to develop learning so that students are able to develop in the 21st century era. In the 21st century, learning requires supporting learning tools in the form of good learning tools that are acceptable to students. One of them is using electronic student worksheets. The aim of this research is to determine the validity of electronic learning media for Student Worksheets based on a scientific approach to cell material to train students' critical thinking based on validation results from media and material experts. This research uses a 4D development model, data collection instruments in the form of validation sheets. Validity testing is carried out by media and material expert validators. The results of the research show a value of 86.00% carried out by media experts, which means it is feasible and the value made by material experts is 84.00%, which means it is suitable for use.

***Keywords**: E-LKPD; scientific approach; critical thinking*

INTRODUCTION
Changes in the development of science (science and technology) cause changes in learning in the curriculum, learning media and technology. This means that teachers are obliged to continue to develop learning so that students are able to develop in the 21st century era. In its development, technology has a high value in a civilization so that humans use technology as the main tool in various aspects of life, including education. The world of education must continue to have innovation to continue to develop and keep up with developments. 21st century education is marked by advances in information and communication technology, so that the role of technology in learning becomes very significant (Said, 2023). One of them i the electronic learning media Student Worksheet or commonly called E-LKPD.

E-LKPD plays an important role in developing 21st century education. Because E-LKPD is an electronic learning media. According to (E-LKPD plays an important role in developing 21st century education. Because E-LKPD is an electronic learning media. According to (Apriliyani and Mulyatna 2021) E-LKPD is a student worksheet in electronic form that can be used anywhere and anytime using a cellphone or laptop. E-LKPD can also help teachers in learning because E-LKPD is efficient to use, this is because students are used to using electronic media. In this case, it is supported by the opinion of (Firtsanianta and Khofifah, 2022) which states that E-LKPD is efficient to use because students are already accustomed to the world of digitalization. E-LKPD can also improve the balance of soft skills and hard skills which include aspects of attitude, knowledge and skill competence. In order for this to be achieved teachers are required to be able to develop models, methods, approaches and strategies in learning. One of them is the scientific approach. According to (Wadi et al. 2021) the scientific approach is an approach to learning activities that prioritizes creativity and findings from the subjects being followed. In this case, students are expected to be able to develop scientific, logical, critical, creative and objective thinking skills that are in accordance with existing facts.

E-LKPD is a student worksheet in electronic form that can be used anywhere and anytime using a cellphone or laptop. E-LKPD can also help teachers in learning because E-LKPD is efficient to use, this is because students are used to using electronic media. In this case, it is supported by the opinion of (Firtsanianta and Khofifah, 2022) which states that E-LKPD is efficient to use because students are already accustomed to the world of digitalization. E-LKPD can also improve the balance of soft skills and hard skills which include aspects of attitude, knowledge and skill competence. In order for this to be achieved teachers are required to be able to develop models, methods, approaches and strategies in

learning. One of them is the scientific approach. According to (Wadi et al. 2021) the scientific approach is an approach to learning activities that prioritizes creativity and findings from the subjects being followed. In this case, students are expected to be able to develop scientific, logical, critical, creative and objective thinking skills that are in accordance with existing facts.

One of the subjects taught at high school level is Biology. Biology is the science that studies living things, biology also has a very broad scope. According to (Azizah and Alberida 2021) biology learning requires students to understand, apply, analyze conceptual and procedural knowledge and apply it in solving problems. (Erpiyana, Sulistiono, 2022) also said that biology is a difficult subject, students still find biology lessons very boring, too much to memorize, and irrelevant to their lives. Based on the results of a needs analysis in the form of a questionnaire to 32 students of class Apart from that, the learning method used still uses conventional methods so there is less interest in cell material.

The use of technology as a learning medium has created many learning experiences for students and trained their cognitive development abilities. One of the cognitive skills that is very important in the world of education is critical thinking skills. According to (Juliyantika and Batubara 2022) critical thinking skills are skills that involve cognitive processes and invite students to think according to their abilities. (Manurung et al. 2023) also explains that critical thinking skills have the aim of producing purposeful, reasoned, goal-oriented thinking to solve problems, draw conclusions, and make decisions. With the E-LKPD based on a scientific approach to cell material which is used to train students' critical thinking skills.

In making E-LKPD based on a scientific approach on cell material which is used to train critical thinking skills, students need validation from experts in order to know the suitability of the media before it is developed so that a good E-LKPD based on a scientific approach is obtained and can be used to train skills. students' critical thinking.

With the above background, the researcher conducted research with the title "Validity of E-LKPD based on a scientific approach on Cell Material to Train Students' Critical Thinking Abilities"

METHOD

This research is a type of development research with a 4D model. Researchers use 4D model development because it has clear and structured stages in its implementation, making it easier for researchers to develop learning media products such as E-LKPD. This development model has 4 stages, namely Define, Design, Develop, and Disseminate. However, in this case, the researcher only developed research methods starting from the Define, Design and Develop stages. The Disseminate stage was not carried out due to time constraints. The steps in this research are:

Define

This is the stage for establishing and defining the conditions needed in the learning development process. This define stage includes two steps, namely material analysis and analysis of student characteristics. Material analysis is carried out by identifying the material and selecting the appropriate material, namely Cell material. Then analyze the characteristics of the students, this is done because all learning processes must be adjusted to the characteristics of the students

Design

This stage is a product development design planning process in the form of E-LKPD based on Scientific Approach on Cell Material to train students' critical thinking skills. This stage is also known as creating an E-LKPD design which contains cell material with a discussion of the structure, function and differences of animal and plant cells as well as questions which include critical thinking analysis. The e-LKPD developed was created to train students' critical thinking skills integrated with scientific approach-based learning. To implement the material and learning used, the researcher used learning media with the Wizerme application. The Wizerme application is an interactive application that can be filled in by students like a manual LKPD. The process of preparing an E-LKPD regarding cell material includes cell material, instructions for use, objectives and questions related to the material.

Develop

At this stage, it is the embodiment of the design process, where the product development created is an E-LKPD based on a scientific approach to cell materials. This e-LKPD was created as a learning medium. Then the product design results are given to media and material experts to determine the feasibility of E-LKPD learning media based on a scientific approach to cell material.

The disseminate stage in this research was not carried out due to time constraints in the research. The type of data used in this research is quantitative and qualitative data, namely data analyzed descriptively obtained from the validation results of media experts and material experts. The data collection instrument consists of validation sheets from material experts and media experts regarding E-LKPD based on a scientific approach to cell material which is used to train critical thinking. The instrument used to assess the developed E-LKPD is a Likert scale.

Data Analysis Technique

Feasibility can be determined through validation results and expert responses. The results of data analysis are used as a basis for revising the media being developed. The validator's response to the product is analyzed descriptively, then interpreted further and explained qualitatively. Media and material expert validation sheets in the form of questions with answers to each instrument in the form of five scores according to a Likert scale (Table 1)

Table 1. Guidelines for assessing Likert scale categories

Percentage of achievement	Interpretation
Very worthy	5
Worthy	4
Quite worthy	3
Less worthy	2
Not worthy	1

(Source: Sugiyono, 2011)

The collected material expert and media expert validation assessment data is analyzed by adding up and comparing with the expected number to obtain a percentage of feasibility and attractiveness or can be written using the following formula:

$$\text{Eligibility percentage \%} = \frac{\sum X\ (score\ from\ the\ validator)}{\sum Xi\ (maximum\ total\ score)} x\ 100$$

From the assessment above, the percentage scale criteria for the suitability of the media used to train students' critical thinking skills are obtained, which can be seen in the following table:

Table 2. Eligibility percentage scale criteria

No	Score in percent	Eligibility category
1	< 21%	Very unfit
2	21-40 %	Not worth it
3	41-60%	Quite decent
4	61-80%	Decent
5	81-100%	Very desent

(Source: I Ernawati, 2017).

RESULT AND DISCUSSION

Result

Product Trial Results

Product trials are presented in E-LKPD media based on a scientific approach using the wizzer.me application on cell material which is used to train class lecturer at the Faculty of Education, University KH. A. Wahab Hasbullah Tambakberas Jombang.

Assessment of Data Resulting from Media Expert Validation

The validation questionnaire for the development of E-LKPD based on a scientific approach to cell material used to train students' critical thinking skills contains 10 indicator items along with a sheet of suggestions and input. Suggestions and input by media experts are used as material for consideration for improving E-LKPD. Data from the validation results of media expert assessments are presented in table 3.

Table 3. Data from Media Expert Assessment Validation Results

No	Question item	Score			Eligibility criteria
		X	Xi	%	
1	The attractiveness of the cover design in E-LKPD is based on a scientific approach to cell material	4	5	80	Worthy
2	The components in the E-LKPD are complete	5	5	100	Very worthy
3	The typography of the E-LKPD content is simple				
	a.Don't use too many fonts	4	5	80	Worthy
	b. The suitability of font use for letters is consistent	4	5	80	Worthy
	c.The suitability of the language used is in accordance with EYD	4	5	80	Worthy
4	The steps in learning in E-LKPD based on a scientific approach to cell material make it easier for students to learn independently	5	5	100	Very worthy
5	The use of color in E-LKPD based on a scientific approach to cell material is not excessive	4	5	80	Worthy
6	E-LKPD is easy to operate using a PC/Laptop or cellphone	4	5	80	Worthy
7	Instructions for using E-LKPD are clear and not confusing	5	5	100	Very worthy
8	E-LKPD is presented coherently according to the order of the E-LKPD parts	4	5	80	Worthy
Amount		43	50	86,00%	Worthy

Information:
X: score from the validator
XI: maximum score

The average expert assessment score is 43 or 86.00% with good criteria. A total of 7 aspects received a score of 4 and 3 aspects received a score of 5 from the media expert assessment. The 7 aspects that received a score of 4 were the attractiveness of the E-LKPD cover design, the typography of the E-LKPD content, the use of color in the E-LKPD, the E-LKPD being easy to operate, and the E-LKPD being presented in a coherent manner. For the 3 aspects that received a score of 5, namely the completeness of the components in the E-LKPD, learning steps in the E-LKPD, and instructions for using the E-LKPD. The suggestions given by media experts are adding animation to the E-LKPD, adding an E-LKPD link in the instructions for using the E-LKPD, and it is better to make instructions for using the E-LKPD for teachers too.

Data Assessment Result from Material Expert Validation

Validation questionnaire for E-LKPD development based on a scientific approach using the wizer.me application on cell material containing 10 indicators and including a sheet of suggestions and input by material experts, in this case used as consideration for improving the E-LKPD. Data from the validation results of material expert assessments are presented in table 4.

Table 4. Material Expert Validation Results Data

No	Question item	Score			Eligibility criteria
		X	Xi	%	
1	Suitability of material to learning objectives	4	5	80	Worthy
2	Suitability of E-LKPD on cell material with a scientific approach	4	5	80	Worthy
3	The material in the Scientific Approach-based E-LKPD is easy to understand	4	5	80	Worthy
4	The suitability of the material in the E-LKPD is according to the student's ability level	5	5	100	Very worthy
5	Suitability of videos about cell material in E-LKPD with learning materials	4	5	80	Worthy
6	There is suitability of tasks with the material in each learning activity in E-LKPD	4	5	80	Worthy
7	The learning steps on E-LKPD can be followed easily by students	4	5	80	Worthy
8	Suitability of learning activities in E-LKPD cell material according to student learning needs	5	5	100	Very worthy
9	Learning activities in E-LKPD based on a scientific approach to cell material can train students' critical thinking in learning	4	5	80	Worthy
10	Appropriateness of the language used	4	5	80	Worthy
Amount		42	50	84,00%	Worthy

Information:
X: score from the validator
XI: maximum score

The average score for material experts is 84.00% with appropriate criteria. A total of 8 aspects received a score of 4 and 2 aspects received a score of 5. The eight aspects that received a score of 4 were the suitability of the material to the learning objectives, the suitability of the E-LKPD on cell material with a scientific approach, the material on the E-LKPD was easy to understand, the suitability of the video on cell material. in E-LKPD with learning material, there is suitability of assignments with learning material, there is suitability of assignments with material in each learning activity in E-LKPD, learning steps in E-LKPD can be followed easily by students, learning activities in E-LKPD in cell material can train students' critical thinking skills in learning, and the suitability of the language used. The two aspects that received a score of 5 were the suitability of the material in the E-LKPD according to the student's ability level and the suitability of the learning activities in the E-LKPD cell material according to the student's learning needs. As for suggestions and input from material experts, there is some material listed in the video but not yet listed in the learning activity point and cell structure material such as other cell organelles do not appear in the question point.

Discussion

Analysis of Media Expert Validation Results

Based on the results of the assessment carried out by media experts in table 3, a percentage value of 86.00% was obtained. This value shows that the E-LKPD media based on a scientific approach to cell material is suitable for use. Based on suggestions and comments from media experts regarding the development of E-LKPD based on a scientific approach to cell material, there are several improvements that must be made, including adding animation to the E-LKPD so that students are interested in the E-LKPD, not only containing writing which can make students bored. According to (Eva Margaretha Saragih and Syahriani Sirait, 2023) animation can visualize abstract concepts, make material easy to understand, and motivate students to learn. The addition of a link for working on the E-LKPD in the instructions for using the E-LKPD must also be included so that it is easier for students to access it. And also make use of E-LKPD for teachers, so that teachers can also know how to use E-LKPD correctly.

In table 3 there are seven aspects that received a score of 4 from media expert validators. The first aspect is the attractiveness of the cover design in E-LKPD, this shows that the attractiveness of the cover design in E-LKPD is considered feasible. Furthermore, aspects of the content of the E-LKPD, such as not using too many types of letters, suitability of the use of fonts, and suitability of the language used in this case, received a score of 4, which shows that the content aspects of the E-LKPD are classified as adequate. This is also supported by the opinion (Junita and Yuliani 2022) which states that the language used in E-LKPD must use language that is communicative and easy to understand and uses appropriate terms. then the aspect of using color in the E-LKPD media is not excessive, which in this case gets a score of 4 indicating that it is classified as feasible. Finally, the E-LKPD is presented in a coherent manner according to the sequence of the E-LKPD sections, this aspect also gets a score of 4 which means it is classified as adequate. In this case, it is in line with the opinion of (K.L.S. Utami, I.W. Suastra, and N.K. Suarni 2022) which states that the preparation of E-LKPD must include material, summaries and questions that must be done by students which refer to the basic competencies to be achieved.

For aspects that received a score of 5 from media expert validators, namely the first is the completeness of the components in the E-LKPD, which means that in this case it is classified as very feasible, this is supported by the opinion (Andres, Alpusari, and Sari 2023) which states that the E-LKPD components are good, namely there is a cover, instructions for use, contents of the E-LKPD and student activities in the form of practice questions. Both aspects of the instructions for using E-LKPD are clear and not confusing, which means that in this case they are categorized as very feasible. The three work steps in E-LKPD can make it easier for students to learn independently, which means this shows a very feasible category.

Analysis of Material Expert Validation Results

Based on the material expert validation analysis in table 4, a percentage value of 84.00% was obtained. This value indicates that the material in the E-LKPD based on a scientific approach to cell material is suitable for use. Based on suggestions and comments from material experts, there are several improvements that need to be made, including some material that is listed in the learning video but not yet included in the learning activity point, such as substance transportation material and also a lack of cell structure material such as other cell organelles in the question point, it would be better if the questions were varied.

In table 4 there are eight aspects that received a score of 4 from material expert validation. Firstly, the suitability of the material to the learning objectives, in this case means that this aspect is classified as feasible. Then the suitability of the E-LKPD on cell material with a scientific approach, which indicates that this aspect is categorized as feasible because in the E-LKPD there is a component or realm of scientific thinking (scientific approach). This is in line with the opinion of (Kholis 2020) who says that the realm of the scientific approach consists of 5M (observing, asking, collecting data, associating, and communicating). The third aspect of the material in the E-LKPD is easy to understand, which indicates that this aspect is also feasible because it received a score of 4. Then fourthly, the suitability of the video in the E-LKPD with the learning material in this case also indicates that this aspect is categorized as appropriate. Then, the suitability of the task with the material in each learning activity in the E-LKPD also gets a score of 4, in this case it means this aspect is classified as feasible, then the learning steps in the E-LKPD can be followed easily by students which also gets a score of 4 in this case. This means that this aspect is classified as feasible, then the learning activities in E-LKPD can train students' critical thinking skills. This can be seen in the questions on E-LKPD which shows the existence of the realm of

critical thinking, namely formulating problems, making hypotheses, describing variables, creating designs, analyze data, and draw conclusions. The last aspect that received a score of 4 was that the language used in the E-LKPD was easy to understand.

For the aspect that received a score of 5 from the material expert validation, the first is the suitability of the material to the student's ability level, which means this aspect is categorized as adequate.

The second aspect is the suitability of learning activities in E-LKPD according to students' learning needs. This aspect is also categorized as appropriate because it gets a score of 5.

CONCLUSIONS

Research into the validity of E-LKPD based on a scientific approach to cell material used to train students' critical thinking skills uses a 4-D model, namely defining, designing, developing and disseminating. However, it can be seen that this research did not have a dissemination stage due to time constraints. The results of the validation carried out by media experts received a percentage of 86.00%, which means it can be categorized as "Fine" and material experts with a percentage of 84.00% which indicates the criteria are "Worthy". This shows that the validity of the E-LKPD based on a scientific approach to cell material used to train students' critical thinking skills is suitable for use and can be distributed to students later.

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