Development of Guided Discovery Learning Oriented E-LKPD to Improve Critical Thinking Skills and Learning Outcomes of Students on Cell Materials

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Article Info	Abstract
	Critical thinking skills from student learning outcomes are one of the emphases in 21st century learning. Critical thinking skills can train students to be good at selecting the information needed in solving problems, more skilled at detecting conceptual deviations, so as to be able to correct these deviations and can solve problems logically, systematically, rationally, and empirically. One of the learning models that can improve critical thinking skills which will affect learning outcomes is the guided discovery learning model. The guided discovery learning model can be integrated into learning media in the form of e-LKPD oriented towards guided discovery learning on cell material. Cell matter is a material that is quite broad and complex. This research is a type of research and development (R & D) research. This study uses a 4D development model (define, design, development, disseminate). This study aims to produce guided discovery learning-oriented e-LKPD and describe the validity, practicality and effectiveness of improving critical thinking skills and student learning outcomes on cell material. This guided discovery learning-oriented electronic student worksheet (e-LKPD) has been implemented in class XI Science SMA Negeri 3 Klaten for the 2021/2022 academic year. The results showed the validity of the e-LKPD was very valid with a percentage of 90% by material experts and 87.96% by media experts. The results of the practicality of the e-LKPD obtained a percentage of 92.39% very practical criteria from teacher responses and 77.12% practical criteria from student responses. The improvement of critical thinking skills after using the guided discovery learning oriented e-LKPD obtained the percentage results of 80.70% of high criteria and the percentage of students' critical thinking skills questionnaire percentage of 75.85% in the high category. Increasing student learning outcomes after using guided discovery learning-oriented e-LKPD obtained the results of the classical completeness percentage of 88.88% having reached KKM = 70 and obtaining $g \geq 0.3$ of 86.11% in the medium to high category. Thus, it can be concluded that the guided discovery learning-oriented e-LKPD developed is valid, practical and effective to use in learning.

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INTRODUCTION

21st Century Learning is learning that emphasizes the 4Cs, which are critical thinking, communication, collaboration, and creativity. In line with the 4C learning of the 21st century, according to the Regulation of the Minister of National Education (Permendiknas) Number 23 of 2016, one of the skills that need to be developed in learning is critical thinking skills. According to Ennis (2011) critical thinking skills are the process of building arguments or reasons based on the data obtained to make decisions about what to believe, to do and to be accountable for based on reflective thinking processes. The Covid-19 pandemic that has occurred throughout the world, including Indonesia, has caused the learning process to be carried out online or known as Distance Learning (PJJ). Based on the results of interviews with biology teachers at SMA N 3 Klaten during the distance learning process, students rarely ask questions that can trigger critical thinking skills so that online classes tend to be passive and less student-centered (student center learning). Not only students' critical thinking skills are still low, during the Covid-19 pandemic the value of student learning outcomes in carrying out distance learning on average only scored 70, the KKM value of SMA N 3 Klaten was 70.

One of the teacher's efforts that can be done to improve critical thinking skills and student learning outcomes is through the development of learning media. Learning media for electronic student worksheets (e-LKPD) is one example of learning media that needs to be developed in 21st century education. Electronic student worksheets (e-LKPD) are worksheets which contain summaries or information related to the material, questions and instructions for practicum implementation as well as tasks carried out by students in the learning process, e-LKPD is packaged in interactive multimedia (Awe & Ende, 2019). In the development of this e-LKPD, guided discovery learning model is oriented. The selection of the guided discovery learning model is in accordance with the problems faced by the school and adapted to the needs of the school. Guided discovery learning model is a learning model that is guided and receives instructions from the teacher starting by presenting a problem or question that triggers students to think critically, observe, make assumptions, explain, and analyze to find knowledge, understanding and material concepts (Yuliani & Suragih, 2015).

Cell matter is a material that is quite broad and complex. In accordance with the 2013 Curriculum, Cell material is taught in Class XI Odd Semester. Cell material is not only taught in theory but is also taught with practical activities in the learning process, one example of which is the observation of the structure of animal and plant cells and membrane transport. The guided discovery learning-oriented e-LKPD learning media that will be developed will only be membrane transport material which will be held in a practicum, for material on the chemical components that make up cells, structure, function, cell reproduction and protein synthesis, it is delivered through theory.

Based on the problems above, it is necessary to have a development that aims to produce guided discovery learning-oriented e-LKPD to improve critical thinking skills and student learning outcomes on cell material.

RESEARCH METHOD

The type of research used is research and development (R&D) research, namely developing guided discovery learning-oriented e-LKPD to improve critical thinking skills and student learning outcomes of cell material. This research was conducted through the stages of the 4-D (Four-D) model developed by Thiagarajan et al., (1974). The 4-D development model consists of 4 stages, namely define, design, develop, and disseminate. The trial of the guided discovery learning-oriented e-LKPD learning media was carried out at SMA Negeri 3 Klaten. The small-scale trial subjects consisted of 30 students in class XI Science 2 for the 2020/2021 academic year and the large-scale trial subjects consisted of 108 students divided into three classes, those are Class XI Science 5, 6, and 7 in the 2021/2022 academic year.

The instruments used in this development research are material expert validation sheets and media experts, guided discovery learning-oriented e-LKPD, teacher response questionnaires, student response questionnaires, pretest-posttest questions on learning outcomes that have critical thinking indicators, and participant critical thinking questionnaires educate. Electronic student worksheets (e-LKPD) are said to be valid if the assessments from material expert validators and media experts reach 65%, e-LKPD are said to be practical to use if the results of teacher and student responses reach 66%, e-LKPD are said to be effective if the achievement of critical thinking skills indicators from the learning outcomes test scores with a percentage of >71.50% with high criteria, student learning outcomes show 75% reach the KKM value limit = 70 and students who get n-gain criteria are moderate to high reach 75%.

RESULTS AND DISCUSSION

Validity of e-LKPD Oriented Guided Discovery Learning on Cell Material

The e-LKPD validation is carried out based on an assessment by validators, which are material expert validators and media expert validators. The results of the guided discovery learning-oriented e-LKPD assessment conducted by material experts and media experts showed very valid results, with a percentage of 90% by material experts and 87.96% by media experts. The results of the analysis of the percentage of validators of material experts and media experts can be seen in the table below.

Table 1 Results of the Analysis of the Validity of the e-LKPD Materials

No.	Assessment Indicator	Assessment Score (%) Validator
1	Content Validation	95
2	Presentation Validity	83
3	Language Validity	92
	Total Score	151
	Average score	90
	Criteria	Very Valid (Valid)

Based on table 1, the results of the analysis of the validity of the e-LKPD material obtained a percentage of 90% with very valid criteria. Material validity consists of 3 aspects, those are (1) content aspect, (2) presentation component aspect, and 3) linguistic component aspect. The first aspect is the feasibility of the content which gets an assessment of 90% with a very valid category, this is because in the development process it already contains the completeness of the material, the breadth of the material, and the depth of the material in accordance with the basic competencies of the Cell material, in addition to the accuracy of the material, both concepts and definitions, the accuracy of the data and facts used in the e-LKPD, the accuracy of the examples and cases given in accordance with everyday life, the accuracy of pictures, diagrams, and illustrations are good and appropriate. The development of this e-LKPD has also been oriented to the guided discovery learning model where there are steps or phases of guided discovery learning, namely stimulation, problem identification, data collection, data processing, verification, and generalization. The six-step guided discovery learning model that is applied in the e-LKPD will later lead students to have critical thinking skills because it has been adapted to the components of critical thinking skills. The second aspect is the aspect of data presentation which received an assessment of 83% with a very valid category, this presentation aspect is said to be very feasible because in the development of e-LKPD the material provided is coherent in accordance with the Cell material sub-chapters, examples of questions given in each activity, and in the presentation. learning can involve active students in the learning process. The third aspect is the linguistic aspect which received an assessment of 92% with a very valid category, this is because in the development of e-LKPD using sentences that are straightforward, communicative, dialogical, interactive, adapted to the development of high school students, in accordance with the use of correct Indonesian language rules, and pay attention to the use of appropriate terms,

symbols or icons. The inputs or notes of improvement given by the validator to the researcher include; the cover of the e-LKPD does not yet contain the author's name, the introduction is replaced with a preface, in the material section it is a picture of the nucleus and lysosomes, the description of the picture is not clear, there is no reference list, material or description of the picture in the e-LKPD if that is not required in the curriculum currently in use should be closed and deleted. This is because some materials or pictures are found that are too high for the high school level, because they cite text books.

Table 2 Results of the e-LKPD Media Validity Analysis

No.	Assessment Indicator	Assessment Score (%)
		Validator
1	Size of e-LKPD	100
2	e-LKPD cover design (Cover)	100
3	e-LKPD content design	83,3
	Total Score	108
	Average score	87,96
	Criteria	Very Valid (Valid)

Based on Table 2, the results of the analysis of the validity of the e-LKPD media obtained a percentage of 87.96% with very valid criteria. This aspect is divided into three assessment indicators; The size of the e-LKPD obtained a 100% assessment because the size of the e-LKPD was developed in accordance with the ISO standard size, namely A4. The cover design of the e-LKPD (cover) received a 100% rating because in the development of the e-LKPD cover, which was made to pay attention to the appearance of the layout elements on the front, back and back in harmony so that it has a consistent color rhythm and unity, harmonious color elements and clarifying function, the letters used are clearly visible, proportional, attractive and easy to read, the color of the title in the e-LKPD also contrasts with the background color and there are not too many letter combinations, for the illustration of the cover of the e-LKPD, a cell picture is given that describes the content of the material and adjusted accordingly. with the shape, color, size, proportion of objects according to reality so as to create an attractive impression. And finally, the content design of the e-LKPD received an 83.3% rating because the e-LKPD was developed with layout consistency, using simple e-LKPD content typography, e-LKPD content typography can facilitate students' understanding in using it, and the last illustration content is able to express the meaning or meaning of the object, creative, dynamic and accurate form, proportional to reality. As for the input or improvement notes from the validator for researchers, including; the terms on the page are inaccurate, the pictures on pages 10, 11 are not clear, the writing of practice questions is not neat, the consistency of the source or source writing, the wrong vocabulary like literature should not be literature, writing e-LKPD according to the rules correct writing in Indonesian, and some sources have their writings cut off.

The Practicality of Guided Discovery Learning Oriented e-LKPD

The practicality test is carried out with the aim of testing the product is practical and easy to use or vice versa. The assessment of the practicality of the guided discovery learning-oriented e-LKPD was obtained through filling out questionnaire responses by biology subject teachers and students. Data on teacher and student responses were obtained during small-scale trials.

1) Practical Feedback by Teacher

Practical responses by the teacher were obtained from the results of the Biology teacher responses at SMA N 3 Klaten and the results of the guided discovery learning-oriented e-LKPD assessment of cell material based on aspects of the assessment including (1) graphic aspects, (2) linguistic aspects, (3) material aspects, and (4) presentation aspect. The results of the questionnaire analysis of teacher responses are presented in Table 3.

Table 3 Percentage Results of Teacher Response Questionnaires on e-LKPD

No.	Indicator	Questionnaire answer percentage (%)
1.	Graphic Aspect	95.83
2.	Language Aspect	90
3.	Material Aspect	90
4.	Presentation Aspect	93.75
	Average Percentage	92.395
	Criteria	Very Practical

Based on the results of the questionnaire analysis of the teacher's responses to the e-LKPD, an average percentage of 92.39% was obtained. Based on this analysis, it can be concluded that the guided discovery learning-oriented e-LKPD learning media that has been developed is very practical and good for use in the learning process. The description of each aspect is explained as follows. The material aspect obtained a percentage of 80.68% with very practical criteria. This is because the material in the e-LKPD was developed in accordance with KI, KD and learning objectives, using guided discovery learning orientation, equipped with concept maps, content standards and others. The practice questions given direct students to think critically. The second aspect is the language aspect which gets a percentage of 75.83% with practical criteria. This is because in the e-LKPD the language used is clear, easy to understand, easy to understand and simple so that it is easy to read. The last one is the aspect of interest that gets a percentage of 74.86% with practical criteria. The display of the e-LKPD is made attractive and fun plus it is presented in electronic form so that it can arouse students' motivation and curiosity so that in studying the Cell material, students feel happy coupled with pictures, clear and colorful illustrations that make it easier for students to understand the material. As for input, suggestions from students in the form of e-LKPD covers need to be added layers or other images that can increase interest in e-LKPD covers.

2) Practical Responses by Students

Practical responses by students were obtained from the responses of 30 students of class XI MIPA SMA N 3 Klaten who had gone through cell material with an instrument in the form of a questionnaire. The questionnaire instrument contains 20 questions which are divided into 3 aspects, namely (1) the material aspect, (2) the language aspect, and (3) the interest aspect. The results of the student response questionnaire to guided discovery learning-oriented e-LKPD are presented in Table 4.

Table 4 Percentage Results of Student Response Questionnaires

No.	Indicator	Percentage of questionnaire answers (%)
1.	Material Aspect	80.68
2.	Language Aspect	75.83
3.	Interesting Aspect	74.86
	Average Percentage	77.12
	Criteria	Practical

Based on Table 4, the results of the questionnaire analysis of student responses to the developed e-LKPD received a good response by students, it can be seen from the percentage of each aspect and the average value for all aspects of 77.12%. The detailed explanation of each aspect of the assessment is as follows. The first aspect is the graphic aspect which gets a percentage of 95.83% with very practical criteria. This is because the developed e-LKPD has an attractive cover, the layout placement of both titles, subtitles, text, images, and page numbers is consistent with the pattern. Certain types of letters, sizes, and spaces are used accordingly to make it easier for students to learn and use the e-LKPD, the images presented also support student understanding, and lastly, a harmonious and harmonious blend of colors and images can attract students. . The second aspect is the linguistic aspect which gets a percentage of 90% with a very decent category which in this development process uses language that is adapted to the development of students, uses communicative language, uses clear sentence structures that do not cause double sentences,

and simple sentences. so easy to understand. The third aspect is the material aspect which gets a percentage of 90% with very practical criteria. The material in the e-LKPD is in accordance with KI, KD material and adjusted to the level of ability of students. The last is the presentation aspect, which is 93.75% with very practical criteria. The electronic student worksheet (e-LKPD) which was developed facilitates students to build understanding based on their previous abilities, develop students' thinking skills, explore the information needed for problem solving and e-LKPD is easy to implement in learning. However, there are inputs or notes for improvement from the teacher that need to be revised, such as a sentence that has a double meaning so that it needs to be removed or corrected. The electronic student worksheet (e-LKPD) oriented to guided discovery learning obtains an assessment with good criteria, if the minimum practicality achieved is practical. Thus, it can be concluded that the e-LKPD guided discovery learning is practically used for the learning process.

Improving Students' Critical Thinking Skills

The recapitulation of the results analysis of increasing students' critical thinking skills for each indicator is presented in Table 5.

Table 5 Recapitulation of Critical Thinking Indicators Percentage

Critical Thinking Indicator	Percentage (%)		Category	
	Pretest	Posttest	Pretest	Posttest
Elementary clarification (give a simple explanation)	56.85	82.03	Low	Very High
Basic support (build basic skills)	60.74	77.40	Low	High
Advanced clarification (make further explanation)	62.59	89.62	Moderate	Very High
Strategy and tactics (strategy and tactics)	57.77	76.11	Low	High
Inference (conclusion)	61.48	78.33	Low	High
Average	59.88	80.70	Low	High

Based on Table 5, the achievement of each indicator of critical thinking skills obtained from the posttest score with an average score of 80.70% is in the high category. The improvement of students' critical thinking skills on the elementary clarification indicator (providing a simple explanation) obtained a pretest score of 56.85% and a posttest score of 82.03%. There is an increase in the elementary clarification indicator because students are getting used to focusing on the questions that arise in guided discovery learning-oriented e-LKPD, being able to analyze what must be done and answered in each guided discovery learning step in the e-LKPD, and Finally, students get used to asking and answering questions about an explanation and challenge. This is evidenced by the increase in student activity in each meeting using google meet (online). Some students ask questions that may be deemed unclear until students understand which later with a good understanding will lead to patterns of answers that are in accordance with the questions and one of the answers. An example of a test question given with an elementary clarification indicator is that students are able to show the picture indicated on the cell organelle by mentioning the name of the cell organelle and its function clearly and correctly. The improvement in critical thinking skills indicators. Basic support (building basic skills) obtained a pretest score of 60.74% and a posttest value of 77.40%. This is because in the development of guided discovery learning-oriented e-LKPD learning media, in several steps or syntax used such as data collection, data processing and verification, students are trained to consider the credibility of a source by writing literature or references in building basic skills. Students are also trained to observe and consider the results of the observations they

have made as well as in answering questions. Students are able to analyze the changes in processes that occur in the osmosis process correctly and precisely. Although this indicator only increased by 16.66%, it has shown an increase in students' critical thinking skills. The next indicator is advanced clarification (making further explanations) obtaining a pretest score of 62.59% and a posttest value of 89.62%. This indicator is an indicator that obtains the highest percentage increase among other indicators. This is because students are able to identify the assumptions that exist in guided discovery learning-oriented e-LKPD as evidenced by the answer sheets that have been done. Students are able to identify problems well based on the stimulus that has been given. Success in working on e-LKPD makes students more able to work on posttest questions given for example in this indicator students are able to show the right answers related to examples of events in diffusion events. Next is the strategy and tactics indicator (strategy and tactics) obtaining a pretest value of 57.77% and a posttest value of 76.11%. The increase in this indicator can be seen from the way students decide an action to work on or answer the activities in the guided discovery learning-oriented e-LKPD. In addition, students are also able to interact with their friends through WhatsApp groups or private chats to answer activities in e-LKPD such as practicum activities, students exchange information and some students work on practicums in groups or individually with the results of reports written individually. This is evidenced by the results of students' answers to questions with indicators of strategy and tactics, one example of which is that students are able to answer questions related to the difference between animal cells and plant cells correctly and correctly. The last critical thinking skill indicator is Inference (conclusion) obtaining a pretest score of 61.48% and a posttest value of 78.33%. Although the increase in this indicator has not been maximized, some students are able to make decisions and consider the value of decisions or are able to conceptualize the results of both theory and practicum activities in guided discovery learning-oriented e-LKPD. This is indicated by the correct answers to the posttest questions of students who are able to correctly conclude the processes that occur in membrane transport (osmosis). The increase in inference indicators (conclusions) has not been maximized due to the possibility that during the learning process, when doing practicum at home or working on e-LKPD questions, students are still less focused and do not understand the material presented and the guidance provided by researchers so that the final result is in the form of student conclusions. still confused.

The results of the posttest score analysis based on each indicator of critical thinking skills showed an increase in students' critical thinking skills with scores on the elementary clarification indicators (explaining simple explanations) 82.03 very high categories, basic support indicators (building basic skills) 77.40 high categories , the advanced clarification indicator (making further explanation) 89.62 very high category, strategy and tactics indicator (strategy and tactics) 76.11 high category, and inference indicator (conclusion) 78.33 high category. Based on the scores for each critical thinking indicator, the overall percentage of students' critical thinking skills improvement is 80.70% high critical thinking category so it can be concluded that guided discovery learning oriented e-LKPD learning media is effective for improving students' critical thinking skills on Cell material.

The success of e-LKPD in developing students' critical thinking skills is also influenced by the use of learning models in e-LKPD oriented to guided discovery learning. As for the guidance or arrangement of the guided discovery learning model given by researchers to students during the distance learning process, the researcher explained the pre-laboratory steps to students through google meet, the researcher explained how the practical steps were, explained the tools and materials used in the practical work, such as osmosis and diffusion practicals. In the tools and practicum materials, the researcher gave directions to replace the beaker glass into a used bottled drinking water glass, replaced the stopwatch with the stopwatch on the smartphone, replaced the ink with syrup, and gave examples to students how to make holes in the potato material to be used for practical activities. With the guidance or arrangement to help students in understanding to do practicum both independently and in groups. So that the guided discovery learning model does not require students to find it on their own. This is in accordance with what was conveyed by Astra & Wahidah (2017) that in the guided discovery learning model providing arrangement

assistance and useful guidance to ensure that the material presented or learned by students can be carried out completely and accurately. The learning model has an effect on the results of increasing students' critical thinking skills. This is in accordance with the research of Widura et al., (2015) which states that the guided discovery learning model has an influence on students' critical thinking skills. The same thing was also conveyed from the results of research by Amalia et al., (2019) which stated that the application of the guided discovery learning (GDL) model in the learning process can affect students' critical thinking skills. There is a relationship between the application of guided discovery learning strategies and critical thinking skills, namely when students make discoveries, students will use their thinking system from the initial knowledge they have acquired and then relate it to the theory and results of the discovery process they do until they can complete or solve a problem (Firdani & Poedjiastoeti, 2015). In addition to the learning model applied in e-LKPD, the influence of e-LKPD which is displayed in electronic form that can be opened via smartphones and laptops also makes students more interested in participating in the learning process, the e-LKPD developed can be carried everywhere, has a format such as books with colorful and clear picture displays so that students do not feel bored, plus the material presented in the e-LKPD is complete, concise, and solid.

The improvement of each indicator of students' critical thinking skills is also supported by the percentage results of critical thinking skills questionnaires given to students, the results of the percentage of students' critical thinking skills questionnaires can be seen in Table 6.

Table 6 Percentage Results of Students' Critical Thinking Questionnaire

No.	Indicator	Questionnaire answer percentage (%)
1.	Elementary Clarification	78.70
2.	Basic Support	75.23
3.	Inference	72.91
4.	Advance Clarification	75.40
5.	Strategy and Tactics	77.02
	Average Percentage	75.85
	Criteria	High

Based on Table 6, the results of the percentage of students' critical thinking response questionnaires obtained an average of 75.85% in the high category. This questionnaire consists of 20 questions according to the five critical thinking indicators. In the elementary clarification indicator, students get an average of 78.70 high categories where students feel they have carried out activities according to indicators such as focusing and digesting every question given, trying to analyze arguments, asking friends or teachers if they find something new, and trying to explain something that a friend asked according to what he knew. Basic support indicators, students get an average of 75.25 in the high category, this is because students try to consider the source of knowledge of the Cell material obtained, students try to understand the concept of every thing found related to cell material, students like to observe and think about every event related to the concept of cell material and finally students try to connect the existing cell material concept with references and real life. The next indicator is advance clarification, students get an average of 75.40 in the high category, this is because in doing the activities in the e-LKPD students try to find out the definition of the term Cell material that is not yet known, try to answer questions from the teacher by coherent language and using the terms of the Cell material that has been studied, students record new vocabulary related to the terms in the Cell material. The strategy and tactics indicator obtained an average of 77.02 in the high category, this is evidenced by the students trying to work on cell material questions in the e-LKPD, discussing to solve a cell material problem either through whattaps group or private chat, students conduct experiments to solve problems in cell material by doing practicum both individually and in groups. And finally, the inference indicator obtained an average of 72.91 in the high category where students tried to find answers from the predictions that had been made related to the Cell material, and tried to conceptualize based on the results obtained in conducting experiments.

Improving student learning outcomes

Student learning outcomes were obtained from the pretest-posttest scores given before and after the treatment of the learning process using the guided discovery learning-oriented e-LKPD learning media on cell material with the n-gain test. The pre-test and post-test data used to determine classical completeness and n-gain are presented in Table 7.

Table 7 Description of Student Learning Outcomes Scores

Data Description	Student Scores	
	PreTest	PostTest
Number of Students	108	108
The highest score	80	100
Lowest Value	24	64
Average	59.07	80.62
Number of Completed Students (Reached KKM 70)	22	96
Number of Students Not Complete	86	12
Average classical completeness of KKM students 70	20.37%	88.88%

Based on Table 7, it can be seen that the classical mastery of students' learning outcomes before and after using the guided discovery learning-oriented e-LKPD learning media experienced an increase where before using the e-LKPD the pretest score showed classical completeness only 20.37% and after using the e-LKPD the posttest value. learning outcomes have increased with the percentage of classical completeness 88.88% of students getting scores above the KKM. Improved learning outcomes were also analyzed using the n-gain test. The results of the analysis of increasing student learning outcomes on the n-gain test can be seen in Table 8.

Table 8 Percentage Results of n-gain student learning outcomes

Range	Qualitative Criteria	Σ Students	Percentage (%)
$g \geq 0,7$	High	17	15.74
$0,3 \leq g < 0,7$	Moderate	76	70.37
$g < 0,3$	Low	15	13.89

Guided discovery learning-oriented e-LKPD learning media has a positive impact on students. This can be seen from the achievement of student learning outcomes based on the results of the n-gain test analysis where students who get $g \geq 0.3$ are 86.11% in the medium to high category. The increase in learning outcomes can be seen from the pretest-posttest scores of students' learning outcomes. To find out if there is an increase in student learning outcomes, it is done by comparing the results of the pretest and posttest of student learning outcomes (Mulyasa in Wati and Yuliani, 2020). Based on Table 7, it can be seen that the score before using the e-LKPD was obtained, the lowest score was 24 and the highest score was 80. Meanwhile, the value of students after using the e-LKPD increased, namely the lowest score was 64 and the highest score was 100. This is also supported by good learning completeness. shown by students. Completeness of student learning outcomes if the value obtained is more than the same as the Minimum Completeness (KKM) value of 70. Before using the e-LKPD learning media there were 86 students who had not completed and only 12 students had completed. After using the e-LKPD learning media, the number of students' complete learning outcomes increased, namely there were 96 students who completed and only 22 students who did not complete. From the results of the analysis, the percentage of classical completeness of students before using the e-LKPD was 20.37% and the percentage of classical completeness of students after using the e-LKPD was 88.88%. The incompleteness of students in the posttest is due to the fact that in working on guided discovery learning-oriented e-LKPD assignments, both theoretical and practical, students are not accustomed to understanding the material to determine concepts independently, plus the learning process is carried out online so that the guidance or direction given by the

teacher has not been conveyed. maximally. This is in accordance with the statement of Fitriasari & Yuliani (2021) in their research, that the incompleteness of the students posttest results is due to the fact that students are not accustomed to learning to find concepts independently in material that is considered difficult. Supported by the statement of Mursitaningrum (2019) in his research, that the guided discovery learning process using the e-LKPD guided discovery students had difficulties in understanding the concept of the material during the learning process. This is because in guided discovery-based learning, students are asked to find concepts independently, so that guidance from the teacher is needed in doing each task in the e-LKPD.

Furthermore, based on Table 8, the percentage of the results of the n-gain analysis of student learning outcomes g (medium to high criteria) is 86.11%, totaling 93 students, which is described as 17 students with a percentage of 15.74% experiencing an increase with high criteria, 76 students with a percentage of 70.37% experienced an increase with moderate criteria, and 15 students with a percentage of 13.89 only experienced an increase with low criteria. Based on the results of the analysis of guided discovery learning-oriented learning media, e-LKPD is effective in improving student learning outcomes in terms of the percentage of students who get n-gain 0.3 (medium to high criteria) is at a percentage of 75%. This increase in learning outcomes is due to the guided discovery learning model applied in e-LKPD. In accordance with the research of Estuningsih et al., (2013) which states that the development of guided discovery learning-based worksheets can improve student learning outcomes. Improving student learning outcomes is also supported by the use of e-LKPD in the form of a flipbook on the FlipHTML5 application. Electronic student worksheets (e-LKPD) in the form of flipbooks and can be flipped over like a book, coupled with the use of pictures, clear and colorful icons can attract the attention of students. Septiana's research in Fitriasari & Yuliani (2021), reveals that the use of flipbook media can improve student learning outcomes. The use of appropriate learning media and learning models is of course also supported by the teacher's role in the learning process. The role of the teacher is still very much needed, especially at this time of PJJ. In line with Muzenda, (2013) which states that in the learning process the teacher is still very necessary in interacting with students both face-to-face learning and distance learning, the teacher as a facilitator and evaluator of students' understanding so that the teacher's function remains influential in the learning outcomes of students.

CONCLUSION

The electronic student worksheet (e-LKPD) oriented to guided discovery learning that was developed was declared valid by obtaining validity results of 90% by material experts and 87.96% by media experts. The electronic student worksheet (e-LKPD) oriented to guided discovery learning was declared practical by obtaining practical results of 92.39% of the teacher's responses on very practical criteria and 77.12% of the results of student responses on practical criteria. The electronic student worksheet (e-LKPD) oriented to guided discovery learning is effective for improving students' critical thinking skills with a percentage of 80.70% in the high criteria and the results of the students' critical thinking skills questionnaire obtaining a percentage result of 78.75% in the high category. The electronic student worksheet (e-LKPD) oriented to guided discovery learning is effective for improving student learning outcomes by obtaining the results of the classical completeness percentage of 88.88% having reached KKM = 70 and obtaining g ≥ 0.3 of 86.11% with the category medium to high.

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