

Electronic Development of Student Worksheets (E-LKPD) in Class XI Coordination System Material Using Liveworksheets

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Abstract

The non-natural disaster of the COVID-19 pandemic requires learning to be done online. This of course requires educators to provide solutions, one of which is by applying electronic teaching materials to learning activities. This study aims to develop electronic student worksheets (E-LKPD) using live worksheets that are valid, practical, and effective. This research model uses the Rowntree model which consists of planning, writing preparation, writing and editing or evaluation stages. The evaluation applied in this study was a tessmer evaluation which consisted of five stages of self-evaluation, expert review, one to one, small group, and field test. The subjects of this study were students of class XI Islamic Senior High School Az-zahrah Palembang. Data collection techniques consist of observation and interviews, walkthrough, questionnaire, and test. The level of validity of the E-LKPD produced by three material, design and language experts got 86.66% very valid category results. The practicality of E-LKPD generated from one to one and small group activities each got a different percentage, namely one to one at 84.76% and small group getting 85.75% in the very practical category. The effectiveness of the development of E-LKPD is evidenced by the results of the N-gain obtained, namely 0.61 in the medium category. It can be concluded that the E-LKPD developed in this study is valid, practical and effective. The practicality of E-LKPD generated from one to one and small group activities each got a different percentage, namely one to one at 84.76% and small group getting 85.75% in the very practical category. The effectiveness of the development of E-LKPD is evidenced by the results of the N-gain obtained, namely 0.61 in the medium category. It can be concluded that the E-LKPD developed in this study is valid, practical and effective. The practicality of E-LKPD generated from one to one and small group activities each got a different percentage, namely one to one at 84.76% and small group getting 85.75% in the very practical category. The effectiveness of the development of E-LKPD is evidenced by the results of the N-gain obtained, namely 0.61 in the medium category. It can be concluded that the E-LKPD developed in this study is valid, practical and effective.

INTRODUCTION

Along with the times, science is growing from time to time, the occurrence of these developments certainly results in the sophistication of a technology (Sustainable, 2018). Science and technology are always related to each other, namely advancing and developing rapidly and simultaneously in all fields without exception also in the world of education. (Mulyani & Haliza, 2021). When science develops and produces advanced technology, it can be empowered to facilitate learning and teaching activities, it will certainly have an impact on the quality and progress of education. (Tekege, 2017).

Education, especially at the school level, will experience an increase in quality depending on several factors, one of which is related to management carried out in the ongoing process of learning activities in the school itself. (Nahrawi, 2019). Efforts to improve the quality of education, of course, as educators and students must always adapt to be able to follow and apply technological developments that continue to innovate so that they can be utilized in helping the learning process. (Budiman, 2017). Learning in schools is greatly assisted by technological advances, one of which can be empowered in making electronic teaching materials, but based on this it does not mean having to give up the main function of an educator who acts as the main driver in the implementation of learning. (Lubis, 2016). The existence of technology can help in overcoming various learning problems, as we are currently experiencing a non-natural disaster, namely the covid 19 pandemic that all activities including learning must be carried out remotely to prevent the spread of covid 19. (Habibah et al., 2020).

The emergence of these problems inevitably requires that learning activities which are usually face-to-face must be carried out face-to-face or online. (Fitriani et al., 2021). Online learning is a learning activity that is assisted by using the help of the internet network with accessibility, connectivity, flexibility, and the ability to generate learning interactions. (Sadikin & Hamidah, 2020). Technological sophistication can be empowered as a solution to solve these problems so that learning activities can continue without being limited in how to get them because as we know that the nature of learning can be done anywhere, by anyone and anytime. (Supriadi, 2017). Learning problems with the emergence of the covid 19 pandemic will certainly not discourage educators and students from learning, but they must continue to adapt to technological sophistication that continues to innovate in order to help solve these problems. Schools, especially educators, must be good at designing and making learning devices according to the needs of students in learning activities (Sari et al., 2020). The needs in question are those that can help facilitate students in the learning process both in discussion and independently, one of which is by applying student worksheets (LKPD). However, the LKPD that is commonly used is still in print, because online learning is required to require assistance in the application of electronic student worksheets (E-LKPD) which is of course expected to overcome these learning problems.

Based on the learning needs that have been explained, it is contrary to the fact that the implementation of LKPD in print is still found and has not used E-LKPD. This of course can trigger the saturation and lack of activity of students during this remote learning period because they only work on sheets of paper and then collect them via WhatsApp learning groups, whereas with E-LKPD it is hoped that it can help to support and shape students to be more active so that learning takes place. hopefully it will be more interactive and meaningful (Munandar et al., 2015). These problems must of course be overcome by an educator who is already responsible for planning learning activities (Febrina et al., 2016). If this is not given a solution that is in accordance with the problem, it will certainly have an impact on student learning outcomes, especially in Biology subjects.

Biology is a subject that requires students to be able to construct knowledge and practice understanding concepts, because a lot of concept material students tend to learn by memorizing even though the material must be understood in order to produce a complete understanding so that the concepts that have been learned are not easily forgotten. (Rahmi, 2017). This is certainly a challenge for educators to continue to overcome learning problems by paying attention to important components that support

learning, one of which is by preparing teaching materials in the form of interesting and interactive E-LKPD which can be designed with the help of live worksheets.

Liveworksheets is an internet-based software that can change the form of printed worksheets in the form of documents such as pdf, jpg and png into interactive (E-LKPD). The worksheet can insert images, audio, and video (Widiyani & Pramudiani, 2021). In addition to being able to change LKPD from printed to electronic, the existence of these live worksheets can make it easier to access assignments given by educators without having to fill out answers via paper (Fitriani et al., 2021). This of course can be empowered to overcome online learning as it is today. Paying attention and designing teaching materials according to the needs of students such as E-LKPD is the duty and responsibility of an educator in planning learning activities because this will affect the learning outcomes to be achieved (Warif, 2019). To achieve learning objectives, of course, not only applying the teaching materials to be used but other supporting factors must also be considered.

The results of interviews that have been carried out with Biology subject educators at Az-zahrah Islamic High School Palembang explain that the school is used to implementing learning using LKPD, but for E-LKPD it has never been especially during a pandemic like now. Learning activities and assignments given by educators are only collected via WhatsApp. Based on this, to overcome the problems above, a solution or effort is needed that must be done by an educator, one of which is by applying teaching materials in the form of interesting E-LKPD in order to help students understand the material in participating in learning activities,

METHODS

This research is a type of development research by applying Rowntree development model combined with tessmer evaluation. The subject of this research is class XI IPA Islamic Senior High School Az-zahrah Palembang in 2022/2023. This development model consists of three stages. The stages are as follows: 1. The planning stage is to carry out a needs analysis by doing a breakdown of students with educators at school, with the aim of getting information on what are the obstacles or needs in teaching and learning activities. 2. The second stage is the preparation of writing what must be done is to prepare various sources that will be used in making E-LKPD, Pay attention to various sources such as those obtained from the internet and from available school textbooks. 3. The writing and editing stages or evaluations carried out are self-evaluation, expert validation, one-on-one test, small group test and field test.

RESULTS AND DISCUSSIONS

1. Planning stage results

This development research stage begins with several steps, starting from planning, namely the description of students, formulating general goals and special objectives, arrangement of content outlines, determining media, planning learning support and considering existing teaching materials. Analysis of the characteristics of students is done through interviews with educators in the subject of Biology to find out the description of students. Characteristics of students in class XI different gender, ethnicity, learning style of students. Educators also said that students often complain about the coordination system material because it contains a lot of concept and memorization material so that students often find it difficult to understand the subject matter if there is no help from the teaching materials used. Educators also convey that from the minimum completeness criteria (KKM) that have been determined, which is 75, there are still some students who have not met these provisions. Based on this, efforts can be made to overcome this problem, namely by developing teaching materials in the form of E-LKPD.

The next stage is to formulate general goals and special objectives with the hope that the resulting E-LKPD is in accordance with the characteristics of each student. The following are the learning objectives

after applying the E-LKPD in the first learning activity, it is hoped that students can describe the structure of the nervous system in humans correctly, describe the functions of cells found in the human nervous system correctly, distinguish the central nervous system and peripheral nerves correctly, and correctly distinguish between voluntary and reflex movements. After applying the E-LKPD in the second learning activity, it is expected that students can explain the endocrine system in humans correctly, identify the various endocrine glands in humans correctly, Explain the function of each gland in the endocrine system correctly. After applying the E-LKPD in the third learning activity, it is expected that students can correctly demonstrate each structure of the sense of smell, correctly show each structure of the sense of sight, correctly show the different areas of taste for sweet, sour, bitter, and salty tastes on the tongue. , shows each structure of the sense of hearing correctly, and shows each structure of the sense of touch correctly. After applying E-LKPD in the fourth learning activity, it is expected that students can analyze healthy and unhealthy lifestyles in the nervous system correctly, analyze healthy and unhealthy lifestyles in the endocrine system correctly,

After determining the learning objectives to be achieved, the next step is to determine the outline of the content. The material in the developed E-LKPD is material for the nervous system in humans, material for the endocrine system, material for the sensory system and material for examples of healthy and unhealthy lifestyles in the material for the human coordination system. If the determination of learning objectives has been carried out, the next step is that based on the procedure, namely determining the media to be developed. The results of determining the selected media are in the form of electronic teaching materials E-LKPD, the development of E-LKPD is expected to help facilitate students when learning activities take place either remotely or face-to-face school.

2. Writing preparation stage

At this stage the thing to do is to consider what are the obstacles and what can be used as a source of teaching materials. Based on the results of observations, it is shown that the students of class XI IPA are used to using E-LKPD but have never implemented E-LKPD. Next, sort out the outline of the content or idea then proceed to determine the outline of the content by making a flowchart in the development of this product. The description of the material in this E-LKPD is material on the human coordination system consisting of the human nervous system, endocrine system, sensory system, as well as examples of healthy and unhealthy lifestyles in the human coordination system. The next step is to determine the graphics on the E-LKPD by making a storyboard.

3. Stage of writing and editing (evaluation)

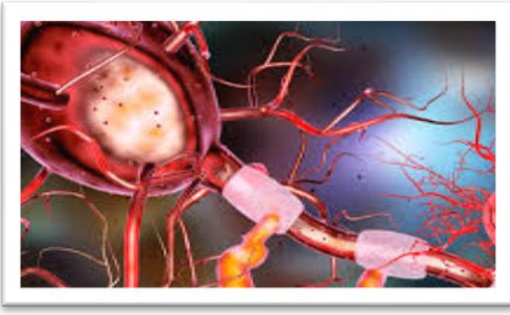

What is done at this stage is to make a draft of the E-LKPD according to the outline of the content that has been determined. The order of the E-LKPD consists of a front cover that displays like a normal front cover display consisting of titles and pictures according to each material, the identity of the E-LKPD starting from KI, KD, indicators, learning objectives, study instructions and supporting information that can be used to help find references when working on E-LKPD. Furthermore, it consists of evaluating several questions that are in accordance with each of the indicators that have been determined in the E-LKPD.

At the editing stage, self-evaluation of a product in the form of the developed E-LKPD is carried out.

1) Self-evaluation stage(*self-evaluation*)

The self-evaluation stage is an activity carried out to assess the results of products that have been obtained independently by paying attention to various errors that are still present in the product to be repaired in the hope of reducing various other errors by researchers. As for the results of this self-evaluation activity, namely making improvements to the consistency of the use of the front cover on each E-LKPD which can be used as prototype 1 which can be seen in the following table.

Table 1. Self Evaluation Results

Before revision	After revision
	
It is not appropriate to use the front cover for each E-LKPD material.	Cover each E-LKPD has been consistent with each E-LKPD material.

After conducting a self-evaluation on the product (prototype 1) that was developed, the next step is to validate several parallel experts on one-to-one test activities (one to one test).

2) Expert validation

Below is a table that shows the recapitulation of the results of the validation against three experts. The data obtained in this activity are in the form of qualitative and quantitative data. Quantitative data was obtained from the calculation of the item values given by the experts on the instrument, while the qualitative data was obtained from comments and suggestions that had been added by the experts on the instrument sheet.

The following is a recapitulation table of the level of validity of the E-LKPD based on three experts, namely material, design and language experts.

Table 2. Expert validation results

No	Validation	Percentage	Information
1	Theory	80.00%	Valid
2	Learning design	88.57%	Very valid
3	Language	91.43%	Very valid
Average		86.66%	Very valid

Based on the table above illustrates that the results of three expert validations from material, design and language experts show that the E-LKPD which has been developed with the help of live worksheets is included in the very valid category with a percentage of 86.66%. This E-LKPD is declared feasible to be tested by paying attention to some suggestions and comments that have been added to the comments column that has been provided for the validator. This is in line with research conducted by (Widiyani & Pramudiani, 2021) that a valid, effective and very practical E-LKPD has been produced which was developed with the help of live worksheets software so that it is feasible to be tested with the percentage obtained, namely media experts at 75% and Materials getting a percentage of 91.75%.

3) One-on-one test

At the one-on-one test stage, students who are empowered to fill out the E-LKDP practicality questionnaire are students in the above average category, students below average and students in the middle or moderate category with the following initials: AD, NS, and MF. The results of the one-on-one test and the small group test are then used as reference material for making improvements to the product. The following is a table that shows the results of the recapitulation of the practicality level of E-LKPD:

Table3. E-LKPD practical results on the one to one test

No	Name	Percentage	Category
1	AD	85.71%	Very practical
2	NS	85.71%	Very practical
3	MF	82.86%	Very practical
Average		84.76%	Very practical

Based on the results obtained in research activities, not only lies in the results in the form of the level of validity of the product, but also on the level of practicality of E-LKPD as well. The E-LKPD that has been used by students in learning activities shows that the E-LKPD is included in the very practical category which is measured based on a predetermined scale with an average percentage obtained which is 84.76%. This is of course in line with research that has been carried out by (Khikmiyah, 2021) that the implementation of web liveworksheets based on Problem Based Learning (PBL) is able to improve student learning outcomes with an average activity of 84%.

4) Small Group Test

In this small group test, eight students were involved, except for three students who had taken the one to one test. The purpose of this activity is to see the practicality of developing E-LKPD. The nine students in the small group test came from different social, economic, and ethnic backgrounds. The table below is a table that shows the recapitulation of the results of the small group test.

Table 4. The results of the recapitulation of E-LKPD in the small group test

No	Name	Percentage	Category
1	MR	91.43	Very practical
2	YM	91.43	Very practical
3	NS	85.71	Very practical
4	MS	91.43	Very practical
5	DA	91.43	Very practical
6	US	82.85	Very practical
7	MA	85.71	Very practical
8	RM	82.86	Very practical
Average		87.85	Very practical

The product that has been repaired by the validator at the validation stage in the one to one test is called prototype 2 which will then be continued at the small group stage. In the small group test activity the students used were eight students with different categories of backgrounds such as different social status, ethnicity and economic conditions. In this stage, the empowered students are the exception from the three students who have worked on the E-LKPD at the one to one test stage. The results obtained from this small group activity show that this E-LKPD is categorized as very practical with the percentage obtained which is 87.85%. This is in line with research conducted by (Nurbayani et al., 2021) illustrates that the existence of LKPD with live worksheets, educators feel helped in online learning activities, this shows that indeed E-LKPD with live worksheets has been tested for practicality.

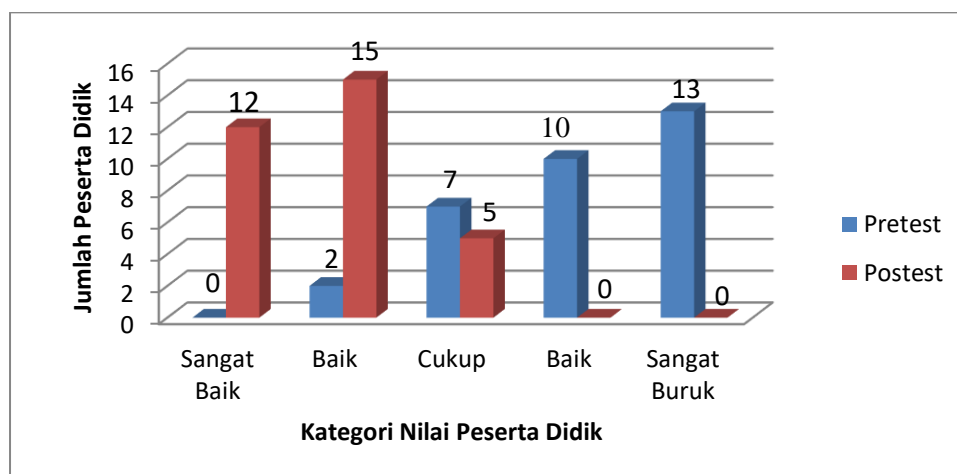
5) Field test

The field test in this activity is in the form of an initial test and a final test given to students. The questions given are in the form of twenty multiple choice questions in accordance with the basic competencies in the E-LKPD. The purpose of this activity is to see the effectiveness of the E-LKPD that has been developed using live worksheets. The following is a recapitulation of the results of the pretest and posttest activities which can be seen in the table below :

Table 5. Pretest and posttest recapitulation results

Value in- ter- val	Number of students		Percentage (%)		Information
	Pretest	Posttest	Pretest	Posttest	
90-100	0	12	0	37.5	Very good
80-89	2	15	6.25	46,875	Well
70-79	7	5	21,875	15.625	Enough
60-69	10	0	31.25	0	Well
0-59	13	0	40,625	0	Very bad

The table above shows that based on the number of students, namely thirty-two people, at the time of the initial test activity there were 13 people who got the very bad category, while at the posttest there were 12 students who got very good scores. Another thing is that the percentage level obtained in the initial test shows 40.625% of students are in the very bad category, but at the posttest, they get a score of 37.5% with very good information. Based on these data, it shows that there is an increase in student learning outcomes after implementing E-LKPD. The following is a diagram that shows the results of students' scores on pretest and posttest activities based on the number of students.

**Figure 1. Results of pretest and posttest**

The diagram above shows that there has been an increase in student learning outcomes before and after the initial and final tests. The diagram shows an increase in learning outcomes after the final test that there were twelve people in the very good category and fifteen people in the good category. The following is a table of the results of the average N-gain recapitulation of the results of the pretest and posttest:

Table 6. N-gain recapitulation result

Pretest mean	Posttest mean	N-gain
59.8	84.6	0.61
Category		Currently

Based on the table above, it shows that after empowering the development product in the form of E-LKPD, there is an increase in student learning outcomes. This is also in line with the provisions that have been used as a reference in determining the category of learning outcomes obtained by students that if the N-gain obtained is less than 0.3 then it is categorized as low if the result is greater than 0.7 then it can be categorized as high and if score less than 0.7 is categorized as moderate. The learning outcomes that have

been accumulated after implementing the E-LKPD are included in the medium category, namely getting an N-gain of 0.61, which means that the E-LKPD is feasible to use to assist the learning process. This is in line with the research conducted by (Suharsono & Handayani, 2022) which states that there is an increase in student learning outcomes by applying LKPD with live worksheets during online learning with the percentage obtained, which was originally 81% to 92%.

CONCLUSION

Based on research that has been conducted at the Islamic Senior High School Az-zahrah Palembang, the results show that the development of E-LKPD using live worksheets produces valid, practical and effective E-LKPD. The results that have been obtained are that the validity of the E-LKPD is tested in terms of material, design and language which gets an average percentage of 86.66%. Likewise, the practicality of the E-LKPD which was carried out at the one to one and small group test stage for students showed that the E-LKPD got an average percentage of 84.76 with a very practical category. LKPD can provide effectiveness on student learning outcomes, especially biology subjects for class XI SMA, the coordination system material has increased.

It can be seen from the average learning outcomes during the initial test and the final test, namely the initial test of 59.8% and the final test of 84.6% which indicates an increase from before the implementation of E-LKPD in learning activities, participant learning outcomes students can be categorized as moderate with an N-gain value of 0.61. Based on the data obtained from the research activities described above, the development of E-LKPD using live worksheets in biology class XI SMA has indeed been tested for its validity, practicality and effectiveness of student learning outcomes after using the E-LKPD which has been developed in learning activities. .

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