Jurnal Pendidikan Geografi

Vol. 10 No. 2, 2023
https://ppjp.ulm.ac.id/journal/index.php/jpg

Development of Electronic Learner Worksheets with Live worksheets on Lithospheric Dynamics Material for High School Students

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Abstract

This research aims to develop learning products in the form of electronic student worksheets with live worksheets on lithospheric dynamics material in class X at Senior High School which has eligibility standards. The research method used is R&D (Research and Development) research with the ADDIE model which consists of analysis, design, development implementation and evaluation stages. The analysis stage includes performance analysis, needs analysis, curriculum analysis, student analysis. The design stage includes making learning devices, product design, and preparing research instruments. The development stage is determining the media used, validation, and revision. The implementation stage is the stage of implementing the E-LKPD that has been developed in a real situation in the classroom. The final stage is the evaluation stage which is carried out to analyze errors during data collection and can be done in each of the four stages above. This research was conducted at Senior High School Number 1 Jember with the research trial subjects were students of class X5 as many as 36 students. The research instruments used were validation sheets and student response questionnaires. The results showed that electronic student worksheets with live worksheets were feasible with a percentage achievement of 97.5% in the material aspect, 95.8% in the design aspect, 100% in the language aspect and 88%. overall assessment by geography learning practitioners. The implementation of the E-LKPD trial required 2x meetings or 4 x 45 minutes of class time on January 11 and 18, 2022. The results of student responses get very good criteria with an average percentage of 91.2%. From these data it can be concluded that the products developed are declared feasible and very good for use in learning geography, especially in high school lithospheric dynamics material.

Keywords: live worksheets, lithospheric dynamics, high school

DOI: 10.20527/jpg.v10i2.15826
Received: 10 July 2023**; Accepted:** 27 September 2023**; Published:** 28 September 2023
How to cite: Palupi, D. A. T., Kantun, S., Nurdin, E. A., Wahyudi S. A. (2023). Development of Electronic Learner Worksheets with Live worksheets on Lithospheric Dynamics Material for High School Students. *JPG (Jurnal Pendidikan Geografi)*, Vol. 10 No. 2. http://dx.doi.org/10.20527/jpg.v10i2.15826
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1. Introduction

The 21st century brought the rapid development of Science and Technology (IPTEK) which resulted in a change in the learning paradigm that prioritizes the interaction process that involves students actively and integrates technology. This makes teachers have to keep up with technological developments so that they can continue to innovate in learning in accordance with the times, including the use of digital-based teaching materials. Digital-based teaching materials such as Lembar Kerja Peserta Didik berbasis Elektronik (E-LKPD) are very suitable for the development of learning situations at this time where students are able and happy to operate electronic devices. In line with the opinion (Nida et al., 2021) that the use of technology-based teaching materials is very possible to use for students using laptops or smartphones.

Rahayu et al. (2021) mention that the use of E-LKPD can build conceptual knowledge in students and make learning not boring because it contains images, videos, text and interestingly designed questions. E-LKPD can be used as a means to make it easier for students to understand the material, especially in subjects or materials that are considered boring (Firtsanianta et al., 2019). This makes E-LKPD can be used in geography subjects where geography learning is known as learning that contains material in the form of memorization that seems boring for students. Geography according to Suprato (2016) is a social science that studies the location and differences or similarities in the spatial context of phenomena that occur on the earth's surface, both physical and social. Geography is often called the science of synthesis because its learning is quite extensive and forms a system of interactions (Lasaiba, 2022). One of the geography learning materials that has many sub-themes, with a broad object of study of lithospheric dynamics.

Making electronic student worksheet teaching materials certainly requires teacher creativity in designing worksheets to be interesting and interactive with the use of technology. This makes many schools still choose to use printed LKPD which is considered easier to make, including at Senior High School Number 1 Jember, especially in geography class X subjects.

Based on the results of interviews with geography teachers, the worksheets used are still in the form of sheets containing questions. The printed worksheets often make students bored and are considered less effective to use at this time especially the learning system at Senior High School Number 1 Jember currently using smartphones. The use of E-LKPD is also considered very suitable for learning at Senior High School Number 1 Jember where student learning tools and resources cannot be separated from the use of laptops, tablets and smartphones. E-LKPD itself has various advantages that can support the learning process. The advantages of E-LKPD are practical, easy to use, more interesting learning, can contain material, learning videos, audio, varied learning evaluations, and facilitate the collection of tasks (Lestari, 2022).

Based on the percentage results of filling out a questionnaire on the needs of electronic student worksheets (E-LKPD) conducted on December 6-8, 2022 with 211 student respondents, namely in classes X1 - X6, 40.44% really need, 56.95% of students feel they need, 2.37% less need and 0.24% do not need. Based on these percentages, it shows that students at the research location on average need E-LKPD developed by researchers, especially on lithospheric dynamics material.

E-LKPD must fulfill the principle of attractiveness so that students are motivated to learn the material presented (Ginanjar, 2020). Interesting E-LKPDs can be seen from typography (font and arrangement), the use of media in the form of images, videos or

films, colors, animations and layouts (Directorate of High School Development, 2010). One of the learning applications that can be used in making E-LKPD more interactive and interesting in geography subjects is live worksheets. Live worksheets is a web-based application that provides services for educators or teachers in making interactive E-LKPD online (Suhendra, 2021). Live worksheets make it easy to make printed E-LKPDs interactive so that they encourage students to be active and not boring (Fauzi et al., 2021). Live worksheets also make it easy for students to work on various projects and questions to learning evaluation activities without the need to download or register on the live worksheets website (Sinuraya & Frisnoiry, 2022).

The research developed by researchers has differences with previous research, namely: (1) The type of model used in the research. Researchers in developing E-LKPD with live worksheets applications use the ADDIE model which has 5 stages, namely: analysis, design, development, implementation, and evaluation. While previous studies used different models including the development research of Nianti et al., (2022), Cholifah & Novita (2022) and Syahputri et al. (2023) conducted with the 4D model, Rahmawati & Zaini's research (2022) used a formative evaluation design development model with EDR (Educational Design Research) research type, and Wati et al.'s research (2021) used the Rowntree development model with planning, development and assessment steps. (2) differences in learning materials, where the subjects in previous researchers were related to science subjects while in this study they were geography subjects, (3) research objects, (4) curriculum used. This study aims to assess the feasibility and to determine student responses to E-LKPD with live worksheets on lithospheric dynamics material for high school students being developed.

2. Method

This research uses the ADDIE model which consists of 5 stages, namely Analysis, Design, Development, Implementation, Evaluation (Cahyadi, 2019). The choice of using the ADDIE development model in this study is because this model has regular and systematic stages. The analysis stage has 4 analysis activities, namely performance analysis, needs analysis, material procedure analysis, learning objectives analysis. The design stage includes several teaching material development plans which include designing learning tools, designing product designs, and preparing research instruments.

The resulting product design design is a researcher's initial product in the form of a student worksheet which contains: (1) cover page, (2) basic competencies, learning objectives, learning achievement indicators and work instructions, (3) material summary, (4) learning activities in which there are practice questions and instructions and activity steps, (5) bibliography. The development stage is a stage that aims to produce electronic learner worksheets with live worksheets that are suitable for use with stages including determining the media used, the stages of expert validation and revision in accordance with the suggestions or input of experts validation of electronic learner worksheets (E-LKPD) was carried out by 3 lecturers of Geography Education University of Jember and 1 practitioner of geography learning in Senior High School Number 1 Jember. The validation was carried out using an instrument in the form of a validation sheet for the feasibility of material content, design and language. Calculation of validation scores using the formula (Akbar, 2013) as follows:

$$V - ah = \frac{TSe}{TSh} x\ 100\% \quad (1)$$

Description:
V-ah = Expert Validation
Tse = Total Emprical Score of Validator
Tsh = Total Maximum Score

The calculation results that have been known to the average percentage will be made in accordance with the validation criteria (Akbar, 2013) as follows:

Table 1. Validation score criteria

Score	Validity Level
85,01 % - 100%	Very Good, can be used without revision
70,01% - 85%	Appropriate, can be used but needs minor revisions
50,01 % - 70%	Inappropriate, recommended not to be used because it needs major revisions
01,00% - 50%	Inappropriate, or should not be used

Source: (Akbar, 2013)

The implementation stage is the implementation or testing of the E-LKPD that has been developed in a real situation in the classroom. The trial target in this study used Purposive sampling area method, namely X5 class students consisting of 36 students. The trial was conducted to determine students' responses to the E-LKPD that had been developed. In addition, the trial was conducted to check whether the E-LKPD developed could be read, done and completed according to the plan.

Data from the trial results that have been carried out are analyzed using a Likert scale. Likert scale is used in analyzing students' responses to measure students' opinions on the E-LKPD that has been tested. The Likert scale in this student response questionnaire is guided by (Andriani et al., 2021), which is as follows:

Table 2. Student Response Assesment Score

Score	Information
4	Very good
3	Good
2	Less good
1	Not good

The data obtained will then be processed to obtain the value of the questionnaire results on E-LKPD using live worksheets. The calculation of the questionnaire results uses the following formula:

$$P = \frac{F}{N} X\ 100\% \quad (2)$$

Description:
P = Percentage
F = Number of rater scores
N = Total maximum score

After the questionnaire results obtained are calculated and the percentage, then it is concluded using the criteria presented in the following table:

Table 3. Category of Student Response Questionnaire Score

Percentage	Information
81 % - 100%	Very good
61% - 85%	Good
41 % - 60%	Fair
21% - 40%	Deficient
<21%	Very Poor

The evaluation stage is carried out to analyze errors during data collection which can be done at each of the four stages above.

3. Results and Discussion

A. Analyze Stage

The first stage is analyze. This stage has 4 analyses, namely performance analysis, needs analysis, curriculum analysis, student analysis. Performance analysis shows that the research site was chosen on the grounds that the school has not implemented E-LKPD with live worksheets application, especially in geography subjects. Needs analysis was conducted by filling out a questionnaire by X1-X2 class students as many as 211 students. The following are the results of the E-LKPD needs analysis data acquisition

Table 4. E-LKPD Needs Analysis Questionnaire Results

Student Needs Analysis Questionnaire	**Voter Percentage**			
	No Need	**Less Need**	**Need**	**Very Need**
Do you need an LKPD that contains practice questions to improve understanding of lithospheric dynamics material?	0.47%	2.37%	64.45%	32.70%
Do you need electronic LKPD (E-LKPD) with the use of smartphones in lithospheric dynamics material?	0.47%	1.42%	61.14%	36.97%
Do you need electronic LKPD (E-LKPD) that is easy to use in learning?	0.00%	2.37%	55.92%	41.71%
Do you need (E-LKPD) presented in clear and concise sentences through smartphone media on lithospheric dynamics material?	0.47%	2.37%	56.40%	40.76%
Do you need (E-LKPD) that contains images to visualize lithospheric dynamics material?	0.00%	1.42%	53.55%	45.02%
Do you need (E-LKPD) that contains videos to visualize lithospheric dynamics material?	0.00%	4.27%	50.24%	45.50%
Total Percentage	**0.24%**	**2.37%**	**56.95%**	**40.44%**

Source: Data Processing, (2023)

The percentage results from filling out the student needs questionnaire show the highest total of 56.95% which shows that students at the research location, precisely at

Senior High School Number 1 Jember, need electronic LKPD developed by researchers. The analysis of material procedures is the preparation of learning outcomes (CP) or competencies that must be possessed by students in class X or what is called phase E. The last step in the analysis stage in this study is the analysis of learning objectives. The learning objectives to be achieved are the ability to explain and analyze the characteristics of the earth's layers and the ability to identify rocks that form the earth's skin and their uses.

B. Design Stage

The design stage includes several teaching material development plans which include designing learning devices, designing product designs, and preparing research instruments. The stages of designing learning devices are designing all the components needed in learning. Researchers designed learning devices including; flow of learning objectives (ATP) and teaching modules (MA) of lithospheric dynamics class X Phase E. Stages of designing products that are developed, namely LKPD (Learner Worksheet) on lithospheric dynamics material in order to get a valid LKPD. Researchers design LKPD using the canva application which will then be uploaded to liveworksheet.com so that it becomes an interactive or electronic LKPD.

The design of the LKPD content design includes:

- Cover Page (Material Title)
- Page 2 contains basic competencies, learning objectives, learning achievement indicators and work instructions.
- Page 3 learning material
- Pages 4 to 8 learning activities in which there are practice questions as well as instructions and activity steps
- Page 9 there is a bibliography

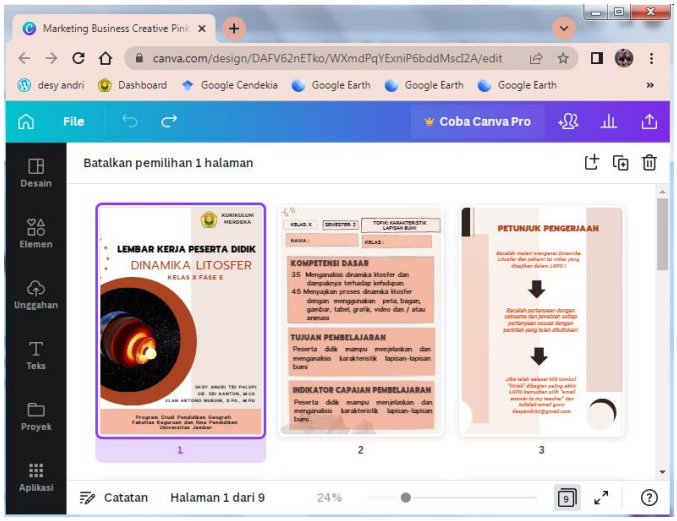

Figure 1. Preparation of LKPD Design 1

The preparation of instruments from this study is in the form of preparing a validation sheet consisting of; (1) material expert validation sheet, (2) design expert validation sheet, (3) language expert validation sheet, and geography learning practitioner validation sheet In addition, at this stage the researchers also compiled a student response questionnaire sheet.

C. Development Stage

The development stage is determining the media used, validation, and revision. At the media determination stage, researchers used live worksheets as a provider for making interactive LKPD. The process after designing the LKPD in the canva application, then uploaded to the liveworksheets.com website so that it becomes an electronic LKPD that can be accessed by all students. In addition, live worksheets also provides a feature of adding learning videos connected to the YouTube application so that students can open and view these learning videos in the LKPD easily. An overview of the process of uploading and adding learning videos can be seen in the following figure:

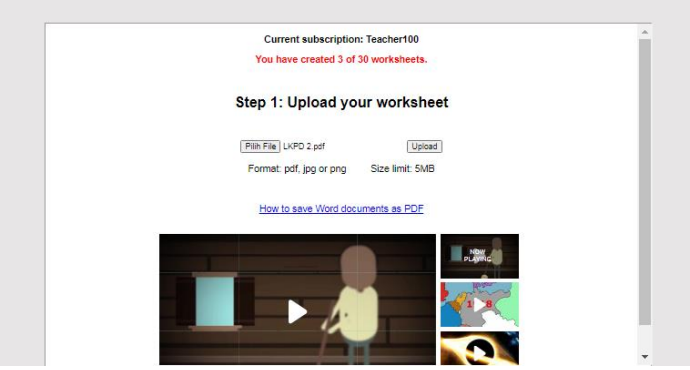

Figure 2. Uploading Pdf Files into liveworksheets.com

After uploading the LKPD to the live worksheets site, then editing the LKPD that has been uploaded to be interactive by using the features provided on live worksheets. . At this stage, videos are also added in the LKPD to make it more interesting and also to make it easier for students to understand the material before working on practice questions.

Figure 3. Addition of Video in LKPD

The developed product was validated by 4 validators, namely 3 lecturers of Geography Education University of Jember and 1 practitioner of geography learning SMAN 1 Jember. The validation was carried out using an instrument in the form of a validation sheet for the feasibility of material content, design and language. The validation results are as follows:

The results of validation from the material / content aspect obtained very good results with a score of 90% which was classified as very feasible and could be tested, but the assessment results from the validator showed that it still needed revision before being tested. After making revisions according to the validator's suggestions, continued with phase II validation. The validation value obtained was 97.5% The validator's assessment at stage II showed that the E-LKPD developed was very feasible and could be tested. Validation of the design aspect was carried out in 2 stages because at the first stage there were suggestions for improvement / comments from the validator so that revisions needed to be made and revalidated. The percentage of the results of stage I validation amounted to 91.6%). This percentage shows that the design expert's assessment is classified as very feasible, but there are still errors that need to be corrected or revised. After making improvements, proceed to stage II validation. Phase II validation obtained an assessment of 95.8%. This value based on decision making according to (Akbar, 2013) shows that the design expert's assessment is classified as very feasible and can be tested.

The validation results from the language aspect at stage I obtained an assessment of 96.4%. This value indicates that the E-LKPD language developed is very feasible, but in the assessment of linguist validators there are still some suggestions for improvement, namely there are 3 components that must be corrected, namely in chemical writing, writing foreign terms, and paragraph improvement. Phase II validation was continued after product revision. In stage II language validation obtained a percentage of 100% which means that the E-LKPD developed is very feasible to be tested. The last validation result is validation from learning practitioners from various aspects of both material, design, and language. Assessment of student worksheets by geography learning practitioners or geography subject teachers gets very good results with a value of 88% which is classified as very feasible. The assessment of the geography learning practitioner validator shows there are no errors so it can be concluded that the electronic student worksheet (E-LKPD) developed by the researcher is feasible and can proceed to the trial stage without any revisions.

D. Implementation Stage

The implementation stage is the stage of implementing the E-LKPD that has been developed in real situations in the classroom by giving questionnaires to students to get students' opinions and responses to E-LKPD with live worksheets that have been made. The test subjects in this study were students of class X5 at Senior High School Number 1 Jember consisting of 36 students. Data collection of student responses was conducted after students completed learning activities using E-LKPD. The following is a recapitulation of student responses to the use of electronic learner worksheets (E-LKPD) with live worksheets on lithospheric dynamics material:

Table 5. Results of Student Response Class X5 in Senior High School Number 1 Jember

Indicator	Percentage
The use of E-LKPD with live worksheets is easy to access	91,6%
Ease of operation of E-LKPD with live worksheets	90,2%
The E-LKPD displayed on the lithospheric dynamics material is interesting	91,6%
E-LKPD on the material of the dynamics of the lithosphere makes me more enthusiastic in learning geography	89,5%
The use of this E-LKPD makes learning geography not boring.	93%
I like this electronic LKPD with live worksheets more than printed LKPDs.	88,1%
The presentation of the material is coherent	88,1%
The presentation of the material is clear and complete	89,5%
The practice questions given are varied and in accordance with the learning objectives	90,2%
E-LKPD is equipped with learning videos that make me better understand the material	91,6%
Lalyout (layout) is neat	91,6%
Color composition and attractive appearance	93,75%
The sentences and paragraphs used are clear and easy to understand	92,3%
The letters used are simple and easy to read	93%
The grammar used is communicative	94,4%
Average score	**91,2%**
Classification	**Very Good**

Source: Data Processing, (2023)

The results of the student response trial stated that the students' assessment of the E-LKPD with live worksheets was very good. The most prominent assessment in the student response questionnaire is the indicator of color composition and attractive appearance and the indicator of communicative grammar used. This means that the appearance of E-LKPD with live worksheets is made with an attractive design, and the language used is easily understood by students so that it makes learning not boring and makes it easier for students to understand the material. In accordance with the opinion of Eliana et al. (2021) interactive LKPD with live worksheets, students can easily learn the concept of material and research by Pawestri & Zulfiati (2020) that LKPD that is suitable for use in learning is LKPD that is interesting and makes it easier for students to understand the material. This is also supported by the results of interviews with several students as follows:

"The LKPD is very interesting and very exciting to learn, the material explained is very clear and detailed. I am very helped by the LKPD I understand what the lithosphere is..." (A, 16 years old)

"It is very easy to understand this lithospheric dynamics material using LKPD, the material is in order and the layout is appropriate so there is no confusion in

understanding the material. the display is also good, colorful, and cool. I can do the questions by moving the answers from the questions and I really like that and the questions can be typed directly so I don't need to write on paper anymore" (R, 15 years old).

The assessment of one geography learning practitioner or geography teacher sees students' responses during learning using E-LKPD with live worksheets, namely:

"It can be seen from the learning that students' responses are very good and foster interest in learning and curiosity about lithospheric phenomena. This E-LKPD is very helpful and can be applied to other geography topics" (S, 44 years old).

This shows that the E-LKPD with live worksheets being developed by researchers is very interesting and exciting, and makes it easy for students to understand the material on lithospheric dynamics. There are 2 problems complained about by students during the trial process, namely, the first is that the answer writing on the essay questions in the E-LKPD is too small so that when answering questions it needs to be zoomed in first. The second problem is internet access which is often slow when using school wifi so that many students choose to use their personal data packages. The problems that arise during the E-LKPD trial can be used as a separate evaluation material by researchers in developing E-LKPD or other teaching materials in the next research, namely by paying attention to the size of the letters displayed small and ensuring that the school where E-LKPD is applied in learning has adequate wifi facilities so that students do not experience difficulties when accessing E-LKPD provided by the teacher.

4. Conclusion

The results of this study concluded that electronic student worksheets with live worksheets on lithospheric dynamics material were declared feasible from the assessment results of expert validators. Material expert validators gave a percentage assessment of 97.5%, design expert validators 95.8%, language expert validators 100%, and learning practitioner validators 88%. The assessment obtained from the validators falls into the category of very feasible Electronic student worksheets with live worksheets on lithospheric dynamics material also get very good responses from students. Based on the recapitulation of student response results, it shows that the students' assessment of the E-LKPD is very good with an average acquisition of 91.2%.

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