Development of Educational Game-Based Student Worksheets on Reproductive System Materials to Improve Student Interest and Learning Outcomes

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Article Info	Abstract
	Learning media is an important thing that plays a very important role in the learning process in the classroom. Based on the results of the interview, it is known that the learning media at SMA N 1 Kendal still uses limited sources, namely package books and Student Worksheets which are still conventional. The speaker mentioned that one of the materials that were considered difficult was the Reproductive System material. The development of educational game-based Student Worksheets (LKPD) is needed to overcome problems that arise. This study aims to determine the validity of LKPD media and the effectiveness of using educational game-based LKPD on Reproductive System material in increasing student interest and learning outcomes. The research was designed with 4D research methods: define, design, develop, and disseminate. The research design used is a one-group pretest-posttest design. The sampling technique uses the purposive sampling method. The validity of the LKPD developed gets very feasible criteria for use for learning media on the Reproductive System material. The results of LKPD validation obtained a percentage of 89.85% from media experts, and 97.5% from material experts, both of whom are in the very decent category. Validation results by students obtained a percentage of 81.47% with the category of very decent. Analysis of learning outcomes obtained an N-gain score of 74.75% with medium and high categories and for classical completion, students obtained results of 85.04%. Based on the results of research and data analysis that has been carried out, it was concluded that LKPD based on educational games on the Reproductive System material is suitable for use as a learning medium and is effective in increasing student interest and learning outcomes at SMA Negeri 1 Kendal.

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INTRODUCTION

Learning media is an important thing that plays a very important role in the learning process in the classroom. Mustaqim (2016) defines learning media as something that bridges educators and learners in learning that can connect, provide information, and channel messages so that an effective and efficient learning process will be created. Given the many forms and kinds of learning media, teachers are required to be able to choose learning media carefully, so that they will be used appropriately (Kustandi & Sucipto, 2011).

In the implementation of biology learning in high school, there are often problems that will eventually have an impact on the results and implementation. According to Mulyani (2013) material that is difficult for students to understand is material related to physiological concepts that cannot be sensed. Yasin (2017) added that the lack of learning media that can support teaching Biology content cannot be sensed directly. One of the materials in the subject of Biology is the Human Reproductive System. The concepts studied in the Human Reproductive System material include concepts that are concrete and cannot be sensed.

Based on the results of an interview with one of the teachers who teach Biology subjects at SMA Negeri 1 Kendal, it is said that the learning media used in teaching Biology material is still lacking. One of the biological materials that are considered difficult is the Reproductive System material. The resource person said that for learning about the Reproductive System, they still use package books and LKS which are still presented simply and conventionally. Reproductive System material learning has never previously used educational games. For this reason, researchers developed educational game-based LKPD learning media on reproductive system material.

The resource person also mentioned that students have difficulty learning the Reproductive System material. The difficulties found are due to the following: complex material, not much learning time, and difficulty practicing like biology material in general. In addition, the Reproductive System material cannot be sensed directly and can only be seen as the results. The small amount of learning time also results in the material being difficult for students to understand. In addition, in the previous year, only 72.22% of students exceeded KKM during the daily test of the Reproductive System material.

The development of a new learning medium needs to be carried out. It is hoped that the development of new learning media can help in increasing student interest and learning outcomes. In this case, the learning media developed is a Student Worksheet based on educational games on the Reproductive System material. The created Student Worksheets come with several educational games that can be accessed using a mobile phone. By being equipped with games, it is hoped that it will be able to increase students' interest in learning. The increasing interest in student learning is further expected to improve student cognitive learning outcomes.

The development of educational game-based Student Worksheets (LKPD) is needed to overcome problems that arise. This study aims to determine the validity of LKPD media and the effectiveness of using educational game-based LKPD on Reproductive System material in increasing student interest and learning outcomes.

RESEARCH METHODS

This research was conducted at SMA Negeri 1 Kendal in the Even Semester of the 2021/2022 academic year. The type of research is development research (4D). The study subjects were selected using purposive sampling techniques with a one-group pretest-posttest design research method. The method of data collection is by conducting interviews, filling out questionnaires, tests, and documentation. The feasibility of

the LKPD is taken from the validation of media experts, the validation of material experts, and the questionnaire of student responses. The increase in interest in learning is known by filling out a questionnaire to then calculate the percentage. Improved learning outcomes are obtained by providing pretest and posttest questions. The results of the pretest and posttest were analyzed using N-Gain and the student's classical completeness.

RESULT AND DISCUSSION

The results obtained in this study are the validity of LKPD media and the effectiveness of the use of educational game-based LKPD media on reproductive system material in increasing student interest and learning outcomes.

Eligibility LKPD

The feasibility of LKPD is assessed by media experts and material experts supported by the results of student questionnaires. Analysis of the final results of LKPD feasibility by media experts and material experts can be seen in Table 1.

Table 1. Analysis of LKPD Feasibility Final Results by Media Experts and Material Experts

Validators	Assessed aspects	Percentage (%)	Kriteria Kelayakan
Media Expert	LKPD Size	100	Very Worthy
	LKPD cover layout	91.67	Very Worthy
	LKPD cover typography	87.5	Very Worthy
	LKPD content layout	87.5	Very Worthy
	Typography contents of LKPD	91.67	Very Worthy
	The image on LKPD contents	75	Worthy
	Average	89.58	Very Worthy
Material Expert	Dimensions of knowledge	87.5	Very Worthy
	Linguistics	100	Very Worthy
	Serving technique	100	Very Worthy
	Completeness of presentation	100	Very Worthy
	Average	97.5	Very Worthy

Based on the assessment of media experts, the LKPD developed obtained validation results with very worthy criteria and validation from material experts obtained validation with very worthy criteria. This means that the LKPD media developed is suitable for use as a learning medium.

The student response questionnaire was filled out by 107 respondents. The learner response questionnaire consists of 10 statements. Analysis of the results of the questionnaire of student responses can be seen in Table 2.

Table 2. Analysis of LKPD Feasibility Final Results by Learners

No.	Statement	Percentage (%)	Category
1.	The appearance of this LKPD is very attractive	78.73	Worthy
2.	This LKPD makes me more excited about learning Biology	79.43	Worthy
3.	Images/photos can attract me to study the material	82	Very Worthy
4.	The presentation of material presented in the LKPD is presented systematically	81.77	Very Worthy
5.	The delivery of material in this LKPD is related to daily life	79.90	Worthy
6.	This LKPD is equipped with photos/ images supporting the material	85.51	Very Worthy
7.	There is a table of contents that contains chapter titles, sub-chapters, and LKPD lists to make it easier to find and understand the contents of LKPD	81.54	Very Worthy
8.	The language used in this LKPD makes it easier for me to understand its contents	81.30	Very Worthy
9.	This LKPD was not found to be a lot of typos or miswriting	78.97	Worthy
10.	The letters used are clear and easy to read	85.51	Very Worthy
	Total	81.47	Very Worthy

Of the 10 points of statements in the questionnaire of student responses to the LKPD media that were developed, there were 2 category results, namely worthy and very worthy. Categories are worthy of statements items number 1, 2, 5, and 9. While those that fall into the category are very worthy, namely numbers 3, 4, 6, 7, 8, and 10. The average percentage of student response questionnaires falls into the category of highly decent. This means that the LKPD media developed is suitable for use as a learning medium.

Media eligibility is taken from expert validation and student response questionnaires. Based on the feasibility results obtained, including validation of media experts, validation of material experts, and questionnaires of student responses, the LKPD media developed is suitable for use as a learning medium.

Interest in Learning

The LKPD media developed was then tested to determine the increase in interest in learning in students. The results of the analysis of learning interest are obtained from filling out questionnaires by students. Students' interest in learning is seen from several indicators, including interest in learning, attention in learning, feelings of pleasure, involvement in studying, diligent study and diligently doing tasks, as well as being diligent and disciplined in studying and having a study schedule. The results of students' interest in learning can be seen from each indicator can be seen in Table 3.

Table 3. Results of the Percentage of Learning Interest Questionnaire

Learning Interest Indicators	Percentage (%)	Category
Interest in learning	81.73	Very Good
Attention in learning	77.15	Good
Feelings of pleasure	81.48	Very Good
Involvement in learning	78.15	Good
Study hard and diligently do tasks	73.91	Good
Persevere and discipline in learning and have a learning schedule	80.78	Very Good
Average	78.87	Good

The indicator of interest in learning belongs to the category of very good. Slameto (2010) mentioned that interest in learning is interpreted if a person is interested in a lesson, he will have a feeling of interest in the lesson, which in this case is to have an interest in learning Biology lessons. In the indicator of interest in learning, as many as 18.27% of students do not have an interest in learning using the developed LKPD media. Students feel bored when learning using LKPD, students do not focus on learning, and students feel burdened by the material presented. Students feel bored, unfocused during learning, and feel burdened with the material presented making students have no interest in learning.

The indicator of attention in learning belongs to the category of good. As many as 22.85% of students still have low interest in learning indicators of attention in learning. Students with low attention in learning tend to learn only at the time of learning and are sleepy when the teacher explains the material. Students only learn while in the classroom indicating that students do not have the will to learn. In the study, Firdaus (2019) mentioned that most of the students' learning attention is greatly influenced by feelings and moods determined by willpower. Drowsiness in the classroom during learning indicates that students are not concentrating in the classroom. According to Slameto (2010) in Nurhasanah (2016), attention is the concentration or activity of a person's soul towards observation, understanding, or others by leaving aside anything other than that.

In the indicator of feelings of pleasure, students obtained questionnaire results that are included in the very good category. According to Rojabiyah and Setiawan (2019) interest in learning is an activity carried out by a person in the learning process permanently with a feeling of pleasure without any coercion from others. According to Hanipa et al. (2019), with a feeling of pleasure, students will not feel compelled to participate in teaching and learning activities if students have a feeling of pleasure in what they are learning.

As many as 18.52% of students have a low interest in learning on the indicator of feelings of pleasure. Students consider learning using the developed LKPD to be unpleasant and students do not understand the material presented. Students who do not have a feeling of pleasure mean that they do not like the material being taught and will not strive to understand it. This is in line with research conducted by Firdaus (2019) which revealed that students who have a high interest in learning activities will try hard in learning, compared to students who are less interested in learning.

The percentage of the indicator of involvement in learning is included in the good category. As many as 21.85% of students feel that they are not actively involved in learning and are lazy to take notes. This makes student involvement in learning low. According to Simbolon (2014), engagement is the will, tenacity, and hard work that students show that shows that students are engaged in learning. Students who are engaged in learning will always be active in learning, trying to find and look for things related to the lessons delivered by the teacher. Involvement in learning can be seen from the activeness during the learning process. Slameto (2010: 180) in Sholehah et al. (2018) mention that if a student realizes that learning is a tool to achieve some goals that he considers important and if the student sees that the results of his learning experience will bring progress to him, he will most likely be interested (and motivated) to learn it.

Indicators of diligent study and diligent work on tasks only obtained a percentage with good categories. As many as 26.09% of students have a low interest in studying hard-to-study indicators and diligently working on assignments. Students are reluctant to do reproductive system material assignments because they are complicated and only choose simple reproductive system questions. This is contrary to Purwanto's opinion (Fatimah et al., 2019) which reveals that students who have an interest will have the drive to do things vigorously and better. A total of 26.09% of students showed less diligence in studying and less diligent in doing reproductive system material tasks.

Indicators of perseverance and discipline in learning and having a study schedule obtain results that fall into the category of very good. As many as 19.22% of students have a low interest in learning when

viewed from indicators of perseverance and discipline in studying and having a study schedule. Students quibble in handing over assignments and are not on time in meeting the study schedule. Sucipto's research (2021) revealed that this attitude shows that students are less diligent and disciplined in studying and have a study schedule.

Of the six indicators of interest in learning, the average percentage was 78.87% or included in the good category. This means that the use of educational game-based LKPD media in learning Biology System materials is said to be successful or influential in increasing students' interest in learning.

Each student's interest in learning is also seen to find out the spread of students' interest in learning in each category. Students' interest in learning in each category can be seen in Table 4.

Table 4. Student Learning Interest Outcome

No.	Category	Total Students
1.	Very Good	46
2.	Good	44
3.	Enough	15
4.	Not Good	1
5.	Not Very Good	1
	Total	107

The data shown in Table 4 is the number of students in each category of interest in learning. Students who have a very good interest in learning as many as 46 students or as much as 43% of the total research sample, students with an interest in learning in the good category as many as 44 students or as much as 41% of the total research sample, students with an interest in learning in enough category as many as 15 students or as much as 14% of the total research sample, and as many as 1 students in the category of learning interest is not good and not very good or as much as 1% of the total research sample.

Some of the things that cause students to have enough, not good, and very not good interest in learning are that students do not open devices according to the direction and do not participate in group discussions. This can be overcome by educators paying more attention when students are asked to open the device, according to whether it is directed or not.

Learning Outcomes

The LKPD media developed was then tested to determine the improvement of student learning outcomes. Student learning outcomes (cognitive) were measured using pretest and posttest questions. The effectiveness of the use of LKPD in the learning process on student learning outcomes is seen from the N-Gain and the completeness of student learning outcomes. LKPD will be considered effective if the N-Gain score is > 0.3 and a minimum of 75% for the completion of students' classical learning outcomes. The completeness of students' classical learning outcomes is seen from the student's post-test scores, where the minimum number of completed students is 75% of the number of students in the research sample with the Minimum Completion Criteria for Biology subjects of 70.

The questions tested consisted of 25 multiple-choice questions. The improvement of student learning outcomes is seen from the N-Gain score and the student's classical completion. The improvement in student learning outcomes is seen from the N-Gain score obtained in Table 5.

Table 5. Student N-Gain Score Spread

No.	N-Gain Category	Percentage (%)
1.	Low	25,23
2.	Medium	45,79
3.	High	28,97
	Total	100

Table 5 shows the distribution of students' N-gain scores, as many as 25.23% of students obtained a low N-Gain score, 45.79% in the medium N-Gain category, and the high N-Gain category as much 28.97%. A total of 80 students obtained an N-Gain score of ≤ 0.30 or 74.76% of the use of LKPD affecting the improvement of student learning outcomes.

Learning is said to be successful also seen from the completeness of students' classical values. The completion of students' classical scores is seen from how many students obtained ≥ 70, with the percentage of students' classical score completion at least 75%. The results of the students' classical completion can be seen in Table 6.

Table 6. Percentage of Students' Classical Completion

No.	Complete Category	Percentage (%)
1.	Finished	85
2.	Not Finished	15
	Total	100

From Tabe 6, the percentage of classical completion of students was 85.05% or as many as 91 students from a total of 107 research samples obtained a posttest score of ≥70. From the results of the study, there are still 16 students, or about 15% of students who do not complete KKM. The indicator of research success is seen from the percentage of classical completion, which is 75%. Therefore, with the percentage of classical completion obtained, the LKPD media developed is said to be effective in improving student learning outcomes.

The Effect of Learning Interest on Learning Outcomes

The student's interest in learning will further affect student learning outcomes. Research by Nurhasanah and Sobandi (2016) stated that the higher the student interest, the higher the student learning outcomes, and vice versa. If the interest in learning decreases, then learning outcomes will also decrease. Astuti (2015) in his research revealed that if a person is not interested in learning something, then it is not expected that the person is successful in learning something.

Interests and learning outcomes are one or two things that influence each other. The more interested a person is, the more knowledge gained will be. That way, the learning outcomes obtained will also be higher. This is the statement of Laa et al. (2017) which states that interest in learning is one of the important factors that can influence students in the learning process. Interest in learning is an elementary factor that can affect the level of students' understanding of the teaching materials presented by the teacher and the level of student success in achieving maximum grades at the end of the learning process.

Information Processing Learning Theory and Educational Games

The Learner Worksheet developed is an educational game-based LKPD on the Reproductive System material equipped with games displayed at the end of the learning or as an evaluation. Learning begins by showing videos to stimulate students regarding the Reproductive System material. Learning is continued by explaining the material through ppt broadcasting about the material to be studied. Educational games are carried out at the end of learning as an evaluation. The learning process that has been described is an effort to provide information repeatedly to create long-term memory in students.

Providing information in this case material about the reproductive system is given repeatedly by starting to stimulate students using videos at the beginning of learning, followed by displaying material through PPT, and at the end of working on educational games as an evaluation of learning is an effort to include students' long-term memory. Long-term memory is related to the theory of learning by Gagne (1988) that is, the theory of learning information processing.

The theory of information processing consists of several components, namely the components of information processing and the components of cognitive processes. The information storage component consists of sensory registers, short-term memory, and long-term memory. Components of cognitive processes include attention, perception, retrieval, rehearsal, and encoding (Amamah, 2016).

The occurrence of information processing begins with a stimulus or information that enters the sensory register or through the sensory apparatus (Hitipiew (2009) in Kusaeri et al. (2018)). Learning that begins with displaying a video on an LCD screen will provide a stimulus to students through sensory devices. Students view and listen to the video shown. Furthermore, from the video shown, students will selective attention to the information provided. Students will forget about information that is not given attention and information that is given attention will be passed into short-term memory. These results will then cause perception.

The appearance of the material presented in the PPT in learning is an effort to provide information repeatedly. With the attention given and the iteration of the provision of information, the information that the student gets will be remembered in long-term memory. Kusaeri et al. (2018) revealed that when information is given attention and there is a frequent rehearsal, the information that has been given perception will enter long-term memory.

The information obtained by students after receiving the next material will be strengthened (encoding) by working on educational games at the end of learning. Once in long-term memory, information can be retrieved by asking some questions at the end of the lesson. From the learning process that has been carried out, a response will be obtained in the form of learning outcomes.

CONCLUSION

Based on the results of data analysis and discussion from research conducted on the development of educational game-based LKPD, it is feasible to use it as a learning medium and the application of LKPD to learning Reproductive System material is effective in increasing student interest and learning outcomes at SMA Negeri 1 Kendal.

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