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The Development of Experimental Electronic Student Activity Sheet (E-LKPD) using The Guided Inquiry Learning Model on Blood Circulation System Materials for Class XI SMA/MA

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A B S T R A C T

This e-LKPD research uses a guided inquiry learning model aimed at analyzing the effect of e-LKPD on improving cognitive learning outcomes of high school students on the material of the circulatory system. The study used the One Group Pretest-Posttest design model with the research subjects of class XI MIPA 3. At the beginning of the implementation students were given pretest questions, then students studied e-LKPD using a guided inquiry learning model and were given posttest questions. This e-LKPD was developed using the ADDIE model. This model consists of 5 stages of development, namely the Analyze, Design, Development. Implementation and Evaluation stages. The results of the research on the development of e-LKPD show that: The feasibility value by media experts is very valid 3.76 (94) and the feasibility value of material experts is very valid 3.42 (85.5) and the feasibility value of practitioners is very good 3.79 (94.75). Student and student responses are very practical, the practicality test by students is called trial 1 3.59 (89.75) and trial 2 by students 3.64 (90.78) This shows that e-LKPD using the kvisoft flipbook maker produced in this research This is considered feasible to be used in learning material about the circulatory system. Cognitive learning outcomes of students using e-LKPD development results increased from 30.4 to 90.35 with a high value increase (N-Gain: 0.85).

1. Introduction

Such rapid changes in the world of education and the influence of globalization have consequences in shaping the young generation who are ready to face the challenges of the 21st century. The 21st century is marked by the rapid

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development of science and technology, especially information technology, therefore learning is needed that can prepare students to be science literate. Education is one of the important means that is believed to be able to support the progress of the nation, support future development and produce qualified, skilled and highly competitive human resources, because through education a person is able to increase their potential so that students are able to solve the problems they will face (Hotimah, 2008).

The potential developed through such learning can prepare students to survive in the face of education in the 21st century and future challenges, by managing productive, creative, innovative, and affective learning processes in science learning using the e-LKPD media kvisoft flilpbook maker is a e-learning teaching materials that do not require paper, are reproduced without cost, can be used when and where I am, flexible with time and place, abstract objects become contextual, and can be used online or offline (Syamsiah, 2019). Teaching materials are a collection of learning materials that are systematically arranged according to what is set and allow students to learn. The teaching materials that the researchers mean here are teaching materials that can make students interested and interested in learning, these teaching materials are in the form of electronic student activity sheets (e-LKPD) with the inquiry learning method (National, 2006).

Inquiry is one of the effective ways that can help students improve thinking skills by using higher mental processes and critical thinking skills (Putria, 2019). In learning with inquiry, students in addition to mastering science concepts, are also trained to research and solve a problem or question with existing facts (Astuti, 2013). Based on the results of observations in several schools in Rokan Hulu, it is known that some biology teachers currently rarely develop student activity e-sheets (e-LKPD) in the learning process, teachers only use LKPD from the MGMP that are already available, there are no new innovations that have been developed. implemented in the learning process.

The LKPD used predominantly contains questions and solutions. In addition, practicum is rarely used in biology learning. If biology learning should be done with a practicum, usually the teacher replaces it with a demonstration in front of the class, students are asked to observe without doing it themselves. So that the thinking ability of students cannot develop optimally. In working on the questions, students are often trained only on the ability to remember and understand the material. The ability to apply and analyze is rarely given to students. In fact, this ability can be trained through experiments (practicum) and supported by the appropriate LKPD. Many science teachers believe that practical work can lead students to learn better because they can all understand and remember things better if they do it alone. So it can be concluded that practical activities in the form of practicum can help students better understand the subject matter because they directly try and observe (Millar, 2009).

The schedule or time of the learning process also affects the cognitive learning outcomes of students. Observation results show that SMA Negeri 1 Kabun does not have a fixed schedule of biology practicum activities. When students study in

the morning, students are more concentrated and focused on the teaching and learning process, if the time used is not enough in the learning process, the teacher will move the practicum schedule during the day. When doing practicum during the day, many students are tired because they have been active in the morning so they are no longer interested in the learning process, some even tend to be sleepy, make noise, go in and out of class, tend to avoid being asked questions and answers, and students get bored quickly. in paying attention to the teacher's explanation. As a result, the learning process does not go well.

The difficulty of students in carrying out practicum during covid 19 which is done at home is that they do not have a practicum worksheet, so teaching materials in the form of e-LKPD are needed. The learning process will be able to run well if the teacher has innovation in managing the learning process (Permana, 2017). One of the innovations that can overcome these problems is the creativity of teachers in making and using various learning media that are able to generate motivation and creativity of students independently. Based on the background and symptoms found in the school, researchers are interested in conducting research with the title "Development of an experimental electronic student activity sheet (e-LKPD) using a guided inquiry learning model on the material of the circulatory system for class XI SMA/MA students.

2. Methodology

The type of research used in this research is research and development or commonly abbreviated as R&D. R&D is a research method to develop products or improve products (Suryana, 2015). Based on the opinion of Sanjaya (2014), research and development is the process of developing and validating educational products. The electronic student activity sheet (e-LKPD) was developed using the ADDIE model. This model consists of 5 stages of development, namely the Analyze, Design, Development, Implementation and Evaluation stages (Sugiyono, 2016). After the LKPD developed is valid and feasible to use, the study was carried out at SMA 1 Kabun October 5 to December 30, 2020 in the odd semester of 2020/2021 starting from the analysis, validation and implementation, evaluation stages. The types of data obtained can be concluded including: (1) the results of the validity of the e-LKPD from experts. Content validity was assessed by 3 validators, namely 1 media expert, 2 material experts and 4 practitioner experts. (2) the practicality test and student response questionnaires from the results of Trial 1, distributed response questionnaires to 5 postgraduate students of FKIP Biology at the University of Riau, while for trial 2 the response questionnaire was distributed to 20 students of class XII.MIPA SMA N 1 Kabun.

3. Results and Discussion

This research is a development research, namely the development of experimental student activity sheets (e-LKPD) using a guided inquiry learning model on the material of the circulatory system. This study uses the ADDIE model design

which consists of 5 stages, namely Analysis, Design, Development, Implementation, and Evaluation. This research was carried out in class XI IPA starting from October 05 to December 30, 2020 in the odd semester of 2020/2021 starting from the analysis, validation and implementation, evaluation stages. starting from the e-LKPD validation stage by the validator to the e-LKPD implementation to students. Prior to the implementation stage, the e-LKPD was first validated by content validity which was assessed by 3 validators, namely 1 media expert, 2 material experts and 4 practitioner experts.

The research continued to the LKPD implementation stage, starting with testing (2) practicality tests and student response questionnaires from the results of Trial 1, distributed response questionnaires to 5 postgraduate students of FKIP Biology at the University of Riau, while for trial 2, response questionnaires were distributed to 20 students of class XII. MIPA SMA N 1 Kabun. The allocation of research time in class XI IPA in one week consists of 3 x 45 minutes, where every week there are 2 meetings, namely on Wednesday at 13.50-15.15 WIB and Thursday at 08.45-10.50 WIB. Before applying the student activity sheet (e-LKPD), experiment using a guided inquiry learning model on the material of the circulatory system. First, students do a preetest which consists of 25 questions, which is to test the extent to which students' cognitive learning outcomes before e-LKPD treatment use a guided inquiry learning model. The posttest which consists of 25 questions is to test the extent to which students' cognitive learning outcomes after e-LKPD treatment using the guided inquiry learning model, learning outcomes increase after giving e-LKPD to students, the e-LKPD using the guided inquiry learning model is feasible to use.

Ikhwani (2021) states that e-LKPD is a student work guide to facilitate students in implementing learning activities in electronic form that can be seen on desktop computers, notebooks, smartphones, and mobile phones. Kvisoft flipbook meker is an application for creating e-books, e-lkpd, e-papers and e-magazines, not only in the form of text, with kvisoft flipbook meker can insert images, graphics, sound, links and videos on LKPD (Hidayati, 2012) . Making the display of the e-LKPD using the kvisoft flilpbook maker: The cover page is designed as attractive as possible so that students' attention is paid to studying the developed e-LKPD so that students become more enthusiastic in the learning process (Putria, 2019). The cover contains the logo of the university where research and development is being carried out, the title of the e-LKPD, the name of the subject, class and semester, the image used for the title of the E-LKPD, the year of manufacture, the identity of the author. The cover image can be seen in Figure 1.

Figure 1. Cover of Blood Circulation e-LKPD With Guided Inquiry Model

This learning e-LKPD contains the syntax of 6 stages of guided inquiry learning activities. (1) problem orientation (2) making hypotheses (3) collecting data (4) analyzing data (5) making conclusions (6) doing reflection (Anggriyani, 2013) can be seen in Figure 2.

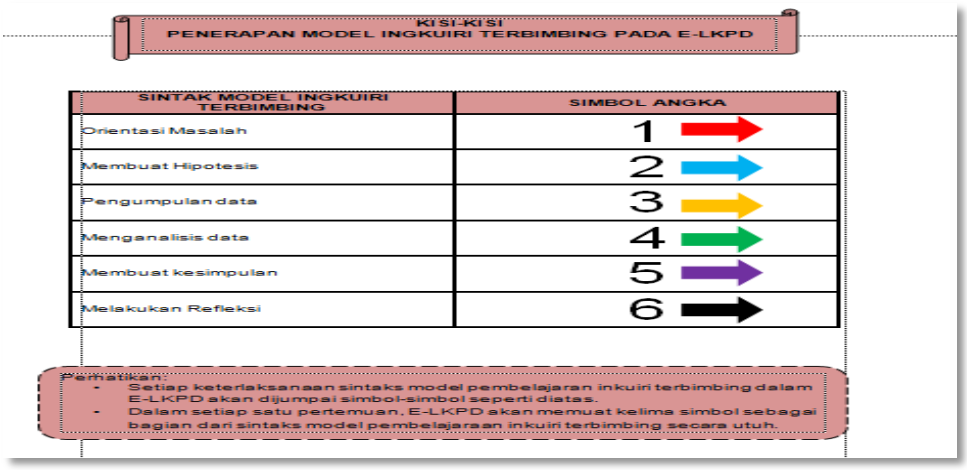

Figure 2. Syntax of e-LKPD Blood Circulation with a Guided Inquiry Model

Problem orientation is (1) The teacher guides the students to identify the problem and write it on the blackboard and the students read the discourse (2) The teacher divides the students into several groups. Making hypotheses are (1) The teacher provides opportunities for students to brainstorm in forming hypotheses (2) The teacher guides students in determining hypotheses relevant to the problem prioritizing hypotheses that will be used as investigations can be seen in Figure 3.

Wacana

Pernahkah kamu bermain sepeda? Saat kamu bersepeda, pernahkah kamu terjatuh lalu terluka? Saat kamu terluka, apakah yang kamu rasakan? Selain rasa sakit, kamu akan melihat ada cairan yang keluar dari bagian tubuh yang terluka. Untuk lebih jelasnya, mari kita perhatikan ilustrasi pada Gambar 1 dan Gambar 2 berikutnya ini! Perhatikan aktivitas yang dilakukan pada seorang anak berikut ini!

Gambar 1.anak-anak yang bersepeda Gambar 2. Terjatuh saat main sepeda

1

Saat kamu terjatuh dari sepeda seperti yang dialami oleh anak pada Gambar 2, jika terjadi luka maka kamu akan merasakan sakit dan mengeluarkan suatu cairan yang berwarna merah. Cairan tersebut akan keluar, namun beberapa saat akan berhenti. Cairan merah itu disebut dengan darah. Darah memiliki banyak fungsi yang penting bagi tubuh kita, salah satunya sebagai unit transportasi tubuh. Darah terdiri dari 3 komponen, salah satunya adalah sel darah. Namun, tahukah kamu bahwa jumlah sel darah dalam tubuh kita ternyata juga dipengaruhi oleh ketinggian tempat tinggal?

Lalu, pernahkah memperhatikan saat kamu terluka dan berdarah, berdarah tersebut akan berhenti keluar? Peristiwa tersebut dikenal dengan pembekuan darah. Proses pembekuan darah melibatkan beberapa komponen dan terjadi secara kompleks. Selain itu, darah kita juga dapat didonorkan kepada orang lain yang membutuhkan melalui transfusi darah.

Untuk memahami lebih lanjut, silahkan kamu buat 4 pertanyaan terkait wacana yang telah diberikan. Tuliskan apa saja pertanyaan yang ingin kamu tanyakan pada materi setelah kamu membaca wacana di atas!

1. .....
2. .....
3. .....
4. .....

2

LKPD Biologi Struktur dan Fungsi pada Sistem Peredaran Darah

Figure 3. (1) Problem Orientation (2) Make a Hypothesis

Collecting data and analyzing data are (1) The teacher provides opportunities for students to determine the steps that are in accordance with the hypothesis that will be carried out (2) The teacher guides students in determining experimental steps (3) The teacher guides students to get data through experiments (4) The teacher provides an opportunity for each group to convey the results of processing the collected data can be seen in Figure 4.

L A T I H A N S O A L

1. Bedasarkan wacana pada halaman 1 dan 2, jelaskan pengertian dari darah! *(gunakan buku biologi, modul maupun komik untuk membantu kamu menjawab pertanyaan)* 3

.....
.....
.....

2. Dengan menggunakan buku ajar dan diskusi kelompok, silahkan kamu deskripsikan beberapa fungsi dari darah dengan tepat ! *(gunakan buku biologi, modul maupun komik untuk membantu kamu menjawab pertanyaan)* 3

.....
.....
.....

3. Jika kita mencampurkan antara minyak goreng dan air yang berbeda massa jenisnya dalam satu wadah akan terbentuk lapisan berupa minyak goreng akan berada dibawah dan air akan berada diatasnya. Begitu halnya dengan darah kita, jika dilakukan sentrifugasi (memisahkan cairan berdasarkan berat jenisnya menggunakan alat tertentu) akan terpisah menjadi beberapa komponen, yaitu ada plasma darah, sel darah yaitu eritosit dan leukosit serta kepingan darah. Perhatikan gambar berikut ini! 4

Gambar 3. Ilustrasi hasil sentrifugasi darah (sumber:google, 2020)

LKPD Biologi Struktur dan Fungsi pada Sistem Peredaran Darah 6

Figure 4. (3) Data Collection (4) Analyzing Data

Making conclusions is the teacher guiding students in making conclusions based on the data that has been obtained and reflecting to find out the understanding of the material for the human circulatory system can be seen in Figure 5.

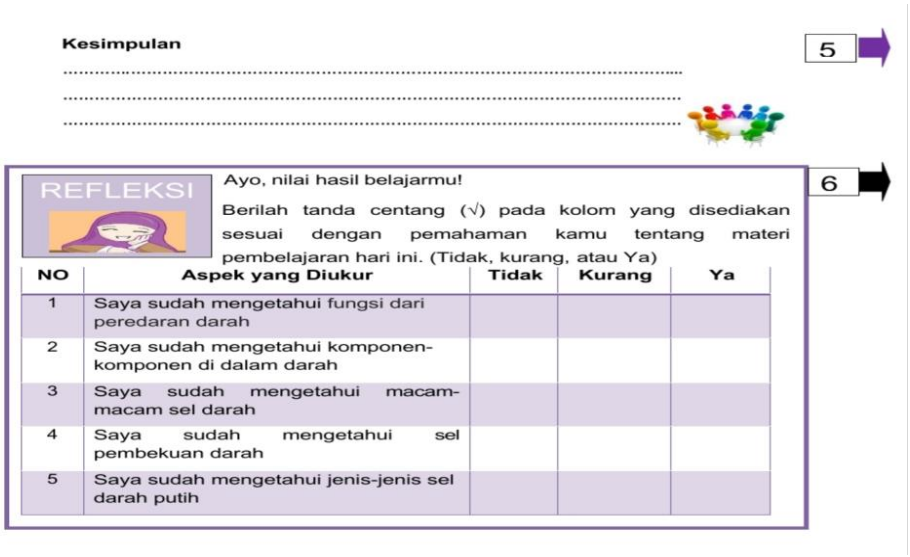

Figure 5. (5) Draw Conclusions (6) Reflect

The advantages of using e-LKPD, namely: Saves space and time, allows users to mark important things without fear of making them ugly because of scribbles, environmentally friendly, because they do not use paper, ink, etc., font size can be changed easily, because it is available in digital form, so it will always be available all the time, small size and capacity, so it can accommodate many e-LKPD, saving costs (Haqsari, 2014). The validity of the e-LKPD using the kvisoft flipbook meker can be measured using the validity instruments used in this study, namely: Content validity assessed by 3 validators, namely 1 media expert, 2 material experts and 4 practitioner experts. The validator will conduct an assessment with a validation sheet that covers programming aspects. Appearance, learning, material, and language can be seen in table 1.

Table 1. Recapitulation of Experimental e-LKPD Validation using Guided Inquiry Model with KD 3.6 Human Circulatory System

Evaluation	Average	Criteria	Overall Average	Validity Level
Media Expert	3,76	Very valid		
Material Expert	3,42	Very valid	3,64	Very Valid
Expert Practitioner	3,77	Very valid		

Table 1. Shows that media experts are 3.76 with very valid criteria, where the suitability of material experts is 3.42 with very valid criteria, the suitability of practitioner experts is 3.77 with very valid criteria. Overall, the e-LKPD that has been developed has an average The average score is 3.64 in the Very valid category. Overall, according to the validator in the field of education, the e-LKPD has been usable. However, there are inputs from expert validators that need to be

improved to improve e-LKPD. Illahi (2021) also argues that with validation by the education sector, the resulting LKPD will be more feasible and more perfect.
The results of the Practicality Test were carried out with Trial 1, distributed response questionnaires to 5 postgraduate students of FKIP Biology at Riau University, while for trial 2 the response questionnaires were distributed to 20 students of class XII. MIPA SMA N 1 Kabun can be seen in table 2.

Table 2. Recapitulation of e-LKPD Validation in the Practical Test of KD 3.6 Human Circulatory System

Evaluation	Average	Criteria	Overall Average	Validity Level
Testing 1	3,59	Very Valid		
Testing 2	3.64	Very Valid	3,60	Very Valid

Table 2 shows that the practicality test in trial 1, an average of 3.59 with very valid criteria, where conformity in trial 2, an average of 3.64 with very valid criteria, overall e-LKPD that has been developed obtains an average score of 3.60 with a very valid category. Novitas (2021) states that if a validity test is carried out to obtain very valid criteria, then the developed e-LKPD meets the terms and conditions of a good and correct assessment. Cognitive learning outcomes are the final results obtained by students in their understanding of science related to mental processes (the brain) and are the basis for mastering knowledge that must be mastered by students after they have done a lesson. The assessment of students' cognitive learning outcomes was carried out through pretest and posttest in class XI MIPA 3. The results of the study are presented in table 3. Chotimah (2018) argues that learning resources that are able to meet the needs of students and are able to improve student learning outcomes mean that these learning resources are suitable for use. in the learning process.

Table 3. Student Cognitive Learning Outcomes Based on Pretest and Posttest Scores

No	Category	Predicate	Interval	*Pretest*	*Postest*
1	Very Good	A	5	-	8
2	Good	B	4	-	8
3	Enough	C	3	-	3
4	Less	D	2	20	1
5	Very Less	E	1	-	-
Number of Student				20	20
Average				30,4	90,35
Predicate				D	B
Category				Less	Good

From table 3, the average posttest score is 90.35 and B predicate in good category, 8 students who get A predicate in very good category, 8 students who get B predicate in good category, students who get B predicate There are 3 students who get a C predicate in the sufficient category, and 1 student who gets a D predicate with a less category. While the average value of the pretest is 30.4 and the D category is less with the number of students 20 students in the less category. Firdaus (2018) stated that the comparison of student learning outcomes in the

pretest and posttest experienced a significant increase, affecting the learning resources used in the learning process. Based on the data on the increase in the Posttest value, the N-Gain value analysis was then carried out. It aims to interpret the criteria for improving the cognitive learning outcomes of students as a whole. The results of the N-Gain analysis are presented in table 4.

Table 4. Results of N-Gain Analysis for Improving Student Cognitive Learning Outcomes

Evaluation		Result
Pre-Test		30,4
Post-Test		90,35
	N-Gain	**0,85**
	Description	**High**

According to the classification by Hake (2007), if the value of n gain 0.70 then the n-gain value is in the high classification, then if the n-gain value is 0.30 (g) 0.70, then the n-gain value is it is in the medium classification and if <0.30 then it is classified as low. Based on this classification, the n-gain value in increasing the knowledge value on the Posttest score is quite high. The increase in cognitive learning outcomes is classified as high with an N-Gain value of 0.85. JK (2021) argues that the effectiveness of using e-LKPD in the learning process of students can increase the value of students' cognitive learning knowledge. Based on the increase in the value of cognitive learning outcomes in the application of the e-LKPD of the human circulatory system, it is known that learning using e-LKPD using the learning model of the human circulatory system material can improve the cognitive learning outcomes of students, which can be seen in Figure 6.

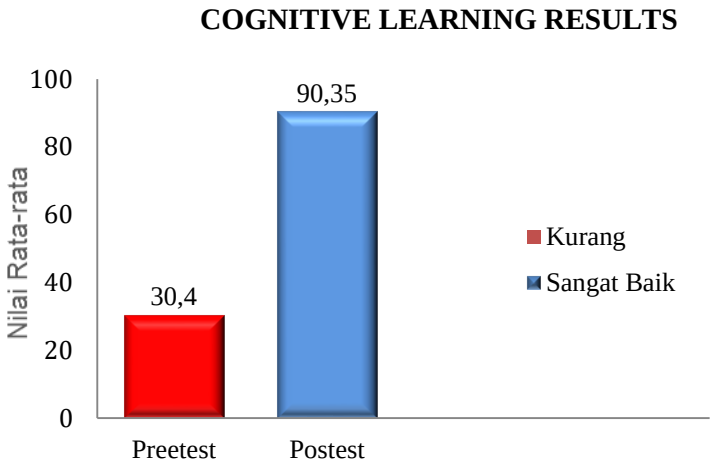

Figure 6. Results of N-Gain Analysis for Increasing Student Cognitive Learning Outcomes

Based on the increase in the value of cognitive learning outcomes in the application of experimental e-LKPD using a guided inquiry learning model on the material of the human circulatory system, it is known that learning can improve students' cognitive learning outcomes. Maida (2019) states that student learning

outcomes with guided inquiry learning make students able to guide students to find their own concepts and make practical activities more meaningful.

4. Conclusion

Experimental e-LKPD using a guided inquiry learning model on the material of the human circulatory system which was developed from the content validation aspect is very valid, and the practical aspect shows it is very practical. There is an increase in students' cognitive learning outcomes after the application of the experimental e-LKPD using the guided inquiry learning model on the circulatory system material for class XI SMA.

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