



# Development of Canva-Based Electronic Student Worksheet (E-LKPD) to Improve Student Biology Learning Outcomes

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**Abstract:** This study aims to make and develop electronic worksheet students (E-LKPD) that can be used by teachers in implementing learning in using IT-based learning media. This type of research is research and research and development (R&D) with a 4D development model (Define, Design, Development, and Dissemination). The sample in this study was biology teachers and students of SMA Negeri 1 Kaliorang. The results of the validation of media, material, and language experts respectively are 84.41% (very feasible), 82.35% (very feasible), and 69.41% (feasible). The results of the Biology Teacher Repson related to product practicality obtained a percentage of 92.50% (very practical), while the results of the trial to see the response of students obtained a percentage of 82.50% (very practical). The results of the effectiveness test using the paired sample t-test test showed that there was an effect of the use of canva-based e-LKPD in improving the learning outcomes of high school students in East Kutai on biotechnology material.

**Keywords:** Biotechnology material; Canva media; Development research; E-LKPD; Learning media

## Introduction

Education has a very large role in creating quality human resources and superior individuals (Nurhayati et al., 2020). In the era of the Industrial Revolution 4.0 accompanied by a very rapid technological development so that the world of education must also innovate and must be able to adapt to the development of current technology (Octavia et al., 2022). In line with the demands of the 21st century, where students are expected to be able to answer the challenges of globalization and advances in information technology. One of the efforts that can be done is to study and master the various 21st century skills namely, life and career skills, innovation skills, and information media and technology skills (Muhali, 2019; Yulianisa et al., 2018). These three skills are often referred to as 21<sup>st</sup> century knowledge-skill rainbow (Yusri, 2021).

The 21st century learning policy system is a curriculum that is centered on students from previously centered on educators (Cholilah et al., 2023). The steps that educators can take to be able to create these learning

objectives are to place students as a student center (Fatimah et al., 2020; Sandria et al., 2022). One alternative that can be used to increase student participation and interest in learning is to use various multimedia (Aftiani et al., 2021; Rahmat, 2015; Rizaldi et al., 2020).

The use of multimedia is an implementation of the development of technology, information, and communication (ICT). The development of multimedia applications is considered to be in line in the 21st century learning characteristics by integrating technology in learning media with the aim of training learning skills in order to increase significantly (Muliastri, 2020). Learning experiences that are meaningful with the use of Information and Communication Technology (ICT), both as physical (concrete) and non -physical tools (abstract) which are used as intermediaries between teachers and students to better understand or understand the contents of the subject matter effectively and efficiently meaningful learning activities. This is in line with the characteristics of 21st century learning including learning that should be directed at the activities of encouraging students to find out from

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various learning resources, so that the process that occurs is not as an ordinary learning activity without meaningfulness in students (Komara, 2018; Zubaidah, 2016). One of the technology-based learning media is electronic worksheet of students (E-LKPD).

Electronic Student Worksheets (e-LKPD) are a form of learning media that is more practical to use, can be studied anywhere, with flexible time, allowing students to more easily learn, understand and discover concepts compared to printed learning media (Puspitasari & Handziko, 2018). Electronic Student Worksheets (e-LKPD) can support the academic activities of teachers and students across the boundaries of traditional school spaces (classrooms, tutorial rooms, laboratories and multimedia rooms) (Puspitasari, 2019). Apart from that, it can also increase flexibility and provide the latest interaction capabilities (Yustanti & Novita, 2019). Electronic student worksheet (e-LKPD) bridges learning in various situations and conditions, accommodates the diversity of student learning variations and individual learning, directs student centered learning (Rahmat, 2015).

In fact, in real conditions, there are still many students who put aside learning when teachers provide material using distance learning policies, where teachers only provide conventional and less innovative material and assignments. This is supported by the results of researchers' observations regarding real conditions in the field, where in general students' worksheets contain material based on basic competencies, activity material according to the competencies that must be achieved in Basic Competencies. It's just that the student worksheets (LKPD) that have been used are sometimes too monotonous where too much material appears, as a result, students only seem to copy answers directly without going through the literacy results. The student worksheet (LKPD) should contain questions or questions and answers that require answers resulting from the discovery of experimental activities, and also be equipped with questions whose answers are the result of analysis of the relationship between experimental activities.

With the rapid development of technology today, of course teachers must be able to take advantage of this by coming up with an approach that integrates student worksheets with technology that is widely known by students today. One of them is related to the use of learning media, namely starting to change student worksheets (LKPD) into electronic or digital form which can be accessed via the internet with electronic media, smartphones or computers, or also commonly referred to as internet enabled learning (Mukhtar et al., 2020). The use of technology as a learning medium has been carried out by many previous researchers in various learning materials and contexts, such as that done by England et al. (2017) by developing STEAM-based e-LKPD on

Straight Motion material, Alhikma (2021) by developing REACT-based e-LKPD on side space building materials, Rohma et al. (2023) by developing e-LKPD based on question prompt scaffolding to improve students' critical thinking skills; Zahroh et al. (2021) developed e-LKPD based on scientific literacy to train critical thinking skills, and Azizah et al. (2022) developed e-LKPD based on think pair share on movement system material to train critical thinking skills.

Based on the background of the problem that has been described, researchers are interested in conducting research related to the development of Canva-based electronic student worksheets (e-LKPD) to improve the learning outcomes of high school students in East Kutai. The importance of developing e-LKPD in this research is, of course, to create modernization in the use of learning approaches that are more adapted to the conditions and characteristics currently developing in the student environment, namely the students' intense use of technology.

## Method

The research design carried out is development research or commonly known as Research & Development (R&D). The development research model used refers to the 4D model, starting from defining, planning, developing and disseminating (Tanjung & Nababan, 2019). This model helps researchers adapt the development of media in the form of electronic student worksheets (e-LKPD) based on the research objectives, namely the development of Canva-based electronic student worksheets (e-LKPD) for high school students in East Kutai and testing the feasibility, practicality, and its effectiveness. The research design developed by the researcher is as in Figure 1.

The subjects of this research were biology teachers and students of SMA Negeri 1 Kaliorang. Consisting of a biology teacher and two class XII. In the small class product research, it consisted of 21 students from class XII MIPA 1, and the treatment class was class XII MIPA 2. The product test results were then analyzed, using pre-test and post-test. This is done to see whether the product being developed can make learning media effective. The research subjects were students and biology teachers who provided responses and input on the media developed during the experiment by filling in student questionnaires and teacher reviews. Meanwhile, the research object used was the feasibility, practicality and effectiveness of Canva-based electronic student worksheets (e-LKPD) on Biotechnology material for class XII students at SMA Negeri 1 Kaliorang.

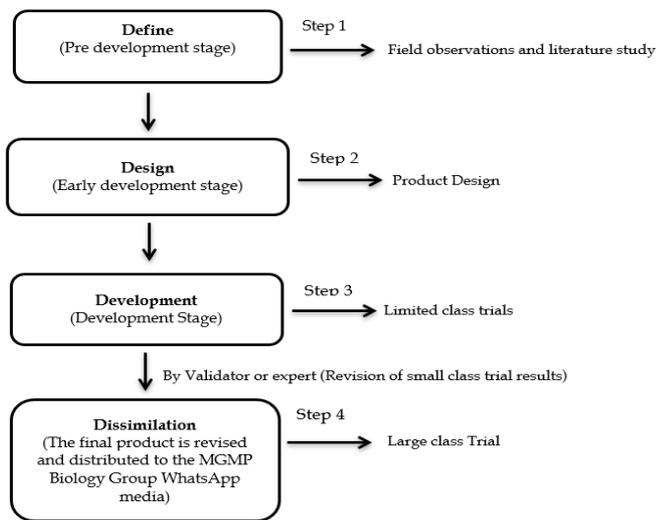


Figure 1. 4D Model R&D research design

The data instruments in this research are divided into three groups, namely to measure 1) the suitability of the media using observation sheets and expert questionnaires, 2) the practicality of the media using observation sheets and questionnaires, and 3) the effectiveness of the media by giving tests in the form of pre-test and post-test questions for obtain the N-gain value. Feasibility and practicality test data are obtained using the following equation (Ihwanudin et al., 2018).

$$P = \frac{F}{N} \times 100\% \quad (1)$$

Description:

- P = Percentage from questionnaire data
- F = The number of respondents' answers
- N = The number of highest scores

All validity and practicality test data obtained are then analyzed and a conclusion process is carried out referring to the following categories.

Table 1. Percentage Range of Expert Team and Qualitative Criteria for Feasibility and Practicality of E-LKPD

Percentage Range (%)	Qualitative Criteria
80.00 - 100.00	Very Feasible/Practical (Not Revised)
70.00 - 80.00	Feasible/Practical (Not Revised)
60.00 - 70.00	Fairly Feasible/Practical (Revised)
50.00 - 60.00	Less Feasible/Practical (Revised)
< 50%	Not Feasible/Practical (Revised)

(Adapted from Sudjana, 2010)

Table 2. Teacher and Student Response Questionnaire Criteria

Score	Criteria
5	Very good
4	Good
3	Enough
2	Less
1	Very less

(Adapted from Suharsimi, 2021)

Table 3. N-Gain Categories

Score	Categories
$(g) < 0.30$	Low
$0,7 > (g) < 0.3$	Medium
$(g) > 0.7$	High

(Adapted from Hakke in Irhamna et al., 2017)

## Result and Discussion

### Development Results

This research was carried out with a research and development (R&D) design. Researchers are trying to create a learning media design, namely electronic student worksheets (e-LKPD) on Biotechnology material so that it can be used as one of the learning media choices for teachers in improving the learning outcomes of high school students in East Kutai. The biotechnology material taught to class XII students has a material context that can provide learning experiences for students to actively explore.



Figure 2. Display of canva-based electronic student worksheet (e-LKPD) design

The electronic student worksheet development model (e-LKPD), refers to the concept of problem-based learning or known as Problem Based Learning (PBL) and Discovery Learning (DL), discovery-based learning, is based on the idea that students when studying Biotechnology material, it is hoped that it can help students develop thinking skills, problem solving skills, and at the same time improve their intellectual skills. Problem-based learning activates students to participate in finding solutions and solving problems through scientific methods, so that students can find out and learn knowledge that can be related to the problem being solved and can increase students' skills in solving problems (Angga et al., 2022; Rosnaeni, 2021).

Researchers in this case really hope that the learning process will always lead to better improvements and ultimately improve students' cognitive abilities, make the learning atmosphere enjoyable and more meaningful.

*Validity Test Results*

*Media Aspect*

In the next stage, after the initial development of the Canva-based Electronic Student Worksheet (e-LKPD) media, a validation process was first carried out by

learning media experts, before the media was tested in schools. Validation of learning media was carried out by lecturers at the Faculty of Computer Science and Information Technology, Mulawarman University. Media validation is carried out to obtain input in the form of information, suggestions and criticism with the hope that the participant worksheet electronic learning media (e-LKPD) will be developed into a product that is suitable for use in schools, especially class XII. The following are the results of expert validity assessments on media aspects.

**Table 4.** Media Expert Validator Assessment Results

Statement	Assessment Items	Value	Score	Total Score
(1)	(2)	(3)	(4)	(5)=(3) x(4)
1	In accordance with the lesson material	0.05	4	0.20
2	In accordance with learning objectives	0.05	4	0.20
3	Create competencies that are in accordance with Basic Competencies	0.05	5	0.25
4	Easy to understand	0.10	5	0.50
5	The language used complies with the Enhanced Spelling rules (EYD)	0.05	4	0.20
6	Has good completeness (there is a foreword, instructions for using e-LKPD, for teachers and students, KD, KD achievement indicators, learning objectives, e-LKPD activity materials, author's biodata, bibliography)	0.10	4	0.40
7	e-LKPD contains problem-based learning (PBL) syntax and learning models	0.05	4	0.20
8	e-LKPD contains Discovery Based Learning (DBL) syntax and learning models.	0.05	5	0.25
9	Integration of two learning models (Problem Based Learning (PBL) and Discovery Based Learning (DBL) are contained in e-LKPD	0.05	5	0.25
10	e-LKPD contains basic competencies and objectives	0.05	4	0.20
11	Includes all material	0.05	4	0.20
12	According to the actual situation	0.05	4	0.20
13	Easy to understand (Illustration)	0.05	4	0.20
14	The material and illustrations are easy to read/follow	0.07	4	0.30
15	The printed material and illustrations are clear	0.07	4	0.30
16	The print appearance of the material is attractive	0.05	4	0.20
17	Illustration print view	0.05	4	0.20
	Total score		72	4.25
	Percentage (%)		84.71	

The results of the analysis show that the average score obtained is 4.25 with a very appropriate category for the assessment carried out by media experts regarding the suitability of subject matter, material coverage, competencies that are in accordance with basic competencies and learning plans. Several elements of media validation, namely from the aspects of illustration, quality and appearance of the media, and attractiveness have been fulfilled very well in the electronic design of student worksheets (e-LKPD). Based on the scores obtained, the development model is classified into the very feasible category (not revised) with a percentage value of 84.71%.

*Material Aspects*

Validation of the material was carried out by a Master of Biology Education lecturer who has an expert background in Biotechnology, so that it is in accordance with the material contained in the electronic student worksheet (e-LKPD). Validation by material experts aims to obtain information, suggestions and criticism so that the electronic learning media for student worksheets (e-LKPD) is developed into a quality product in terms of the readability aspect of biotechnology material with the electronic learning media for student worksheets (e-LKPD ). The following are the results of expert validity assessments on material aspects.

**Table 5.** Material Expert Validator Assessment Results

Statement	Assessment Items	Value	Score	Total score
(1)	(2)	(3)	(4)	(5)=(3) x(4)
1	In accordance with the lesson material	0.05	5	0.25
2	In accordance with learning objectives	0.05	4	0.20
3	Create competencies that are in accordance with Basic Competencies	0.05	5	0.25
4	Easy to understand	0.10	4	0.40
5	The language used complies with the Enhanced Spelling rules (EYD)	0.05	4	0.20
6	Has good completeness (there is a foreword, instructions for using e-LKPD, for teachers and students, KD, KD achievement indicators, learning objectives, e-LKPD activity materials, author's biodata, bibliography	0.10	4	0.40
7	e-LKPD contains problem-based learning (PBL) syntax and learning models	0.05	4	0.20
8	e-LKPD contains Discovery Based Learning (DBL) syntax and learning models.	0.05	4	0.20
9	Integration of two learning models (Problem Based Learning (PBL) and Discovery Based Learning (DBL) are contained in e-LKPD	0.05	4	0.20
10	e-LKPD contains basic competencies and objectives	0.05	4	0.20
11	Includes all material	0.05	4	0.20
12	According to the actual situation	0.05	4	0.20
13	Easy to understand (Illustration)	0.05	4	0.20
14	The material and illustrations are easy to read/follow	0.07	4	0.30
15	The printed material and illustrations are clear	0.07	4	0.30
16	The print appearance of the material is attractive	0.05	4	0.20
17	Illustration print view	0.05	4	0.20
	Total score		70	4.10
	Percentage (%)		82.35	

The results of the analysis show that the average score obtained was 4.10 for the assessment carried out by material experts regarding the suitability of lesson material, material coverage, competencies in accordance with KD and learning plans. Based on the scores obtained, the model is classified as very feasible (not revised) with a percentage value of 82.35%.

*Language Aspects*

Language validation is carried out by Master of Indonesian Language Education lecturers who have a

background in accordance with the grammar used in electronic student worksheets (e-LKPD). Language validation focuses more on aspects of readability and use of language presented in the media. Linguist experts assess that the suitability of the language and readability stated in the electronic media of student worksheets (e-LKPD) has been fulfilled. The following are the results of expert validity assessments on language aspects.

**Table 6.** Linguistic Expert Validator Assessment Results

No.	Assessment Items	Value	Score	Total score
(1)	(2)	(3)	(4)	(5)=(3) x(4)
1	In accordance with the lesson material	0.05	4	0.20
2	In accordance with learning objectives	0.05	4	0.20
3	Create competencies that are in accordance with Basic Competencies	0.05	3	0.15
4	Easy to understand	0.10	3	0.30
5	The language used complies with the Enhanced Spelling rules (EYD)	0.05	4	0.20
6	Has good completeness (there is a foreword, instructions for using e-LKPD, for teachers and students, KD, KD achievement indicators, learning objectives, e-LKPD activity materials, author's biodata, bibliography	0.10	3	0.30
7	e-LKPD contains problem-based learning (PBL) syntax and learning models	0.05	4	0.20
8	e-LKPD contains Discovery Based Learning (DBL) syntax and learning models.	0.05	3	0.15
9	Integration of two learning models (Problem Based Learning (PBL) and Discovery Based Learning (DBL) are contained in e-LKPD	0.05	3	0.15
10	e-LKPD contains basic competencies and objectives	0.05	4	0.20
11	Includes all material	0.05	3	0.15
12	According to the actual situation	0.05	4	0.20
13	Easy to understand (Illustration)	0.05	4	0.20
14	The material and illustrations are easy to read/follow	0.07	4	0.30
15	The printed material and illustrations are clear	0.07	3	0.23
16	The print appearance of the material is attractive	0.05	4	0.20
17	Illustration print view	0.05	4	0.20
	Total score		59	3.37
	Percentage (%)		69.41	

The results of the analysis show that the average score obtained is 3.37 for the assessment carried out by language experts according to the subject matter, material coverage, competencies in accordance with KD and learning plans. Learning linguist experts concluded that the electronic student worksheet (e-LKPD) was suitable for testing after a few minor revisions, namely changing from using bright colors to softer ones and also paying attention to the use of terms in italics.

Based on the scores obtained and grouped into categories, the model is classified as quite feasible (revised) with a percentage value of 69.41%.

*Practicality Test Results*

*Teacher Response*

Learning media is said to be practical if the results of the teacher response questionnaire and student

responses in the practicality test show good criteria and the results of the media practicality test can be used by teachers and students in the learning process at school (Dwijayani, 2017; Nabila et al., 2021; Puspitasari, 2019). Practicality is measured from the assessment of two response questionnaires, namely the teacher response questionnaire and the student response questionnaire. The teacher response questionnaire consists of 8 statement items, comments and suggestions in response, as well as conclusions. Meanwhile, the student response questionnaire consists of 8 statements, notes, criticism and suggestions. The teacher response questionnaire was filled in by 1 Biology subject teacher for class XII MIPA and the student response questionnaire was filled in by 42 students in class XII MPA. The following is a summary of teacher responses regarding the Canva-based e-LKPD that has been developed.

**Table 7.** Teacher Response Questionnaire Sheet

Statement (1)	Assessment Items (2)	Value (3)	Score (4)	Total score (5)= (3)x(4)
1	Learning e-LKPD helps understand problems in everyday life	0.25	5	1.25
2	e-LKPD is useful in studying Biotechnology	0.05	5	0.25
3	e-LKPD provides new knowledge	0.10	5	0.50
4	e-LKPD has a relationship with Biotechnology	0.05	5	0.25
5	Pictures/illustrations in e-LKPD make it easier/helping to understand the material	0.15	5	0.75
6	The order of material on e-LKPD is easy to implement	0.05	4	0.20
7	e-LKPD contains steps that make it easier to carry out learning activities	0.20	5	1.00
8	The proposed steps for learning using e-LKPD do not create a burden	0.15	4	0.60
Total Score			37	4.80
Percentage (%)			92.50	

The results of the analysis show that the average score obtained was 4.80 for the assessment carried out by expert practitioners regarding the suitability of lesson material, material coverage, competencies in accordance with KD and learning plans. Learning practitioner experts concluded that electronic student worksheets (e-LKPD) are suitable for testing after improvements have been made.

Innovative learning media is very necessary, especially those that can be integrated with various learning models (Irwan et al., 2019; Wijaya & Arismunandar, 2018). This is because it can stimulate students to be active in learning (Putra et al., 2019; Yunita & Wijayanti, 2017). Apart from that, learning with this technology-based model provides students with the opportunity to decide on various problems both related to scientific fields and contextual problems in everyday life.

According to research conducted by Pratiwi et al. (2022), it is confirmed that the use of digital technological developments in the current era makes it easier for teachers to integrate digital-based learning media with the learning approaches used. Of course, the information obtained by students using conventional learning media, in this case handbooks, is different in

terms of meaning for students. In general, the material displayed is not much different, but by utilizing technology, the editorial display of the material certainly provides its own characteristics for students (Lestari et al., 2015). Apart from that, learning with e-LKPD provides students with the opportunity to decide various problems both related to the scientific field and contextual problems in everyday life related to Biotechnology.

*Student Response*

Practicality tests for students were carried out in classes XII MIPA 1 and XII MIPA 2. The average percentage of practicality tests for students can be seen in the following table.

**Table 8.** Recap of Student Practicality Tests

Class	Student Practicality Percentage (%)
XII MIPA 1 (Control Class)	70.20
XII MIPA 2 (Experiment Class)	94.80
Average Percentage of Practicality of Students	82.50
Categories	Very Practical

Based on the table above, it shows the results of the practicality test by students of XII MIPA 1 and based on the scores obtained and grouped into categories, electronic student worksheet (e-LKPD) is classified into the very practical category with 82.50%. So referring to these conditions, electronic student worksheets (e-LKPD) are very practical to use in student learning at school.

This is in line with research that has been conducted previously by several researchers which illustrate that the level of practicality of a learning media can be measured based on the ease of use in learning activities and in accordance with the objectives of developing learning media (Fitra & Maksum, 2021; Fridayanti et al., 2022).

*Effectiveness Test Results*

The effectiveness test of Canva-based learning media was carried out to see its effect on improving students' cognitive learning outcomes by conducting a t test on the pre-test and post-test results. A recap of the average pretest and posttest scores of students can be seen in the following table.

**Table 9.** Recap of Pretest and Posttest Results

Class	Average score		N-gain	Categories
	Pretest	Posttest		
XII MIPA 1	47.14	86.70	0.72	High
XII MIPA 2	47.14	86.60	0.73	High

**Table 11.** Canva Based Independent Sample t-test e-LKPD Test Results

	Levene's test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Cognitive	Equal variances assumed	0.889	-2.407	40.00	0.021
	Equal variances not assumed		-2.407	39.16	0.021

The use of Canva as a technology to support the development of learning media has been proven to have an influence on the expected research results, as carried out by several previous researchers, namely by Alfian et al. (2022), it was found that Canva-assisted audio-visual learning media is suitable for application in learning activities because it appears to be effective. Its use is not only during the offline learning process but can also be applied in online conditions. Apart from that, according to Wahyu et al. (2020), the aim of using Canva in the learning process is to clarify and emphasize important parts of the subject matter. By providing a variety of learning alternatives, especially in science classes, it is able to increase students' motivation in participating in each stage of learning in class (Mu'minah, 2021; Rizaldi & Fatimah, 2020). This can be seen from the increase in several skills in students such as processing thought stimuli, feelings, will, attention, and of course increased learning motivation. The growth of these various skills

Based on the table above, it shows that the average pre-test and post-test scores of students are 47.14 and 86.70 respectively. There is a significant difference, namely 39.59, so learning using electronic student worksheets (e-LKPD) is very effective for students to use in learning at school because it can improve the cognitive learning outcomes of class XII students on Biotechnology material. According to research conducted by Amthari et al. (2021), it was found that scientific-based e-LKPD media can significantly improve student learning outcomes on human respiratory system material.

Data from students' pre-test and post-test results before the t test is carried out requires prerequisite tests in the form of data homogeneity and normality tests. Then, to measure the effect of e-LKPD learning media on improving students' cognitive learning outcomes, it is shown by the results of the t test, namely the results of calculations using the help of the SPSS application which are proven to have an influence because  $t_{count} < t_{table}$ , namely  $0.00 < 0.05$ . Canva-based learning media has an influence on the effectiveness of learning in the control class as evidenced by the N-Gain test scores, namely 0.72 (high) and 0.73 (high).

**Table 10.** Canva Based Paired Sample T-test E-LKPD Test Results

	t	df	Sig.(2-tailed)
Pair 1 pretest experiment-posttest experiment	-11.608	20	0.000

will of course indirectly have an impact on increasing student learning outcomes.

**Conclusion**

The Canva-based e-LKPD product on Biotechnology material was successfully developed using a 4D development model consisting of define, design, development and dissemination stages. The media, material and language expert validation results were respectively 84.41% (very feasible), 82.35% (very feasible) and 69.41% (decent). The results of the biology teacher's response regarding the practicality of the product obtained a percentage of 92.50% (very practical), while the results of trials to see students' responses obtained a percentage of 82.50% (very practical). The results of the effectiveness test using the paired sample t test show that there is an influence of using Canva-based e-LKPD in improving the biology

learning outcomes of high school students in East Kutai on Biotechnology material.

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### Author Contributions

Musdalifah conceptualized the research idea, designed of methodology, management and coordination responsibility; Sonja Verra T. Lumowa analyzed data, conducted a research and investigation process; Vandalita M. M. Rambitan conducted literature review and provided critical feedback on the manuscript.

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### Conflicts of Interest

The author declared no conflict of interest.

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