

IMPLEMENTATION OF E-LKPD VIRUS MATERIAL BASED ON KNOW-LEARNED (K-L) STRATEGY TO TRAIN STUDENT METACOGNITIVE SKILLS

Penerapan E-LKPD Materi Virus Berbasis Strategi Metakognitif Know-Learned (K-L) untuk Melatih Keterampilan Metakognitif Peserta Didik

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Abstract

Covid19 pandemic that emerged in 2020 caused learning to be carried out online, including in learning virus material. Virus material has abstract characteristics so it is difficult for students, proven by the average national exam in 2019, the result of virus material concept of 54.2 which is still below the minimum standard. Low learning outcomes can be overcome by metacognitive strategies. One type is Know-Learned. K-L that can be integrated into E-LKPD to help students achieve learning objectives. Based on these problems, research is needed on the application of E-LKPD using K-L metacognitive strategies on virus material during online learning. The research aims to describe the practicality and effectiveness of K-L E-LKPD using One-Group Pretest-Posttest Design. The research was conducted at SMAN 2 Mejayan on 26 students of X MIA 1 online. The results of the study the activities of students were 100% very practical category and the positive response of students was 92.1% belong to a very practical category. Learning outcomes based on the N-Gain score of 0.9 classified into a very high category, the completeness indicator items is 86.5% and the item sensitivity is 0.7. The results of the students' metacognitive skills were 3.375 very good categories based on four indicators namely: ability to determine initial and final knowledge; determine the level of confidence; comparing initial and final knowledge; and determine the score. These results conclude that the application of K-L E-LKPD on virus material is practical and effective in training students' metacognitive skills.

Keywords: E-LKPD, virus, metacognitive Know-Learned, online learning

Abstrak

Pandemi Covid19 yang muncul pada tahun 2020 menyebabkan pembelajaran dilakukan secara daring, termasuk pembelajaran materi virus. Virus merupakan materi berkarakteristik abstrak sehingga dianggap sulit oleh peserta didik yang dibuktikan rata-rata hasil ujian nasional tahun 2019 penguasaan materi virus sebesar 54,2 masih dibawah standar minimal. Rendahnya hasil belajar tersebut bisa diatasi menggunakan strategi metakognitif. Salah satu jenis strategi metakognitif adalah Know-Learned. Know-Learned dapat diintegrasikan ke dalam E-LKPD yang dapat membantu siswa mencapai tujuan pembelajaran. Berdasarkan permasalahan tersebut, diperlukan penelitian penerapan E-LKPD menggunakan Strategi metakognitif K-L dalam materi virus selama pembelajaran online. Tujuan penelitian untuk mendeskripsikan kepraktisan dan keefektifan E-LKPD Know-Learned menggunakan One-Group Pretest-Posttest Design. Penelitian dilaksanakan di SMAN 2 Mejayan pada 26 peserta didik X MIA 1 secara daring. Hasil penelitian dari keterlaksanaan aktivitas peserta didik sebesar 100% kategori sangat praktis dan respon positif peserta didik sebesar 92,1% sangat praktis. Hasil belajar berdasarkan skor N-Gain sebesar 0,9 kategori sangat tinggi, ketuntasan indikator sebesar 86,5% dan sensitivitas butir soal sebesar 0,7. Hasil keterampilan metakognitif peserta didik sebesar 3,375 kategori sangat baik ditinjau dari kemampuan menentukan pengetahuan awal dan akhir; menentukan tingkat keyakinan; membandingkan pengetahuan awal dan akhir; serta menentukan skor. Hasil tersebut menyimpulkan bahwa penerapan E-LKPD Know-Learned pada materi virus praktis dan efektif untuk melatih keterampilan metakognitif peserta didik.

Kata Kunci: E-LKPD, virus, metakognitif Know-Learned, pembelajaran daring.

INTRODUCTION

The emergence of the Covid19 pandemic in 2020 has a major impact on the education world. One of the impacts is that learning that previously took place face-to-face has been converted into online learning as an effort to prevent the spread of Covid19. Impact of online learning includes the absence of direct interaction between teachers and students, the problem of inadequate use of cellphones, where students live for access to a proper signal is limited, receiving of material information is limited to the availability of quotas, and sometimes feels bored (Anugrahana, 2020). Online learning causes student difficulty to get material explanations (Wajni, 2020). This also involved biology learning being taught online, including on virus material.

Viruses are one of the materials taught in high school biology lessons. Based on data from Puspendik, the mastery concept of virus material in the 2019 National Examination is 54.2. This number is still below the minimum absorption value of 55 as determined by the Ministry of Education and Culture of the Republic of Indonesia (Puspendik, 2019). This data shows that the mastery concept level of the virus material of students is still low. The low score of students on this virus material can be caused by several factors. The first factor is because students do not master virus material in by with the demands of basic competencies. This was reinforced by the results of research which stated that students did not master the characteristics, structure, and stages of virus replication (Hasibuan & Djulia, 2016). Another statement also states that the concept of viruses is difficult for students to master, namely in the section on characteristics, determining the virus structure that differentiates it from other organisms, especially the replication synthesis process (Firmanshah et al., 2020).

The low learning outcomes of students on virus material can be overcome, one of them is mastery of students 'metacognitive skills, but the fact is that students' metacognitive skills are still rarely trained (Purnomo et al., 2017). This can be seen from the survey results which show that 88.6% of teachers have not trained students in metacognitive skills even though metacognitive skills are one of the demands of the 2013 Curriculum contained in KI 3 (Nuraini, 2019).

Metacognitive is a skill that can plan, monitor, and evaluate activities from the process until learning outcomes (Nuraini, 2019). Metacognitive skills need to be trained for students to master metacomprehension which includes determining initial and final knowledge, giving scores, writing confidence levels for answers, and comparing initial knowledge with final knowledge (Yasir et al., 2013). One of the ways to train metacognitive skills is by using teaching materials that organize metacognitive

strategies with thorough learning materials (Wati & Susantini, 2015). Characteristics of metacognitive skill-based learning are students independent in learning, honest, and able to develop themselves to achieve learning goals to improve learning outcomes (Susantini et al., 2018)

One of the metacognitive based learning strategies is Know-Learned (K-L). Know-Learned is adapted from the Know-Want-Learn (KWL) strategy that existing before (Andarwati et al., 2019). Know-Learned is a metacognitive strategy that consists of 2 steps. The first step is Know, students write the initial knowledge they already have, while the second step is Learned, where students write down knowledge after receiving the lesson. Activities before and after receiving material can help students practice realizing their knowledge, thinking activities, monitoring and evaluating thinking skills (Savitri & Susantini, 2019).

Efforts that can be made to overcome problems related to online learning of virus material are through the application of E-LKPD. E-LKPD is considered suitable to be applied in online learning because through E-LKPD, communication can still be created between teachers and students online, besides that students can also learn independently at home. Another reason E-LKPD is considered more effective that is more modern and packaged in electronic form that is suitable for online learning so that students can access it at their respective homes (Syafitri & Tressyalina, 2020). The advantage of implementing online learning is students can carry out discussions and do assignments online so that they can do their obligations to become students even at home (Roqobih & Ambarwati, 2020).

One of the research that has been developed is "Effectiveness of Virus Material Topic Student Worksheet Based On Know-Learned (K-L) Metacognitive Strategy To Train Student Metacognitive Skills". The LKPD was proven practical and effective with the results of the metacognitive score of students in the category of 3.93 very good, positive sensitivity in the range 0.3-1, and able to improve learning outcomes by 93.33% of high category (Savitri & Susantini, 2019). The success in this research was used as the base for the implementation of the LKPD, LKPD was modified into E-LKPD to match with online learning that mostly used computers and smartphones.

Based on this description, a study was conducted on the Implementation of E-LKPD virus material based on Know-Learned Strategy to Train Students' Metacognitive Skills. The study aims to describe the practicality and effectiveness of the modified E-LKPD for online learning.

Practicality is observed from the implementation activity and response of students. The effectiveness of E-LKPD is seen from the improvement of learning outcomes, completeness of indicators and items sensitivity also metacognitive skills of students.

METHOD

Type of research is applied research using the One-Group Pretest-Posttest Design to compare pretest and post-test results. The pretest step is carried out when students have not been given treatment, while the posttest step is carried out when students have been treated. The implementation was carried out on 22-23 December 2020 with three meetings for 26 students of class X MIA 1 SMAN 2 Mejayan. The implementation is done online using the google classroom, google meet, and WhatsApp group platforms. Aspects that are measured in research include the implementation of student activities, student responses, learning outcomes, completeness of indicators, items sensitivity, and metacognitive skills of students.

Implementation aspects were collected through observations made by three observers using an online observation sheet instrument of student activity using the Google Form platform. Observers can monitor the learning process because they join google classroom and google meeting that are used during learning. The observation sheet that was used contains a list of student activities and a checklist column to fill in the activities carried out during learning. Options “Yes” for activities that are implemented and “No” for activities that are not implemented. The collected questionnaire data are then calculated based on the Guttman scale in the table:

Table 1. Guttman Scale Criteria (Riduwan, 2013).

Answer	Scores
Yes	1
No	0

The total score of student activity implementation that has been obtained is then analyzed using the following formula:

$$\% \text{ student activity implementation} = \frac{\text{Number of activities carried out}}{\text{Total Activity}} \times 100\%$$

The results obtained were then converted according to the following interpretation criteria in Table 2.

Table 2. Implementation of Student Activity Criteria (Riduwan, 2013).

Scores (%)	Criteria
0-48	Not Practical
49-61	Less Practical
62-74	Fair Practical

75-87	Practical
88-100	Very Practical

Student response aspects are measured using response questionnaires by students with online google form. Students fill out a response questionnaire by choosing the option "Yes" or "No" according to the choice. The completed questionnaire is then calculated based on the Guttman scale in Table 3.

Table 3. Guttman Scale Criteria (Riduwan, 2013).

Answer	Scores
Yes	1
No	0

Student response questionnaire data are then calculated using the following formula:

$$\text{Student response: } \frac{\sum \text{ Student Who Answer "Yes" }}{\sum \text{ Maximum Score }} \times 100\%$$

The results obtained were then converted according to the interpretation criteria in Table 4.

Table 4. Respons Students Criteria (Riduwan, 2013).

Average Scores (%)	Categories
0-24	Not Practical
25-49	Fair Practical
50-74	Practical
75-100	Very Practical

The increase in learning outcomes was collected by comparing the results of the students' pretest and posttest with the Minimum Completion Criteria (KKM) of 70. The pretest and posttest questions were 10 questions consisting of multiple-choice and essay. This grade is calculated using the following formula:

$$\frac{\sum \text{ Score Obtained }}{\sum \text{ Maximum Score }} \times 100\%$$

The pretest and posttest grades that have been obtained are then analyzed using the N-gain Score with the following formula:

$$N - \text{Gain} = \frac{\text{Posttest} - \text{Pretest}}{100 - \text{pretest}}$$

The N-Gain score obtained is interpreted based on Table 5.

Table 5. N-Gain Score Criteria

Gain Score	Criteria
N-gain<0.3	Low
0.3<N-gain<0.7	Fair
N-gain>0.7	High

The completeness of each indicator is calculated using the following formula:

$$\% \text{ Completeness of the n-indicator:}$$

$$\frac{\sum \text{Student who complete n - indicator}}{\sum \text{Total Student}} \times 100\%$$

The completeness of each indicator obtained was then interpreted according to the criteria in Table 6.

Table 6. Completeness Indicator Criteria (adapted from Savitri & Susantini, 2019).

Average Scores	Categories
0-24	Not Good
25-49	Good Enough
50-74	Good
75-100	Very Good

In addition to being determined by the completeness of the indicators, concept mastery is also determined by the sensitivity of the items. Item sensitivity serves to determine the sensitivity of the questions to learning outcomes. The sensitivity of a good item is ≥ 0.30 (Brown, 2017). The sensitivity of the item is calculated using the following formula:

$$S = \frac{(Ra - Rb)}{T}$$

Note:

- S = Item sensitivity
- Ra = Final number of correct answers on the posttest
- Rb = Initial number of correct answers on the pretest
- T = Total student

The metacognitive skills of students are calculated based on four indicators which are based on the following Table 7.

Table 7. Metacognitive Skill Scoring Technique (adapted from Savitri & Susantini, 2019).

Indicators	Scores	
	0	1
Determining initial dan final knowledge	Student don't write done initial and final knowledge	Student write down initial and final knowledge
Determining self-confidence levels	Suitability between correct answer with their self-confidence level ≤ 65	Suitability between correct answer with their self-confidence level ≥ 65
Comparing initial and final knowledge	Student do not compare similarities or differences between Know and Learned column	Student compare similarities or differences between Know and Learned column
Determining Scores	The difference in score between	The difference in score between

student and teacher ≥ 7	student and teacher ≤ 7
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Metacognitive skill scores are then interpreted based on the classification in Table 8.

Table 8. Metacognitive Skill Assessment Classification

Score Range	Category
$3.26 < X \leq 4$	Very Good
$2.6 < X \leq 3.25$	Good
$1.76 < X \leq 2.5$	Fair
$1 \leq X \leq 1.75$	Poor

RESULT AND DISCUSSION

E-LKPD 1 contains Basic Competencies (KD) 3.4 Analyzing the structure, replication, and role of viruses in life while E-LKPD 2 contains KD 4.4 Conducting a campaign about the dangers of viruses in life, especially the dangers of AIDS based on the level of virulence. The application of E-LKPD based on Know-Learned metacognitive virus material was carried out in three meetings. The first meeting discussed E-LKPD 1, the second meeting discussed E-LKPD 2 and the third meeting was for post-test.

The results of the implementation of students' activities obtained an average of 100% in all aspects of E-LKPD 1 and 100% of E-LKPD 2 in the very practical category. The results of student activity implementation can be seen in the following graph:

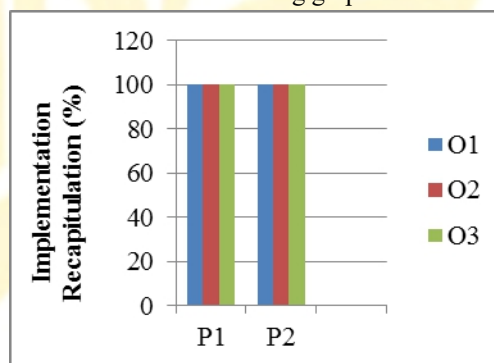


Figure 1. Recapitulation of Student Activity Implementation

Note :

- O1 = 1st Observer
- O2 = 2nd Observer
- O3 = 3rd Observer
- P1 = 1st Meeting
- P2 = 2nd Meeting

Results of students' responses E-LKPD Know-Learned obtained from a questionnaire in terms of physical appearance were 90.5%, in terms of content was 92.9%, in terms of language was 92.9%, in terms of metacognitive were 94.7% and 92.1% of the aspects of interest are categorized as very practical. The average in all aspects is 92.1% and belongs to the very practical

category. Recapitulation of students' responses can be seen in Table 9.

Table 9. Recapitulation of Student Response

No.	Aspek of Assessment	Positive Response Presentation (%)	Category
1.	Physical Appearance	90.5	Very Practical
2.	Content	92.9	Very Practical
3.	Language	92.9	Very Practical
4.	Metacognitive	94.7	Very Practical
5.	Interest	92.1	Very Practical
	Average	92.1	Very Practical

The average activity implementation and student response show very practical results. These results can prove that the Know-Learned E-LKPD can train the metacognitive students. In line with the statement which states that the K-L metacognitive strategy can make it easier for students to independently practice metacognitive skills in learning (Derlina & Pane, 2016). The high positive response of students with very practical category indicates that the Know-Learned E-LKPD is very practical to use for learning viruses. E-LKPD in terms of attractive appearance, the contents of E-LKPD can be used by students to complete indicators, language is easy to understand, able to train metacognitive skills and students are interested in learning virus material so that learning activities are meaningful.

The effectiveness of Know-Learned E-LKPD is seen from the learning outcomes, completeness of indicators, and item sensitivity, and metacognitive skills of students. Student learning outcomes are determined based on the N-Gain score of the pre-test and post-test which can be observed in Table 10.

Table 10. Student Learning Outcomes

Student	Pretest	Posttest	N-Gain Scores	Category
1	36.7	100	1.0	High
2	30	100	1.0	High
3	13.3	100	1.0	High
4	43.3	80	0.6	Fair
5	20	80	0.8	High
6	36.7	100	1.0	High
7	23.3	90	0.9	High
8	36.7	80	0.7	Fair
9	33.3	76.7	0.7	Fair
10	46.7	90	0.8	High
11	36.7	96.7	0.9	High
12	3.3	100	1.0	High

13	50	80.0	0.6	Fair
14	40	100	1.0	High
15	46.7	100	1.0	High
16	50	100	1.0	High
17	46.7	90.0	0.8	High
18	13.3	100	1.0	High
19	16.7	96.7	1.0	High
20	26.7	100	1.0	High
21	40	100	1.0	High
22	40	96.7	0.9	High
23	50	83.3	0.7	Fair
24	30	100	1.0	High
25	46.7	86.7	0.8	High
26	50	100	1.0	High
Average	34.9	93.3	0.9	High

Based on the learning outcomes of students obtained, the average N-Gain score of the 26 students was 0.9 belongs to the high category. This score is suitable with the results of previous research from Savitri (2019) that the Know-Learned LKPD succeeded in improving student learning outcomes in a very high category. The high increase in student learning outcomes with the application of the Know-Learned E-LKPD shows that the metacognitive skills contained in the E-LKPD it is effective in achieving learning objectives. The improvement of learning outcomes using metacognitive strategies contained in E-LKPD indicates that metacognitive skills can help improve learning outcomes because students can think at higher levels which affect high-level cognitive processes (Bahri & Corebima, 2015). These results also matching with the statement which states that metacognitive skills have a positive relationship with cognitive aspects, metacognitive skills can help improve students' cognitive (Kusmaningtyas, 2013).

The completeness of the indicators which consisted of 10 item indicators on the pretest had an average of 16.9 while the average posttest was 86.5 and the sensitivity of the items on the average was 0.7. The completeness of the item indicators at the pretest was low while at the posttest was high. Recapitulation of indicator completeness can be seen in Table 11.

Table 11. Completeness and Sensitivity Items

No.	Items Indicator	% Completeness (Category)		Sensitivity
		Pretest	Posttest	
1.	Analyze the relationship between the structure and	7.7 (TB)	100 (SB)	0.92

	features of the virus.			
2.	Comparing complex and simple virus structures.	19.2 (TB)	96.2 (SB)	0.77
3.	Analyze the characteristics of viruses as a basis for classification.	0.0 (TB)	65.4 (B)	0.65
4.	Analyze the mode of transmission of the virus.	11.5 (TB)	69.2 (B)	0.58
5.	Determine virus replication correctly.	57.7 (B)	96.2 (SB)	0.38
6.	Evaluating the relationship between virus replication process and virus characteristics.	0.0 (TB)	76.9 (SB)	0.77
7.	Comparing the characteristics of the lytic cycle and the lysogenic cycle.	15.4 (TB)	100 (SB)	0.85
8.	Analyze the causes and ways of preventing HIV-AIDS.	57.7 (B)	100 (SB)	0.42
9.	Evaluating the role of viruses.	0.0 (TB)	80,8 (SB)	0.81
10	Analyze phenomena caused by viruses.	0.0 (TB)	80.8 (SB)	0.81
	Average	16.9 (TB)	86.5 (SB)	0.7

Note :

0%-25% = Not Good (TB)

26%-50% = Less Good (KB)

51%-75% = Good (B)

76%-100% = Very Good (SB)

The item indicators are adjusted to the demands of the basic competencies of virus material. This indicator belongs to high order thinking skills as evidenced by the demands of each item at the C4 level regarding analyzing and C5 relating to evaluating. The increase in the average completeness of the item indicators from the pretest which was included in the bad category became very good at the posttest indicating that the E-LKPD was successfully applied in learning. The average item sensitivity of 0.7 indicates that the item is sensitive to learning outcomes. These results are in line with the

statement that the higher the sensitivity value, the more sensitive the item to learning (Brown, 2017).

The metacognitive skills of students are reviewed based on four indicators. The first indicator is able to determine initial knowledge and final knowledge. The results obtained for the ability to determine the initial and final knowledge at each E-LKPD 1 and E-LKPD 2 were 100%.

Students are able to determine the initial knowledge contained in the Know phase, although in the Know phase the accuracy of the average answers is not appropriate, students have practiced metacognitive skills. Initial knowledge is very important because it can facilitate new knowledge for students to involve their cognitive arrangements to test the relevance and accuracy associated with advanced tasks (Susantini et al., 2013). The final knowledge written in the Learned phase is on average able to write the correct answer. This is because students have gained new knowledge through group discussion activities and literature studies.

The second indicator of metacognitive skills is to determine the level of confidence. E-LKPD 1 has an average confidence level of 46.2% while E-LKPD 2 has an average of 73.1. The increase in the level of confidence of students from E-LKPD 1 to E-LKPD 2 amount 26.9% indicates that students can master monitoring skills, students with good monitoring abilities are marked by answering questions correctly with confidence. Students who have the skills to determine the level of self-confidence can practice understanding of concepts by asking themselves questions (Savitri & Susantini, 2019).

The third indicator of metacognitive skills is being able to compare initial knowledge and final knowledge. The results obtained were at E-LKPD 1 of 88% while E-LKPD 2 was 92.2%. Students are able to compare the initial and final knowledge marked by writing down the similarities or differences in answers between the Know and Learned sections. Mastery of these skills shows that metacognitive awareness can increase awareness and help students to monitor and the initial and final knowledge they already have (Savitri & Susantini, E, 2019). Students who have realized the location of the similarities or differences in the answers on E-LKPD indicate that they are able to evaluate themselves to what extent they have mastered the material during learning.

The fourth indicator is a skill to determine the score. These skills are obtained based on the difference between the teacher and student scores. In E-LKPD 1, the difference in scores in the range 0-3 is 53%, the difference in score ranges from 4-7 is 30.8%, while the

difference in scores of more than 7 is 15.4%. The amount of completeness of students in determining the total score on E-LKPD 1 was 84.6%. E-LKPD 2, the percentage difference between the scores of 0-3 is 46.2%, the difference in the range 4-7 is 46.2%, while the difference in scores of more than 7 is 7.7%. The average completeness of students in determining the score on E-LKPD 2 was 92.3%. The success of scoring skills on each E-LKPD is shown in the high percentage of completeness ability. Students through the skills trained in the E-LKPD can practice honestly and can assess themselves during learning. In addition to being able to train self-assessment, scoring skills can also increase students' self-motivation during learning. Another advantage of metacognitive self-assessment is that it is able to make students more capable of evaluating learning progress and doing learning independently (Siegesmund, 2017).

Total indicators obtained were recapitulated to determine how effective the two E-LKPDs were based on their total metacognitive score. The total metacognitive score of E-LKPD 1 was 3.18 and E-LKPD 2 was 3.57 and the final metacognitive score obtained was 3.375 with the very good category. The recapitulation can be observed in Table 12.

Tabel 12. Metacognitive Skills Recapitulation

No.	Metacognitive Skills	Scores Average	
		E-LKPD 1	E-LKPD 2
1.	Determine initial and final knowledge	1	1
2.	Determine self-confidence	0.46	0.73
3.	Compare initial and final knowledge	0.88	0.92
4.	Determine scores	0.84	0.92
Total Scores		3.18	3.57
Metacognitive Final Scores		3.375 (Very Good)	

A high metacognitive final score indicates that the application of Know-Learned E-LKPD was successfully used in virus material. These results are suitable with Susantini et al., (2018) statement which states that metacognitive strategies can train students' metacognitive skills. Know-Learned is also able to facilitate students during learning to explore their knowledge, monitor and evaluate themselves independently. Students also can independently carry out self-assessment. Self-assessment is needed during online learning to still be able to achieve learning goals even though direct interaction between teachers and students is very limited. This implies that the Know-Learned E-LKPD can be applied in online learning on virus material.

CONCLUSION

Based on the results of research on the application of E-LKPD virus material based on Know-Learned strategy to train students' metacognitive skills, the following results were obtained. The application of the Know-Learned E-LKPD is stated to be practically based on the 100% implementation aspect of learning activities and the positive response aspect of students by 92.1%, the category is very practical. E-LKPD Know-Learned is stated to be effective in terms of increasing learning outcomes, completeness of indicators, item sensitivity, and metacognitive skills of students. The learning outcomes obtained an average value of N-Gain of 0.9 with the high category proven to improve learning outcomes. The completeness of the item indicators on an average of 86.5% proved to be very good in completeness and an average value of item sensitivity of 0.7 proved that the items were sensitive to learning outcomes. The metacognitive skills of students in terms of four indicators include determining the initial and final knowledge; determine the level of confidence; comparing initial and final knowledge; and determining the score obtained by an average of 3.375 very good categories proves that E-LKPD Know-Learned is effective for training students' metacognitive skills.

SUGGESTION

It is necessary to carry out further research on the application of E-LKPD virus material based on Know-Learned metacognitive in the number of research subjects is greater. Further research should take advantage of compatible platforms for computers and smartphones that save quota because of the limited quota that students have.

ACKNOWLEDGEMENT

Thanks are conveyed to the Principal of SMAN 2 Mejayan and Dwi Susanti S.Pd as the class X biology teacher who gave permission and opportunity to conduct research. Thank you also to the X MIA 1 students and the three observers who have contributed and helped the research. The author's thanks are also given to both parents and friends for their prayers and support

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