



## Development of ELKPD Based on a Learning Model Sole Using Liveworksheet for Reaction Rate Material in Second Grade Senior High School

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**Abstract.** This study aims to produce a valid SOLE-based reaction rate electronic student activity sheet (E-LKPD) and to determine user responses to the resulting product. The research method used is research and development (R&D) using the ADDIE (Analysis, Design, Development, Implementation and Evaluation) development model. The research instrument is a validation sheet given to three validators and a user response sheet to one chemistry teacher of Senior High School 7 Pekanbaru and one chemistry teacher of Senior High School 11 Pekanbaru as well as 13 class XI students of Senior High School 7 Pekanbaru and 13 class XI students of Senior High School 11 Pekanbaru. The data analysis technique is carried out by calculating the percentage of validation assessment scores and user responses, the results of which are measured by an attitude assessment table. The results of the study indicate that the electronic student activity sheet (E-LKPD) based on SOLE that was developed has met the valid criteria by the material validator based on the aspect of content feasibility of 92.19%, SOLE model characteristics of 95.83%, pedagogic of 93.75%, linguistic of 95.83% and graphic of 95.83%. For the media validator based on the aspect of size of 100%, cover design of 92.50% and content design of 97.50%. While the user response based on teacher and student responses is in the very good criteria with scores of 94.79% and 88.05% respectively.

**Keywords:** E-LKPD, Learning Model SOLE, Liveworksheet.

### 1. INTRODUCTION

The rapid development of information technology today has brought various changes to the world, especially in the world of education. Based on Government Regulation of the Republic of Indonesia Number 57 of 2021 concerning national education standards, Article 40 paragraph 1 states that the learning process must be supported by the use of information and communication technology (ICT) to support the effectiveness and quality of education. Furthermore, Article 30 explains that the development of technology in the context of learning is the responsibility of the head of the education unit together with functional position groups, including teachers.

In the learning process, student activity can be influenced by several factors such as the use of teaching materials. Teaching materials can be in the form of textbooks, modules, handouts, LKPD or E-LKPD, audio teaching materials, interactive teaching materials and so on. One of the teaching materials commonly used is the Student Worksheet (LKPD). The use of LKPD in the learning process can build and improve students, especially in chemistry material, both theory, calculations and chemistry practicums (JK & Yuliani, 2021).

The interviews with chemistry teachers at Senior High School 7 Pekanbaru and Senior High School 11 Pekanbaru showed that in the learning process, teachers have used LKPD, but the LKPD used is a printed LKPD that is not yet technology-based. This LKPD has not been able to attract students' attention in the learning process and has not been able to find concepts independently. This can be seen from the LKPD which only contains questions without any short material or videos displayed. Based on the interview, information was also obtained that the graduation rate of students at Senior High School 7 Pekanbaru and Senior High School 11 Pekanbaru on the reaction rate material was 60% and 50%, respectively, which reached the KKTP standard (Criteria for Achieving Learning Objectives). So according to Indriani, et al. (2023) to optimize it both in terms of appearance and learning quality, a transformation based on the convergence of information and telecommunications technology (ICT) is needed. In this transformation, printed LKPD can be replaced with electronic LKPD that is ICT-based so that the learning process can be more lively, deeper and can increase innovation and creativity of students. Electronic LKPD is an alternative that can be used to support the learning process, consisting of learning videos, materials and questions that can be accessed via electronic devices such as mobile phones.

Another problem is that the LKPD used by teachers does not yet contain the requirements for compiling LKPD. (Herawati, Gulo, & Hartono, 2016) explained that the didactic requirements for compiling LKPD are that LKPD emphasizes the process of finding concepts so that it can function as a guide for students to find out, has a variety of stimuli through various media and student activities, and can develop social communication skills in students according to the syntax. Based on this description, the LKPD used by teachers does not yet contain the requirements that should be in the LKPD. Apart from the didactic requirements, the LKPD used by the two schools does not yet meet the technical requirements, where the cover of the LKPD does not motivate students to learn chemistry, especially the reaction rate material. To overcome this problem, it is necessary to develop the LKPD. The LKPD developed is the electronic LKPD (E-LKPD) which is collaborated with a relevant learning model. E-LKPD based on a learning model contains stages that make learning activities effective. One learning model that can be used is the Self-Organized Learning Environment (SOLE) learning model.

The SOLE learning model was first initiated by an Indian education practitioner, Sugatra Mitra in 2015. He conducted an experiment in the suburbs of New Delhi. With the first phase in this learning model, namely, questions, which aim to get students to create questions based on a phenomenon/discourse; the second phase, namely investigation, which aims to conduct investigations and explorations, the third phase, namely sharing, which aims to draw

conclusions and communicate (Mitra, 2015). SOLE is an innovative learning model that emphasizes independent learning, collaboration, and critical thinking of students (Novianti. et al., 2022). One platform that can support the integration of technology-based LKPD using the SOLE model is the liveworksheet platform.

Liveworksheet refers to a web-based platform designed to create interactive electronic Student Activity Sheets that enhance the learning experience at various levels and subjects (Novike Bela Sumanik, et al., 2023). This platform allows educators to develop engaging materials that combine a variety of question formats, such as multiple choice, drag and drop, and word searches, making learning more dynamic and enjoyable (Bela Sumanik, et al., 2023). The development of E-LKPD based on the SOLE learning model using Liveworksheet on the reaction rate material for grade XI SMA/MA equivalent is expected to be one of the teaching materials that can improve students' understanding and activeness in the material. Thus, it is hoped that students can better understand the reaction rate material, both in terms of theory and calculations. The development of E-LKPD using technology is also in line with government policies in integrating information and communication technology (ICT) in the learning process.

Previous research related to the development of SOLE-based E-LKPD has been conducted by (Lestari, 2023) with the title Development of Science Literacy-Based E-LKPD with the Self Organized Learning Environment (SOLE) Learning Model on the Subject of Acids and Bases. The results of the study showed that the E-LKPD design obtained a feasibility validation result of 89.53%, practicality of 95.56% and user response of 87.56%, which means that this E-LKPD is categorized as valid and suitable for use in the learning process. In chemistry learning, until now the development of SOLE-based E-LKPD, especially on the reaction rate material, has not been available. In connection with the background of the problems that have been described, researchers are interested in conducting research with the title “Development Of Elkpd Based On A Learning Model Sole Using Liveworksheet For Reaction Rate Material In Second Grade Senior High School”.

## 2. RESEARCH METHOD(S)

The development of SOLE-based e-LKPD using liveworksheets on reaction rate material was carried out using the Research and Development (R&D) method with the ADDIE development model. The stages of this model include Sugiyono (2019: 39) Analysis, Design, Development, Implementation and Evaluation. This can be seen in Figure 1



The results obtained are converted into qualitative data based on the assessment criteria of the attitude measurement scale with scores. The assessment criteria can be seen in Table 1.

**Table 1.** Attitude Measurement Scale Assessment Table

<b>Persentase</b>	<b>Criteria</b>
86,00 – 100	Very Good/Valid
70,00 – 85,99	good/quiet Valid
50,00 – 69,99	Less Good/Less Valid
0 – 49,99	Not Good (replaced)

(Riduwan, 2008)

### 3. FINDINGS AND DUSCUSSION

#### Analysis Stage

##### Needs Analysis

The first thing to do at the analysis stage is to conduct a needs analysis, the results obtained from this analysis are that the LKPD used by teachers is a LKPD that is only a collection of formulas and practice questions. The LKPD has not been able to guide students to practice scientific skills and build knowledge independently. And also, the cover of the LKPD used is not attractive so that students are less motivated to learn and causes a lack of meaningful learning for students. For this reason, innovation is needed in the development of LKPD, namely in the form of electronic LKPD.

The use of this electronic LKPD can create a pleasant and not boring learning atmosphere. This is because the electronic LKPD does not only contain short material and practice questions, but also contains images, videos, animations and others that make users more interactive with the program. Another problem is that the LKPD used does not meet the didactic requirements and technical requirements. A suitable LKPD is an LKPD that meets the requirements for compiling LKPD.

##### Student Analysis

The results obtained from the analysis of student characteristics are that students from each school enjoy the learning process using gadgets and students still do not understand the reaction rate material, especially the calculation material, because according to them the calculation material has high complexity and is abstract. Furthermore, information was obtained that the successive graduation rates of students in the reaction rate material at Senior High School 7 Pekanbaru and Senior High School 11 Pekanbaru were 60% and 50% who reached the KKTP, this proves the need for innovation in the use of better teaching materials.

Therefore, students need teaching materials such as SOLE-based E-LKPD which can guide students in understanding the material and its relationship to everyday life so that learning objectives will be achieved and can increase students' interest in studying chemistry material.

### Learning Objectives Analysis

The results of this analysis are information obtained that both schools have used the independent curriculum in the learning process in class XI so that learning objectives for the reaction rate material can be compiled which can be seen in the table below.

**Table 2.** Learning Objectives of Reaction Rate Material

Learning Objectives	Topic	Meeting to	Time Allocation
1. Students are able to explain the concept of reaction rate and provide examples of the use of the concept of reaction rate related to everyday life.	reaction rate and application of the concept of reaction rate in life	Meet 1	2 JP (2 x 45 Minute)
2. Students are able to calculate the reaction rate of a reaction.			
1. Students are able to explain the relationship between reaction rate factors (concentration, surface area and temperature based on collision theory)	Factors that affect reaction rate	Meet 2	2 JP (2 x 45 Minute)
2. Students are able to explain the relationship between reaction rate factors (catalysts based on activation energy)			
1. Students are able to carry out practical work on factors that influence reaction rates (concentration, surface area, temperature and catalysts).		Meet 3	3 JP (2 x 45 Minute)
1. Students are able to describe the relationship between reaction order and reaction rate	Reaction rate equation and reaction order	Meet 4	3 JP (3 x 45 Minute)
2. Students are able to write the rate equation and reaction order based on the data provided.			
3. Students are able to calculate reaction order and rate constant based on experimental data.			

## Design Stage

The step of this stage is format selection. Format selection is used for the display on the E-LKPD to be proportional and precise. Format selection consists of paper selection, paper orientation, margins, and font type and size. which refers to the qualification of the book in the SMA/MA chemistry book assessment instrument for graphic aspects (BSNP, 2006). This E-LKPD uses A4 paper type with portrait orientation. The font type and font size that are not too diverse are used as reasons for the E-LKPD design to be harmonious and cohesive. Most of the fonts used are montserrat, and the font size is adjusted to the position on the E-LKPD, such as the title, subtitle and material. The outline format or display on the E-LKPD in each learning material is adjusted to the material, invitation sentences in activities, such as do it, answer it, group activities, and activity sheets. The result of this design is the E-LKPD prototype.

The design of the instrument in the form of a validation sheet by the validator has been carried out by collecting relevant literature related to the instrument, so that the validation sheet design and validation sheet rubric are obtained. The design of the material expert validation sheet refers to BNSP (2006) which has been adjusted to the needs of developing E-LKPD, namely developing SOLE-based E-LKPD on valid reaction rate material based on the feasibility of the content, characteristics of the SOLE model, pedagogy, language, and graphics. The design of the media expert validation sheet consists of the E-LKPD size, E-LKPD cover design, and E-LKPD content design. The assessment points in each validation instrument are equipped with an assessment rubric used to assist the validator in assessing the feasibility and use of E-LKPD in the learning process. So that a good validation sheet and user response are obtained as seen from the assessment aspects.

## Development Stage

The results of the development stage are Electronic Student Activity Sheets (E-LKPD) based on SOLE using liveworksheets on the reaction rate material for class XI. An example of E-LKPD can be seen in the image below.



Figure 2(a) cover view



Figure 2(b) E-LKPD Description Material



Figure 2(c) Short

The developed E-LKPD was then validated. The validation of E-LKPD was carried out by 3 validators, namely 2 material expert validators and 1 media expert validator. The assessment instrument used was a validation sheet. Validation was carried out 2 times by the three validators. The first validation stage in E-LKPD contained several errors and the validators provided suggestions and input on E-LKPD. At the validation stage, revisions were also made based on references and suggestions from the validators in order to obtain a better SOLE-based E-LKPD using liveworksheets on reaction rate material. The second validation stage has made improvements and E-LKPD is in the valid category in terms of material and media. The following are details of the validation results based on the validator's assessment:

### Validation by Material Experts

Validation of material experts on SOLE-based E-LKPD using liveworksheets on reaction rate material consists of 5 assessment aspects, namely aspects of content feasibility, SOLE characteristics, pedagogy, language and graphics. Quantitative data are obtained from calculating the average score of the material expert validation sheet for all aspects as follows :

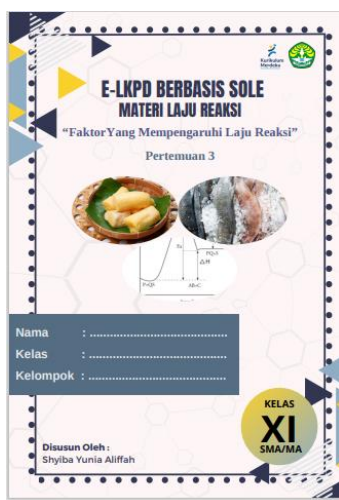
**Table 3.** Recapitulation of Total Percentage of Validation by Material Experts

No	Assessment Aspects	Percentage Score by Two Validators	
		The validation of the	
		1	2
1	Aspects of content feasibility	89%	92,19
2	Aspects of Characteristic SOLE	70,83	95,83
3	Aspects of Pedagogic	89,58%	93,75
4	Aspects of Language	85,42%	95,83
5	Aspects of Graphics	83,33%	95,83



<b>Average Percentage Score</b>	<b>83,63</b>	<b>94,68</b>
<b>Overall Average Validity Criteria Aspects</b>	<b>quite Valid</b>	<b>Valid</b>

Based on the table above, the average validation of the material, the average percentage for the first validation of the criteria obtained was only up to the fairly valid category of 83.63%. Then a revision was made according to the suggestions and input given by the validator so that when the second validation was carried out, a percentage of 94.68 was obtained with a valid category. An example of the revised display can be seen in Figure 3



**Figure 3 (a)** unrevised E-LKPD  
Cover display



**Gambar 3 (b)** revised E-LKPD  
cover display

In figure 3 (a) is the cover display before revision, then the material validator suggested changing the E-LKPD cover, because the cover looks unattractive so it is less able to attract students' interest in learning and less able to motivate students to want to work on E-LKPD. So the cover revision was carried out which is seen in figure 3 (b).

### Validation By Media Expert

Media validation of SOLE-based E-LKPD using liveworksheet consists of aspects of E-LKPD size, E-LKPD cover design and E-LKPD content design. Quantitative data is obtained from the calculation of the average score of the media expert validation sheet for all aspects as follows:

**Table 4.** Recapitulation of Total Percentage of Media Expert Validation

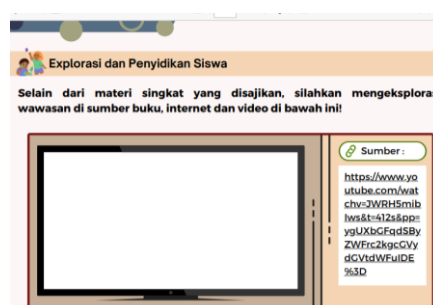
No	Assessment Aspects	Percentage Score by Validator	
		The validation of the	
		1	2
1	Aspects E-LKPD size	100%	1
2	Aspects of E-LKPD cover design	100%	2

No	Assessment Aspects	Percentage Score by Validator	
		The validation of the	
		1	2
3	Aspects of E-LKPD content design	77,52%	3
Average Percentage Score		92,50%	97,50%
Overall Average Validity Criteria Aspects		Valid	Valid

Based on the table above, the average validation of the material, the average percentage for the first validation of the criteria obtained is valid at 92.50%. Although it is already in the valid criteria, there are still suggestions and input from the validator, especially on the use of buttons, the results of the revision can be seen in the image below



**Figure 4 (a)** There is no link display in the e-LKPD before the revision



**Figure 4 (b)** There is an additional link display on e-LKPD after the revision

In figure 4.4 (a) is the video display before revision, then the media validator suggested adding a link, because the video did not include a link. So a follow-up was carried out by adding a video link which is seen in figure 4.4 (b). After the revision was carried out, a second validation was carried out and an average percentage of eligibility was obtained of 97.50 with a valid category.

## Implementation Stage

### Teacher Respon Tests

Teacher responses were conducted on grade XI chemistry teachers from Senior High School 7 Pekanbaru and Senior High School 11 Pekanbaru. The teacher response test for chemistry teachers at Senior High School 7 Pekanbaru was conducted on February 4, 2025. The teacher response test for chemistry teachers at Senior High School 11 Pekanbaru was conducted on February 11, 2025, where according to the teacher concerned, the E-LKPD developed was very good and suitable for use in the learning process, because E-LKPD can be opened on Android, making it easier for students to learn anywhere and anytime. So that the average percentage of teacher response test scores can be seen in table 4

**Table 5.** Recapitulation of Total Percentage of Teachers Response

Assessment Aspects	Average Teacher Response Score (%)	Teacher Response Criteria
Aspek of Attration	100%	Very Good
Aspek of effectiveness	96,87%	Very Good
Aspek of Practicality	87,50%	Very Good
<b>Average Score Percentage</b>	<b>94,79%</b>	<b>Very Good</b>

The average percentage of the attractiveness aspect, the effectiveness aspect and the practicality aspect respectively are 100%; 96.87% and 87.50%. While the overall average percentage is 94.79% which is in the range (86.00%-100%) with the category "Very good".

### Student Respon Tests

Small group trials were conducted on 20 students consisting of 10 students from Senior High School 7 Pekanbaru and 10 students from Senior High School 11 Pekanbaru. Small group trials were conducted face-to-face. Small group trials for each student were conducted in different time periods, namely February 5, 2025 and February 12, 2025. Before providing the E-LKPD link to students, the researcher first conveyed the researcher's intentions and objectives to the students. The researcher also provided a brief explanation of SOLE-based E-LKPD using liveworksheet. Then, the researcher distributed the E-LKPD link and user response questionnaire to the students. Furthermore, the students worked on the E-LKPD. So that the average percentage of student response test scores can be seen in table 5

**Table 6.** Recapitulation of Total Percentage of Students Response

Assessment Aspects	Averrgre Score of (%)		Average Percentage of Total Score (%)	Criteria
	Senior High School 7 PKU	Senior High School 11 PKU		
Aspek of Attration	85,31%	90,31%	87,81%	Aspek of Attration
Aspek of ease of use	85%	Very Good	87,50%	Aspek of ease of use
Aspek of Practicality	87,50%	Very Good	88,75%	Aspek of Practicality
<b>Average Score Percentage</b>			<b>88,05%</b>	<b>Very Good</b>

The results of small group trials to students received positive comments and suggestions from students. The average percentage of student responses was the aspect of attractiveness of 87.81%, the aspect of ease of 87.50% and the aspect of practicality of 88.75%. In the response of E-LKPD users from several aspects that obtained the highest percentage was the aspect of practicality: 88.75%. This shows that the platform used is very easy to operate.

## **Evaluation Stage**

Evaluation at the design stage is an assessment of whether the learning objectives can be achieved with the design that has been made. For this reason, at the design stage, an initial design/draft/prototype of SOLE-based E-LKPD can be produced using the liveworksheet platform on the reaction rate material. Then the evaluation at the development stage is carried out based on criticism and suggestions from material expert validators and media experts so that valid teaching materials are obtained. Summative evaluation is the final revision of the product developed based on suggestions and input from teachers and students given during the implementation stage.

Summative evaluation is carried out by providing an assessment questionnaire to teachers and students. Based on the assessment questionnaire, the teacher assessed that SOLE-based E-LKPD using the liveworksheet platform on the reaction rate material was good and could be used in the learning process. In addition, based on the assessment questionnaire by students, students provided positive comments and constructive suggestions such as the answer column being widened and the writing in the E-LKPD being enlarged.

## **Discussion**

Analysis of the need for the development of E-LKPD because E-LKPD supports the learning process practically and interactively. This is in accordance with (Bombang & Viktor, 2022) Electronic LKPD is a form of interactive LKPD. One of the supports for interactive e-LKPD is e-LKPD based on SOLE learning. This model is a model that can make students learn independently. (Hasanah, 2021). The self-organized learning environments (SOLE) learning model is a learning model based on independent learning. This learning can help students understand the material and increase their enthusiasm for learning through learning. In the SOLE model, the term "Self-Organized" refers to the process in which students are independently given the freedom to explore, collaborate, and actively find information from various sources. (Almaki, 2024). "environment" refers to the learning environment of students integrated by technology that allows students to access various information, facilitate independent learning and critical thinking (Nurhayanti, Ayu, & Pramitra, 2023). Therefore, students need teaching materials such as SOLE-based E-LKPD that can guide students in understanding the material and its relationship to everyday life so that learning objectives will be achieved and can increase students' interest in studying chemistry material. (Ramadhani & Setiawan, 2024) is needed in making E-LKPD products because the learning carried out must be adjusted to the stage of cognitive development that students go through. The characteristics of this stage are the ability to think abstractly but limited, reason logically, and draw

conclusions from available information and children already have the ability to think systematically, namely being able to think of all possibilities (Yusuf & Syamsu, 2016)

The first validation by the material expert obtained a less than satisfactory score percentage of only 83.63% which was included in the fairly valid category. In response to this, the validator provided quite a lot of comments and suggestions for revision. The validator assessed that the e-LKPD cover was less able to motivate students to learn the reaction rate material. Following up on these comments and suggestions, the researcher revised the e-LKPD cover section. (Zein & Musyarofah, 2024) A good E-LKPD cover should be designed to attract attention and motivate students in the learning process. Attractive visual elements, use of inspiring language, and relevance to learning materials can increase students' enthusiasm for learning. In addition, the revision made by the researcher was in the e-LKPD 2 part of the discourse regarding the sub-material factors that affect the reaction rate, the researcher made a discourse on brewing tea which is included in the concentration factor. However, the validator suggested changing the discourse because the tea brewing process is a physical change reaction while the reaction rate material contains chemical change reactions. So the researcher changed the discourse to the metal rusting process due to salt concentration in seawater. The reaction rate always refers to a chemical change because it measures how quickly reactants are converted into products. It involves changes in chemical bonds, which is a characteristic of chemical reactions (Martharefa, 2017).

In the first validation, the characteristics aspect of the sole model only received a score percentage of 70.83% because at the investigation stage the researcher presented full material which made students not have the opportunity to investigate other sources. Then the researcher carried out a follow-up in the form of revisions and only presented brief material, so that at the time of the second validation a score percentage of 95.83% was obtained with a valid category. This is in accordance with (Hidayat, 2022) "at the investigation stage, students are given the opportunity to conduct investigations and explorations from various sources to explore knowledge and the main source for finding answers is the internet either through gadgets. Furthermore, the validator provided suggestions and comments related to the questions that the researcher gave on E-LKPD 1 and 4. The validator saw that the questions given did not contain many calculation questions, so as a follow-up, the researcher revised the E-LKPD and included several calculation questions, in accordance with research (Hassan, 2020) which states that "Calculation questions often present data that must be analyzed and interpreted before they can be used in calculations. This trains students' ability to identify relevant information and requires students to think critically.

The first validation of E-LKPD conducted by media experts obtained a percentage score of 92.50 which is included in the valid category. Even so, the smallest percentage score is in the content design aspect of 77.50% included in the fairly valid category. The media validator said that the content design of the e-LKPD that the researcher made was still not neatly arranged and also the use of buttons had not been provided which made it difficult for students to access it. Following up on these comments and suggestions, the researcher made revisions by adding the necessary buttons. Furthermore, after the second validation was carried out, a percentage score of 92.50% was obtained which was included in the valid category. In accordance with In making media, it is necessary to pay attention to the selection of colour contrast, clarity, readability and proportional layout placement to make it attractive (Mahnun, 2019). The use of buttons functions as a navigation tool that makes it easier for students to move between pages or sections in the LKPD, so that the learning process becomes smoother and more efficient. In addition, buttons can also be used to trigger interactive actions, such as displaying additional information, playing videos, or sending answers, which can increase student engagement and understanding of the material. (Fuadah, 2021)

The teacher response trial obtained the largest percentage score in the aspect of attractiveness, which was 100%. Teachers considered that SOLE-based E-LKPD using liveworkshees on the reaction rate material was very interesting and in accordance with learning outcomes so that it could be used as a learning guide to achieve the expected learning objectives by utilizing the available learning time. This is in accordance with the statement (Suprihatin & Manik, 2020) that the use of interesting teaching materials in learning can increase student motivation, interest and learning outcomes. In line with research (Fitriah & Wardana, 2019) Student Worksheets (LKPD) which are packaged innovatively have been proven to be able to increase students' enthusiasm for learning. This shows that the design and presentation of materials in LKPD have an important role in creating an interesting and motivating learning experience. Innovation in LKPD can be in the form of the use of technology, attractive visual presentations, or the application of interactive and fun learning methods.

In the small group trial on E-LKPD 1 and 4, it is a LKPD that takes longer than LKPD 3 and 4, because LKPD 3 contains practical work and LKPD 4 contains calculation questions. Research shows that students often have difficulty in solving calculation questions compared to theory questions. This is due to the complexity and need to apply mathematical concepts in calculations, which take longer to understand and work on (Kamid, 2021). The student response trial obtained the largest percentage score in the practicality aspect, which was

88.75%. Students considered that the electronic LKPD used was very practical because it was easy to access anywhere with social networks. This is supported by research (Putri, 2024) the use of E-LKPD showed a high level of practicality in the work by students. This is because E-LKPD is accessed and worked on via gadgets, such as smartphones or tablets, which have become an inseparable part of students' daily lives. Thus, students can work on assignments anytime and anywhere, without being bound by time and place as in conventional LKPD. This practicality is also supported by interactive features in E-LKPD, such as online answer submission and instant feedback, which makes the assignment process more efficient and effective.

#### 4. CONCLUSION AND RECOMMENDATION

The development of SOLE-based E-LKPD using the liveworksheet platform on the reaction rate material for grade XI SMA/MA equivalent was carried out using the ADDIE development model. The results of the material validation consisting of aspects of content feasibility, aspects of SOLE model characteristics, pedagogical aspects, language aspects and graphic aspects obtained valid categories with percentages of 92.19%, 95.83%, 93.75%, 95.83% and 95.83% respectively with an average score percentage of 94.68%. The results of the media validation consisting of aspects of E-LKPD size, aspects of E-LKPD cover design and aspects of E-LKPD content design obtained valid categories with percentages of 100%, 92.50% and 97.50% respectively with an average score percentage of 97.50%. Then the summative evaluation was obtained based on an assessment questionnaire by teachers and students who provided comments and suggestions.

The teacher response trial obtained results with an average percentage of 94.79% with very good criteria. The teacher response test assessment consisted of aspects of attractiveness, effectiveness and practicality with scores of 100%, 96.87% and 87.50% respectively. The student response test obtained results with an average percentage of 88.05% consisting of aspects of attractiveness, ease and practicality with scores of 87.81%, 87.50% and 88.75% respectively with very good criteria.

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