

The Practicality of Electronic Biology-Based Student Worksheets (LKPD) Scientific Approach

Nurafni Darwis^{1*}, A. Asmawati Azis², Dian Dwi Putri Ulan Sari Patongai³

Biology Education, FMIPA, Universitas Negeri Makassar, Indonesia

Email: ¹nurafnidarwis23@gmail.com,

²asma.azis@unm.ac.id,

³dianputriulan@unm.ac.id,

*Corresponding Author

Article History

Received : 09 – 02 – 2023

Revised : 09 – 10 – 2023

Accepted : 30 – 10 – 2023

Keywords:

ADDIE, Electronic LKPD, Practical

Article link



Abstract

Development of Electronic Student Worksheets Based on Scientific Approach Plantae Material for Class X SMA Negeri 1 Kalukku. The research aims to develop an electronic worksheet based on a scientific approach to material plantae that meets practical criteria. This type of research is Research and Development (R&D) with the ADDIE development model which consists of five stages, namely analysis, design, development, implementation, and evaluation. The research subjects were biology teachers and students of class X IPA 1, SMA Negeri 1 Kalukku. Data was collected using several instruments, namely electronic worksheet validation sheets, teacher and student response questionnaire validation sheets and teacher and student questionnaires. The results of the research show that the developed electronic worksheet product is practical. The practicality test results from the teacher's response were 91.46% (very practical) and students' responses were 85% (very practical). Based on the results of the study, it can be concluded that the electronic worksheet products based on the scientific approach developed are practical.

©the authors

This is an open-access article under the CC-BY-NC-SA license

<https://creativecommons.org/licenses/by-nc-sa/4.0/>



Introduction

Scientific approach is an approach that can help improve learning outcomes, train scientific attitudes, and train students' science process skills. The scientific approach is very closely related to the skills and character of students, namely characters based on scientific attitudes such as hard work, discipline, honesty, openness, democracy, creativity, thoroughness, thoroughness, communicativeness, organization and responsibility (Sumiati, 2018).

The scientific approach is a scientific learning framework that is carried out by the 2013 curriculum, the steps in the scientific approach are a form of adaptation of scientific steps in science. The learning process can be equated with a scientific process, therefore the 2013 curriculum mandates the essence of a scientific approach in learning. The scientific approach is the organization of learning experiences in a logical sequence better known as 5M covering the learning process consisting of observing, asking, gathering information and communicating (Banawi, 2019).

Student worksheets are a means of learning activities that can help and facilitate understanding of the material being studied, besides that student worksheets are one of the printed teaching materials in the form of sheets of paper containing material, summaries and instructions for carrying out learning tasks that must be done by students who refer to basic competencies and indicators that must be achieved. Student worksheets are needed in the learning process because they can attract students to be actively involved in the learning process (Yuni et al., 2018).

The function of student worksheets (LKPD) is as teaching materials that can have the role of educators, but activates students more as teaching materials that make it easier for students to understand

the material provided, as teaching materials that are concise and rich in tasks to practice, and also facilitate implementation of teachers to students (Kristiyowati, 2018).

Student worksheets has a function as a study guide for students to facilitate students and teachers in the learning process. Student worksheets can also be said to be printed teaching materials in the form of filled paper sheets instructions for carrying out the task, and a little material that must be done by students who refer to basic competencies and goals achieved (Katriani & Danurejan, 2014).

Nurliawaty (2017) explained that the use of learning media such as student worksheets is an alternative to improve student learning outcomes, the presentation of LKPD can be developed with various kinds of innovations. There are various kinds of new innovations that can be applied in writing electronic LKPD, one of which is electronic LKPD, namely student practice sheets that are done digitally and are carried out systematically and continuously for a certain period of time. The role of electronic worksheets in the learning process is as a tool to impart knowledge, attitudes and skills to students (Sari, 2017).

The use of electronic worksheets in learning has an impact on student learning activities which become more enjoyable, learning becomes interactive, provides space for students to practice and motivates students in learning. Tita (2019) explained that e LKPD can help students understand and develop self-confidence in solving critical thinking questions.

Electronic student worksheets based on a scientific approach are presented with information and learning stages of students who follow the components of 5 scientific characteristics that are developed according to the main components with 5 characteristics of the scientific approach so that students will learn by observing, asking, trying, reasoning activities, and communicate (Widiyanti & Nisa, 2021).

The electronic student worksheet contains about learning materials that are arranged in a coherent manner into certain learning units, namely presented in electronic format which visually contains video images and is done more interactively, making learning more interesting (Puspita & Dewi, 2021).

The development of electronic student worksheets based on a scientific approach (scientific approach) in learning is intended to increase the creativity of students so that they are able to think systematically, logically and critically in accordance with the application of the 2013 curriculum through a scientific approach. In addition, students will find it easier to understand and construct concepts and know how to apply them in everyday life (Widiyanti & Nisa, 2021).

Rahmawati (2022) explained electronic student worksheets that use the Liveworksheet platform are very helpful for the implementation of student learning because they are practical and easy for students to use. The electronic student worksheet is a platform that is integrated with the technology used it contains effective pictures, animations and videos to attract the attention of students so they don't feel bored in the lesson. Learning process activities using electronic student worksheets are one of the efforts to adapt to the development of the 21st century technology based (Hafsah et al., 2016).

The difference between conventional student worksheets and electronic student worksheets in terms of practicality is very helpful for teachers, in improve the quality of student learning. Students will be more active as a result of being given an explanation of the material with a learning model equipped with audio visuals (Pratiwi & Aslam, 2021). This statement supported by research by Kholifah (2021) which states that there are advantages to electronic-based teaching material products can be accessed anywhere, anytime, easy to use, can increase students' interest in reading and there are many illustrations that can attract students' attention. Electronic teaching materials contain text, images and videos can motivate students to learn, because multimedia is developed in teaching materials, this can attract students' attention to study. while conventional student worksheets are in how to use technology.

From the description of these differences, it is an updated matter in the world of education regarding the tools used to increase student interest and motivation in carrying out assignments in the learning process (Riwu et al., 2018) Biology subject is one of the subjects that can be taught using a scientific approach because of the characteristics of biology as a science with concrete object studies that are captured by the senses and developed based on real experience. This empirical experience can make students active and interactive by using electronic student worksheets (Budiarti, 2017).

The initial analysis carried out to find out the field conditions regarding the electronic LKPD plantae material, was obtained from one of the study field teachers from the results of the interview it was concluded that students received the material using the lecture method, the use of the LKPD used was in the form of question sheets to be carried out, and the goals to be achieved, in addition to the form in which it is presented not yet in electronic form so participants do not know LKPD electronic, and the LKPD used is not based on a scientific approach, because the teacher make LKPD based on material needs. So to get ideal conditions you need an electronic LKPD that explains about in the form of a student work guide to make it easier for students to learn understand the application of learning material in electronic form using a desktop computer, notebook, smartphone or mobile phone (Putriyana, 2020).

Methods

The type of research conducted was development research, namely the development of electronic student worksheets based on Scientific Approach for class X high school students on plantae material. The research was conducted at SMA Negeri 1 Kalukku, Jalan Trans Sulawesi Tasiu, Kalukku, Kec. Kalukku, Mamuju Regency, West Sulawesi. The resulting product is a scientific approach-based LKPD on kingdom plantae material which has been tested on teachers and students of class X SMA Negeri 1 Kalukku even semester.

The research subjects were 39 class X students of SMAN 1 Kalukku. The object of this research is LKPD based on a scientific approach on Kingdom Plantae material for class X SMA students. LKPD based on a scientific approach was validated by two lecturers majoring in Biology FMIPA UNM and two Biology teachers at SMAN 1 Kalukku for the practical results of LKPD.

The research data comes from the results of validity and practicality questionnaires, the instrument validation sheet serves to be able to provide an assessment of the instrument consisting of the learning media development expert assessment validation sheet, material expert validation sheet, and teacher and student response instrument sheets for practicality tests. The research instrument used is a validation sheet to obtain information about the validity of the product based on the expert validator's assessment. The instruments in question are Student Worksheet validation questionnaires and instrument validation questionnaires (teacher response questionnaires and student response questionnaires).

LKPD was developed using the ADDIE model consisting of five stages according to its name which stands for first, second Analysis, Design, third Development, fourth Implementation, and finally Evolution, further stages will be described as follows.

1. Analysis

This stage is carried out based on needs analysis, objective analysis, content analysis, and structural analysis. The analysis activities in this study are described in more detail as follows:

a. Needs Analysis

The analysis stage of the needs of students and teachers was carried out by conducting interviews via whatsapp messages for teachers while students had an initial analysis using a questionnaire to collect information on students of SMA Negeri 1 Kalukku regarding the implementation of the learning process and the use of learning media.

b. Goal Analysis

Objective analysis is an analysis step that is carried out by taking into account the KI/KD required in the 2013 curriculum.

- KD. 3.8: Classifying plants into division based on general characteristics and linking their role in life, in mosses (Bryophyta) and ferns (pteridophyta).
- KD. 4.8: Presenting reports on the results of observations and analysis of plant phenetic and phylogenetic and their role in life.

c. Structure Analysis

Structural analysis was carried out by analyzing the structure of the concept of material to be contained in student worksheets, the material to be loaded was plantae (plants) material for class X even semester.

d. Content Analysis / Content

Aims to determine material boundaries both in terms of breadth and depth of biology material for class X SMA, especially plantae material in accordance with the 2013 curriculum.

2. Stage Design

The design stage is the stage for carrying out product design planning activities to be developed, the steps that can be taken in designing are as follows: 1). Provide supporting literature, 2). Making indicators of achieving core competencies (KI) and basic competencies (KD) according to the 2013 curriculum, 3). Analyzing learning objectives, 4). Conduct literacy studies from various references, 5). Design of student worksheet components (LKPD).

3. Development Stage

The development stage aims to apply all the stages that have been previously designed at the design stage to produce the final product, namely electronic student worksheets using the Canva application and the liveworksheet platform.

4. Implementation Stage

The practicality of student worksheets is measured based on the assessment results of 36 biology students and teachers at SMA Negeri 1 Kalukku. Test The practicality of the product is assessed from the students' and teachers' responses to the instrument student worksheets. Referring to Sugiyono (2010) practicality of teaching materials determined by whether the teachers' and students' responses

are positive or not positive how to match the results of the criteria according to according to Table 1.

Table 1. Assessment of Practicality

Category	Score
Strongly agree	5
Agree	4
Disagree	3
Don't agree	2
Strongly disagree	1

(Source: Sugiyono, 2010).

Data analysis techniques for teachers and students' responses to the use of scientific approach-based electronic LKPD, using data collection techniques in the form of questionnaires. According to Sudjana & Rivai (2007) to determine the percentage of respondents' ratings, the following formula is used:

$$PPR = \frac{\sum \text{Respondent score}}{\sum \text{Respondent} \times \sum \text{Items} \times \text{Highest scale}} \times 100\% \quad (1)$$

Information:

PPR	= Percentage of respondents' ratings
\sum Respondent Score	= Total score given by all respondents
\sum Respondents	= Number of respondents
\sum Items	= The number of items assessed.

After obtaining the percentage of the respondent's assessment, the percentage score of the statement indicator is determined using the formula:

$$SIP = \frac{\sum \text{Assesment Aspect Scores}}{\sum \text{Aspect}} \quad (2)$$

Information:

SIP	= Assessment indicator score
\sum Assessment aspect score	= Total score given by all respondents
\sum Aspect	= Number of aspects

Furthermore, the percentage score of the respondent's statement indicator was adjusted according to the practicality criteria referring to Riduwan (2010), the criteria according to the Table 2.

Table 2. Categories of Practicality Assessment E

Score	Information
81% - 100%	Very practical
61% - 80%	Practical
41% - 60%	Quit praqtical
21% - 40%	Less practical
0 - 20%	impractical

(Source: Riduwan, 2010).

5. Evaluation Stage

At this stage, after going through revisions based on questionnaire data from the responses of students and teachers at the previous implementation stage, it aims to give value to the final product. In addition, evaluation is also carried out at each stage of development.

Results and Discussion

The product produced in this research is an electronic student worksheet on plantae material for class X high school students. Electronic LKPD was developed by using the ADDIE model which consists of five stages, there are analysis, design, development, implementation and evaluation. Development stages and results development of electronic LKPD will be explained as follows:

a. Analysis Phase

1) Needs Analysis

The first stage was to identify the things faced by students and teachers during the learning process, at this stage the researcher interviewed one of the subject teachers in an unstructured way. From the results of the interviews, there were several things, namely, students received material using the lecture method, used worksheets that used in the form of worksheets to be worked on, and goals to be achieved, besides that the form presented is not yet in electronic form so that participants do not know about electronic LKPD, and the LKPD used is not based on a scientific approach, because the teacher makes LKPD based on material needs.

2) Content Analysis

Content analysis is carried out to find out the concepts that will be presented in the development of electronic worksheets that refer to Core Competencies (KI) and Basic Competencies (KD). Content analysis includes analysis of material and activities that will be included in the electronic LKPD, content analysis is carried out by researchers from the results of material collection and material analysis, journals that can be used in product development. Material analysis has the objective of identifying, detailing and systematically compiling material to be learned by students.

3) Structural analysis

Structural analysis was carried out to analyze the structure of the concept material to be contained in the electronic LKPD that would be developed, this was carried out to analyze the main concept of the subject matter of class X high school plantae which would be contained in the electronic LKPD. Structural analysis is made to ensure the product being developed includes all material information that students need to know.

4) Goal Analysis

Learning objectives are arranged based on indicators from the development of basic competencies in the 2013 curriculum. Learning objectives can help students to know the direction of learning. Learning objectives are arranged according to the ABCD formula, namely Audience, Behavior, Condition, and Degree.

b. Design Stage (Design)

The electronic LKPD development plan is carried out at the design stage, the design stage is carried out by the design format selection stage process. Electronic LKPD format or storyboard developed in a scientific approach-based research designed based on the display format on Liveworksheet.com.

c. Development

The development stage is the stage that aims to realize everything that has been done at the analysis and design stage. The results of the analysis and design stages are then compiled into a development product in the form of an electronic LKPD based on a scientific approach to material plantae. Assessment is obtained by analyzing research instruments based on assessments carried out by two expert validators, measuring data for validity analysis using a validation sheet which aims to test the feasibility of the research instrument to be used, product validation results are as follows by Table 3.

d. Implementation Stage

The implementation stage is the stage of implementing electronic worksheets by conducting practicality tests that have been validated previously and providing feedback to researchers and then analyzing them. The results of the teacher's response practicality test The practicality analysis was carried out by analyzing the data from the teacher's response questionnaire. The results of the teacher's response analysis can be seen in Table 4.

Table 4. Results of Teacher Response Analysis

No	Aspect	Average score	Information
1.	Appropriateness	94,29	Very practical
2.	Scientific approach activities	88,00	Very practical
3.	Serving	93,33	Very practical
4.	Language	86,67	Very practical
5.	Design	95,00	Very practical
Average		91,46	Very practical

(Source: Author's document, 2023)

Based on the data analysis above, it can be seen that the overall average score is 91.46 so that it can be classified in the Very Practical category (81% - 100%), thus the electronic LKPD that has been developed meets the practical requirements based on the analysis of teacher response data. The results of the practicality test of student responses, Practicality analysis was carried out by analyzing student response questionnaire data. The results of the student analysis can be seen in Table 5.

Table 3. Example of Electronic LKPD




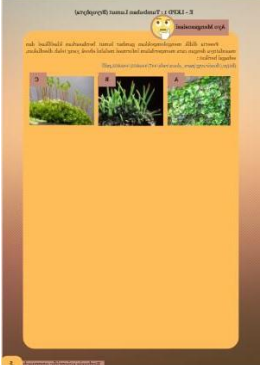
Scientific approach indicator	Example activities Electronic LKPD
Observe	
Ask	
Gathering Information	
Associate	

Table 5. Results of Student Response Analysis

No	Aspect	Average score	Information
1.	Benefit	83,08	Very practical
2.	Design	87,90	Very practical
3.	Scientific approach activities	85,23	Very practical
4.	Fill	85,30	Very practical
	Average	85	Very practical

Based on the analysis of the data above, it can be seen that the overall average score is 85 so that it can be classified in the very practical category (81%-100%), thus the electronic LKPD that has been developed is stated to be practical.

e. Evaluation stage

The evaluation stage in this study is the stage of the practicality analysis of electronic LKPD, the practical analysis of electronic LKPD is carried out by analyzing data from the results of the teacher's response questionnaire and the student response questionnaire with a limited test of 39 class X IPA 1 students and the results of suggestions from the teacher's suggestions.

Electronic student worksheets were created using the Canva application with the final result in the form of a Portable Document Format (PDF) with the help of the electronic LKPD live worksheet platform that meets the actual electronic criteria. As stated by Sari (2017) the learning process that is packaged in electronic form requires a web-based computer or smartphone facility on the internet site.

The practicality test was carried out to determine the practicality of the product resulting from the development. Respondents in the practicality test were biology teachers in class X IPA and students in class X IPA 1 who used electronic worksheets in groups, with a total of 8 groups of 39 students.

The teacher's response questionnaire consists of 5 aspects, namely the feasibility aspect, the scientific approach activity aspect, the presentation aspect, the language aspect and the design aspect. The response questionnaire was given to 2 biology teachers for class X IPA 1, the results of the analysis of the teacher's responses showed that the average acquisition score was at 91%, meaning that the teacher's response to the electronic LKPD was included in the very practical category so that it could be said to be practical.

Practicality tests with limited trials were also carried out by 39 students of class X IPA 1. The response questionnaire consisted of 4 aspects, namely aspects of benefits, design, scientific approach activities and content. The practicality test is carried out directly at the school with the results of the student response analysis showing an average acquisition score of 85%, meaning that the student's response to the electronic LKPD is included in the very practical category.

A scientific approach in learning can trigger student activity, this is in accordance with the results of Marjan (2014) learning with a scientific approach can improve biology learning outcomes and student activity. The application of a scientific approach to the learning process can be integrated into teaching materials such as modules, handouts, books, and worksheets.

The aim of this research is to produce scientific- based electronic student worksheets approach for Class Science and class X Science 1 students who use electronic LKPD in groups, with a total of 8 groups from the number of participants educated 39 people. The teacher response questionnaire consists of 5 aspects, namely the feasibility aspect, the activity aspect scientific approach, presentation aspects, language aspects and design aspects. Response questionnaire given to 2 biology teachers in class X Science 1, results of analysis of teacher responses shows that the average score is 91%, meaning the teacher's response electronic LKPD is included in the very practical category so it can be done stated to be practical.

Practicality testing with limited trials was also carried out by 39 students class X Science 1. The response questionnaire consists of 4 aspects, namely aspects of benefits, design, scientific approach and content activities. The practicality test was carried out directly at Schools with the results of analysis of student responses show achievement scores an average of 85% means that students' responses to electronic LKPD are included in very practical category.

During the research, there were several things that complemented each other's student shortcomings, such as when implementing the Electronic LKPD, some students had problems in the network section because they used school network access, so some students used a private network and gave their friends a hotspot so that can be accessed by each other. This electronic LKPD at the time of application looks enthusiastic and enthusiastic about learning students work on LKPD, besides that they follow the instructions properly based on a scientific approach, this can be found from the results of the student questionnaire and the suggestions in the questionnaire.

Conclusions and Recommendations

Based on the results of the research and discussion previously described, the following conclusions is electronic student worksheets based on the scientific approach to material plantae for class X SMA that have been developed are very practical.

The suggestion that can be made by researchers at the next stage is to develop an electronic-based student worksheet The scientific approach needs to be expanded to other biological material besides plantae.

References

- Banawi, A. (2019). Implementasi Pendekatan Saintifik Pada Sintaks Discovery/Inquiry Learning, Based Learning, Project Based Learning. *BIOSEL (Biology Science and Education): Jurnal Penelitian Science dan Pendidikan*, 8(1), 90-100. <http://dx.doi.org/10.33477/bs.v8i1.850>
- Budiarti, W., & Oka, A. A. (2017). Pengembangan Petunjuk Praktikum Biologi Berbasis Pendekatan Ilmiah (Scientific Approach) untuk Siswa Sma Kelas XI Semester Genap Tahun Pelajaran 2013/2014. *BIOEDUKASI (Jurnal Pendidikan Biologi)*, 5(2), 123-130. <http://dx.doi.org/10.24127/bioedukasi.v5i2.791>
- Hafsah, N. R., Rohendi, D., & Purnawan, P. (2016). Application of Electronic Module Learning Media to Improve Student Learning Outcomes on Mechanical Technology Subjects. *Journal of Mechanical Engineering Education*, 3(1), 106-112. <https://doi.org/10.17509/jmee.v3i1.3200>
- Katriani, L., and Danurejan, K. Y. (2014). Pengembangan Lembar Kerja Peserta Didik (LKPD). Yogyakarta: *Jurusan Pendidikan Fisika FMIPA Universitas Negeri Yogyakarta*, 1-6.
- Kholifah, W. T., & Kristin, F. (2021). Pengembangan Bahan Ajar Cerita Bergambar Tematik untuk Meningkatkan Minat Baca Siswa Sekolah Dasar. *Jurnal Basicedu*, 5(5), 3061-3072. <https://dx.doi.org/10.31004/basicedu.v5i5.1256>
- Kristyowati, R. (2018). Lembar Kerja Peserta Didik (LKPD) IPA Sekolah Dasar Berorientasi Lingkungan. In *Prosiding Seminar Dan Diskusi Nasional Pendidikan Dasar*.
- Marjan, J., Arnyana, I. B. P., & Setiawan, I. G. A. N. (2014). Pengaruh pembelajaran pendekatan saintifik terhadap hasil belajar biologi dan keterampilan proses sains siswa MA. Mu allimat NW Pancor Selong Kabupaten Lombok Timur Nusa Tenggara Barat. *Jurnal Pendidikan dan Pembelajaran IPA Indonesia*, 4(1).
- Nurliawaty, L., Mujasam, M., Yusuf, I., & Widyaningsih, S. W. (2017). Lembar Kerja Peserta Didik (Lkpd) Berbasis Problem Solving Polya. *JPI (Jurnal Pendidikan Indonesia)*, 6(1). <https://doi.org/10.23887/jpi-undiksha.v6i1.9183>
- Pratiwi, N., & Aslam, A. (2021). Pengaruh Model Pembelajaran Picture and Picture terhadap Kemampuan Berpikir Kreatif Siswa di Sekolah Dasar. *Edukatif: Jurnal Ilmu Pendidikan*, 3(6), 3697-3703. <https://doi.org/10.31004/edukatif.v3i6.1081>
- Puspita, V., & Dewi, I. P. (2021). Efektifitas E-LKPD berbasis Pendekatan Investigasi terhadap Kemampuan Berfikir Kritis Siswa Sekolah Dasar. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 5(1), 86-96. <https://doi.org/10.31004/cendekia.v5i1.456>
- Putriyana, A. W., Auliandari, L., & Kholillah, K. (2020). Kelayakan Lembar Kerja Peserta Didik Berbasis Model Pembelajaran Search, Solve, Create and Share pada Praktikum Materi Fungi. *Biodik*, 6(2), 106-117. <https://doi.org/10.22437/bio.v6i2.9255>
- Rahmawati, E., Kaspul, K., & Zaini, M. (2022). Pengembangan LKPD elektronik berbasis liveworksheet konsep sistem sirkulasi untuk meningkatkan keterampilan berpikir kritis SMA. *Practice of The Science of Teaching Journal: Jurnal Praktisi Pendidikan*, 1(1), 16-22. <https://doi.org/10.58362/hafecspost.v1i1.6>
- Riduwan. (2010). *Metode & Teknik Menyusun Thesis*. Bandung: Alfabeta.
- Riwu, I. U., Laksana, D. N. L., & Dhiu, K. D. (2018). Pengembangan bahan ajar elektronik bermuatan multimedia pada tema peduli terhadap makhluk hidup untuk siswa sekolah dasar kelas IV di Kabupaten Ngada. *Journal of Education Technology*, 2(2), 56-64. <https://doi.org/10.23887/jet.v2i2.16182>
- Sari, F. N., Nurhayati, N., & Soetopo, S. (2017). Pengembangan Lembar Kerja Peserta Didik (LKPD) Elektronik Teks Cerita Pendek Berbasis Budaya Lokal. In *Seminar Nasional Pendidikan Bahasa Indonesia (Vol. 1, No. 1)*.
- Sudjana, N. dan Riva'I, Ahmad. (2007). *Teknologi Pengajaran*. Bandung: Sinar Baru Algensindo.
- Sugiyono. (2010). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, kualitatif, dan R&D*. Bandung: Alfabeta.
- Sumiati, E., Septian, D., & Faizah, F. (2018). Pengembangan modul fisika berbasis Scientific Approach untuk meningkatkan Keterampilan Proses Sains siswa. *Jurnal Pendidikan Fisika dan Keilmuan (JPFK)*, 4(2), 75-88. <http://doi.org/10.25273/jpfk.v4i2.2535>
- Tita, N. A., Friska Septiani, S., & Eka Putra, R. (2019). Pengembangan Electronic Lembar Kerja Peserta Didik (ELKPD) Berbasis Guided Inquiry Materi Kelarutan Dan Hasil Kali Kelarutan (*Doctoral dissertation, Universitas Maritim Raja Ali Haji*).
- Widiyanti, T., & Nisa, A. F. (2021). Pengembangan E-LKPD Berbasis Pendekatan Saintifik untuk Meningkatkan Hasil Belajar Peserta Didik pada Pembelajaran IPA Kelas V Sekolah Dasar. *Trihayu: Jurnal Pendidikan Ke-SD-An*, 8(1). <https://doi.org/10.30738/trihayu.v8i1.11136>

Yuni, E., Ernawati, M. D. W., & Malik, A. (2018). Pengembangan Lembar Kerja Peserta Didik Elektronik Berbasis Proyek Pada Materi Termokimia Di Kelas XI Sma. *Journal of The Indonesian Society of Integrated Chemistry*, 10(1), 6-11. <https://doi.org/10.22437/jisic.v10i1.5306>