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Development of Students' e-Worksheet on Environmental Change using PRIMA Learning Model to Improve Science Process Skills

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Abstract: This study objective was to describe the validity, practicality and effectiveness of Blended Learning-based Student Worksheets on environmental change materials using the PRIMA Learning model in improving Science Process Skills. This study was conducted at SMA State 1 Batudaa Pantai Senior High School and employed ADDIE development model. The result demonstrated that the developed blended learning-based worksheets were valid for use in schools with the assessment result from validators in the score range of 89.2% - 91.7% (extremely valid). Students' worksheet practicality can be observable from several stages, including student activities, learning implementation, student responses' results with an average value of 91.25%, 100%, 93% (perfectly acceptable). Further, Students' worksheet effectiveness test based on the N-Gain score obtained a result of 0.68 (Effective), and the percentage N-Gain value (%) is 68 (moderately effective).In conclusion, the said learning is valid, practical, and effective in learning biology in class X SMA 1 Batudaa Pantai Senior High School.

Keywords: students' worksheet, environmental change, science process skills.

Abstrak: *Penelitian ini bertujuan untuk mendeskripsikan validitas,kepraktisan dan keefektifan Lembar Kerja Peserta Didik berbasis blended learning pada materi perubahan lingkungan menggunakan model Pembelajaran PRIMA dalam meningkatkan Keterampilan Proses Sains. Penelitian ini dilaksanakan di SMA N 1 Batudaa Pantai. Penelitian pengembangan ini menggunakan model pengembangan ADDIE. Hasil penelitian menunjukkan bahwa Students' worksheet berbasis blended learning yang dikembangkan telah valid untuk digunakan di sekolah dengan hasil penilaian dari validator yaitu pada rentang skor 89.2% - 91.7% (sangat valid). Kepraktisan Students' worksheet berbasis blended learning dilihat dari beberapa tahap yaitu aktivitas peserta didik, keterlaksanaan pembelajaran, respon peserta didik memperoleh hasil dengan nilai rata-rata 91,25%, 100%, 93% (sangat layak).Uji Keefektifan Students' worksheet berdasarkan N-Gain skor yang menghasilkan 0,68 (Efektif), dan nilai N-Gain presentase (%) yaitu 68 (cukup efektif). Kesimpulannya bahwa Students' worksheet berbasis blended learning pada materi Perubahan Lingkungan menggunakan model Pembelajaran PRIMA untuk meningkatkan keterampilan proses sains valid, praktis dan efektif digunakan dalam pembelajaran Biologi di kelas X SMA 1 Batudaa Pantai.*

Kata kunci: *lembar kerja peserta didik, perubahan lingkungan, keterampilan proses sains.*

▪ INTRODUCTION

The current situation nowadays, such as Covid-19 pandemic restricts the learning process in schools which result ineffective learning that causes difficulties for student to comprehend the material. On the other hand, continuous online learning without offline learning produces poor-quality study (Setiawan et al, 2022) states that through the online learning system that is applied, not a few problems arise, ranging from subject matter that has not been fully delivered by the teacher, to the many tasks given to students to access information that is constrained because of the difficulty of learning. hence, learning tools are needed in the form of lesson plans, Students' worksheet and

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modules that can be taught online or offline. Blended learning is a winning combination of learning (Fimala et al., 2022). (Husaini et al., 2019) States that blended learning is a combination of face-to-face learning and online learning so that teaching occurs both in the classroom and online or outside the classroom, and where online learning is a continuation of classroom learning. Based on science teacher, online learning is less effective because some students do not pay attention during teaching and learning activities, some purposefully turn off the camera, some eat during class, and so forth. As a result, student still needs gu idance from teacher through direct learning in class (offline learning). Therefore, the researcher develops Students' worksheet based on Blended Learning on Environmental Change material using PRIMA Learning model in order to adapt to current conditions. (Fimala et al., 2022) the use of Students' worksheet encourages students to be more active. Students' worksheet based on blended learning on environmental change materials was developed so that students can be more concerned about the environment by processing waste into handicrafts that can be used in everyday life (Yusuf et al., 2013) states that it is necessary for students to know that changes that occur in the environment that have a negative impact in the form of natural disasters are due to excessive use by humans. The role and concern of educators on the environment is very important as an example of students in everyday life (Ranti et al., 2019).

Learning is a challenging process that aids students in developing their skills and has the potential to alter behavior and cognitive processes. According to (Firanti et al, 2010), thinking skills are the ability to perceive something and the ability to think critically, such as difficult tasks referred to as higher order thinking skills. As stated by Browne and Keeley, higher order thinking skills are divided into critical thinking and creative thinking (Firanti et al, 2010). She also stated that Creative thinking capacity is defined as a mental process that produces original and interesting ideas. This allows individuals to provide various solutions to overcome the problems. A creative thinker is someone who possesses the ability to handle things easily.

Biology lessons are included in the Natural Sciences (IPA) family. Science has characteristics related to how to find out about nature systematically, so that science is not only a collection of information including facts, ideas, or principles but also a stage of discovery because it has characteristics related to the process of knowing about nature in a methodical manner (Carolina & Sutanto, 2017). Biology learning is a science that is closely related to everyday life, through the concept of biology will greatly assist students in solving problems related to the natural environment (Setiawan et al., 2021). Biology is one of the science-based subjects with the scientific method as a reference for delivering the material (Putri & Susanti, 2020). The implementation of the 2013 curriculum, explains that one of the tasks of the teacher is to change the view of teacher-centered learning to become student-centered. This allows students to be actively involved in learning and work together in discovering their knowledge. So that a teacher must have the competence to package material into a teaching material because good teaching materials allow students to develop thinking skills, process skills and scientific attitudes (Carolina & Sutanto, 2017). Teaching materials generally consist of knowledge, skills, and attitudes that students must learn to achieve predetermined competency standards (Titin et al., 2022)

Blended Learning-Based Students' worksheet with the PRIMA learning model uses the initial step in formulating the development of Students' worksheet, namely through conducting initial observations and interviewing the school at SMA Negeri 1 Batudaa Pantai which was carried out on February 9, 2021. Observations carried out included Biology teaching materials, the physical condition of the school , Biology students and teachers. Based on the results of this statement, the authors intend to conduct research on the development of Students' worksheet based on Blended Learning using the PRIMA learning model. The selection of Students' worksheet development in this study was seen because there was still a lack of understanding of teachers in compiling learning tools that were in accordance with curriculum content and learning activities that further empowered students' abilities, so that teachers only used learning tools from various sources, which were not in accordance with the characteristics of students in the form of modules. provided, the content is only reading, filling out practice questions and not many learning activities that can activate the enthusiasm, creativity and science process skills of students. Students' worksheet must assist the learning process and see the complete achievement of essential competencies (Ramadianti et al., 2021).

The use of Students' worksheet allows students to participate actively in teaching and learning activities, which also provide the student the freedom to fully express their abilities and talents in developing their thinking processes. According to (Magdalena et al., 2021) learning with the help of student worksheet makes students learn actively. Students' worksheet is one of the means to assist and facilitate teaching and learning activities so that an effective interaction will be formed between students and educators, so as to increase the activeness of students in improving learning achievement (Ranti et al., 2019) Further, it also presents several advantages, including student involvement in teaching and learning activities, and teaching students to identify and improve process skills (Syabani et al., 2018). This skill is very important to be trained on students in every subject, one of the skills studied is science process skills as one of the skills that must be possessed by students because the indicators contain skills in facing the progress of the 21st century era (Suliwa et al., 2021). (Anggraeni & Yonata, 2020) stated that the most significant way to develop students' science process skills is by conducting experiments. When someone has mastered process skills, then that person has been able to master high-level learning skills including solving problems and conducting experiments. Students' worksheet is composed using PRIMA model to determine the students' ability related to Science Process Skills (KPS) by examining the learning outcomes. The advantage of PRIMA-based Students' worksheet is that students are required to apply science skills in daily life in addition to solving problems linked to the learning materials. In addition, this model employs problems as the first step in gathering new insight in which the problems experienced by students are the first step for them to integrate real experiences by conducting collaborative research (Yusuf et al., 2016).

The Students' worksheet development selection in this study was due to the lack of teachers comprehension in composing learning tools, it is possible to direct students' mindset in building and understanding the material for Environmental Change while also fostering independence in students. Thus, it is expected that students' Science Process Skills will improve.

▪ METHOD

The study was carried out at SMA State 1 Batudaa pantai Senior High School in the Even Semester of February 2022 to March of 2022 Academic Year with a sample as many as 15 student of grade X Science at research site, meanwhile, the study's type is development type research using ADDIE development model (Analysis, Design, Development, Implementation, Evaluation). The first step of this research is to analyze the state of the learning device. At this stage, the necessary learning tools will be determined designed to help students. The second stage is the design or design at this stage the learning device for environmental change materials is designed with steps, namely looking at the content, material and language aspects. The third stage is the device development stage through several steps, namely 1) making blended learning-based Students' worksheet learning tools on environmental change materials. 2) reviewing learning tools by validating learning tools by a team of experts and teachers. 3) improve learning tools in accordance with suggestions and input from a team of experts and teachers, so that there is a comparison of the initial and post-revision tools. The final stage of a limited trial (small scale) where at this stage a valid, practical and effective Students' worksheet will be obtained.

The instruments used for data collection were as follows: a) Instruments of interviews with Biology teachers at the observation stage; b) Students' worksheet validation instruments by expert validators and Biology teachers; c) Instruments for student responses to Students' worksheet based on blended learning on environmental change materials using the PRIMA learning model to improve science process skills; d) Learning implementation instruments; e) The instrument of student activity observation sheet; f) instrument of pre-test and post-test questions to determine the students' science process skills before and after the implementation. The purpose of this study's pre-experimental design, which was not a real experiment, was to determine the effectiveness of using Students' worksheet. The form of pre-experimental design used by the author is the form of one group pre-test and post-test design. The following is a description of the design O1 x O2 where O1 is the pre-test score (before given treatment), x is the treatment given or experiment and O2 is the post-test score (after treatment) (Wahyuddin & Nurcahaya, 2018).

The data collection technique employed a test instrument for validity, practicality and effectiveness. Several expert validators assessed the study validity results in the Students' worksheet preparation. Based on data obtained, the presentation of Students' worksheet validity is calculated using a Likert scale reference. The results of the score scale obtained are then calculated with validation presentation using equivalent formula (Ismail et al., 2020). Data analysis of the practicality of Students' worksheet based on blended learning using the PRIMA learning model was obtained from the analysis of student activities, implementation of learning and response questionnaires given to students. Students' worksheet based on blended learning using the PRIMA learning model is said to be good in terms of the validity and practicality of the Students' worksheet, judging from the level of achievement of the criteria for the percentage of validity and practicality of the Students' worksheet based on blended learning using the PRIMA learning model is a percentage of 86%-100% with the criteria "very valid and very practical ", the percentage is 71%-85% with the criteria of "valid and practical", the percentage is 56%-70% with the criteria of "quite valid and quite practical", the percentage is 41%-55% with the criteria of "less valid and less practical", the

percentage 40% have “invalid and impractical” criteria (Yazid et al, 2016).

The analysis of the effectiveness of Students’ worksheet based on blended learning using the PRIMA learning model consists of 2 aspects, namely the learning outcomes test (problem solving analysis) and the N-Gain analysis. N-Gain analysis with blended learning-based Students’ worksheet effectiveness criteria using the PRIMA learning model, if the average value of Normalized Gain > 0.70 then it is "effective" or in the "high" category, if the average value of Normalized Gain is 0.30 and < 0.7 then it is "quite effective" or in the "medium" category, and if the average value of Normalized Gain is <0.30 then it is included in "less effective" or "low" category (Purnomo et al., 2018).

▪ RESULT AND DISSCUSSION

Students’ Worksheet Validity

The author utilizes the validation results and the comments from validator as a reference in revising the developed Students’ worksheet based on the inputs and suggestions provided by the validator. The revised result of Prototype I which called Prototype II is considered valid by the validator which then the Students’ worksheet wAs tested with limited distribution to grade X Science of said school. After the improvements of Prototype I in line with the validators' recommendations, the new prototype II then evaluated by the validator. Acccording to (Lestari et al., 2018), The validity test aims to evaluate developed Students’ worksheet.

The validation assesmetn obtained a score in the range of 89.2% - 91.7% (extremely valid), which meaning that the product was suitable for implementation with revisions. Further, after revisions, Students’ worksheet was tested at SMA State 1 Batudaa Pantai Senior High School for learning activities. In accordance with (Lestari et al., 2018), the developed Students’ worksheet is considered valid if it has a validity value of 80% and is considered invalid if it has a validity value of <80%. All in all, it can be concluded that Students’ worksheet based on Blended Learning is valid because it is considered in “very valid” category, and can be tested in line with validator’s criticisms and suggestions. (Desmiwati et al., 2017) claimed that the use of Students’ worksheet in learning can improve students' competence, meaning that the developed Students’ worksheet is a good quality Students’ worksheet. One of the criteria of it, is Students’ worksheet which has a high level of validity, while the terms of valid is interpreted as correct, precise, and rational.

Students’ Worksheet Practicality

Student Activities

Observation of student activities in using aforementioned learning aims to determine student activities during limited trials. (Irsalina & Dwiningsih, 2018) assert that observational data are supporting data to determine the practicality of the developed Students’ worksheet. Students are divided into several groups, the Students’ worksheet that is distributed already contains environmental problems which relate to daily life. (Suliwa et al., 2021) stated that science process skills will be assessed in groups and for each student during the learning process. Students will be given a chance to observe, ask questions, formulate hypotheses, conduct experiments, communicate, and apply these concepts. In line with (Setiawan et al., 2021), who stated that the learning process does

not accommodate scientific activities that can foster scientific attitudes and hone students' skills, science process skills will not develop in students. Student activities are obtained by completing a questionnaire in the form of a checklist that has been adjusted to the syntax in the lesson plans and acquired the results of the four online and offline meetings. The average score of student activities for online-offline meetings is 91.25, which indicates that that student activities during learning activities are included in very good criteria. According to (Wahyuddin et al., 2018), the success of student activities criteria in the study is considered good if at least 70% of students are actively involved in the learning process. (Besare., 2020), asserts that the teacher must developed their students' learning activities since those are crucial and fundamental in learning process.

Learning Implementation

Based on learning implementation outcomes using a checklist list questionnaire at four meetings based on blended learning and achieving good results, namely the virtual (online) I and III meetings which obtained a score of 100% and the meetings II and IV face-to-face (offline) meetings that obtained a score of 100% with excellent category. This is in accordance with (Wahyuddin et al., 2018) that the implementation criteria for learning are said to be well implemented if the average value of each aspect of the observations given by the observer at each meeting is in the implemented or heavily implemented category. The teacher must guide and encourage students to understand the material to implement the learning well. (Rahmayuningsih et al., 2018) state that in the learning implementation, teachers must be able to motivate and encourage students to be able to think hypothetically and the learning is carried out based on concepts, theories and empirical facts.

Students' Responses

The practical results of student responses were obtained from giving questionnaires to students after students had actually used Students' worksheet in learning activities, the questionnaire contained participants' responses to blended learning-based Students' worksheet which consisted of several aspects. The student responses result at SMA State 1 Batudaa Pantai Senior High School obtained an average score of 838 (93%) with a total of 15 students who responded positively towards Students' worksheet based on Blended Learning. It demonstrates that, it can easily use the aforesaid learning to enhance science process skills, in line with (Anggrahini et al., 2022), the product developed can be said to be practical if the product is easy to use and created in accordance with the learning design. Hence, Students' worksheet based on Blended Learning to improve Students' Science Process Skills acquired "very feasible" category to be utilized as teaching materials at research site. (Zainuddin et al., 2022), claimed that teaching material can be said to be acceptable if the average student is active and completes the assignments.

Worksheet Effectiveness

The pre-test results obtained an average value of 36.7. Pre-test was conducted to identify students' initial ability to improve Science Process Skills in the topics to be studied before using Blended Learning-based worksheets. After the learning topic has been presented, then a post-test is administered with the students' average value

obtained of 79.9. This shows that the Students' worksheet based on blended learning has a good effect on improving the Science Process Skills (KPS) of students. It indicated that the Students' worksheet based on blended learning has a positive impact on raising students' Science Process Skills (KPS). Further, the pre-test score was 100% incomplete, the lowest score was 23 and the highest score was 55. In contrast, post-test score was 87% complete, the lowest score was 66 and the highest score was 95 with the minimum mastery standard set at SMA State 1 Batudaa Pantai Senior High School, which is 75. In line with (Saputra et al., 2021) states that science process skills are cognitive skills, intellectual skills with a background in science process skills and sensorimotor skills. Therefore, written assessments can be used to examine science process skills, including cognitive skills.

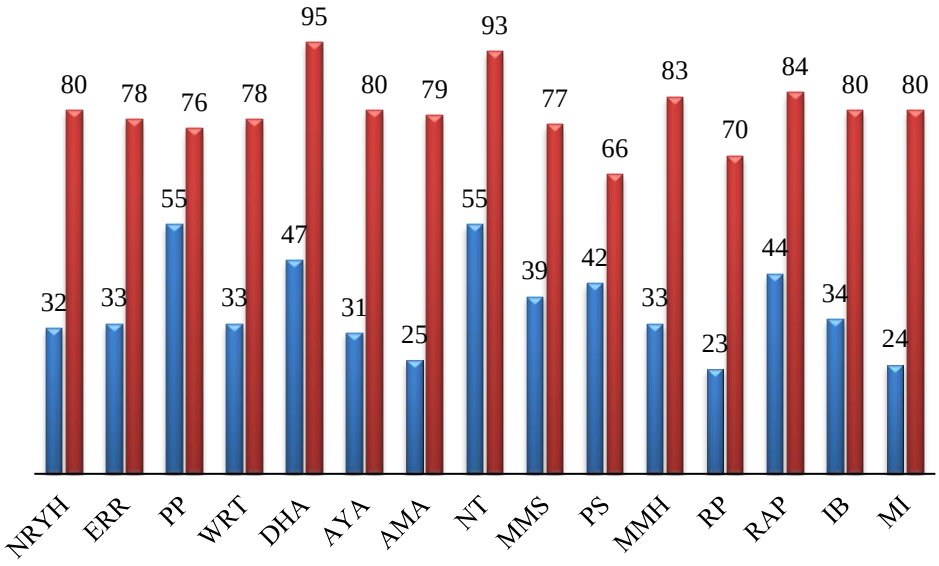

Figure 1. Student learning outcomes on pretest (blue) and posttest (red) questions

The results showed that the students' worksheet developed using the PRIMA learning model was effective for improving the Science Process Skills (KPS) of students at school site on environmental change material which was identified from student learning outcomes before and after using the students' worksheet learning tool, which the students are required to be able to observe, discuss, conduct question, answer, and create a handicraft product in groups. In line with (Setyawati., 2017) which describe that the value of students' Science Process Skills in the limited trial significantly increased from the pre-test and post-test scores. So it can be predicted that learning when in extensive trials will also increase the value of Science Process Skills. Therefore, it can be predicted that the said learning also able to improve Science Process Skills in a bigger area.

The increase in science process skills can be determined by calculating the N-Gain value which yield a value of 0.68 with moderate criteria and an N-Gain Percentage value (%) 68.2 with the effectiveness category of the N-Gain (56- 75). Thus, it can be concluded that the implementation of developed blended learning-based Students' worksheet is effective in improving the Science Process Skills (KPS) of students in

terms of students' learning tests result of pre-test and post-test, which have met a significant value of $p<0.05$ through t-test with a significant value of 0.00 and calculated using Normalized Gain. This is in line with (Setyawati, 2017) that the application of science process through science process skills and the growth of conceptual knowledge in learning will result in optimal learning outcomes, raising educational qualities. Learning success can be measured through understanding concepts (science products) and scientific performance (science process skills) which will affect the students learning comprehension

▪ CONCLUSION

Based on analysis and discussion, the validity of developed Blended learning-based Students' worksheet with revisions meets the extremely valid category with the validator's assessment results which is in the range of 89.2% - 91.7%, and is feasible to be tested on students at SMA State 1 Batudaa Pantai Senior High School. Meanwhile, the practicality of developed blended learning-based Students' worksheet is determined from three stages, including student activities, learning implementation, and student responses are in excellent and perfectly feasible category with each average score of 91.25%, 100%, and 93%, indicating that students are starting to have Science Process skills. Further, Students' worksheet based on blended learning effectiveness to determine the developed Science Process Skills (KPS) is identified from learning outcomes tests carried out during the learning process before (pre-test) and after (pos-ttest), which revealed the value of post-test learning outcomes was higher namely 79.9 than the pretest results, which was 36.7.

▪ REFERENCES

Anggraeni, R., & Yonata, B. (2020). Development of Inquiry Student Worksheet Through Internet Assisted Learning to Train Science Process Skills. UNESA Jurnal Pendidikan Dan Pembelajaran Kimia, 9(3), 43–54.

Anggrahini, I., & Rusmini. (2022). Improving Science Proses Skills and Collaboration on the Lesson on Reaction Rate Using Electronic Student Worksheet Assisted With Liveworksheets Website. Journal of The Indonesian Society of Integrated Chemistry, 14(1), 28–43.

Besare S. D. (2020). Hubungan Minat Dengan Aktivitas Belajar Siswa. JINOTEP (Jurnal Inovasi Teknologi Pembelajaran), 1, 18-25.

Carolina, H. S., & Sutanto, A. (2017). Pengembangan Buku Ajar Perubahan Lingkungan Berbasis Model Search, Solve, Create, Share (Sscs)Untuk Memberdayakan Kemampuan Berpikir Kritis Development of Textbook-Based Sscs Model on Enviromental [Development of Textbook-Based SSCS Model On Environmental Change Material To Improve The Critical Thingking]. Journal Of Biology Education Research, 1, 79–87.

Desmiwati, R., Ratnawulan., & Yulkifli. (2017). Validitas Lkpd Fisika Sma Menggunakan Model Problem Based [Validity of High School Physics Worksheets Using a Problem Based Learning Model Based on Digital Technology]. Jurnal Eksakta Pendidikan (JEP), 1, 33-38.

Fimala, Y., Alwi, N. A., Miaz, Y., & Darmansyah. (2022). Blended Learning LKPD Development Based on Learning Using Nearpod Applications for Integrated

Learning in Elementary School. Journal of Innovation in Educational and Cultural Research, 3(2), 97–105.

Firanti, A., & Paidi. (2016). Pengembangan Lkpd Pembelajaran Biologi Berbasis Masalah dan Keefektifannya Terhadap Kemampuan Berpikir Kreatif dan Reflektif [Development of LKPD Problem-Based Biology Learning and its Effectivness on Creative and Reflective Thingking Skills]. Integrated LAB Journal, 4(2), 259–268.

Husaini, A., Syarifuddin, H., & Usmadi, U. (2019). The Practicality of Learning Devices Cooperative Models Based on Blended Learning to Improve Learning Outcomes of 10th-Grade MA Students. International Journal of Trends in Mathematics Education Research, 2(3), 157.

Irsalina, A., & Dwiningsih, K. (2018). Analisis Kepraktisan Pengembangan Lembar Kegiatan Peserta Didik (LKPD) Berorientasi Blended Learning Pada Materi Asam Basa [Practicality Analysis of Developing the Student Worksheet Oriented Blended Learning in Acid Base Material]. JKPK (Jurnal Kimia Dan Pendidikan Kimia), 3(3), 171.

Lestari, L., Alberida, H., & Rahmi, Y. L. (2018). Validitas dan Praktikalitas Lembar Kerja Peserta Didik (LKPD) Materi Kingdom Plantae Berbasis Pendekatan Saintifik untuk Peserta Didik Kelas X SMA/MA [Validity dan Practicality of Student Worksheets (LKPD) Material Kingdom Plantae Based on a Scientific Approach For Students of Class X SMA/MA]. Jurnal Eksakta Pendidikan (Jep), 2(2), 170.

Magdalena, M., Putra, A. P., & Winarti, A. (2021). The Practicality of E-LKPD Materials on Environmental Pollution to Practice Critical Thinking. BIO-INOVED: Jurnal Biologi-Inovasi Pendidikan, 3(3), 210-215.

Purnomo, T., & Reynawati, A. (2018). Penerapan Model Problem Based Learning Pada Materi Pencemaran Lingkungan Untuk Melatihkan Keterampilan Berpikir Kreatif Siswa [Aplication of Problem Based Learning Model on Environmental Pollution Material to Train Students' Creative Thingking Skills]. 06(02), 325–329.

Putri, A. N., & Susanti, R. (2020). Application of Guided Inquiry Using Lkpd on Animal Tissue Topic and Its Impact To Science Process Skills and Students' Outcome Learning. Journal of Biology Education, 9(1), 36–42.

Rahmayuningsih, D. I., Mustaji., & Subroto, W. T. (2018). Pengembangan Lembar Kerja Peserta Didik (LKPD) Dengan Pendekatan Saintifik Untuk Meningkatkan Hasil Belajar Mata Pelajaran IPS Bagi Siswa Kelas IV Sekolah Dasar [Development of Student Worksheets (LKPD) With a Scientific Approach to Improve Learning Outcomes for Social Studies Subjects for Fourth Grade Elementary School Students]. Jurnal Review Pendidikan Dasar: Jurnal Kajian Pendidikan dan Hasil Penelitian, 4(2).

Ramadianti, A. A., Syahputra, E., & Mursidi, R. (2021). Development of Lkpd Based on Project Based Learning Model To Improve Mathematical Creative Thinking Ability of Grade V Elementary School Students. International Journal of Education and Lingusitics, 1(3), 729-741.

Ranti, S., & Usmeldi. (2019). Development of integrated science student ' s worksheet (LKPD) based on research-based learning integrated with religion value. Journal of Physics:Conference Series, 1185(1), 012143.

Saputra, K., Herlina, K., & Sesunan, F. (2021). The development of m-LKPD project-based assisted by smart apps creator 3 to stimulate science process skills. Gravity : Jurnal Ilmiah Penelitian Dan Pembelajaran Fisika, 7(2), 51–60.

Setiawan, R. R., Suwondo., Syafii, I. (2021). Implementation of Project Based Learning Student Worksheets to Improve Student's Science Process Skills on Environmental Pollution in High Schools. Journal of Educational Sciences, 5(1), 130–140.

Setiawan, T. Y., & Fikri, A. (2022). The Development Of E-LKPD Using Book Creator On Fraction Operations Material In Elementary School. MaPan:Journal of Mathematics and Learning, 10(1), 116–126.

Setyawati, H. (2017). Pengembangan Perangkat Pembelajaran Berbasis Masalah Untuk Meningkatan Keterampilan Proses Sains Siswa [Development of Problem-Based Learning Tools to Improve Students Science Process Skills]. Bioedukasi, 15(1), 32–42.

Suliwa., Widodo, W., & Munasir. (2021). Influence of LKPD to Facilitate Cooperative Group Investigation in Improving Students' Science Process Skills. Studies in Learning and Teaching, 2(3), 73–85.

Syabani, P., Darmawati., & Febrita, I. (2018). Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Pendekatan Kontruktivisme Pada Materi Perubahan dan Pelestarian Lingkungan Hidup Untuk Pembelajaran Biologi Kelas X SMA [Development Of Students Worksheet Based On Contracttivism Approach To Material Changes And Conservation Of Living Environment For Learning Biology Tenth Grade Senior High School]. Jurnal Online Mahasiswa, 5(1), 1–14.

Titin, T., Ganda, R., Panjaitan, P., Widiyatmoko, A. (2022). Development of Multimedia-Based Worksheets as a Teaching Material on Sub-Material of Invertebrates. Jurnal Penelitian dan Pembelajaran IPA, 8(1), 91–107.

Wahyuddin & Nurcahaya. (2018). Efektivitas Pembelajaran Matematika Melalui Pembelajaran Aktif Tipe Everyone is a Teacher Here (ETH) Pada Siswa Kelas X SMA Negeri 8 Takalar [Effectiveness of Learning Mathematics Through Active Learning of the Everyone is a Teacher Here (ETH) type in Class X SMA Negeri 8 Takalar]. Al-Khawarizmi: Jurnal Pendidikan dan Pembelajaran Matematika, 2(1), 72–105.

Yazid, K., Susantini, E., Fitrihidajati, H. (2016). Validitas Buku Saku Materi Ekologi Untuk Siswa Kelas X SMA [Validity of The Ecology Matter Pocket Book For Class X Senior High School]. BioEdu Berkala Ilmiah Pendidikan Biologi, 3(3), 571–579.

Yusuf, F. M., Baderan, D. W. K., Amu, A. S. (2013). Pengembangan Rencana Pembelajaran Untuk Menanamkan Karakter Peduli Lingkungan [Development of Lesson Plants to Instill a Caring Character for the Environment]. Conference on Research & Community Services, 241, 241–248.

Yusuf, F. M., Kardi, S., & Rahayu, Y. S. (2016). Learning Tool Development To Train Thinking Skill of Biology Students Using the PRIMA Learning Model. International Conference on Education (IECO), 1, 262–271.

Zainuddin., Luthfia, S., Syukri, M., & Prayogi, S. (2022). Implementation of Engineering Everywhere in Physics LKPD Based on STEM Approach to Improve Science Process Skills. Jurnal Pendidikan Sains Indonesia, 10(2), 231–239.