Jurnal Bidang Pendidikan Dasar
Vol 8 No 1, January 2024, pp 96 – 106
Available at:
http://ejournal.unikama.ac.id/index.php/JBPD

PBL-based liveworksheet e-LKPD to improve critical thinking ability in 4th class primary school science learning

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Abstract: *The low critical thinking ability of students in science and science learning is still not competent because learning activities still seem monotonous, teachers still do not use designing learning tools to improve critical thinking skills, especially not using interactive LKPD, therefore, researchers use PBL-based Liveworksheet software to improve critical thinking skills which aims to describe the development process, determine the level of feasibility, practicality and effectiveness of the product. This research method uses ADDIE, namely Analysis, Design, Implementation and Evaluation. Data collection techniques use test sheets and validation questionnaires on material, language, media, teacher responses and student responses. Based on these results, the PBL-based E-LKPD Liveworksheet to improve critical thinking skills is valid and practical to use for fourth grade elementary school learning activities.*

Keywords*: E-LKPD; Liveworksheet; PBL; Critical thinking; IPAS*

Introduction

Government Regulation no. 32 of 2013 article 19 learning process for students in educational units with competence and excellence(Muthoharoh, 2017 in(Issn, 2021)). Improving competent and superior quality can be done through educational facilities in order to achieve goals(Carisma, 017.in(Issn. 2021)). Education is a movement for better social change(Tiara, 2023), which provides updates in the learning process(Shelviana, 2023).According to(Maulani, 2022)In science and science learning education, it is a vehicle for students to develop skills, attitudes and scientific knowledge, including critical thinking.(Delawati 2019)

Critical thinking skills are high-level thinking that students must have to analyze an idea or thought(Asmar 2020). According to(Zahroh 2021)Critical thinking skills are included in the metacognitive skills aspect which is related to education in the 21st century, namely the 4Cs which must be mastered by students. The ability to think critically is closely related to science learning because it is in line with the character of the learning process(Utami, 2022). Science learning studies natural and social phenomena(Viera Valencia, 2019)This skill must be trained through providing stimuli that require students to think critically(Azizah, 2014), critical thinking is thinking using reasoning(Hidayat, 2019)which is oriented to problems in actual life(Kumala, 2018) challenged and seeking the truth so that students become critical thinkers(Ramadani, 2019)

Critical thinking, the ability to analyze information, in determining the relevance of the information collected and then interpreting it in solving problems(Muhammad Santoso, 2021)and plays a role in moral development, social development(Fakhriyah 2014)in order to expand knowledge and develop rational thinking behavior(Dewi, 2019). Critical thinking is

https://doi.org/10.21067/jbpd.v8i1.10371

defined as the ability to connect ideas systematically(Ayu, 2023), the importance of critical thinking skills integrated into the curriculum to provide benefits in society(Diharjo, 2017)By thinking critically, students are full of curiosity and can think thoughtfullyindependent (Kumala, 2019),According to Ennis, the critical thinking indicators used are providing simple explanations, building basic skills, concluding, providing further explanations and organizing strategies and tactics(Amanda, 2018)

Based on the results of observations and interviews at SDN Mulyorejo 3, Malang City, one of the factors inhibiting students' thinking skills is monotonous learning. It is known that when the learning process takes place, teachers have not been able to design learning tools to improve critical thinking skills, the ones used by teachers are less varied, they only do things. practice questions on the LKS. When learning, the completeness of the infrastructure in schools is adequate, but teachers do not provide innovation when the learning process is carried out, such as developing teaching materials that lack innovation and do not use technology, resulting in the ability to improve students' critical thinking that cannot be competent.

To overcome low critical thinking skills, it is necessary to utilize technology to apply teaching materials(Rasmawan, 2022)and the required learning model used in this development is Problem Based Learning (PBL). The PBL model is a learning model that involves students to solve a problem by carrying out active learning(Setyowati. 2023;Islamic, 2023). This model supports students to be able to improve themselves to think critically(Novitasari, 2023) which applies cognitive theory to solve problems(Nugraha, 2017). This PBL model applies concrete problems to students (Rositania, 2023), the advantages of PBL can improve learning outcomes and make it easier for students to understand learning(Triwahyudianto, 2020)The PBL steps that must be taken are: a) understanding the problem, b) planning how to solve it, c) solving the problem according to the plan; and d) re-check all the steps that have been carried out(Susilowati, 2023). The advantages of the PBL model are; a) students' critical thinking can be developed, b) students' ability to solve problems independently can be improved, c) in this model the teacher plays more of a role as a guide and facilitator(Suliyati, 2018).The learning model really determines success in learning(Triwahyudianto, 2019)

So the presence of learning teaching materials has an important role, especially in the 4.0 era, it is time for educators to create electronic teaching materials, in the form of E-LKPD(Tiara, 2023).LKPD is a worksheet that makes it easier for students to use electronic media(Okrull, 2020).E-LKPD which is packaged electronically increases students' understanding abilities to improve critical thinking abilities(Indriani, 2022). E-LKPD is able to build students' conceptual knowledge(Kumala. 2021).E-LKPD can be accessed easily, it can be accessed via smartphone, computer and is supported by pictures and videos where students can answer immediately, after which it is automatically sent to the teacher's email(Zahroh, 2021).E-LKPD is used as training material for students who work on it digitally(Hurrahma, 2022), E-LKPD is also able to stimulate students to analyze information(Kumala, 2021). The advantages of E-LKPD are efficiency, saving space and time, saving costs. This interactive LKPD is an interactive version of LKPD combining questions into a Liveworksheet.

Liveworksheet is a digital education service founded by Victor Gray which is built on a website that allows teachers and students, the liveworksheets site to be used to create E-LKPD to develop Student Worksheets(Okrul et al. 2020), Liveworksheet is a website that has the specialty of creating interactive student worksheets(Princess, 2023), which was developed with a design in the E-LKPD component(Suastra, 2020).Liveworksheets are also beneficial for students, students can easily use them and can work directly, students don't need to download them but just do the E-LKPD by visiting the site via Google Chrome, it also has variations in the activity steps in working on the E-LKPD(Prastika 2021). These live worksheets are a tool that can make students' learning more interesting(Fiska 2022)

Researchers developed the E-LKPD Liveworksheet to improve critical thinking skills in science and science learning in line with previous research conducted(Utami. 2022)namely the results of research that has been carried out, the design of a live worksheet-based E-LKPD makes it easier to understand the material and at the same time answer practice questions that refer to the level of students' critical thinking abilities. Other researchers were also carried out by(Tiara et al. 2023)development of E-LKPD liveworksheets for high school students", the product produced by this development can increase student motivation, because it is presented with an attractive appearance so that the results obtained are obtained. Other researchers also carried out(Teresa, 2022), the product produced by E-LKPD shows that E-LKPD Liveworksheet has high effectiveness in improving students' learning, the E-LKPD developed is also suitable for use in learning, other research was also carried out by(Princess. 2023)The product produced by E-LKPD mathematics assisted by PBL-based live worksheets can facilitate mathematical understanding abilities and has met the criteria of being valid for small groups and practical for large groups. The differences in this research are, 1) PBL-based E-LKPD Live Worksheets; 2) The target of this research is basic level; 3) Improve critical thinking skills, 4) E-LKPD is used for mathematics learning.

Based on this explanation, the research objective of this research is to understand the development process, determine feasibility, determine practicality, and test the effectiveness of the product. The development of E-LKPD with the help of the Liveworksheet website in elementary schools is expected to be able to provide broad and new innovative changes in improving and using interactive LKPD, as well as making it easier for students to absorb learning to improve students' abilities.

Method

In this research, an approach and development (Research and Development) is used, which is known as research that can produce the latest products, and tests the effectiveness of existing products to produce products that are useful for the wider community. This also requires in-depth studies from researchers to test these products.(Furwana, 2021). Development research using the ADDIE model with 5 phases, namely:Analysis (Analysis), planning (Design), development (Development), Implementation (Implementation), evaluation (Evaluation)(Tiara, 2023)

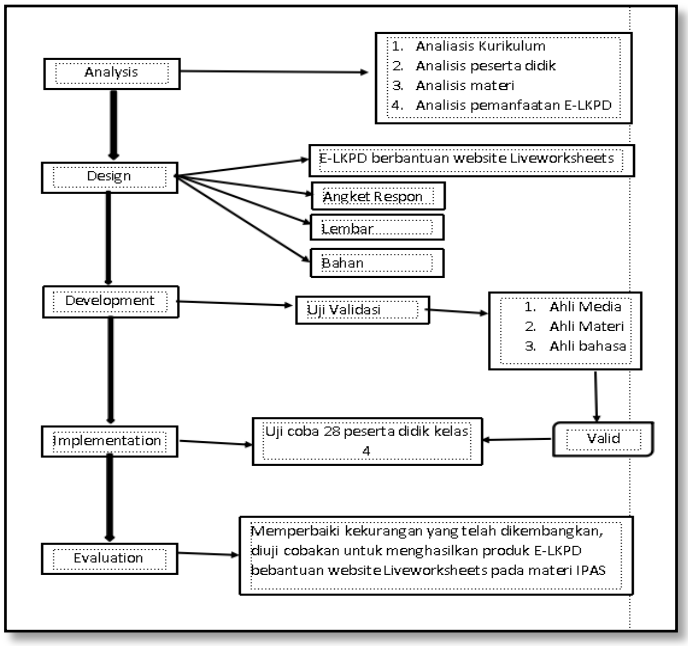

Figure 1. ADDIE Development Procedure developed by researchers

The subjects of this research are teachers and students. 1 teacher and 28 students as trial respondents for E-LKPD, where data was collected at SDN Mulyorejo 3, Wagir sub-district, Malang City, East Java. Data collection techniques use questionnaires and tests. The questionnaire was used to measure the feasibility of the E-LKPD that researchers had created according to experts, and the practicality of the E-LKPD according to students and teachers. This research instrument uses questionnaires and test sheets. The validation instrument grid is from media experts, material experts, language experts.

Results and Discussion

In research on the development of PBL-based E-LKPD Liveworksheets to improve critical thinking skills on Photosynthesis material, the most important process on earth in grade IV Elementary Schools using the ADDIE model includes five stages referring to the ADDIE model which includes five stages, namely Analysis, Design. , Development (Development), Implementation (Implementation), and Evaluation (Evaluation).

The analysis carried out by researchers was needs analysis, student character and curriculum. In the needs analysis, when teacher learning lacks innovation, they only use LKS and are given questions from the LKS. Character analysis, students do not understand the material presented so they do not pay attention and seem bored. Curriculum analysis, in the learning process the independent curriculum is used.

Design,E-LKPD planning is designed using the Canva editing website to produce E-LKPD sheets which contain study instructions and questions. The E-LKPD that has been designed on the Canva website is then downloaded in PDF form so that it can be uploaded to the LiveWorksheet website. Uploading LKPD on the liveworksheet website aims to change LKPD which was originally printed into electronic LKPD.

Figure 2. LKPD design

Development, at this stage the researcher validates the experts to determine the validity of the E-LKPD being developed. After that, the researcher refined the E-LKPD by making improvements or revisions based on suggestions and input from experts in order to achieve the desired goals. From the validation results obtained from material experts 89% in the "Very Appropriate" category, 91% language experts in the "Very Appropriate" category, 96% media experts in the "Very Appropriate" category. So it can be concluded that E-LKPD can be tested on students

Table 8. Validation results

Validation	Percentage%	Category
Materials Expert	89	Very Worth It
Linguist	91	Very Worth It
Media Expert	96	Very Worth It

Implementation, at the implementation stage the researcher conducted a trial of the E-LKPD Liveworksheet on a limited field test consisting of 5 grade IV students with cognitive levels of lots, mots, and hots. The field test response results were limited, namely 93% with the "Very Practical" category. So it can be concluded that the E-LKPD Liveworksheet can be tested on a large scale. The extensive field test responses were obtained from 28 class IV students. So the results of the practicality test data based on student responses received a score of 93% in the "Very Practical" category. The results of the teacher's response practicality test data received a score of 97% in the "Very Practical" category.

Table 9. Response results

Response	Percentage%	Category
Teacher	97	Very practical
Limited testing	93	Very practical
Extensive test	93	Very practical

Evaluation, at this stage the researcher measures using a test sheet which is tested in a large field. Pretest and posttest results to determine student learning outcomes in improving critical thinking skills. The pretest results obtained an average value of 65% and the posttest results obtained a result of 90%, and the N-gain value was 0.69. So it can be concluded that PBL-based E-LKPD Liveworksheets can improve critical thinking skills.

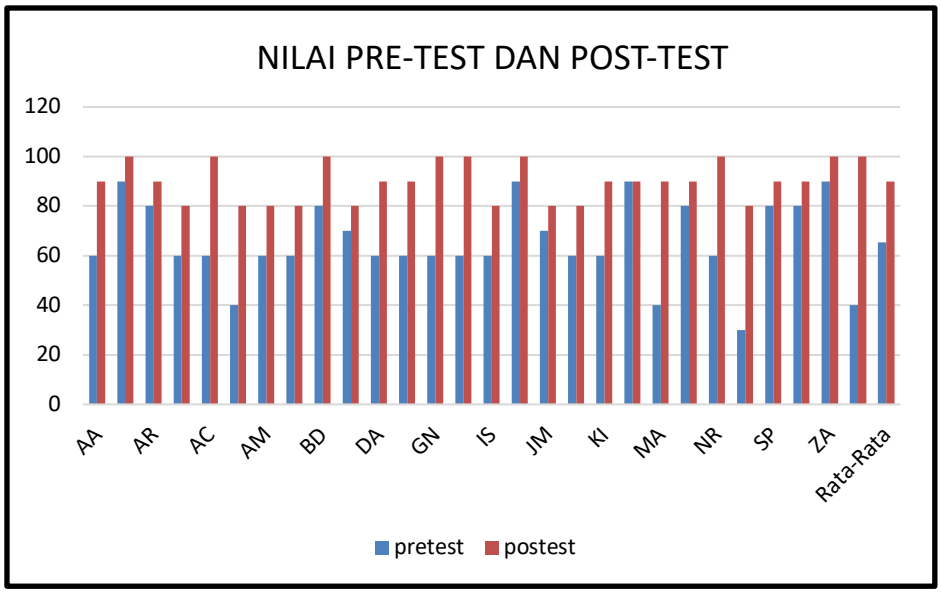

Figure 3. Pre-test and post-test results

Discussions

Research to improve students' critical thinking skills by producing a teaching material product in the form of E-LKPD through PBL-based constructivist learning on photosynthesis, the most important process on earth for class IV SDN Mulyorejo 3 Malang City. The science and science learning process shows that when learning does not involve students as a whole, it is because teachers have not been able to create innovative and interesting teaching materials so that students appear to still be lacking in the learning process, especially the ability to think critically. There is a need for innovation in developing a product, especially in an era that is increasingly developing by utilizing technology such as the presence of E-LKD Liveworksheet

The need to utilize technology to apply teaching materials(Rasmawan. 2022)and the need for an appropriate learning model that improves students' critical thinking skills, namely PBL. According to(Novitasari 2023)The PBL model supports students who are able to improve themselves to think critically by applying cognitive theory to solve problems.

Based on the validation results, it shows that the percentage of feasibility is assessed from the expert scores obtained in the form of responses and assessments. From the results of expert tests, amaterial experts with a percentage of 89%, language experts 91%, media experts 96%, so it can be concluded that the E-LKPD Liveworksheet is categorized as very feasible. This E-LKPD is said to be valid, because the researcher created the E-LKPD based on the independent curriculum, the E-LKPD presented already contains the PBL model where learning is linked to a problem. In line with researchers(Princess, 2023)ELKPD Liveworsheet has met the valid criteria

The level of practicality of E-LKPD Liveworsheet can be determined through a response questionnaire from students and teachers. Questionnaires are used to determine user responses to the devices being developed(Abdollah, 2022). The results of the students' practicality questionnaire in the limited test were 93%, the broad test was 93%, and the teacher questionnaire results were 97%. So it can be concluded that the E-LKPD Liveworksheet

is very practical to use, it is said to be practical because it can be seen from the responses of students and teachers who see the role of the E-LKPD Liveworksheet as a learning medium that can make student learning easier and seems interesting to increase students' understanding of students to improve their critical thinking skills.(Indriani, 2022).In line with researchers(Tiara, 2023) that the Liveworsheet LKPD has met the practical criteria.

The level of effectiveness in the E-LKPD Liveworksheet can be seen in the average pretest, posttest and N-gain values. The pretest score got an average score of 72%, the posttest score got an average score of 90% so that the N-gain value got a value of 0.69 with the "Medium" treatment category. The E-LKPD Liveworksheet is said to be effective because the questions contain a PBL model, with steps a). Understand the problem, so that students can solve a problem and be critical of something that happens b). Planning how to solve it, students can more easily understand the problem given, by expressing their thoughts on the problem, c). solve problems according to plan, students can identify solutions to problems to develop investigation skills with critical thinking abilities d). re-check the steps that have been taken, to show how much you understand the problem at hand(Susilowati, 2023):(March, 2021)with the advantage of encouraging active learning, developing critical thinking skills connecting learning with real contexts(Susilowati, 2023), The PBL model is very suitable to be used to improve critical thinking skills so that the PBL-based Liveworsheet E-LKPD can improve critical thinking skills with a "medium" treatment category of 0.65.

Conclusion

The conclusion of the BPL-based E-LKPD Liveworksheet product is to improve critical thinking skills in science and science learning regarding photosynthesis, the most important process on earth. The validation results obtained from material experts were 89% in the "Very Eligible" category, 91% language experts in the "Very Eligible" category, 96% media experts in the Very Eligible category, from the validation results it can be said that the E-LKPD Liveworksheet is PBL based for improve critical thinking skills that are valid and suitable for use. The practicality of E-LKPD is based on the results of the questionnaire responses from class IV students with a limited test of 93%, a broad test of 93% with the category "Very practical". The teacher response questionnaire obtained 97% results in the "Very Practical" category. From the very practical results it can be said that the E-LKPD Liveworksheet is very practical to use in learning. From the pretest and posttest results, E-LKPD Liveworksheet can improve students' critical thinking skills as seen from the average pretest score of 65% and posttest of 90% and the N-gain value of0.69 with the treatment category "Medium". In the future, researchers are expected to use innovative E-LKPD creation features and it is hoped that in the future there will be more implementation of learning models applied by teachers in learning, one of which is the PBL model so that the learning provided to students will be of higher quality and more meaningful.

References

Amanda, Sutria, Laila Khamsatul Muharrami, Irsad Rosidi, and Mochammad Ahied. 2018. "Improving Students' Critical Thinking Abilities in Science Learning Using Sets-Based Problem-Based Learning Models." Natural Science Education Research 1(1):57–64. doi: 10.21107/nser.v1i1.4199.

Anggraini, Yestilia, Rendy Wikrama Wardana, and M. Lutfi Firdaus. 2023. "Analysis of the Need for Development of Student Worksheets on Solar Cell Context Environmentally Friendly Technology Materials." Tambusai Education Journal 7(2):976–82.

Asmar, Ali. 2020. "Critical Thinking Through the Use of Geogebra Software." Journal of Mathematics Education Study Program 9(2):221–30.

Ayu, Diah, Adelia Septia Damanik, Siti Asiah Rangkuti, Rina Sari, and Nur Rahmi Rizqi. 2023. "Development of Mathematics Student Worksheets (LKPD) Using the Problem Based Learning (PBL) Model to Improve Critical Thinking Ability." Journal of Sigma Learning and Mathematics (Jpms) 9(2):177–87. doi: 10.36987/jpms.v9i2.4552.

Azizah, Nur, Siska Desy Fatmaryanti, and Nur Ngazizah. 2014. "Application of the Constructivist Learning Model Based on Problem Based Learning (PBL) to Improve Critical Thinking Ability in Students of SMA Negeri 1 Kutowinangun Class X 2013/2014 Academic Year." Radiation 5(2):24–28.

Delawati, Denna. 2019. "Critical Thinking Skills: Brain-Based Learning Model and Whole Brain Teaching Model." Journal of Basic Education 3(2):9–14. doi: 10.21067/jbpd.v3i2.3356.

Goddess, Atika Puspita. 2019. "Implementation of Student Worksheets (LKPD) Based on Science, Technology, Engineering, and Mathematics (STEM) on Business and Energy Material to Improve Critical Thinking Ability at SMA Muhammadiyah 7 Yogyakarta." Ahmad Dahlan University Physics Education Journal.

Diharjo, Roby Firmandil, Budijanto, and Dwiyono Hari Utomo. 2017. "The Importance of Students' Critical Thinking Abilities in the Constructivist Learning Paradigm." TEP & PDs Proceedings 4(39):445–49.

Fakhriyah, F. 2014. "Application of Problem Based Learning in Efforts to Develop Students' Critical Thinking Abilities." Indonesian Journal of Science Education 3(1):95–101. doi: 10.15294/jpii.v3i1.2906.

Fiska, Nadia Agwizil. 2022. "Development of E-LKPD on Material for Understanding Fractions Using Liveworksheets in Class II Elementary Schools." 01:1–23.

Furwana, Dewi, and Andi Tenrisanna Syam. 2021. "'Listening Is Hard': ADDIE Model on the Development of English Listening Worksheets." Language Circle: Journal of Language and Literature 16(1):52–60. doi: 10.15294/lc.v16i1.30355.

Hidayat, Fauziah, Padillah Akbar, and Martin Bernard. 2019. "Analysis of Mathematical Critical Thinking Abilities and Learning Independence of Middle School Students on SPLDV Material." Journal on Education 1(2):515–23.

Hu, Muhammad, Yul ALfian Hadi, Saprudinjauhari, and Hidaman Huri. 2020. "Development of Student Worksheet (Lkpd) Teaching Materials Based on Student Centered Learning (Scl) in Class V of Sdn 1 Ketangga." Didika Journal: Scientific Forum for Basic Education

6(2):294–303. doi: 10.29408/didika.v6i2.3045.

Hurrahma, Mifta, and Ike Sylvia. 2022. "Effectiveness of Liveworksheet-Based E-LKPD in Improving Students' Sociology Learning Outcomes in Class XI IPS SMA N 5 Padang." Sikola Journal: Journal of Education and Learning Studies 4(1):14–22. doi: 10.24036/sikola.v4i1.193.

Indriani, S., N. Nuryadi, and ... 2022. "Students' Response to E-LKPD Assisted by Liveworksheets as Teaching Material for Triangles and Quadrilaterals." Journal on… 3:315–23.

Islami, Rika Yaitul, Husni Wakhyudin, and Titing Asri Cahyani. 2023. "Improving Learning Outcomes of the PBL Model Assisted by Class 1 Learning Bag Media at SDN 05 Margorejo." 199–206.

Issn, E., Global Warming, and Performance Based. 2021. "JOURNAL of Banua Science Education." 1(2):69–72.

Kumala, Farida Nur, Karvita Firdayani, and Muhammad Nur Hudha. 2018. "Science Critical Thinking Skills for Elementary School Students: Brain Based Learning (BBL) and Problem Based Learning (PBL)." Journal of Educational Inspiration 8(2):53–59. doi: 10.21067/jip.v8i2.2641.

Lusia, AWP, P. Purnomo, and G. Kusumo. 2022. "Development of material for the use of energy using the problem-based learning model to develop critical thinking skills for elementary school students." Mandiri University PGSD FKIP Scientific Journal 08(02):3129–39.

Mathematics, Department of Education, Science and Nature Fkip. 2023. "ABSTRACT Yunita, Elsa Rahma . 2023. Development of Interactive LKPD Based on the Creative Problem Solving Model Assisted by the Liveworksheet Application to Support Students' Mathematical Problem Solving Abilities. Thesis,."

Maulani, Juniar, Jajang Bayu Kelana, and Asep Kurnia Jayadinata. 2022. "Development of LKPD Assisted by Liveworksheets to Increase Understanding of Science Concepts for Class IV Elementary School Students." Journal of Educational Professionals 1(2):106–23. doi: 10.22460/jpp.v1i2.11613.

Merici, Angela, Triwahyudianto Triwahyudianto, and Nelya Eka Susanti. 2019. "Implementation of the Picture and Picture Learning Model Assisted by Lottery Groups to Improve Student Learning Outcomes at SMP Negeri 2 Wagir." JPIG (Journal of Geography Education and Science) 4(1):70–77. doi: 10.21067/jpig.v4i1.3105.

Mochamad Nashrullah, Okvi Maharani, Abdul Rohman, Eni Fariyatul Fahyuni, Nurdyansyah, Rahmania Sri Untari. 2023. Educational Research Methodology.

Muhammad Santoso, Aris, and Syaiful Arif. 2021. "Effectiveness of the Inquiry Model Using a STEM Education Approach on Students' Critical Thinking Abilities." Tadris IPA Indonesian Journal 1(2):73–86. doi: 10.21154/jtii.v1i2.123.

Muhid, Abdul, Suhadiyanto, and Dona Nurhidayat. 2015. "Development of Psychological Measuring Tools." Health Research Methodology 2008(November):1–10.

Novitasari, Kikit Anggreany, and Joko Siswanto. 2023. "Improving the PBL Model on PKN Learning Outcomes for Class I Students at SDN Gayamsari 02." 471–80.

Nugraha, Arief Juang, Hardi Suyitno, and Endang Susilaningsih. 2017. "Analysis of Critical Thinking Ability in View of Science Process Skills and Learning Motivation Through the PBL Model." Journal of Primary Education 6(1):35–43.

Okrul, Wike, Yulia Tri Samiha, Asnilawati, Jhon Riswanda, and Amin Nurokhman. 2020. "Development of Electronic Student Worksheets (E-Lkpd) Based on Interactive Multimedia Complete with Educational Games." Proceedings of the National Seminar on Biology Education 3(1):90–97.

Ono, Sugi. 2020. "Validity and Reliability Test of the SG Posture Evaluation Measuring Instrument." Journal of Physical Therapy 5(1):55–61. doi: 10.37341/jkf.v5i1.167.

Pabri, Meta, Rosane Medriati, and Eko Risdianto. 2022. "Contextually Based E-LKPD Feasibility Test Assisted by Liveworksheets to Train Critical Thinking Skills in High Schools." Scientific Journal of Physics Education 6(3):637. doi: 10.20527/jipf.v6i3.6812.

Patmawati, Devi, Hanida Amilia Sholehah, Himmatul Muyyasaroh, and Aziza Karenina. 2021. "Profile Analysis of Scientific Approaches to Teaching Materials and Learning Tools for Madrasah Tsanaiyah in Ponorogo Regency." Journal of Education Vol. 1:01–06.

Prastika, Yuri, and Masniladevi. 2021. "Development of Liveworksheets-Based Multifaceted Interactive E-LKPD for Class IV Elementary School Students." Journal of Basic Education Studies 4(1):2601–14.

Putri, Dhea Ika, Sehatta Saragih, and Nur Siregar. 2023. "Analysis of E-LKPD Assisted by Liveworksheets Based on PBL Sequences and Series Material to Facilitate Mathematical Understanding Ability." Juring (Journal for Research in Mathematics Learning) 6(2):173–82.

Putri, Sarmila Eka, Abdullah Abdullah, and Sri Wilda Albeta. 2022. "Development of E-LKPD Based on Predict-Observe-Explain (POE) Using Liveworksheets on Ion Equilibrium and PH of Buffer Solutions." Hydrogen: Journal of Chemical Education 10(2):98–108.

Rasmawan, Rahmat, Rini Muharini, and Ira Lestari. 2022. "Development of a Science Flipbook E-Module Based on Problem Based Learning on Environmental Pollution Material." Basicedu Journal 6(5):9156–69.

Rohmawati, Ria Indi, and Yuliani. 2018. "Feasibility of Project-Based Worksheets on Structure and Function of Plant Tissues to Train Critical Thinking Skills." BioEdu 7(2):242–49.

Rositania, Lenisa Wahyu, Widya Kusumaningsih, and Daru Hesti Wihartasih. 2023. "Application of the Problem Based Learning (PBL) Model to Improve Thematic Learning Outcomes for Class V Elementary School Students." 15.

Safitry, A., YL Rahmi, R. Yogica, and ... 2023. "Analysis of the Need for Developing Electronic Student Worksheets Based on Scientific Literacy on Metabolism Material." Journal of Education… 7:20722–27.

Setyowati, Dyah, Muhammad Prayito, Nor Djama'i, and et al. 2023. "Application of the PBL Model Assisted by Snakes and Ladders Media on Learning Outcomes of Class IV Students at SD 2 Mijen." PPG UPGRIS National Seminar 1975–85.

Suliyati, Suliyati, Mujasam Mujasam, Irfan Yusuf, and Sri Wahyu Widyaningsih. 2018. "Application of the Pbl Model Using Simple Teaching Aids on Student Learning Outcomes." Curricula 3(1):11–22. doi: 10.22216/jcc.2018.v3i1.2100.

Suryaningsih, Siti, and Riska Nurlita. 2021. "The Importance of Innovative Electronic Student Worksheets (E-LKPD) in the 21st Century Learning Process." Indonesian Education Journal 2(7):1256–68. doi: 10.36418/japendi.v2i7.233.

Susanti, Romia Hari, Iskandar Ladamay, Sri Rahayu, and Farida Nur Kumala. 2021. "Development of Thematic Learning Electronic Worksheets Based on High Order Thinking Skill (HOTS) to Increase Student Motivation and Attention in the Learning Process." UNIKAMA PGSD National Seminar 5(32):740–48.

Susilowati, N., SLD Pramesti, and ... 2023. "Application of the Problem Based Learning Model in an Effort to Increase Student Mathematics Learning Achievement." … Tadris Mathematics (2):669–81.

Teresa, Teresa, Tuti Kurniati, and Raudhatul Fadhilah. 2022. "Development of Electronic Student Worksheets (E-Lkpd) Based on Liveworksheets on Mole Concept Material for Class X Mipa Man 3 Pontianak Students." Ar-Razi Scientific Journal 10(1):13–19. doi: 10.29406/ar-r.v10i1.3245.

Tiara, Ratu Tiara Savira, Suherman, and Grandson Atikah. 2023. "Development of Digital Student Worksheets Based on the Liveworksheets Application for High School Students." Citra Bakti Educational Scientific Journal 10(1):32–44. doi: 10.38048/jipcb.v10i1.1555.

Tressyalina, Tressyalina, Ena Noveria, Ermawati Arief, Ella Wulandari, and Novia Tri Ramadani. 2023. "Analysis of the Need for Interactive E-LKPD Based on Local Wisdom in Learning Expository Texts." Educaniora: Journal of Education and Humanities 1(1):23–31. doi: 10.59687/educaniora.v1i1.1.

Trisnani, Kiki Dwi, Subiki Subiki, and Sri Astutik. 2021. "Development of E-Lkpd Teaching Materials Based on Drying Salted Fish on High School Physics Temperature and Heat Material." Journal of Physics Learning 10(4):143. doi: 10.19184/jpf.v10i4.28192.

Utami, KL .., IW Suastra, and NK Suarni. 2022. "Development of Liveworksheet-Based E-Lkpd to IMPROVE CRITICAL THINKING ABILITY IN LEARNING SCIENCE THEMES OF ENERGY SOURCES IN CLASS IV PRIMARY SCHOOL." PENDASI: Indonesian Journal of Basic Education 6(2):46–55.

Wirawan, Devitha Octaviana, Ida Ermiana, and Asri Fauzi. 2023. "HOTS-Based E-LKPD Fraction Material Assisted with Liveworksheets Oriented to Understanding Mathematical Concepts for Class V Students." UNMA FKIP Education Journal 9(4):2011–21. doi: 10.31949/educatio.v9i4.5998.

Zahroh, Dwi Aulia, and Yuliani Yuliani. 2021. "Development of E-LKPD Based on Scientific Literacy to Train Students' Critical Thinking Skills on Growth and Development Material." Scientific Periodicals Biology Education (BioEdu) 10(3):605–16. doi: 10.26740/bioedu.v10n3.p605-616.