JPPIPA 11(8) (2025)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

Development of E-LKPD Differentiated Learning of Ecosystem Material to Improve Critical Thinking Skills and Learning Outcomes

Rista Wahyu Mahanani[1*], Suhartini[1]

[1] Faculty of Mathematics and Natural Sciences, Yogyakarta State University, Indonesia.

Received: June 05, 2025
Revised: July 16, 2025
Accepted: August 25, 2025
Published: August 31, 2025

Corresponding Author:
Rista Wahyu Mahanani
mahananirista@gmail.com

DOI: 10.29303/jppipa.v11i8.12187

© 2025 The Authors. This open access article is distributed under a (CC-BY License)

Abstract: The aims of this research is to develop electronic worksheet differentiated instruction on topic of mangrove ecosystem which improve critical thinking skills. The quality of worksheet determined based on validity, effective, and practical criteria. This research is research and development (R n D and using Plomp model. The subjects are 65 students X grade Senior High School of Abu Bakar Kulon Progo. Data analysis technique uses descriptive analysis and MANOVA test. The results from implementing electronic student worksheet obtained a score of media validity is 81.67, the category is very valid, a score of material validity is 87.86 the category is very valid. The score of practicality worksheet is 97 and 80 from teachers and students, both in the very practical category. Worksheet has significant effectiveness as evidenced by a significance of 0.000 < 0.05, which means that there is a significant difference in critical thinking skills between the control and experimental classes after learning with electronic student worksheet differentiated instruction.

Keywords: Critical thinking skill; Differentiated instruction; Student worksheet

Introduction

The independent curriculum is a curriculum that is based on the nature and times, each student is born with their own talents and interests (Cholilah et al., 2023; Alexon & Handayani, 2024). The uniqueness of the independent curriculum includes the implementation of differentiated learning. Differentiated learning emphasizes differences in learning presentations based on students' profiles and learning readiness (Iskandar, 2021; Elfina & Sylvia, 2016). The ability to reason, provide arguments and solve problems is the definition of critical thinking skills (Juhji, 2018; Fitriyah & Ghofur, 2021). Critical thinking skills are the activities of interpretation, evaluation, observation, communication, information and argumentation (Sihotang, 2018; Haviz, 2016). Students' critical thinking skills at SMAIT Abu Bakar Boarding School have not developed optimally. Classroom observations showed that the percentage of critical thinking skills was 10.11%. The percentage of students who had not yet completed the summative assessment with analysis questions was 45%. Furthermore, 47% of students had not yet completed the learning outcomes for ecosystems in analysis questions, and only 13% achieved scores above 80. Further evidence is provided in the school's education report card, which showed a score of 68% for students' reasoning skills. Critical thinking skills and learning outcomes were not yet in accordance with the Minimum Competency (KKM), which is suspected to be related to the learning process and learning media that are not yet appropriate for the student's profile.

The way students receive information and respond to the learning environment is their learning style (Arif et al., 2019; Mulyawati, 2023). If students learn according to their learning style, it will have a positive impact on

How to Cite:
Mahanani, R. W., & Suhartini. (2025). Development of E-LKPD Differentiated Learning of Ecosystem Material to Improve Critical Thinking Skills and Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*, *11*(8), 771–777. https://doi.org/10.29303/jppipa.v11i8.12187

improving learning achievement (Aprilia et al., 2022; Hurrahma & Sylvia, 2022). Steps to accommodate different learning styles include implementing differentiated learning and using student activity sheets. Biology learning requires student worksheets (LKPD) because they can be used to activate students' learning, help guide them in their learning, and develop conceptual understanding.

One characteristic of biology learning is utilizing the potential of the surrounding environment as a learning tool. One potential ecosystem in Kulon Progo is the Pasir Mendit mangrove forest. This ecosystem is close to the school, allowing students to learn directly in the environment. Through the mangrove forest, students can learn about ecosystem phenomena, biotic and abiotic components, and their roles. Ecosystem material covers a fairly broad scope, and processes may not always be found in the environment. Therefore, additional teaching materials packaged in electronic worksheets (LKPD) tailored to learning styles are needed. Students can study the electronic LKPD at home, not limited to school hours.

Learning using ecosystem problems packaged in electronic worksheets (LKPD) tailored to individual learning styles significantly impacts the ease of learning. The material acquired contributes to the enhancement of students' critical thinking. Phenomena and facts in the Pasir Mendit mangrove forest can be packaged in electronic worksheets. The development of differentiated electronic worksheets tailored to students' learning profiles is expected to positively contribute to critical thinking skills and learning outcomes.

Method

Types of Research

This research is a type of development research or Research and Development (R&D). Development research is research that is oriented towards researching, designing, producing, testing, and validating the resulting product (Sugiyono, 2017; Istiqomah & Suparman, 2020). Electronic LKPD was developed for differentiated learning on ecosystem material in order to improve critical thinking skills and student learning outcomes.

Time and Place of the Research

This research was conducted at SMAIT Abu Bakar Boarding School Kulon Progo, using class X students. The research took place from July to August 2023.

Research Subjects

The product developed in this study was used with 10th-grade students at SMA IT Abu Bakar Boarding School. A total of 65 students and one biology teacher were used to evaluate the product. SMAIT students were selected as a pilot study because they had not yet used electronic student worksheets for differentiated learning and had not yet utilized the Pasir Mendit mangrove forest as a learning resource.

Procedure

The Plomp development model was used in this research. The stages begin with an initial investigation, a design phase, a realization/construction phase, a testing phase, an evaluation and revision phase, and an implementation phase. The following is the procedure for the Plomp development model (Isnaini et al., 2018; Rochmad, 2012). After product development, implementation was carried out in class with a research design using a control class and an experimental class. The development of E-LKPD can be accessed through https://s.id/E-LKPD-Mangrove.

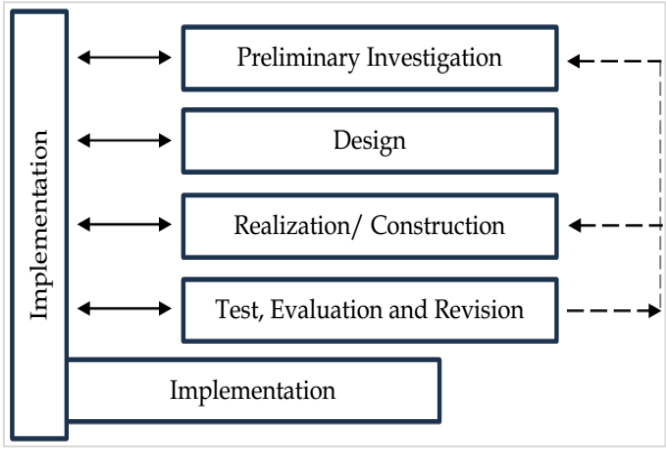

Figure 1. R n D design

Figure 2. E-LKPD cover and microsite

Figure 3. E-LKPD for visual, auditory and kinesthetic learning styles

Instruments and Data Collection Techniques

The instruments used in this study were an interview questionnaire, a feasibility questionnaire, a skills observation questionnaire, and pre- and post-test questions. Data were collected through interviews, observations, questionnaires, and tests. Interviews were used to obtain facts about the learning conditions at the school and identify learning issues. The feasibility questionnaire was used to obtain module assessment results from subject matter and media experts. Questions were used to determine student learning outcomes, while observation sheets were used to assess students' critical thinking skills.

Data Analysis Techniques

Data on the effectiveness of the electronic student worksheet (LKPD) used cognitive test scores. The score used was the difference between the pretest and posttest, calculated using the N-gain formula, determined based on the average gain. The effectiveness of the learning media on the independent variables was analyzed using SPSS, with normality and homogeneity tests as prerequisites. Further testing was conducted using MANOVA to determine the effect of the independent variables. If the significance value is < 0.05, it can be concluded that there is a significant difference between the control and experimental classes. If the significance value is > 0.05, it can be concluded that there is no significant difference between the groups.

Result and Discussion

Research and development of electronic student worksheets (LKPD) for differentiated learning focused on the feasibility, practicality, and effectiveness of electronic LKPDs in improving critical thinking skills and student learning outcomes. The feasibility test results from material experts obtained a score of 87.86, categorized as very feasible. The electronic LKPDs are suitable for use because they have been assessed by material and media experts (Pratikno et al., 2020; Khikmiyah, 2021; Uddin & McNeill, 2025). The strengths of the developed learning media in terms of material are its depth, the accuracy of the examples and cases used, the encouragement of curiosity, and the practice questions that use everyday situations. The material in the electronic LKPD utilizes the mangrove forest ecosystem.

The overall feasibility of the electronic worksheet media received a score of 78.88. This score falls into the feasible category. This feasibility is supported by the design display, material packaging, and ease of use. The electronic worksheet design is very dynamic in terms of color, fonts, and image stimulus selection, thus creating a non-monotonous impression. The packaging of the material in the electronic worksheet media varies, namely with narrative presentations, video displays, podcasts, and concept maps so that students receive a lot of supporting information. The electronic worksheet is practical for students to use by accessing the link provided by the teacher.

One important aspect of utilizing technology is its practicality and its ability to be used in accordance with learning objectives. The teacher's practicality assessment was 97, while the student's response was 80. The practicality assessment category from both teachers and students falls into the very practical category. Electronic student worksheets (LKPD) are very practical because they can be used to support learning activities. The developed electronic LKPDs contribute to both practicality and knowledge (Rochmad, 2012; Kristanto et al., 2025; Yuniati et al., 2022).

The practicality of electronic student worksheets (LKPD) is demonstrated by the availability of user instructions, easy website access, and ease of viewing learning outcomes. Electronic LKPDs, developed with student learning styles in mind, allow for flexible learning, enabling better understanding of the material. Learning using electronic LKPDs is more time-efficient than simply being explained by a teacher. Electronic LKPDs are free from time and place constraints, allowing them to be completed independently outside of school. Another practical benefit of using electronic LKPDs is that the material can be presented more clearly and coherently, positively impacting learning outcomes (Issa et al., 2019; Khoerunnisa et al., 2023).

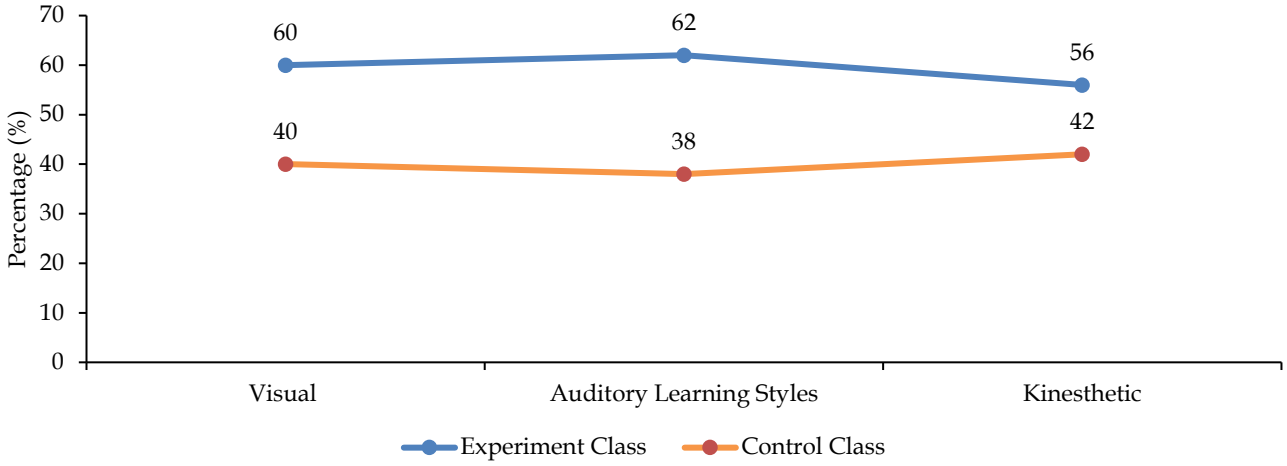

Figure 4. Graph of learning outcome values

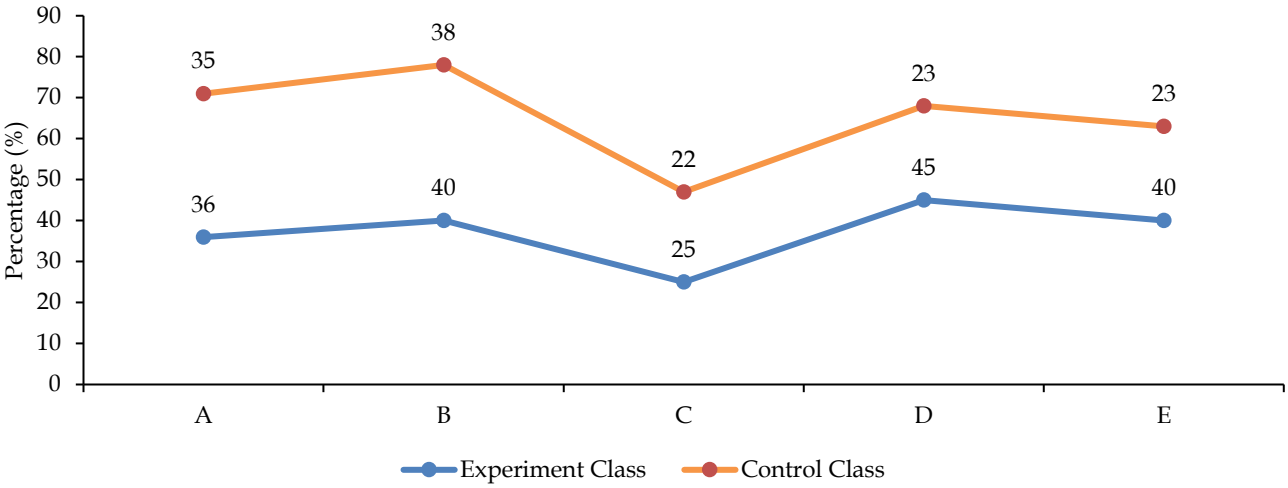

Figure 5. KPS value graph

Based on a practical assessment, this learning medium can be used in biology courses on ecosystems to improve critical thinking skills and student learning outcomes. Furthermore, it can be used to contribute to the implementation of the Merdeka curriculum, which emphasizes learning styles. In this context, the learning styles referred to are visual, auditory, and kinesthetic.

Teaching materials tailored to students' learning styles result in enjoyable and positive learning (Jagantara et al., 2014; Marshel & Ratnawulan, 2020). Such learning conditions enable students to absorb more information. This is consistent with previous research, which shows that providing teaching materials tailored to students' learning styles can improve learning outcomes. The results of the electronic student worksheet effectiveness test align with existing theory. Electronic student worksheets are effective in improving critical thinking skills and learning outcomes.

Table 1. MANOVA Test Results

Tests of Between-Subjects Effects						
Dependent Variables	Type III Sum of Squares	df	Mean Square	F	Sig.	Par.Et Sq
Critical Thinking Skills	2563.571	1	2563.571	6.080	.016	.088
Learning Achievement	4749.539	1	4749.539	15.905	.000	.202

The effectiveness test using MANOVA ensured that nine prerequisite assumptions had been met. The results of the normality test indicated that the data were normal and homogeneous, with a significance level of > 0.05 (Nuryadi et al., 2017; Subandriyo, 2020; Sutrisno & Wulandari, 2018). The MANOVA test was used to determine the effect of differentiated electronic learning worksheets on critical thinking skills and student

learning outcomes. The MANOVA test results showed a significance level of <0.05 for critical thinking skills and student learning outcomes. The control and experimental classes differed significantly after using differentiated electronic worksheets on critical thinking skills and student learning outcomes. The correlation value between critical thinking skills and student learning outcomes was 0.095 based on the results of the regression test.

The use of electronic LKPD for differentiated learning has a significant influence on learning outcomes and critical thinking skills because learning is in accordance with learning methods, is student-oriented and can be used flexibly and guides students to understand concepts (Purba et al., 2021; Meliyanti et al., 2021). In addition, electronic LKPD also provides the opportunity to differentiate content, processes and products (Tomlinson, 2017; Nenggala et al., 2024; Yuanita et al., 2021). The impact of developing electronic student worksheets (LKPD) that considers differentiated learning aspects on improving student learning outcomes was also evident in previous research conducted by Iskandar (2021) and Avandra (2021). The implementation of differentiated learning among 1,200 students and 20 teachers significantly impacted student performance (Haelermans, 2022; Sari et al., 2024; Tressyalina et al., 2023).

Differentiated learning strategies are currently a promising approach to teaching in schools. Students' learning styles influence learning outcomes, with significant differences in learning styles that facilitate visual, auditory, and kinesthetic learning styles affecting biology learning outcomes (Aprilia et al., 2022; Nurjanah & Mukarromah, 2021). In this study, the learning outcomes of students with a kinesthetic learning style were the highest. Learning effectiveness is influenced by the learning method used. Learning style influences the acceptance of material, thus being related to learning effectiveness (Azrai et al., 2018; Okra & Novera, 2019).

Differentiated learning builds a strong foundation that implementing differentiated instruction can improve both academic and non-academic outcomes (Liou et al., 2023; Prabowo, 2021). Intelligence in one domain is correlated with intelligence in other domains, different teaching and learning tools should be combined to enhance brain activity and support the holistic development of students as a whole (Peng et al., 2019; Sari & Susanti, 2016).

Conclusion

The feasibility of electronic LKPD for differentiated learning based on the assessment of material experts is in the very feasible category with an assessment of the feasibility aspect of the material content of 85.52, the material presentation aspect of 90 and the contextual assessment aspect with a value of 91.66. The assessment of media experts is in the feasible category with a value of the feasibility aspect of the presentation of 81.67, a value of the graphic feasibility aspect of 75 and a value of the language feasibility aspect of 75. The practicality of electronic LKPD for differentiated learning is categorized as very practical with a teacher assessment of 97 and a student response of 80. This electronic LKPD is very practical to use to improve critical thinking skills and learning outcomes through a differentiated approach. The effectiveness of electronic LKPD for differentiated learning is quite effective in improving critical thinking skills and student learning outcomes. The results of the MANOVA test show sig. <0.05. Teachers in preparing LKPD need to adjust to students' learning styles in order to obtain optimal learning outcomes.

Acknowledgments
The author would like to thank all those who contributed to this research.

Author Contributions
This research article was written by four authors with their respective contributions: Conceptualization, methodology, I.D.N. and A.K.; formal analysis, data curation, writing-preliminary draft, I.D.N.; writing-review, literature review, and editing, A. and R. All authors have read and approved the published version of the manuscript.

Funding
This research received no external funding.

Conflicts of Interest
All authors stated that there is no conflict of interest.

References

Alexon, & Handayani, D. (2024). The Development of E-LKPD with a Culture-Based Integrated Learning Model (MPTBB) to Improve Student Learning Outcomes on Buffer Solution Material. *International Journal of Information and Education Technology, 14*(1), 141–150. https://doi.org/10.18178/ijiet.2024.14.1.2034

Aprilia, B. L. K., Jamaluddin, J., Lestari, T. A., & Handayani, B. S. (2022). Pengaruh Gaya Belajar Terhadap Hasil Belajar Siswa Pada Mata Pelajaran Biologi di SMA Negeri 1 Pujut. *Jurnal Ilmiah Profesi Pendidikan*, *7*(4b), 2732–2743. https://doi.org/10.29303/jipp.v7i4b.1065

Arif, D. S. F., Zaenuri, & Cahyono, A. N. (2019). Analisis Kemampuan Berpikir Kritis Matematis Pada Model Problem Based Learning (PBL) Berbantu Media Pembelajaran Interaktif dan Google

Classroom. *Prosiding Seminar Nasional Pascasarjana UNNES*, *2018*, 323–328. Retrieved from https://proceeding.unnes.ac.id/index.php/snpasca/article/view/594

Azrai, E. P., Ernawati, E., & Sulistianingrum, G. (2018). Ragam Gaya Belajar Siswa SMA Menurut David Kolb dalam Pembelajaran Biologi. *Jurnal Al-Azhar Indonesia Seri Humaniora*, *4*(4), 251. https://doi.org/10.36722/sh.v4i4.302

Cholilah, M., Tatuwo, A. G. P., Komariah, & Rosdiana, S. P. (2023). Pengembangan Kurikulum Merdeka Dalam Satuan Pendidikan Serta Implementasi Kurikulum Merdeka Pada Pembelajaran Abad 21. *Sanskara Pendidikan Dan Pengajaran*, *1*(02), 56–67. https://doi.org/10.58812/spp.v1i02.110

Elfina, S., & Sylvia, I. (2016). Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Problem Based Learning (PBL) dalam Meningkatkan Kemampuan Berpikir Kritis Siswa pada Mata Pelajaran Sosiolofi di SMA Negeri 1 Payakumbuh. 2(1), 1–23. Retrieved from https://www.researchgate.net/publication/347070588

Fitriyah, I. M. N., & Ghofur, M. A. (2021). Development of Android-Based E-LKPD with Problem Based Learning (PBL) Learning Model to Improve Critical Thinking. *Jurnal Ekonomi Dan Pendidikan, 18*(2), 218-229. https://doi.org/10.21831/jep.v18i2.41224

Haelermans, C. (2022). The Effects of Group differentiation by students' learning strategies. *Instructional Science*, *50*(2), 223–250. https://doi.org/10.1007/s11251-021-09575-0

Haviz, M. (2016). Research and Development; Penelitian di Bidang Kependidikan yang Inovatif, Produktif dan Bermakna. *Ta'dib, 16*(1). https://doi.org/10.31958/jt.v16i1.235

Hurrahma, M., & Sylvia, I. (2022). Efektivitas E-LKPD Berbasis Live Worksheet dalam Meningkatkan Hasil Belajar Sosiologi Peserta Didik di Kelas XI IPS SMA N 5 Padang. *Jurnal Sikola: Jurnal Kajian Pendidikan Dan Pembelajaran, 4*(1), 14–22. https://doi.org/10.24036/sikola.v4i1.193

Iskandar, D. (2021). Peningkatan Hasil Belajar Siswa pada Materi Report Text Melalui Pembelajaran Berdiferensiasi di Kelas IX.A SMP Negeri 1 Sape Tahun Pelajaran 2020/2021. *Jurnal Pendidikan Dan Pembelajaran Indonesia (JPPI)*, *1*(2), 123–140. https://doi.org/10.53299/jppi.v1i2.48

Isnaini, A., Qadariah, N., Mutasam, U., & Karima, Z. F. H. (2018). *Model Pengembangan Addie Dan Plomp*. Retrieved from https://www.scribd.com/document/371311492/Model-Pengembangan-Plomp-Dan-Addie

Istiqomah, A. N., & Suparman. (2020). Design of E-Student Worksheet for Linier Equation Based on Discovery Learning to Improve Creative Thinking. *International Journal of Scientific and Technology Research, 9*(4), 2579–2584. Retrieved from https://shorturl.at/BpRpK

Juhji. (2018). Profesi Guru dalam Mengembangkan Kemampuan Berpikir Kritis Peserta Didik di Era Globalisasi. *Jurnal Genealogi PAI*, *5*(1), 16–24. Retrieved from https://jurnal.uinbanten.ac.id/index.php/geneologi/article/view/1043

Khikmiyah, F. (2021). Implementasi Web Live Worksheet Berbasis Problem Based Learning dalam Pembelajaran Matematika. *Pedagogy: Jurnal Pendidikan Matematika, 6*(1), 1–12. https://doi.org/10.30605/pedagogy.v6i1.1193

Khoerunnisa, N., Badruzzaman, N., & Gani, R. A. (2023). Pengembangan Lembar Kerja Peserta Didik Elektronik (E-LKPD) Berbasis Live Worksheets pada Subtema Lingkungan Tempat Tinggalku. *Dwija Cendekia: Jurnal Riset Pedagogik, 7*(1), 391. https://doi.org/10.20961/jdc.v7i1.71718

Kristanto, W., Harun, Syamsudin, A., & Hendrowibowo, L. (2025). Student Engagement and Digital Literacy in Knowledge Acquisition in Seamless Learning. *Ubiquitous Learning, 18*(1), 113–133. https://doi.org/10.18848/18359795/CGP/v18i01/113-133

Marshel, J., & Ratnawulan. (2020). Analysis of Students Worksheet (LKPD) Integrated Science with the Theme of the Motion in Life Using Integrated Connected Type 21st Century Learning. *Journal of Physics: Conference Series, 1481*(1). https://doi.org/10.1088/17426596/1481/1/012046

Meliyanti, M., Raraswati, P., Nuruddin Hidayat, D., & Aryanto, S. (2021). Kajian Literatur: Perkembangan Literasi dan Numerasi di Lingkungan Keluarga. *Jurnal Pendidikan Tambusai, 5*(3), 6504–6512. Retrieved from https://jptam.org/index.php/jptam/article/view/1973

Mulyawati, M. S., & Us, S. (2023). Pengaruh Gaya Belajar Terhadap Kemampuan Berpikir Kritis Siswa. *STRATEGY: Jurnal Inovasi Strategi dan Model Pembelajaran, 3*(3), 243-249. https://doi.org/10.51878/strategi.v3i3.2425

Nenggala, M. P., Razi, P., Hidayati, & Sari, S. Y. (2024). Electronic Student Worksheet for Solving Problems in Physics Material Based on Problem-Based Learning. *International Journal of Information and Education Technology, 14*(7), 945–954. https://doi.org/10.18178/ijiet.2024.14.7.2121

Nurjanah, N. E., & Mukarromah, T. T. (2021). Pembelajaran Berbasis Media Digital pada Anak

Usia Dini di Era Revollusi Industri 4.0: Studi Literautur. *Ilmiah Potensia, 6*(1), 66–77. https://doi.org/10.33369/jip.6.1.66-77

Nuryadi, Astuti, T. D., Utami, E. S., & Budiantara, M. (2017). *Buku Ajar Dasar-dasar Statistik Penelitian*. Sibuku Media.

Okra, R., & Novera, Y. (2019). Pengembangan Media Pembelajaran Digital IPA Yulia Novera. *Journal of Educational Studies, 4*(2), 121–134. https://doi.org/10.30983/educative.v4i2.2340

Peng, H., Ma, S., & Spector, J. M. (2019). Personalized Adaptive Learning: An Emerging Pedagogical Approach Enabled by a Smart Learning Environment. *Lecture Notes in Educational Technology*, 171–176. https://doi.org/10.1007/978-981-13-6908-7_24

Prabowo, A. (2021). Penggunaan Live Worksheet dengan Aplikasi Berbasis Web untuk Meningkatkan Hasil Belajar Peserta Didik. *Jurnal Pendidikan Dan Teknologi Indonesia, 1*(10), 383–388. https://doi.org/10.52436/1.jpti.87

Pratikno, P., Suyono, S., & Agustini, R. (2020). The Validity of Student Worksheets and Student Textbooks Inquiry Training Model on The Colligative Properties of Solution. *International Journal for Educational and Vocational Studies*, *2*(11), 935–941. https://doi.org/10.29103/ijevs.v2i11.3006

Purba, M., Purnamasari, N., Soetantyo, S., Suwarma, I. R., & Susanti, E. I. (2021). *Prinsip Pengembangan Pembelajaran Berdiferensiasi (Differentiated Instruction)*. Jakarta: Kemdikbudristek.

Rochmad. (2012). Desain Model Pengembangan Perangkat Pembelajaran Matematika. *Kreano: Jurnal Matematika Kreatif-Inovatif*, *3*(1), 59–72. https://doi.org/10.15294/kreano.v3i1.2613

Sari, L. Y., & Susanti, D. (2016). Uji Efektivitas Media Pembelajaran Interaktif Berorientasi Konstruktivisme pada Materi Neurulasi untuk Perkuliahan Perkembangan Hewan. *Bioconcetta, 2*(1), 158–164. https://doi.org/10.22202/bc.2016.v2i1.1806

Sari, R. N., Rosjanuardi, R., Herman, T., Isharyadi, R., & Balkist, P. S. (2024). Development of Mathematics Interactive E-Worksheet. *The Eurasia Proceedings of Science Technology Engineering and Mathematics,* 28, 317–325. https://doi.org/10.55549/epstem.1521959

Sihotang, K. (2018). *Berpikir Kritis*. Kanisius.

Subandriyo, B. (2020). *Analisis Kolerasi dan Regresi*. Retrieved from https://pusdiklat.bps.go.id/diklat/bahan_diklat/BA_Analisis Korelasi dan Regresi_Budi Soebandriyo, SST, M. Stat_2123.pdf

Sugiyono. (2017). *Metode Penelitian Pendidikan*. Alfabeta.

Sutrisno, S., & Wulandari, D. (2018). Multivariate Analysis of Variance (MANOVA) untuk Memperkaya Hasil Penelitian Pendidikan. *AKSIOMA : Jurnal Matematika Dan Pendidikan Matematika*, *9*(1), 37. https://doi.org/10.26877/aks.v9i1.2472

Tomlinson. (2017). *How to Differentiate Instruction* (Vol. 2). ASCD.

Tressyalina, T., Noveria, E., Arief, E., Wulandari, E., & Ramadani, N. T. (2023). Analisis Kebutuhan E-LKPD Interaktif Berbasis Kearifan Lokal dalam Pembelajaran Teks Eksposisi. *Educaniora: Journal of Education and Humanities, 1*(1), 23–31. https://doi.org/10.59687/educaniora.v1i1.1

Uddin, M. M., & McNeill, L. J. (2025). Flipping the Traditional Classroom in Teaching Classical Literature in Higher Education: An Experiment with Oedipus Rex by Sophocles. *Ubiquitous Learning, 18*(1), 1–26. https://doi.org/10.18848/18359795/CGP/v18i01/1-26

Yuanita, P., Maimunah, & Arnellis. (2021). The Effectiveness of Student Worksheet Based on 4'cs Skills to Improve Higher Order Thinking Skills Students' SMP Pekanbaru. *Journal of Physics: Conference Series, 1742*(1). https://doi.org/10.1088/1742-6596/1742/1/012019

Yuniati, S., Murniviyanti, L., & Prasrihamni, M. (2022). Pengembangan E-LKPD Berbasis Live Worksheet pada Pembelajaran Menulis Puisi Siswa Kelas IV SD. *Journal of Educational Review and Research, 6*(2), 94–100. Retrieved from https://journal.stkipsingkawang.ac.id/index.php/JERR/article/view/3494