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Application of Environmentally-Based Student Worksheets on the Observational Skills

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Abstract – *This study investigates the impact of environmentally-based student worksheets on enhancing observational skills in physics education. Active student participation is crucial for effective learning, and innovative tools such as these worksheets are designed to improve student engagement and skill development. The study specifically aims to: (1) assess the observational skills of grade X students at State Senior High School 2 Mamuju using environmentally-based student worksheets; (2) compare these skills with those of students using conventional student worksheets; and (3) analyze the differences in observational skills between the two groups. A quasi-experimental design was employed, using a posttest-only control group method. The independent variable was the type of student worksheet (environmentally-based vs. conventional), while the dependent variable was students' observational skills. The sample included grade X MIPA students, with 33 students in the experimental group (using environmentally-based worksheets) and 35 students in the control group (using conventional worksheets) selected through purposive sampling. Results demonstrated that students using environmentally-based student worksheets exhibited significantly higher observational skills (mean score: 16.27, high category) compared to those using conventional worksheets (mean score: 12.4, moderate category). Statistical analysis confirmed a significant difference between the groups. These findings suggest that integrating environmentally-based student worksheets is an effective strategy for improving observational skills, fostering better engagement, and enhancing students' understanding of physics concepts, particularly in the context of Newton's laws of motion. The study emphasizes the importance of context-rich, interactive learning tools for science education.*

Keywords: *environmentally-based student worksheet; observational skills; physics learning*

I. INTRODUCTION

The advancement of education today emphasizes active student participation in the learning process, requiring teachers to apply teaching strategies that engage students meaningfully. The Indonesian government supports this through the implementation of the 2013 Curriculum, which promotes active learning by encouraging students to engage directly in learning activities until they can independently discover concepts (Kemdikbud, 2013). This strategy is particularly

crucial for developing students' scientific skills, especially observational abilities, which are foundational for scientific inquiry and essential for understanding physics concepts effectively (Stone, 2014; Nusantari et al., 2020; Sari et al., 2020; Jamil et al., 2021).

Observation is the most fundamental skill in science and must be developed alongside other scientific process skills (Sriwarthini et al., 2024; Wakhidah et al., 2022; Idris et al., 2022). It serves as the foundation for all data collection activities (Nugraheny, 2018). Observation skills involve using multiple senses to identify differences and similarities in objects, as well as employing tools to gather and analyze relevant data (Rankin, 2006). Furthermore, Simsek and Kabapinar (2010) highlight that observation encompasses not only visual perception but also other senses, such as hearing, smelling, tasting, and touching, supplemented by tools to improve data accuracy (Rustaman, 2003). These skills are crucial for students as they enable them to identify facts before progressing to higher-level scientific process skills (Rahmawati et al., 2020; Antonio & Pridente, 2024).

However, previous research has shown that students' observational skills remain underdeveloped. Azinah et al. (2022) noted that although observation is a fundamental scientific process skill required by high school students, these skills are still inadequate. Preliminary observations at State Senior High School 2 Mamuju revealed similar issues, where students struggled to understand physics concepts especially Newton's laws of motion due to limited hands-on learning experiences and minimal use of interactive tools like student worksheets. This gap underscores the urgent need to implement more engaging and effective learning strategies to enhance students' observational skills and their understanding of physics concepts (Fan, 2015).

Recent findings highlight the challenges and potential of improving student outcomes through innovative learning tools. For instance, research on students' physics learning outcomes during e-learning amidst the COVID-19 pandemic revealed that cognitive outcomes were largely in the low and very low categories (Marzoli et al., 2021; Sari et al., 2022). Furthermore, cognitive skills such as understanding and applying concepts showed significant variation, emphasizing the need for more engaging and supportive learning strategies (Darling-Hammond et al., 2020). On the other hand, the development of electronic student worksheets (ESW) using problem-based learning (PBL) models has proven effective in enhancing problem-solving and cognitive skills. These tools, validated through expert assessments, demonstrated high levels of practicality and validity, with practicality scores reaching 89% (Septiana et al., 2023).

Additionally, efforts to improve critical thinking skills through the use of environment-based student worksheets have shown promising results. Azinah et al. (2022) found that these worksheets significantly improved students' critical thinking abilities compared to conventional

methods. By incorporating real-life contexts and fostering active participation, environment-based worksheets enable students to connect theoretical concepts with their surroundings, enhancing engagement and learning outcomes.

Student worksheets are important tools that facilitate teaching and learning activities, enhancing effective interaction and improving student achievement (Mahtari et al., 2020; Umbaryati, 2016). These worksheets typically contain both theoretical and practical tasks that students must complete (Astawan & Agustiana, 2020). As instructional aids, they support the development of students' cognitive skills (Markhamah et al., 2020). For optimal effectiveness, educators must be diligent and skilled in preparing high-quality student worksheets that meet didactic, constructive, and technical standards (Purnamasari et al., 2020). A well-designed worksheet includes clear concepts, instructions, and procedures (Dermawati et al., 2019; Kahar et al., 2021). The environmentally-based student worksheets utilized in this study incorporate the surrounding environment to connect real-life examples with physics concepts, fostering a deeper understanding through direct observation (Mustika et al., 2019).

Efforts to improve scientific skills have included active learning approaches, such as the Predict-Observe-Explain (POE) model, which has been shown to effectively enhance students' science process skills by encouraging prediction, experimentation, and reasoning (Algiranto et al., 2019). Similarly, incorporating problem-based learning (PBL) with contextual student worksheets has successfully strengthened students' environmental literacy and cognitive skills (Suryawati et al., 2020; Sari et al., 2022; Gök et al., 2023). Despite these developments, the integration of environmentally-based student worksheets tailored to physics learning remains underexplored, especially concerning their impact on observational skills.

This study aims to bridge this gap by investigating the effectiveness of environmentally-based student worksheets in improving the observational skills of Grade X students at State Senior High School 2 Mamuju. Previous solutions have not adequately addressed this issue, as conventional worksheets lack interactive and contextual engagement. By leveraging the local environment in student worksheets, this research offers an innovative approach to connect theoretical physics concepts with real-world phenomena, fostering active learning and enhancing observation skills. The specific objectives of this study are to analyze the observational skills of students taught using environmentally-based student worksheets, compare these skills with those of students taught using conventional worksheets, and examine the impact of these learning tools on students' understanding of Newton's laws of motion. This research seeks to determine how effective environmentally-based student worksheets are in enhancing students' observational skills and how these worksheets compare to conventional worksheets in improving students' understanding of physics concepts. This study is expected to contribute valuable insights into the

development of effective learning tools that support active learning and scientific inquiry, ultimately improving the quality of physics education at State Senior High School 2 Mamuju.

II. METHODS

This study is an experimental research utilizing a posttest-only control group design. This design was selected as it aligns with the research objective of applying environmentally-based student worksheets to enhance the observational skills of students.

The research design is outlined as follows:

Table 1. Research design

Group	Treatment	Post-test
Experiment	X	O_1
Control	-	O_2

Source: (Sugiyono, 2010).

Where O1 represents the post-test scores of the experimental group taught using environmentally-based student worksheets, O2 represents the post-test scores of the control group taught using conventional student worksheets, and X refers to the treatment using environmentally-based student worksheets. The population in this study consisted of all Grade X MIPA students at State Senior High School 2 Mamuju, totaling 105 students across three classes. A sample of 68 students was selected through purposive sampling, with 33 students from Class X MIPA 3 designated as the experimental group and 35 students from Class X MIPA 2 as the control group. This sampling method ensured that both groups had comparable academic abilities and learning conditions.

Data were collected using a 25-item multiple-choice test designed to assess students' observational skills. The test covered various aspects of observational skills, including data collection through sensory perception, measurement, classification, and analysis. The test was administered after the treatment phase. The instrument used to measure students' observational skills was a multiple-choice test with 25 items. The instrument was developed based on indicators of observational skills, such as using multiple senses for data collection, identifying similarities and differences in objects, measuring and comparing using appropriate tools, and classifying and analyzing data. Content validity was assessed by expert validators, and item analysis was performed using the product-moment correlation to determine item validity. Reliability testing employed Cronbach's Alpha, resulting in a reliability coefficient of 0.8256, indicating high reliability.

The research began with a preparation stage, which involved consultation with academic supervisors and school authorities. Three environmentally-based student worksheets and three conventional student worksheets covering Newton's Laws were developed and validated by experts. During the implementation phase, lessons were delivered over three sessions, focusing on Newton's First Law, Newton's Second Law, and Newton's Third Law. The experimental group used environmentally-based student worksheets, while the control group used conventional student worksheets. In the post-test stage, the observational skills test was administered to both groups, followed by data collection and analysis.

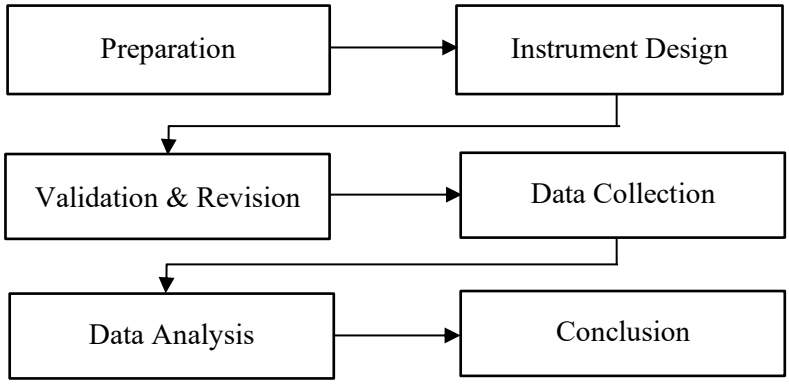

Figure 1. Data collection procedure flowchart

Descriptive statistics, including mean and standard deviation, and inferential statistics using an independent sample t-test were applied to analyze the data. Prerequisite tests, such as normality (Kolmogorov-Smirnov) and homogeneity tests (Levene's Test), were conducted to ensure valid comparisons. The experimental group engaged in hands-on activities using environmentally-based student worksheets designed to apply Newton's Laws to real-life contexts. Students performed experiments and observations in the school environment, fostering direct interaction with physical phenomena related to Newton's Laws. This interactive approach aimed to enhance their observational skills through practical experiences.

III. RESULTS AND DISCUSSION

The results show that students in the experimental class (X MIPA 3) at State Senior High School 2 Mamuju, who were taught using environmentally-based Student Worksheets, demonstrated higher observational skills compared to students in the control class (X MIPA 2) who used conventional worksheets. The experimental group achieved a mean score of 16.27, categorized as high, while the control group achieved a mean score of 12.4, categorized as moderate.

Table 2 presents the statistical results of the control class, where 48.58% of students were in the moderate category (scores of 11-15), while 14.28% fell into both the low and very low categories. This distribution highlights the limited development of observational skills in the control group and suggests that conventional worksheets do not effectively engage students in observational activities.

Table 2. Statistics of students' observational skills scores in the control class

Statistics	Score
Sample size	35
Maximum ideal score	25.00
Minimum ideal score	0.00
Maximum Empirical Score	24.00
Minimum Empirical Score	3.00
Mean	12.40
Deviation Standard	5.21

Source: Processed Primary Data (2022)

Table 3 further emphasizes the distribution of observational skill scores in the control class. It shows that only 8.58% of students achieved very high scores (21-25), while a significant portion of students remained in the moderate to very low categories. This wide distribution indicates a lack of consistent engagement and the absence of learning strategies that support the development of observational skills.

Table 3. Frequency distribution of students' observational skills scores in the control class

Score Range	Category	∑ Score	
		Frequency	Percentage (%)
21-25	Very high	3	8.58
16-20	High	5	14.28
11-15	Moderate	17	48.58
6-10	Low	5	14.28
0-5	Very Low	5	14.28
Total		**35**	**100.00**

Source: Processed Primary Data (2022)

In contrast, Table 4 shows that in the experimental class, 54.55% of students were in the high category (scores of 16-20), and only 6.06% fell into the low category. Notably, no students in the experimental group were in the very low category. This data clearly indicates that the environmentally-based student worksheets had a significant positive impact on students' observational skills by providing engaging, real-world learning experiences.

Tabel 4. Statistics of students' observational skills scores in the experimental class

Statistics	Score
Sample size	33
Maximum ideal score	25.00
Minimum ideal score	0.00
Maximum Empirical Score	22.00
Minimum Empirical Score	6.00
Mean	16.27
Deviation Standard	3.40

Source: Processed Primary Data (2022)

Table 5 presents the results of the independent sample t-test, confirming a statistically significant difference between the experimental and control groups. The experimental group achieved a t-value of 3.343, while the control group achieved a t-value of 3.368, both surpassing the critical value at $\alpha = 0.05$. This statistical evidence strongly supports the effectiveness of environmentally-based student worksheets in enhancing students' observational skills.

Table 5. Frequency distribution of students' observational skills scores in the experimental class

Score Range	Category	∑ Score	
		Frequency	Percentage (%)
21-25	Very high	2	6.06
16-20	High	18	54.55
11-15	Moderate	11	33.33
6-10	Low	2	6.06
0-5	Very Low	0	0.00
Total		**33**	**100.00**
Deviation Standard		3.40	

Source: Processed Primary Data (2022)

The significant t-values observed indicate that the learning interventions in the experimental group had a measurable impact on students' observational abilities. This result reflects the alignment of the intervention with best practices in active learning and contextual education. Moreover, the substantial difference between the groups' mean scores underscores the practical importance of environmentally-based Student Worksheets. By integrating these worksheets into the curriculum, educators can create a more interactive and engaging learning environment, resulting not only in higher statistical outcomes but also improved classroom dynamics and student engagement.

Figure 2 visually supports these findings by displaying the percentage distribution of observational skill scores in both classes. It clearly shows that a larger proportion of students in the experimental group achieved high scores compared to the control group, which had more students in the moderate and lower categories. This visual representation reinforces the effectiveness of environmentally-based worksheets in enhancing observational skills.

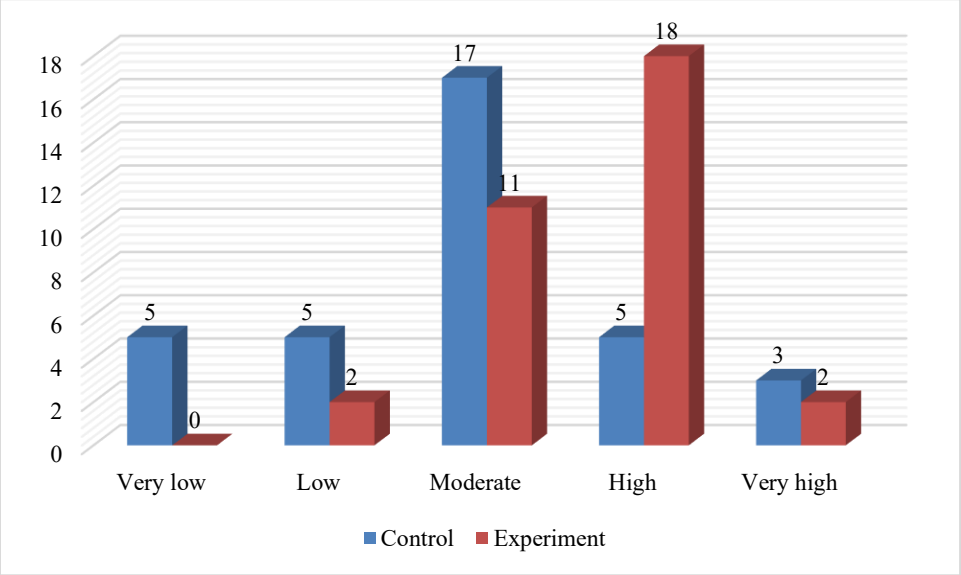

Figure 2. Percentage of students' observational skill scores in the experimental and control classes based on frequency distribution

This significant difference in observational skills can be attributed to several factors. The environmentally-based worksheets incorporated real-world environmental contexts, enabling students to engage in more meaningful and relevant learning experiences. This contextual learning approach aligns with Şimşek and Kabapınar (2010), who emphasized that involving students in hands-on, inquiry-based learning promotes better understanding and observational skills. Furthermore, the Predict-Observe-Explain (POE) model embedded in the worksheets guided students through predicting outcomes, observing phenomena, and explaining results, which enhanced their critical thinking and observational abilities, consistent with findings by Algiranto et al. (2019). In contrast, the conventional worksheets used in the control group lacked interactive and contextual content, limiting student engagement and their opportunity to develop higher-order thinking skills.

The findings also resonate with previous studies. Nugraheny (2018) and Pertiwi et al. (2024) found that learning tools integrating life skills and contextual issues significantly improve students' scientific process skills. Similarly, Rahmawati et al. (2020) and Farisatma et al. (2024) reported that environmentally-based PBL models enhance students' observational abilities. The statistically significant difference in observational skills between the experimental and control groups, confirmed by the independent sample t-test, reinforces the effectiveness of environmentally-based student worksheets in physics education.

These results have important implications for physics education. Teachers are encouraged to implement environmentally-based student worksheets to foster active engagement and improve students' observational skills. Schools should also provide adequate resources and professional

development to support teachers in designing and applying context-rich learning materials. Additionally, future research could explore the impact of integrating other scientific process skills and examine the long-term effects of environmentally-based learning approaches across diverse educational settings.

IV. CONLUSION AND SUGGESTION

This study concludes that the use of environmentally-based student worksheets significantly enhances the observational skills of Grade X students at State Senior High School 2 Mamuju. Students taught with these worksheets achieved higher observational skill scores compared to those using conventional worksheets, indicating that integrating environmental contexts into learning materials effectively promotes student engagement and scientific inquiry. This finding suggests that physics teachers should adopt environmentally-based worksheets to create more interactive and meaningful learning experiences. Schools are encouraged to support this approach by providing resources and training to help teachers develop and implement context-rich instructional tools.

However, this study was limited to a single school and focused solely on observational skills. Future research should involve larger and more diverse populations and explore other scientific process skills to broaden the findings. Additionally, further studies could investigate the long-term impact of environmentally-based worksheets and explore digital adaptations to enhance accessibility and effectiveness in various educational settings.

REFERENCES

Algiranto., Sarwanto., & Marzuki, A. (2019). The development of students worksheet based on predict, observe, explain (POE) to improve students' science process skill in SMA Muhammadiyah Imogiri. *Journal of Physics: Conference Series*, *1153*, 1-6. https://doi.org/10.1088/1742-6596/1153/1/012148

Antonio, R.P. & Prudente M.S. (2024). Effects of inquiry-based approaches on students' higher-order thinking skills in science: A meta-analysis. *International Journal of Education in Mathematics, Science, and Technology (IJEMST), 12*(1), 251-281. https://doi.org/10.46328/ijemst.3216

Astawan, I. G., & Agustiana, I. G. A. T. (2020). *Pendidikan IPA sekolah dasar di era revolusi industri 4.0*. Nilacakra.

Azinah, S. Z., Arsyad, M., & Khaeruddin, K. (2022). Implementation of students' worksheets to improve critical thinking skills. *Jurnal Pendidikan Fisika*, *10*(3), 219–226. https://doi.org/10.26618/jpf.v10i3.8812

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, *24*(2), 97–140. https://doi.org/10.1080/10888691.2018.1537791

Dermawati, N., Suprata, S., & Muzakkir, M. (2019). Pengembangan lembar kerja peserta didik (LKPD) berbasis lingkungan. *JPF (Jurnal Pendidikan Fisika) Universitas Islam Negeri Alauddin Makassar*, *7*(1), 74–78. https://doi.org/10.24252/jpf.v7i1.3143

Fan, X. (2015). *Effectiveness of an inquiry-based learning using interactive simulations for enhancing students' conceptual understanding in physics*. PhD Thesis, School of Education, The University of Queensland

Farisatma., Yusnan, M., Jannah, N., Krisnawati. (2024). The role of teachers in implementing environmentally based learning media through animated videos in elementary schools. *Taksonomi: Jurnal Penelitian Pendidikan Dasar, 4*(2), 285–299.

Gök, G., & Boncukçu, G. (2023). The effect of problem-based learning on middle school students' environmental literacy and problem-solving skills. *Journal of Science Learning*, *6*(4), 414-423. https://doi.org/10.17509/jsl.v6i4.62781

Idris, N., Talib, O., & Razali, F. (2022). Strategies in mastering science process skills in science experiments: A systematic literature review. *Jurnal Pendidikan IPA Indonesia, 11*(1), 155-170. https://doi.org/10.15294/jpii.v11i1.32969

Jamil, M., Muhammad, Y., & Qureshi, N. (2021). Secondary School Science Teachers' Practices for the Development of Critical Thinking Skills: An Observational Study. *Journal of Development and Social Sciences, 2*(4), 259-265. http://doi.org/10.47205/jdss.2021(2-IV)22

Kahar, M. S., Syahputra, R., Arsyad, R. B., Nursetiawan., & Mujiarto. (2021). Design of Student Worksheets Oriented to Higher Order Thinking Skills (HOTS) in Physics Learning. *Eurasian Journal of Educational Research, 96*, 14-29. Doi: 10.14689/ejer.2021.96.2

Kemdikbud. (2013). *Materi pelatihan guru implementasi kurikulum 2013*. Badan Pengembangan Sumber Daya Manusia Pendidikan dan Kebudayaan dan Penjaminan Mutu Pendidikan Kementerian Pendidikan dan Kebudayaan

Mahtari, S., Wati, M., Hartini, S., Misbah, M., & Dewantara, D. (2020). The effectiveness of the student worksheet with PhET simulation used scaffolding question prompt. *Journal of Physics: Conference Series*, *1422*, 1-5. Doi: 10.1088/1742-6596/1422/1/012010

Markhamah., Sufanti, M., Atiqa, S., & Winanrni. (2020). *pembelajaran ejaan di sekolah dasar untuk meningkatkan kemampuan berpikir tingkat tinggi*. Muhammadiyah University Press.

Marzoli, I., Colantonio, A., Fazio, C., Giliberti, M., di Uccio, U. S., & Testa, I. (2021). Effects of emergency remote instruction during the COVID-19 pandemic on university physics students in Italy. *Physical Review Physics Education Research, 17*, 1-18. https://doi.org/10.1103/PhysRevPhysEducRes.17.020130

Mustika, R., Singkam, A. R., & Karyadi, B. (2019). Pengembangan lembar kerja peserta didik berbasis lingkungan sekitar sebagai upaya untuk meningkatkan pemahaman siswa SMP tentang konsep identifikasi makhluk hidup. *Diklabio: Jurnal Pendidikan Dan Pembelajaran Biologi*, *3*(2), 174–184. https://doi.org/10.33369/diklabio.3.2.174-184

Nugraheny, D. C. (2018). Penerapan lembar kerja peserta didik (LKPD) berbasis life skills untuk meningkatkan keterampilan proses dan sikap ilmiah. *Visipena*, *9*(1), 94–114. https://doi.org/10.46244/visipena.v9i1.435

Nusantari, E., Utina, R., Katili, A. S., Tamu, Y., & Damopolii, I. (2020). Effectiveness of environmentally-based science learning towards environmentally-friendly character of students in coastal area. *International Journal of Instruction, 13*(3), 233-246. https://doi.org/10.29333/iji.2020.13316a

Pertiwi, N. P., Saputro, S., Yamtinah, S., & Kamari, A. (2024). Enhancing critical thinking skills through stem problem-based contextual learning: An integrated e-module education website with virtual experiments. *Journal of Baltic Science Education, 23*(4), 739-766. https://doi.org/10.33225/jbse/24.23.739

Purnamasari, A., Karoma, K., Bukhori, K. A., & Sairi, A. P. (2020). Analisis persepsi peserta didik terhadap lembar kerja peserta didik pembelajaran fisika SMA Negeri 8 Palembang. *Jurnal Ilmu Fisika dan Pembelajarannya (JIFP)*, *4*(1), 6–15. https://doi.org/10.19109/jifp.v4i1.5568

Rahmawati, Y., Ridwan, A., Faustine, S., & Mawarni, P. C. (2020). Pengembangan soft skills siswa melalui penerapan culturally responsive transformative teaching (CRTT) dalam pembelajaran kimia. *Jurnal Penelitian Pendidikan IPA*, *6*(1), 86–96. https://doi.org/10.29303/jppipa.v6i1.317

Rankin, L. (2006). *Assessing for learning facilitator's guide workshop II: Assessing process skills a professional development curriculum from the institute for inquiry*. Ekploratorium

Rustaman, N. (2003). *Kemampuan proses ilmiah dalam pembelajaran sains*. Universitas Pendidikan Indonesia.

Sari, C. K., Dwiyani, E., Machromah, I. U., Toyib, M., & Sari, D. N. V. (2022). Enhancing students' critical thinking by integrating contextual problems worksheets on problem-based learning. *Journal of Education Action Research*, *6*(1), 109–115. https://doi.org/10.23887/jear.v6i1.43392

Sarı, U., Duygu, E., Şen, Ö. F., & Kırındı, T. (2020). The effects of STEM education on scientific process skills and STEM awareness in simulation based ınquiry learning environment. *Journal of Turkish Science Education*, *17*(3), 387-405.

Sari, S. S., Zul, M., & Haris, A. (2022). Analysis of students' physics learning outcomes using e-learning during covid-19 pandemic. *Jurnal Pendidikan Fisika, 10*(1), 67-74. https://doi.org/10.26618/jpf.v10i1.6431

Septiana, S., Rizal, R., & Makiyah, Y. S. (2023). Development of electronic student worksheet using problem-based learning model with the Wizer.me platform on momentum and impulse materials. *Jurnal Pendidikan Fisika*, *11*(2), 202–214. https://doi.org/10.26618/jpf.v11i2.10909

Şimşek, P., & Kabapınar, F. (2010). The effects of inquiry-based learning on elementary students' conceptual understanding of matter, scientific process skills and science attitudes. *Procedia-Social and Behavioral Sciences*, *2*(2), 1190–1194. https://doi.org/10.1016/j.sbspro.2010.03.170

Sriwarthini, N. L. P. N., Nurhasanah, N., & Astawa, I. M. S. (2024). Identification of science process skills of group B students at Kreativa Gebang Kindergarten. *Jurnal Penelitian Pendidikan IPA*, *10*(2), 459–464. https://doi.org/10.29303/jppipa.v10i2.5981

Stone, E. M. (2014). Guiding students to develop an understanding of scientific inquiry: A science skills approach to instruction and assessment. *CBE—Life Sciences Education*, *13*(1), 90–101. https://doi.org/10.1187/cbe-12-11-0198

Sugiyono. (2010). *Metode penelitian pendidikan: Pendekatan kuatintatif, kualitatif dan R&D*. Alfabeta

Suryawati, E., Suzanti, F., Zulfarina., Putriana, A. R., & Febrianti, L. (2020). The implementation of local environmental problem-based learning student worksheets to strengthen environmental literacy. *Jurnal Pendidikan IPA Indonesia*, *9*(2), 169–178. https://doi.org/10.15294/jpii.v9i2.22892

Umbaryati, U. (2016). Pentingnya LKPD pada pendekatan scientific pembelajaran matematika. *Prisma, Prosiding Seminar Nasional Matematika*, 217–225.

Wakhidah, N., Laelasari, I., Tasya, G. A., & Sa'adah, A. L. (2022). Observing skills and questioning skills: Are they correlated in the learning process?. *Thabiea : Journal of Natural Science Teaching*, *5*(2), 131–144. http://dx.doi.org/10.21043/thabiea.v5i2.14261