E-LKPD based on Problem-Based Learning on Physical Quantity Measurements to Improve Decision-Making Skills

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E-LKPD based on Problem-Based Learning on Physical Quantity Measurements to Improve Decision-Making Skills

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Abstract: The development of digital learning media as problem-based E-LKPD (electronic LKPD) has become a significant trend in the education sector. This media utilizes information and communication technology to provide students with a more interactive, interesting, and relevant learning experience. Nonetheless, it is crucial to determine the extent to which this media contributes to decision-making. Therefore, this research aims to determine the effectiveness of PBL-based electronic LKPD on physical quantity measurement to improve decision-making skills. This research was quasi-experimental with a one-group pretest-posttest design. The research subjects were 25 10th-grade students. The research instrument was a physical quantity measurement test containing decision-making skills. Effectiveness was measured using the N-Gain test. The research results show that the effectiveness of E-LKPD is in the high category. Moreover, this research reveals that decision-making skills can be trained using problem-based E-LKPD. Furthermore, the results of this research can be developed for other physics topics. This study could assist in the following four domains: curriculum design, learning resource development, continuing professional development for teachers, and integrating technology into the classroom.

Keywords: problem-based learning, E-LKPD, decision-making skills, 21st-century skills, digital learning media

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INTRODUCTION

After COVID-19, online learning media has been widely used for various discussion topics (Puma, 2022; Salas-Pilco et al., 2022; Spitzer & Moeller, 2023). It is essential to develop online learning media to anticipate pandemics such as COVID-19 (Mardini & Mah'd, 2022). One learning media developed is the Electronic Student Activity Sheet (LKPD). Electronic LKPD aims to guide students in teaching and learning activities to form effective interactions between students and educators (Muslimah, 2020). The three primary concerns that underpin the urgency of this research are problem-based learning, digital-era learning, and raising educational standards. The digital age has emerged as a result of information technology advancements (Marzano et al., 2017). In an analogous way, education is gradually moving toward a digital format. Additionally, the existence of E-LKPD is required to expand the capabilities of digital learning. It is crucial to conduct this research to make sure that the developed E-LKPD is effective in achieving learning objectives (Anggereni et al., 2022; Ana, 2020). The ability to think critically and creatively is one of the numerous 21st-century skills that problem-based learning has been shown to effectively improve. As a result, PBL is used in this study as a teaching strategy.

Decision-making is the skill of evaluating a situation, considering the available options, and choosing the most appropriate or beneficial action (Goosen & Steenkamp, 2023; Mahajan et al., 2023). This skill involves complex cognitive processes that can be influenced by other factors, such as available information, individual values and preferences, goals, and pressure from time and risk (Gürkut et al., 2023; Ma et al., 2023; Pan & Gao, 2023; Zhang et al., 2023). Good decision-making skills enable individuals to identify problems, analyze situations well, and choose effective solutions. This skill helps efficiently resolve problems and minimizes negative consequences. Good decision-making can increase one's level of satisfaction and self-satisfaction. Individuals feel they have greater involvement in the outcome by having control over the decisions made. Good decisions can also bring greater satisfaction in achieving personal and professional goals. Physical quantity in physics is categorized into various aspects. From the dimensions of the unit, physical quantities are categorized into basic and derived quantities. In terms of value and direction, there are scalar and vector quantities. In terms of development, there are classical and modern physics quantities. Mastery of the physical quantity measurement concept significantly affects student learning outcomes in quantity and unit material (Sukarno, 2022). There are various ways to train students' ability to measure physical quantities. Actual teaching aids have proven to be effective in increasing mastery of concepts in the unit measurement (Bilousova et al., 2020; Ordu, 2021; Perisic et al., 2023). On the other hand, experimental methods are also effective in improving students' measurement skills (Susilo, 2020). Much research has been conducted on the application of PBL in learning (Arani et al., 2023; Sharma et al., 2023; Sumarni et al., 2021), as well as the development of electronic and

non-electronic LKPD (Muslimah, 2020). Many efforts have been made to improve decision-making skills through learning (Dogan et al., 2023). However, there is no research on using PBL-based electronic LKPD on physical quantity measurement to improve decision-making skills. Therefore, this study intends to explore this topic further. This research aims to determine the effectiveness of PBL-based electronic LKPD on physical quantity measurement to improve decision-making skills.

METHODS

This research was quasi-experimental with a one-group pretest-posttest design (Creswell, 2014). The research subjects were 25 10th-grade students at a state school. The face-to-face learning process was carried out three times using a problem-based learning model assisted by E-LKPD with decision-making skills on physical quantity measurements. The quantities measured included length, volume, mass, and density. Students were given a pretest to obtain their initial skills at the first meeting. Students used E-LKPD about using a ruler, caliper, and micrometer. In the second meeting, students used a graduated cylinder to measure volume and a spring scale to measure mass. Students used their length, volume, and mass measurement skills to determine density and did the posttest at the third meeting. The pretest-posttest consisted of three essay questions integrated with decision-making indicators. Before use, the questions developed were validated by experts. Aspects and indicators of decision-making were formulated from decision-making theory (Pasolong, 2023), as presented in Table 1.

Table 1. Aspects and Indicators of Decision Making

Aspect	Indicator
Formulate problems	Define the problem
	Formulate alternative strategies
	Determine and implement the preferred strategy
Gather information	Gather and consider the required information
	Analyze the right choice
	Consider possible solutions
Make choices	Identify choices
	Use considerations in choosing a solution
	Consider the consequences of each choice for themselves and others
Evaluate choices	Observe and interpret the results well.
	State the suitability of the choice with the criteria
Make decision	Analyze decisions
	Check alternative decisions
	Determine decision choices

This research data was analyzed using the N-Gain statistical test. The data processing sequence began with a normality test for the pretest and posttest results of students' decision-making skills. After the data was proven to be normally distributed and homogeneous, the N-Gain test was applied to determine the increase in students' decision-making skills. The following is the equation for calculating normalized N-Gain (g). Normalized N-Gain categories are shown in Table 2.

Table 2. Interpretation of Normalized N-Gain (Aziz et al., 2021).

Normalized N-Gain	Interpretation
-1,00 < g <0,00	Decreased
g = 0,00	No increase
0,00 < g < 0,30	Low
0,30 < g < 0,70	Average
0,70 < g < 1,00	High

RESULT AND DISCUSSION

Students' decision-making skills are obtained from pretest and posttest scores. The pretest and posttest results are presented in Figure 1.

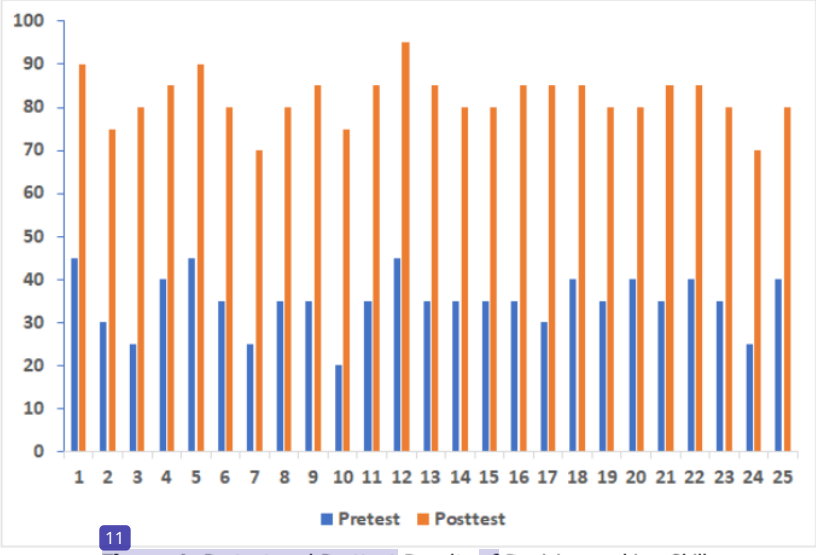

Figure 1. Pretest and Posttest Results of Decision-making Skills

Based on Figure 1, the students' highest pretest score was below 50 out of 100. Most students had scores in the range of 30-40. The results of this pretest show that most students do not have good decision-making skills during the pretest. It is different from the posttest. Most students had scores in the range of 75 - 85. The highest score for students was 90, while the lowest was 70. This posttest score shows that most students have good decision-making skills. However, the magnitude of the increase cannot be determined just based on Figure 1. An N-Gain test is needed to determine the magnitude of the increase. Furthermore, the N Gain test needs data on the average pretest-posttest scores. Data on the number of students, average pretest-posttest score, and standard deviation are presented in Table 3.

Table 3. Pretest-Posttest Score

Score	Number of Students	Average Score	Standard Deviation
Pretest	25	35	6,4
Postest	25	82	5,6
Ideal score: 100			

These scores were then tested for normality with a significance level of α = 0.05, and the results are presented in Table 4.

Table 4. Normality Test Result

Score	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistics	Df	Sig	Statistics	df	Sig
Pretest	0,211	25	0,200	0,968	25	0,420
Posttest	0,250	25	0,300	0,927	25	0,340

Based on Table 4, the Shapiro-Wilk test on the pretest and posttest scores shows a significance of 0.420 and 0.340, respectively. Both significance values are greater than 0.05, so it can be concluded that both are normally distributed. The N-Gain scores are shown in Table 5.

Table 5. N-Gain Score

Score	Number of Students	Average Score	Standard Deviation
N-Gain	25	0,74	0,062

Based on Table 5, the N-Gain result is 0.74. This value was then confirmed with the N-Gain category in Table 2, concluding that N-Gain was in the high category. Thus, the findings of this research indicate that PBL-based electronic LKPD can improve students' decision-making skills. Some supporting factors for success include using electronic LKPD, the PBL approach, and the selection of learning topics. The key factor is the use of electronic LKPD. Electronic LKPD can bring students closer to digital technology adaptation (Chand et al., 2021;

Sibley et al., 2023). In contrast to printed LKPD, electronic LKPD can be combined with interactive media or demonstrations. The more senses involved, the more effective a learning process (Kankal et al., 2023; Kirby & Anwar, 2020). The electronic LKPD in this research utilizes PheT simulations and interactive videos from YouTube. Through these media, students can gather information and make solution choices as an initial stage in decision-making (Canoz et al., 2022; Hovardas et al., 2023). Therefore, students can be actively involved in decision-making throughout their educational experiences.

The second key factor for success is the PBL approach. This approach uses real problems to guide students' learning (Hidajat, 2023). One of the real problems in this research is using appropriate measuring tools to determine the size of nuts and bolts. Before students make a decision, they will look for information and try using various length measuring tools, such as a ruler, caliper, and multimeter. Through electronic LKPD, students are directed to carry out these activities. The PBL approach can train critical thinking skills (Anggraeni et al., 2023; Khoiri et al., 2023). Critical thinking skills are the main provision in decision-making (Lin et al., 2021). Critical thinking is a cognitive process that encompasses the capability to analyze, assess, draw a conclusion, and solve a problem (Chen, 2017; Jatmiko et al., 2018; Rodzalan & Saat, 2015). Critical thinking skills support students in identifying various alternative solutions and evaluating available options.

The third supporting factor is the selection of learning topics. In this research, the learning topic chosen was physical quantity measurement. In this research, the physical quantities measured include length, volume, mass, and density. This topic is linked to real problems students face. Real problems can make learning more meaningful (Das & Tsb, 2023; Khalid et al., 2023; Vermunt et al., 2023; Zgheib et al., 2023). In the electronic LKPD in this study, students were asked to measure the volume of irregular stones and were given the freedom to use measuring instruments in the laboratory. Choosing the right measuring instrument is one way to train decision-making skills. The topic of physical quantity measurement has many alternative scenarios to practice decision-making skills.

This research shows that decision-making skills can be trained in physics learning topics through PBL-based electronic LKPD. Electronic LKPD, as a form of digital learning media, can be used to improve decision-making skills. It aligns with research on the use of modules on biotechnology topics to improve decision-making skills (Nurtamara & Prasetyanti, 2020). LKPD electronic media can also be developed to train 21st-century life skills, such as critical and creative thinking skills (Pramasdyahsari et al., 2023) The results of this research can contribute to the development of digital learning in the 21st century. Additionally, the existence of E-LKPD is required to expand the capabilities of digital learning. It is crucial to conduct this research to make sure that the developed E-LKPD is effective in meeting learning objectives. The ability to think critically and creatively is one of the many 21st century skills that problem-based learning has been shown to effectively improve.

CONCLUSION

The research results show that problem-based E-LKPD on physical quantity measurement has high effectiveness in improving decision-making skills. E-LKPD is designed to train decision-making skills from simple to complex problems gradually and systematically. It is hoped that the results of this research will provide benefits in integrating decision-making into learning as one of the skills needed to face the challenges of the 21st century. Curriculum design, learning resource development, ongoing teacher development training, and the incorporation of technology into the classroom are the four areas in which this research can contribute. In regard to the topic of measuring physical quantities in particular, the research findings can be referenced when developing curricula and instructional strategies. The findings of this research can also be applied to the creation of alternative education resources. In a single subject, educators can use E-LKPD to combine online videos and simulations. While it comes to continuous teacher development training, the efficacy of E-LKPD can serve as a substitute. In conclusion, the findings of this study can serve as an illustration of best practices for incorporating technology into instruction.

REFERENCES

Ana, L. (2020). Efektivitas Penggunaan Lembar Kerja Peserta Didik (LKPD) Berbasis Model Project Based Learning Berbantuan Aplikasi Tracker dengan Pendekatan Saintifik pada Materi Gerak Harmonis Sederhana. *Jurnal Penelitian Pembelajaran Fisika*, 6(2), 155-161.

Anggereni, A., Putra, A. P., & Winarti, A. (2022). Development of e-LKPD biology concept to improve students critical thinking skills. *JPBIO (Jurnal Pendidikan Biologi)*, 7(1), 106-114.

Anggraeni, D. M., Prahani, B. K., Suprapto, N., Shofiyah, N., & Jatmiko, B. (2023). Systematic review of problem-based learning research in fostering critical thinking skills. *Thinking Skills and Creativity*, 49, 101334. https://doi.org/10.1016/j.tsc.2023.101334

Arani, S. M. N., Zarei, A. A., & Sarani, A. (2023). Problem-based language learning: Why Aren't teachers using it?. *Social Sciences & Humanities Open*, *8*(1), 100668. https://doi.org/10.1016/j.ssaho.2023.100668

Aziz, A. A., Adam, I. N. H., Jasmis, J., Elias, S. J., & Mansor, S. (2021). N-Gain and System Usability Scale Analysis on Game Based Learning for Adult Learners. *2021 6th IEEE International Conference on Recent Advances and Innovations in Engineering (ICRAIE)*, 6, 1–6.

Bilousova, L. I., Gryzun, L. E., Rusa, J. O., & Shmeltser, E. O. (2020). *Informatics teacher's training for design of innovative learning aids*. *CTE Workshop Proceedings*, *7*, 563–577. https://doi.org/10.55056/cte.413.

Canoz, G. M., Ucar, S., & Demircioglu, T. (2022). Investigate the effect of argumentation-promoted interactive simulation applications on students' argumentation levels, academic achievements, and entrepreneurship skills in science classes. *Thinking Skills and Creativity*, 45, 101106. https://doi.org/10.1016/j.tsc.2022.101106

Chand, A. A., Lal, P. P., & Chand, K. K. (2021). Remote learning and online teaching in Fiji during COVID-19: The challenges and opportunities. *International Journal of Surgery*, 92, 106019. https://doi.org/10.1016/j.ijsu.2021.106019

Chen, L. (2017). Understanding critical thinking in Chinese sociocultural contexts: A case study in a Chinese college. Thinking Skills and Creativity, 24, 140-151. https://doi.org/10.1016/j.tsc.2017.02.015

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches (4th ed.)*. Sage Publications.

Das, B., & Tsb, S. (2023). Multi-contextual learning in disinformation research: A review of challenges, approaches, and opportunities. *Online Social Networks and Media*, 34–35, 100247. https://doi.org/10.1016/j.osnem.2023.100247

Dogan, B., Pattison, N., Scott, R., & Alinier, G. (2023). A protocol for a scoping review of the use of mental simulation and full-scale simulation in practicing healthcare decision-making skills of undergraduate nursing students. *Nurse Education in Practice*, *71*, 103699. https://doi.org/10.1016/j.nepr.2023.103699

Goosen, R., & Steenkamp, G. (2023). Activating accounting students' decision-making skills through a reflective self-assessment workshop on learning styles. *The International Journal of Management Education*, *21*(3), 100858. https://doi.org/10.1016/j.ijme.2023.100858

Gürkut, C., Elçi, A., & Nat, M. (2023). An enriched decision-making satisfaction model for student information management systems. *International Journal of Information Management Data Insights*, *3*(2), 100195. https://doi.org/10.1016/j.jjimei.2023.100195

Hidajat, F. A. (2023). A comparison between problem-based conventional learning and creative problem-based learning on self-regulation skills: Experimental study. *Heliyon*, 9(9), e19512. https://doi.org/10.1016/j.heliyon.2023.e19512

Hovardas, T., Ter Vrugte, J., Zacharia, Z. C., & de Jong, T. (2023). Simulations and games for learning. In R. J. Tierney, F. Rizvi, & K. Ercikan (Eds.), *International Encyclopedia of Education (Fourth Edition)* (pp. 681–688). Elsevier. https://doi.org/10.1016/B978-0-12-818630-5.14074-6

Jatmiko, B., Prahani, B. K., Munasir, Supardi, Z. A. I., Wicaksono, I., Erlina, N., Pandiangan, P., Althaf, R., & Zainuddin. (2018). The comparison of Oripa teaching model and problem based learning model effectiveness to improve critical thinking skills of pre-service physics teachers. Journal of Baltic Science Education, 17(2), 300-319. https://doi.org/10.33225 /jbse/18.17.300

Kankal, B., Patra, S. K., & Panda, R. (2023). Pedagogical innovation and integration of films in management education: Review and research paradigms. *The International Journal of Management Education*, *21*(2), 100804. https://doi.org/10.1016/j.ijme.2023.100804

Khalid, M., Khan, M. S. H., & Gregory, S. (2023). Contextual variation on teachers' conceptions of ICT-enhanced teaching in engineering education. *Heliyon*, *9*(3), e14531.

Khoiri, N., Ristanto, S., & Kurniawan, A. F. (2023). Project-Based Learning Via Traditional Game in Physics Learning: Its Impact on Critical Thinking, Creative Thinking, and Collaborative Skills. *Jurnal Pendidikan IPA Indonesia*, 12(2), Article 2. https://doi.org/10.15294/jpii.v12i2.43198

Kirby, K., & Anwar, M. N. (2020). An application of activity theory to the "problem of e-books." *Heliyon*, 6(9), e04982. https://doi.org/10.1016/j.heliyon.2020.e04982

Lin, H.-C., Hwang, G.-J., Chang, S.-C., & Hsu, Y.-D. (2021). Facilitating critical thinking in decision making-based professional training: An online interactive peer-review approach in a flipped learning context. *Computers & Education*, 173, 104266. https://doi.org/10.1016/j.compedu.2021.104266

Ma, D., Li, X., Lin, B., Zhu, Y., & Yue, S. (2023). A dynamic intelligent building retrofit decision-making model in response to climate change. *Energy and Buildings*, 284, 112832. https://doi.org/10.1016/j.enbuild.2023.112832

Mahajan, S. L., Tanner, L., Ahmadia, G., Becker, H., DeMello, N., Fidler, R., Harborne, A. R., Jagadish, A., Mills, M., Cairney, P., Cheng, S., Fariss, B., Masuda, Y. J., Pabari, M., Tengö, M., Wyborn, C., & Glew, L. (2023). Accelerating evidence-informed decision-making in conservation implementing agencies through effective monitoring, evaluation, and learning. *Biological Conservation*, 286, 110304. https://doi.org/10.1016/j.biocon.2023.110304

Mardini, G. H., & Mah'd, O. A. (2022). Distance learning as emergency remote teaching vs. traditional learning for accounting students during the COVID-19 pandemic: Cross-country evidence. *Journal of Accounting Education*, 61, 100814. https://doi.org/10.1016/j.jaccedu.2022.100814

Marzano, L., Hollis, C., Cipriani, A., & Malhi, G.S. (2017). Digital technology: coming of age? *Evidence Based Journals*, 20(4), 97 - 97.

Muslimah, M. (2020). Pentingnya LKPD pada Pendekatan Scientific Pembelajaran Matematika. *Social, Humanities, and Educational Studies (SHES): Conference Series*, 3(3), 1472–1479. https://jurnal.uns.ac.id/SHES/article/view/56958

Nurtamara, L., & Prasetyanti, N. M. (2020). The Effect of Biotechnology Module with Problem-Based Learning in the Socioscientific Context to Enhance Students' Socioscientific Decision-Making Skills. *International Education Studies*, 13(1), 11–20.

Ordu, U. B.-A. (2021). The Role of Teaching and Learning Aids/Methods in a Changing World. *Bulgarian Comparative Education Society*. https://eric.ed.gov/?id=ED613989

Pan, L., & Gao, X. (2023). Evidential Markov decision-making model based on belief entropy to predict interference effects. *Information Sciences*, 633, 10–26. https://doi.org/10.1016/j.ins.2023.03.059

Pasolong, H. (2023). *Teori Pengambilan Keputusan*. Penerbit Alfabeta.

Perisic, A., Perisic, I., Lazic, M., & Perisic, B. (2023). The foundation for future education, teaching, training, learning, and performing infrastructure—The open interoperability conceptual framework approach. *Heliyon*, 9(6), e16836. https://doi.org/10.1016/j.heliyon.2023.e16836

Puma, E. G. M. (2022). How universities have responded to E-learning as a result of COVID-19 challenges. *Periodicals of Engineering and Natural Sciences*, 10(3), 40–47.

Pramasdyahsari, A. S., Setyawati, R. D., Aini, S. N., Nusuki, U., Arum, J. P., Astutik, I. D., ... & Salmah, U. (2023). Fostering students' mathematical critical thinking skills on number patterns through digital book STEM PjBL. *Eurasia Journal of Mathematics, Science and Technology Education*, 19(7), em2297.

Rodzalan, S. A., & Saat, M. M. (2015.) The perception of critical thinking and problem-solving skill among Malaysian undergraduate students. Procedia–Social and Behavior Science, 172, 725-732. https://doi.org/10.1016/j.sbspro.2015.01.425

Salas-Pilco, S. Z., Yang, Y., & Zhang, Z. (2022). Student engagement in online learning in Latin American higher education during the COVID-19 pandemic: A systematic review. *British Journal of Educational Technology*, 53(3), 593–619. https://doi.org/10.1111/bjet.13190

Sharma, S., Saragih, I. D., Tarihoran, D. E. T. A. U., & Chou, F.-H. (2023). Outcomes of problem-based learning in nurse education: A systematic review and meta-analysis. *Nurse Education Today*, 120, 105631. https://doi.org/10.1016/j.nedt.2022.105631

Sibley, M. H., Bickman, L., Atkins, D., Tanana, M., Coxe, S., Ortiz, M., Martin, P., King, J., Monroy, J. M., Ponce, T., Cheng, J., Pace, B., Zhao, X., Chawla, V., & Page, T. F. (2023). Developing an Implementation Model for ADHD Intervention in Community Clinics: Leveraging Artificial Intelligence and Digital Technology. *Cognitive and Behavioral Practice*. https://doi.org/10.1016/j.cbpra.2023.02.001

Spitzer, M. W. H., & Moeller, K. (2023). Performance increases in mathematics during COVID-19 pandemic distance learning in Austria: Evidence from an intelligent tutoring system for mathematics. *Trends in Neuroscience and Education*, 31, 100203. https://doi.org/10.1016/j.tine.2023.100203

Sukarno, S. (2022). Pengaruh Kompetensi Sosial Terhadap Penguasaan Konsep Dan Keterampilan Proses Sains Pada Topik Besaran dan Satuan Dalam Perspektif Kooperatif Learning. *Jurnal Luminous: Riset Ilmiah Pendidikan Fisika*, 3(1), 11–16.

Sumarni, W., Rumpaka, D., Wardani, S., & Sumarti, S. (2021). STEM-PBL-Local Culture: Can It Improve Prospective Teachers' Problem-solving and Creative Thinking Skills?. *Journal of Innovation in Educational and Cultural Research*, 3(2), 70-79. doi:https://doi.org/10.46843/jiecr.v3i2.65

Susilo, A. (2020). Penggunaan Metode Pembelajaran Eksperimen untuk Meningkatkan Hasil Belajar Fisika Materi Pengukuran Siswa. *Jurnal Ilmiah Pendidikan Profesi Guru*, 3(3), 542–547.

Vermunt, J. D., Vrikki, M., Dudley, P., & Warwick, P. (2023). Relations between teacher learning patterns, personal and contextual factors, and learning outcomes in the context of Lesson Study. *Teaching and Teacher Education*, 133, 104295. https://doi.org/10.1016/j.tate.2023.104295.

Zgheib, G., Al Daia, R., & Serhan, (2023). A contextual approach for exploring faculty readiness to teach online. *Heliyon*, 9(10), e20491. https://doi.org/10.1016/j.heliyon.2023.e20491.

Zhang, J., Chen, Y., & Xia, C. (2023). Structured multiagent decision-making in information diffusion: The model and dynamics. *Knowledge-Based Systems*, 278, 110869. https://doi.org/10.1016/j.knosys.2023.110869.

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