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Physics of Bamboo Rifle: Improving Data Literacy Through a Project-Based Learning Laboratory with an Ethno-STEM Approach

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Abstract. Data literacy is an essential part of 21st-century skills learning. The rapidly developing digital era currently presents much data-supporting work. This study aimed to improve data literacy through a project-based learning laboratory (PjBL-Lab) with an ethnoscience-science, technology, engineering, and mathematics (ethno-STEM) approach in bamboo rifle physics learning. The research method used a quasi-experiment with a sample of 62 students from the experimental class and 65 students from the control class. The research population was students in the first semester of biology education at a state Islamic university in West Java and science education students at a state Islamic university in Central Java, totaling six classes with a total of 188 students. The sampling technique used was random sampling. The data literacy test instrument used descriptive questions with a rubric that meets valid and reliable criteria. A questionnaire was used to measure the practicality of the learning model's implementation. Data analysis used N-Gain and the non-parametric Mann-Whitney U statistical test. The results showed that data literacy can be improved by implementing the PjBL-Lab learning model integrated with ethno-STEM. There was a significant difference in data literacy abilities between the two classes. The PjBL-Lab model with an ethno-STEM approach received a positive response from students. Therefore, the PjBL-Lab model integrated with ethno-STEM can improve data literacy and is practical for learning. Future research can explore traditional games that can be integrated into physics learning to enhance various 21st-century skills.

Keywords: data literacy, ethnoscience, physics, project-based learning, STEM

Introduction

Digital technology and data systems play an essential role in everyday life in the digital age (Juergens, 202[illegible]; Raffaghelli & Stewart, 2020). Data literacy is an essential skill for prospective teachers to prepare students for the challenges of the 21st century. The ability to process, analyze, and interpret data is an important part of data literacy that prospective teachers must have. In addition, data literacy allows individuals to assess various data presented by various media, business processes, weather forecasts, and health. Using data to make decisions is an important element in educational reform (Dunn et al., 2013) and is part of the prerequisites for making effective decisions (Kippers et al., 2018). Therefore, data literacy is an essential skill that must be provided to prospective teacher students to prepare them to compete in the future (McDowall et al., 2021). Improving data literacy for prospective teachers is a strategic step toward developing skills in the digital era.

Mastering data literacy is crucial for maintaining the quality and integrity of research (Suharsiwi et al., 2025). Data literacy has become a core competency for students (Tu et al., 2025). Science, technology, engineering, and mathematics (STEM) educators view data literacy as a valuable skill for aspiring scientists to learn in the undergraduate curriculum (Carroll et al., 2025). Individuals can possess data-related knowledge and skills to verify validity and reliability, analyze, confirm, and refute claims (Pascual et al., 2025). A person with data literacy skills can identify relevant information from various data sources, understand the context of the data, manage, communicate, and use data for informed decision-making, and effectively apply data within an ethical framework (Nwagwu, 2025; Tu et al., 2025; Suharsiwi et al., 2025). Research shows prospective teachers trained in structured data literacy can improve their data analytics insights for decision-making (Sandoval-ríos et al., 2025). Therefore, data literacy training needs to be provided to prospective teachers through contextual learning.

The data literacy of students needs to be improved through integrated learning that involves local potential and special education interventions. Data literacy is an important skill that teachers must possess and maintain, but empirical studies show that the data literacy of prospective teacher students is still less than optimal (Ambarwati et al., 2020; Pratama et al., 2020). The study results show that students have difficulty applying abstract concepts in everyday life due to their mastery of data literacy (Lopez et al., 2025). Students tend to use unstructured and unsystematic data and utilize data ineffectively (McDowall et al., 2021). In addition, learning that involves local potential is also underutilized in improving data literacy (Lestari & Rosana, 2020). Educational interventions have improved understanding, comfort in using data, analytical skills, and better knowledge (Dunlap & Piro, 2016). Reeves & Honig (2015) also found that interventions have improved prospective teachers' knowledge and skills related to data literacy. Mandinach et al. (2015) emphasized the importance of educational programs that train data literacy in the curriculum, and teachers must acquire and maintain data literacy (Mandinach & Gummer, 2016). Therefore, an effective way to equip prospective teacher students with adequate data literacy is needed by integrating local potential-based learning and special education interventions. Thus, prospective teacher students will have good data literacy competencies, which are very important for their duties as educators in the future.

Indonesia possesses rich cultural traditions, including local knowledge and traditional games that can be integrated into physics learning through an ethnoscience approach. The ethnoscience approach integrates formal and local science knowledge, making it easier for students to relate science concepts to their local cultural context. This is important to improve data literacy and a deeper and more relevant understanding of physics concepts for prospective teacher students. Research by Rahayu & Sudarmin (2015) shows that the ethnoscience approach balances formal and local knowledge. Zulirfan et al. (2023) found that ethnoscience makes it easier for students to relate science knowledge to local culture. In addition, research by Saepudin et al. (2020) revealed that many traditional games are starting to become extinct due to technological developments, even though these games can teach physics concepts. Previous research indicates that the traditional bamboo rifle game can effectively teach the concepts of gas mechanics and thermodynamics through straightforward experiments (Sabarudin, 2020; Khalifah & Mikrajudin, 2021).. It is important to preserve local culture, such as bamboo rifles, in physics learning to support the MBKM curriculum policy, which places local wisdom as an important part of education. Integration of local potential not only maintains cultural heritage but also improves data literacy and understanding of physics concepts for prospective science teachers (Handayani et al., 2016; Lestari et al., 2024; Suastra et al., 2017).

This study identified a gap in integrating ethnoscience with the PjBL-Lab model integrated ethno-STEM approach to improve physics learning data literacy, especially using bamboo rifle games. Tu et al. (2025) included data literacy courses in their research, but their learning topics were limited and did not fully cover the practical applications of data analysis. Tu et al. (2025) research recommends integrating interdisciplinary knowledge to learning with situational interventions to encourage student practice. Although many previous studies have examined the integration of PjBL, STEM, and ethnoscience in various educational contexts, none have specifically used bamboo rifle games as a medium to improve data literacy. Research by Qin & D'Ignazio (2010) and Schmidt & Fulton (2016) showed that the STEM approach can improve data literacy, while Sumarni and Kadarwati (2020) have integrated ethnoscience with the PjBL and STEM models to improve critical thinking skills. The exploration of bamboo rifle games in explaining physics concepts has been revealed (Sabarudin, 2020; Khalifah & Mikrajuddin, 2021). However, research on bamboo rifles, such as that conducted by Maknuni & Sabaruddin (2020) and Khalifah & Mikrajuddin (2021), has not been designed explicitly for physics learning involving data literacy. The novelty of this research lies in the design of the PjBL-Lab model, integrated with ethno-STEM, using traditional bamboo rifle games to train data literacy for prospective teacher students. This research is expected to provide significant contributions to developing physics learning that is more contextual and relevant to local potential, as well as improving data literacy, a 21st-century skill. This study aims to improve the data literacy of prospective teachers through traditional bamboo rifle games using the PjBL-Lab model integrated with the ethno-STEM approach.

Methods

The research used a quasi-experimental approach with a pretest and posttest control group (Creswell & Creswell, 2017). The research population consisted of first-semester biology education students from a state Islamic university in West Java, along with science education students from a state Islamic university in Central Java. In total, there were six classes with 188 students. The sampling technique employed was random sampling, resulting in a research sample of 127 students. This sample specifically included students enrolled in an introductory physics course during the semester. The participants were divided into two groups: a control class with 65 students and an experimental class with 62 students. The experimental class was taught using the ethno-STEM integrated PjBL-Lab model, while the control class used a contextual learning approach. The research procedure adhered to the research objective of improving data literacy through the ethno-STEM integrated PjBL-Lab learning model. Students constructed indigenous community knowledge into scientific knowledge. Students explored both the community and the laboratory. The control and experimental classes were given a data literacy pretest before and after the learning process. The learning syntax for the ethno-STEM integrated PjBL-Lab is presented in Table 1.

Table 1. PjBL-Lab model with an ethno-STEM approach to learning physics using bamboo rifles

Stage	Syntax PjBL (Krajcik & Shin, 2014)	Syntax PjBL ethno STEM (Sudarmin et al., 2023)	Syntax PjBL-Lab ethno-STEM by Researcher	The learning activity
First	Driving Question	Introducing Problem	Problem orientation	The lecturer explains the learning objectives. Presents material on bamboo rifle mechanics.

Stage	Syntax PjBL (Krajcik & Shin, 2014)	Syntax PjBL ethno STEM (Sudarmin et al., 2023)	Syntax PjBL-Lab ethno-STEM by Researcher	The learning activity
				Presents physics problems related to local games.
Second	Focus on Learning Goals	Finding relevant questions	Identify Relevant Questions	The lecturer presents bamboo rifle physics problems using a worksheet. The worksheet contains open-ended questions related to bamboo rifle physics.
Third	Scientific Practices	Arranging the class	Organizing the Class	The lecturer divides students into groups and discusses them.
Fourth	Collaborative Activities	Scheduling	Collaborative Planning of the project	The lecturer provides guidance on ethno-STEM in bamboo rifle games. The lecturer helps students understand the ethno-STEM connection. The lecturer helps students understand indigenous knowledge and transform it into scientific knowledge.
Fifth	Learning Technology Scaffolds	Planning the project	Exploration	The lecturer helps students develop a project plan related to the construction of indigenous knowledge into scientific knowledge.
Sixth	Creation of Artifacts	Monitoring the project implementation	Monitoring the project implementation	Students explore through laboratory experiments and seek information about traditional bamboo rifle games in the community.
Seventh		Monitoring the project improvements	Presentation project	The lecturer monitors the implementation of students' projects.

The data literacy instrument uses objective essay test questions with a rubric. The data literacy test instrument consists of 7 questions that meet the validity and reliability aspects. The Cronbach's alpha test instrument reliability is 0.717. Meanwhile, the content validity of the data literacy test questions by four physics learning experts obtained a value of 0.95. By Aiken's V criteria, the data literacy instrument can be declared valid (Ramadhan et al., 2019; Siagian et al., 2023). The measured data literacy indicators include identifying, analyzing, implementing, using, interpreting, and evaluating data (De Amicis et al., 2019; Pratama et al., 2020; Slayter & Higgins, 2018). The practicality of the learning model instrument is measured using a questionnaire. The practicality of the learning model questionnaire uses a Likert scale, with criteria of strongly agree (4), agree (3), disagree (2), and strongly disagree (1). Data collection techniques for the data literacy variable were conducted before and after the learning process. The practicality of the learning model was measured using a questionnaire distributed after the learning process. Each student filled out the questionnaire without revealing their identity. This was intended to ensure students could fill out the questionnaire objectively.

The data analysis technique used normality, homogeneity, and the Mann-Whitney U statistical test. The normality test used the Kolmogorov-Smirnov normality test. The homogeneity test used the Levene test. The success of increasing data literacy was measured using the N-Gain criteria. The N-Gain criteria $\langle g \rangle < 0.3$ (low); $0.3 < \langle g \rangle \leq 0.7$ (moderate); $0.7 \geq \langle g \rangle$ (high) (Hake, 1999). The calculation of the practicality of the learning model used a percentage. The criteria for determining the practicality of the learning model used a percentage of N-Gain, namely 0-59% not practical; 60%-65% little practical; 66%-70% pretty practical; 71%-81% practical; and 82%-100% very practical (Dahal et al., 2023).

Results and Discussion

This research aims to improve data literacy through a PjBL-Lab model with an ethno-STEM approach. Students reconstructed indigenous community knowledge into scientific knowledge through community interviews and laboratory exploration. Students designed a bamboo rifle practicum, conducted experiments to obtain data, and reported the results in a presentation. The results of the reconstruction of indigenous community knowledge into scientific knowledge about bamboo rifles are shown in Table 2.

Table 2. Reconstructing indigenous knowledge into scientific knowledge about bamboo rifles

No	Question	Answer	Scientific knowledge
1	What type of bamboo is used to make bamboo rifles?	The bamboo commonly used in making bamboo rifles is *apus, atter, betung, and wulung*. The bamboo used is dry. Wet bamboo can easily break.	The scientific names are *Gigantochloa apus (Kurz.), Gigantochloa nigrocillata (Kurz.), Gigantochloa atter (Gigantochloa atter)*, and *Dendrocalamus asper*. These bamboos are used to make bamboo rifles and are commonly used for crafts. Research shows that petung bamboo has superior strength compared to ampel bamboo (Widnyana, 2012). Dry bamboo has superior strength compared to wet bamboo (Arsad, 2015). Betung bamboo has a high vascular density (Nuriyatin & Sofyan, 2011). Wet bamboo contains liquid, resulting in poor density. When subjected to high pressure from a bullet, wet bamboo can easily break. This is because wet bamboo cannot withstand the pressure within the bamboo tube.
2	What type of bullet material is used in the bamboo rifle game?	The materials used include newspaper, cement wrapping paper, photocopy paper (HVS), cardboard, taro leaves, cassava leaves, and Chinese petai (bean stalk) bulbs. When fired at a body part, the petai (bean stalk) bulbs produce a hot, red glow. Players prefer to use newspapers as the bullet material.	Newspaper bullets are easy to shape and soften when water is added. Newspapers chemically contain lead (Pb) (Indriati et al., 2014). When used as bullets for bamboo rifles, they require less propulsion. This is because bullets made from newspaper have little friction against the bamboo walls. Characteristics: Photocopy paper (HVS) is stiff and does not soften as easily when water is added. The paper's more difficult-to-

No	Question	Answer	Scientific knowledge
			shape structure provides a firmer grip on the bamboo walls. Photocopy paper bullets require greater propulsion due to the bullet's friction with the larger walls, which generates greater air pressure inside the bamboo rifle. Consequently, the bullet's ejection distance and velocity are greater.
3	What are the sizes of bamboo rifle casings and plungers?	The bamboo rifle cartridge is longer than the bamboo spearhead. The bamboo rifle is approximately 30-40 cm long. If the cartridge is 30 cm long, the spearhead is 39 cm long.	Bamboo rifle casings are longer than bamboo shovels. This is so that when the paper bullet is first inserted into the cartridge, it does not come out straight away. When another bullet (2nd bullet, etc.) is inserted, the initial bullet will be ejected, and the replacement bullet will remain at the end of the cartridge (Khalifah & Abdullah, 2021).
4	Why can bullets be ejected from bamboo rifle casings?	Paper bullets are ejected by the force of other bullets when inserted into the cartridge.	Scientifically, the air in the bullet casing will be compressed by the thrust of the next bullet, so that the bullet can be thrown. This condition is similar to how a spring works, namely Hooke's Law. Hooke's law equation $F = k\Delta x$. F is the force acting on the bullet. K is the spring constant, and Δx is the change in the length of the casing cavity (Khalifah & Abdullah, 2021).

The data literacy instrument for learning rifle physics was measured using seven descriptive questions tested during the pretest and posttest in the control and experimental classes. The control class used a contextual approach, while the experimental class implemented PjBL-Lab with an ethno-STEM approach. Table 3 presents descriptive statistics from the N-Gain data literacy of the control and experimental classes.

Table 3. Descriptive analysis of N-Gain data literacy of the control and experimental classes

Statistic	Control Class (Contextual Learning)	Experiment (PjBL-Lab Ethno- STEM Approach)
Sample Size	65	62
Mean	0.5443	0.7637
Std. deviation	0.15666	0.12350
Std. Error	0.01943	0.01569
Min	0.25	0.45
Max	0.83	1.00

Table 3 shows that the average N-Gain for the control class taught with a contextual approach was 0.5443, categorized as moderate. Meanwhile, the average N-Gain for the experimental class taught with PjBL-Lab using an ethno-STEM approach was 0.7637, categorized as high. The N-Gain values align with the criteria established by Hake (1999). The higher average N-Gain for the experimental class than for the control class indicates that the PjBL-Lab using an ethno-STEM approach effectively improves data literacy.

Further testing was conducted to determine whether differences in data literacy were statistically significant. Normality and homogeneity tests are prerequisites for further statistical testing. The results of the Kolmogorov-Smirnov normality test for the N-Gain data literacy are shown in Table 4.

Table 4. Kolmogorov-Smirnov normality test

Class	Statistic	Df	Sig.	Conclusion
Control	0.158	65	0.000	Sig. 0.000 < 0.05, Data is not normally distributed
Experiment	0.075	62	0.200	Sig. 0.200 > 0.05, Data is normally distributed

Table 4 shows that the control class's data was not normally distributed, as the significance value was less than 0.05. Meanwhile, the experimental class's data was normally distributed, with a sig. Value greater than 0.05. Therefore, the data literacy difference test used non-parametric method. Meanwhile, the N-Gain homogeneity test used Levene's statistics, the results of which are shown in Table 5.

Table 5. N-Gain homogeneity test for the control and experimental classes

Data	Levene Statistic	df1	df2	Sig.	Conclusion
Based on the Mean	1.322	1	125	0.252	Homogen
Based on the Median	1.316	1	125	0.254	Homogen
Based on Median and with adjusted df	1.316	1	112.179	0.254	Homogen
Based on trimmed mean	1.309	1	125	0.255	Homogen

Table 5 shows that the N-Gain homogeneity statistic for data literacy demonstrates a Levene statistic value based on the mean of 0.252 > 0.05. These results indicate that the data for the control and experimental classes are homogeneous. The results of normality and homogeneity tests indicate that further testing for differences in data literacy improvement using the non-parametric Mann-Whitney U statistic (Table 6) is needed.

Table 6. Non-parametric Mann-Whitney U statistical test

Class	N	Mean rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Control	65	41.70	2710.50	565.500	2710.500	-7.005	0.000
Experiment	62	87.38	5417.50				

Table 6 shows the statistical test results, as seen from the Asymp. Sig. (2-tailed) value of 0.000. Since this value is below 0.05, it indicates a statistically significant difference between students taught using a contextual approach and those taught using the PjBL-Lab with an ethno-STEM approach. This indicates a significant difference between the two classes.

The practicality of the PjBL-Lab learning model integrated with ethno-STEM is based on indicators of learning objectives, resource support, implementation, and student learning context. The questionnaire results indicate that implementing the PjBL-Lab model integrated with ethno-STEM is categorized as practical. This aligns with the practicality criteria (Dahal et al., 2023). This means that the implementation of the PjBL-Lab model integrated with Ethno-STEM can be applied to improve data literacy. Table 7 presents the results of the questionnaire on the practicality of the ethno-STEM integrated PjBL-Lab model.

Table 7. Results of the questionnaire on the practicality of the ethno-STEM integrated PjBL-Lab model

No	Question	Response	Criteria
1	Learning physics using bamboo rifles using the PjBL-Lab model with an Ethno-STEM approach trains data literacy skills.	77.42	Practical
2	Reconstructing indigenous knowledge into scientific knowledge from traditional bamboo rifle games reinforces physics concepts.	82.26	Very practical
3	Problem-solving through collaborative projects motivates continued learning.	88.71	Very practical
4	Bamboo rifle game experimental equipment is easily accessible.	85.48	Very practical
5	Traditional bamboo rifle games are suitable for learning physics.	83.87	Very practical
6	Physics learning that combines aspects of culture, science, technology, engineering, and mathematics provides new perspectives.	90.32	Very practical
7	A project exploring traditional bamboo rifle games in the community raises awareness of the importance of cultural heritage values.	87.10	Very practical
8	Worksheets help practice data literacy skills.	80.65	Practical
9	Explanatory bamboo rifle activities in the laboratory provide meaningful learning experiences.	87.10	Very practical
10	Project presentations provide enjoyable learning experiences.	80.65	Practical

Table 7 shows that the ethno-STEM integrated PjBL-Lab learning model can improve data literacy. Haryanto et al. (2024) stated that learning that integrates the ethnoscience PjBL model with STEM disciplines creates relevant, contextual learning experiences for students and is proven effective in improving numeracy literacy. PjBL with an ethno-STEM approach facilitates data collection, analysis, and interpretation through real-world contexts (Witte et al., 2024; Schenck & Duschl, 2024). Furthermore, ethno-STEM integrated PjBL-Lab learning develops creative thinking by presenting problems containing local wisdom as a bamboo rifle game that stimulates collaborative data-based problem solving. However, the main challenge is holistically addressing data literacy, especially in independent data collection and analysis (Witte et al., 2024).

The integration of an ethno-STEM approach with the PjBL-Lab model contributes to providing solutions to existing problems. This model involves PjBL integrated with four STEM fields based on local culture to develop critical, creative, innovative, and collaborative thinking skills (Sumarni & Kadarwati, 2020). Furthermore, community-specific knowledge (ethnoscience) is crucial for developing student character (Sudarmin et al., 2019). Integrating PjBL-STEM can also improve students' creative problem-solving skills (Purwaningsih et al., 2020), sustainability literacy skills, and outcomes (Safitri et al., 2025). PjBL-Lab integrated ethno-STEM stimulates students to solve challenges in everyday life. PjBL can better accommodate students' ideas and foster greater student engagement.

PjBL-Lab learning that integrates ethno-STEM can improve data literacy. Data literacy is essential for workforce graduates (Ambarwati et al., 2020). Data literacy is closely related to decision-making. Data literacy correlates with decision-making skills (Mandinach et al., 2011). Data literacy is a prerequisite for data-driven decisions (Kippers et al., 2018). To train data literacy, teachers can implement PjBL oriented towards solving real-world problems (Ismail et al., 2016; Lou et al., 2011).

Providing real-world physics-related problem-solving projects contributes to improving data literacy. When students undertake a practical project that reconstructs indigenous knowledge into scientific knowledge, they are involved in data collection. Students conduct interviews with community members regarding bamboo rifle games. Data obtained through laboratory activities is then analyzed to improve data literacy skills. This is in line with research stating that providing projects will influence the formation of student cognition and behavior (Lou et al., 2011), scientific literacy (Afriana et al., 2016), and thinking skills (Subagja et al., 2025). Procedural problem-solving will foster positive attitudes, achieve conceptual knowledge, and demonstrate creative and organized project results.

Problem-solving projects are conducted through collaborative practicums and investigations. Students work in groups, discussing and exchanging ideas, sharing roles in problem-solving, and communicating experimental results to the class. Collaborative work can improve learning efficiency and effectiveness (Malik & Ubaidillah, 2021). Collaborative problem solving can help students construct knowledge. The bamboo rifle physics problem serves as scaffolding in learning. This aligns with Vygotsky's constructivist learning theory, which states that students' knowledge constructs are formed through environmental interactions, problem-solving, group discussions, presentations, and collaborative teamwork (Pritchard & Woollard, 2013; Siller & Ahmad, 2024). Constructivist learning encourages students to explore, experiment, and think critically (Jariah et al., 2025; Ramaila & Mavuru, 2025). Furthermore, collaborative learning can train students in critical reflection skills and transformative learning (Kruger & Buley, 2022). Therefore, providing collaborative problems through projects serves as scaffolding to improve students' data literacy.

The significant increase in data literacy through PjBL-Lab physics learning with an ethno-STEM approach shows a concrete contribution to SDGs 4 and 17. Efforts to improve data literacy in students through the PjBL-Lab model with an Ethno-STEM approach are important in supporting sustainable development in the quality education indicator (SDGs 4). Quality education, inclusive for all, equality, and promoting lifelong learning (Gonz & Magaña, 2020; Leal et al., 2024). Problem-oriented learning and collaborative projects can contribute to education and sustainable development (Dobson & Tomkinson, 2012; Espino-Díaz et al., 2023; Ubaidillah et al., 2023). Furthermore, collaborative learning to achieve shared goals aligns well with the sustainable development goals (SDGs 17) indicator of partnerships to achieve goals (Leal et al., 2024; Vestergaard et al., 2021). Therefore, physics learning designed with student-centered collaborative projects can contribute to sustainable development.

The successful implementation of the PjBL-Lab model is inseparable from the roles of teachers and students. If students and teachers work within the zone of proximal development (ZPD), successful PjBL implementation can be achieved (Capraro et al., 2013). Resource support contributes to the successful implementation of the ethno-STEM integrated PjBL-Lab model. The teacher's competency also influences the ability of educators to implement the STEM-integrated PjBL model. Therefore, teacher mastery and skills in guiding students in completing projects can contribute to student success.

Conclusion

The PjBL-Lab model with an ethno-STEM approach in bamboo rifle physics learning can improve data literacy in prospective teachers. Improved student data literacy stems from a learning process that involves students in collaborative project completion, reconstructing indigenous knowledge into scientific knowledge, discussing, and analyzing data from lab experiments. Student interaction during learning facilitates knowledge construction, leading to improved data literacy. Furthermore, the PjBL-Lab model, using an ethno-STEM approach in learning physics using bamboo rifles, meets practical criteria. Future research recommendations include measuring 21st-century skills, including collaboration, communication, critical thinking, creativity, and innovation. Furthermore, the gamification of the traditional bamboo rifle game is needed, as well as the use of other traditional games to teach physics data literacy.

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