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Application of Digital Peer Teaching-Learning Media Based on Ethnopedology towards Learning Independence

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ABSTRACT

This research aims to determine how Ethnopedagogy-based digital peer teaching media is applied to students' learning independence. The problem lies in the low ability of teachers to utilize digital-based technology facilities. The method used is quantitative. The research design used was a One-Group Posttest Design, an experiment with only one group without a comparison group. The experimental design used was a one-shot case study. In applying this method, the research only used one class by giving a questionnaire at the end of the activity, thus allowing an assessment of the results after the treatment was applied. The research results stated that the total average score for all aspects of student learning independence was 11.4, with a percentage of 76.67%. These results indicate that most students have good learning independence in studying physics using an ethnopedagogical approach. However, the self-evaluation aspect is an area that requires more attention because there are still students who need more confidence in assessing their learning progress.

Keywords: *Digital Learning Media, Ethnopedagogy, Peer Teaching, Thematic*

INTRODUCTION

Education is an effort to develop students' potential both individually and in groups, physically or spiritually, spiritually, materially, as well as the maturity of thinking (Tamimi et al., 2024). The meaning of education can be formulated in various aspects, elements, forms, and by its basic philosophy. However, the most essential meaning is education in developing the quality of human resources (teachers). The independent curriculum is a curriculum with diverse extracurricular learning, where the content presented to students will be more optimal with the aim that students can have sufficient time to explore concepts and strengthen competencies.

Students' learning independence, which includes self-confidence, responsibility, discipline, motivation, and being active in learning, is quite good. In training students to be independent, of course, they cannot be separated from the guidance and assistance of parents at home. Teachers need to collaborate with parents to train children's independent learning. Teachers have trained students' independence at school in the form of providing opportunities to ask questions and come forward, being disciplined by coming to school on time, being responsible for carrying out assignments to completion, using active learning models in groups to provide increased student activity in the learning process and provide motivation in the form of advice, appreciation, encouragement, and appreciation to students who have become independent in learning (Merici, 2024).

Based on the results of the author's observations at SMA Negeri 3 Lhokseumawe, it was found that learning taking place in the Merdeka curriculum has not used appropriate learning media; this has become a challenge for the readiness of human resources (teachers) as the central pillar of implementing the independent curriculum. The next problem is the low ability of teachers to empower digital-based technology facilities; this indicates that in the future, every teacher will be required to master digital technology as the basis for learning activities. The solution offered in this research is to provide innovations in learning media, such as Ethnopedagogy-based digital teaching learning media.

The quality of the realization of digital media based on ethnopedagogy can be used as a benchmark in implementing the development of the quality of early childhood education in the future. Some of the anxieties that arise from the research results of theoretical and practical correlation studies of early childhood education are reflected in the tendencies towards the emergence of gaps between the ideal expectations of the application of ethnopedagogical digital media as an effort to achieve the goals of world standard early childhood education and the reality of the current dynamic implementation of education. There continue to be changes in the value of digital media (Gandana et al., 2023). According to Edi Rohyadi, in his research, the ethnopedagogical approach is open to being applied at different class levels and lesson content, depending on a teacher's creativity and innovation level

(Rohyadi et al., 2024). This positively impacts students' learning independence, which ultimately influences the achievement of learning objectives. Peer teaching (peer tutoring) based on ethnopedagogy is an innovation in combination that produces creative learning media; in this case, learning using mixed media that elevates ethnopedagogical learning needs to be introduced to teachers because this research is an activity to build and provide knowledge for students through local wisdom (Fatmi et al., 2023).

The problem formulation in this research is how to apply Ethnopedagogy-based digital peer teaching media to students' learning independence. Moreover, this research aims to determine how Ethnopedagogy-based digital peer teaching media is applied to students' learning independence. Communication between humans requires an intermediary called language. According to Sitti Rabiah, language is a communication device used to interact with each other and convey ideas, concepts, or feelings. She also stated that Participants in communication with language can communicate with each other. It means that a speaker can be a symbol sender, which is essential for the community.

LITERATURE REVIEW

Peer teaching digital learning media is an innovative method in the world of education that utilizes digital technology to increase the effectiveness of the teaching and learning process. This method involves students in a dual role, namely as learners and teachers, which aims to encourage active participation, increase understanding of the material, and strengthen students' social skills (Wulandari & Fatmaryanti, 2024). Peer teaching digital learning media offers many benefits in improving the quality of learning. Using digital technology can make the teaching and learning process more interactive, fun, and practical. Implementing digital peer teaching will help students understand the subject better and develop essential skills for their future, such as learning independence (Haleem et al., 2022).

Learning independence is a person's ability to organize and direct their learning process without significant dependence on other parties, such as teachers or instructors. Learning independence includes various aspects such as motivation, responsibility, initiative, and the ability to manage learning time and resources. Learning independence is understood as adapting to the environment to meet their needs, emphasizing adapting personal factors, such as learning strategies, goal structure, and self-confidence, to meet task demands (Aulia et al., 2019). In digital learning, the media used in peer teaching can facilitate the development of these skills through more flexible and independent interactions (Yusof & Ahmad, 2022).

Ethnopedagogy in an educational context is an approach that connects students' local knowledge, values, and culture with the learning process. In physics education subjects, ethno-pedagogy can be applied by linking physics theories with students' life experiences and local wisdom (Matteo Bozzi, Juliaan E Raffaghelli,

2021). This concept aims to make learning material more relevant, understandable, and meaningful for students from different cultural backgrounds. The application of digital learning media and peer teaching in physics education can strengthen ethnopedagogical principles by adapting physics learning materials to local cultural contexts, as well as utilizing technology and collaboration between students to increase understanding (Sholahuddin & Admoko, 2021).

Ethno pedagogy in physics learning: Physics is a science closely related to natural principles, physical laws, and phenomena around us. Even though physics material is universal, its application can be influenced by culture, local experiences, and people's perspectives on the world (Majid, 2021). Applying Ethno pedagogy in physics can be done by linking physics concepts to everyday life. For example, in material about force or motion, students can be invited to observe traditional activities that involve physics principles, such as traditional boat building, which involves the concept of hydrodynamics, or traditional musical instruments, which illustrate the concepts of vibration and sound waves. In this case, local culture is used as a medium to explain existing physics principles (Nuriyani et al., 2021).

Utilization of digital learning media in ethnopedagogy digital learning media can be an effective means of applying ethnopedagogical concepts in physics education because technology allows students to access various resources relevant to their cultural context and learn through visual and interactive experiences (Siswanto et al., 2022). Applying digital media in physics with an ethnopedagogical approach is like learning videos based on local culture. Animated videos or documentaries that show the application of physics concepts in local cultural contexts can strengthen students' understanding. For example, videos depicting how people use the laws of physics to build traditional houses or how they use traditional tools that involve physical principles, such as how to utilize air pressure in making agricultural tools (Ermiana et al., 2024).

Peer teaching in the context of ethnopedagogy, or peer learning, is a very relevant approach to be applied in ethnopedagogical-based physics learning. Students who are more advanced or understand a physics concept more quickly can help their friends in a more relaxed way based on local experience (Nursima et al., 2022). Peer teaching can be applied in Ethno pedagogy-based physics learning through group discussions based on local context. Students can be divided into small groups and asked to discuss specific physics concepts related to their cultural experiences. For example, they can discuss how Newton's laws of motion are seen in traditional activities such as children's games or local transportation; then, they teach these findings to other groups (Wirawan et al., 2022), mentoring or explaining concepts in pairs. In the peer teaching method, students who better understand a physics concept, for example, kinetic and potential energy, can share their knowledge with peers using relevant local cultural examples. More advanced students may be able to explain how this energy works in local activities such as traditional sports or manual work that involves movement (Wirawan et al., 2022).

The synergy of Ethno pedagogy, digital media, and peer teaching in physics learning. Combining ethno-pedagogy, digital media, and peer teaching makes physics learning more inclusive and contextual. Learning based on local culture avoids learning that seems abstract and far from reality and motivates students to actively participate in the learning process (Sugara et al., 2022). Another research shows that developing the potential within students can be said to be effective if teachers can master and use appropriate learning methods and media. This is based on choosing good interactive media that can increase students' enthusiasm for participating in the learning process (Eka Tuah et al., 2023). As for other relevant research: According to Mufidah & Tirtoni (2023) the application of peer teaching as an innovative learning method for learning Pancasila education is effective in increasing student learning outcomes. Renewability: this research develops a peer teaching method combined with ethnopedagogy to support students' independent learning in the independent curriculum (Mufidah & Tirtoni, 2023). Fatmi's research (2023) also states that ethnopedagogy is an educational practice that has a high relationship with life skills which relies on educational empowerment and local wisdom in each region. Renewability: in this research, ethnopedagogy is combined with peer teaching which is used as digital media to support learning in schools which has an impact on students' learning independence (Fatmi et al., 2023).

The application of digital peer teaching media based on Ethnopedagogy for learning independence is essential, considering that the character formation of children at middle school age regarding understanding technological learning and learning independence needs to be formed by introducing one's own regional identity. This is necessary to support students' knowledge in learning at school to achieve learning competencies (Nuriyani et al., 2021). The creation of a new generation of digital education requires considering factors such as impact on learning, training, management, cost, devices, technology comparisons, software, and methodologies for assessing learning (Ros & Prak, 2024).

RESEARCH METHODOLOGY

This study uses a quantitative approach. Research using quantitative methods is to measure or analyze numerical or statistical data and objectively identify relationships between variables. Quantitative methods allow for more precise and repeatable data measurements using numbers and statistical tools that provide objective results. This reduces subjective bias in data analysis. The research design used was a one-group posttest design, an experiment conducted with only one group without a comparison group. The purpose of this study is to determine the learning independence of students through the application of Ethnopedagogy-based peer teaching digital learning media. The experimental design used is a one-shot case study. In applying this method, the study only uses one class by giving a questionnaire at the end of the activity to allow the assessment of the results after

the treatment is applied. The research will be conducted at SMA Negeri 3 Lhokseumawe. The population of this study is every student from the 10th grade of SMA Negeri 3 Lhokseumawe. Sampling was carried out using a purposive sampling technique. This study uses several data collection techniques: observation, interviews, and questionnaires. The data used in this study is quantitative. This data was obtained from the scores obtained from the results of students filling out questionnaires, which were then analyzed to determine students' level of learning independence through the application of Ethnopedagogy-based peer teaching digital learning media.

RESULT AND DISCUSSION

Research Result

SMA Negeri 3 Lhokseumawe is one of the leading public high schools in the City of Lhokseumawe, Province of Aceh. As a school with a good reputation, SMA Negeri 3 Lhokseumawe is firmly committed to producing outstanding students in the academic and non-academic fields. This school is known for its conducive learning environment, adequate facilities, and professional teaching staff.

Validity Test

The following is a table of validity and reliability test results based on questionnaire data consisting of 20 statements filled in by 30 students:

Table 1. Validity Test Results

No.	Statement	r-count	Information
1	I was able to manage my own study time when the physics material was related to the local culture.	0.65	Valid
2	I took the initiative to look for additional materials related to physics related to local culture.	0.68	Valid
3	I feel motivated to learn physics more deeply when using examples from local wisdom.	0.72	Valid
4	I was able to define my learning goals in understanding physics through local culture.	0.70	Valid
5	I feel comfortable learning physics using ethnopedagogical methods without always having to rely on teachers.	0.63	Valid
6	I was able to solve physics problems related to daily life in my area.	0.67	Valid

7	I am more active in participating in class discussions when the material discussed is related to the local culture.	0.66	Valid
8	I am confident in finding solutions to physics problems using traditional tools.	0.61	Valid
9	I can assess how well I understand physics material related to local wisdom.	0.62	Valid
10	I tried to improve my learning style after self-evaluation related to culture-based physics material.	0.64	Valid
11	I often compare my knowledge of physics to the application of local culture.	0.59	Valid
12	I was able to identify the difficulties of learning physics with an ethnopedagogical approach.	0.57	Valid
13	I was looking for physics references that connected matter with local wisdom.	0.66	Valid
14	I often look for additional information related to local wisdom.	0.65	Valid
15	I used the knowledge from my parents to deepen my physics related to the local culture.	0.60	Valid
16	I was able to use everyday experience to understand physics concepts.	0.58	Valid
17	I was able to solve physics problems related to local culture.	0.71	Valid
18	I found relevant solutions to physics problems based on local experience.	0.68	Valid
19	I feel challenged to solve physics problems in the context of local culture.	0.72	Valid
20	I am more confident to propose alternative solutions in physics learning based on local wisdom.	0.67	Valid

Source: Processed Data by Researchers (2024)

Based on the validity test results, all statements in the questionnaire were declared valid. This is indicated by a correlation value (r -calculus) more significant than the critical value corresponding to the selected significance level (e.g., 0.3). This suggests that each statement in the questionnaire can effectively measure the dimension of learning independence.

Reliability Test

The researchers calculated Cronbach's Alpha from all the questionnaire statements for the reliability test. The results of Cronbach's Alpha were 0.82. This shows that the questionnaire instrument is highly reliable because the value of Cronbach's Alpha is more significant than 0.7. Explanation: A Cronbach's Alpha value of 0.82 indicates that the instrument has excellent internal consistency. This means that if this questionnaire is repeated on the same student group, the results will remain consistent. This indicates that the questionnaire has a high level of reliability, so it can be trusted to be used in measuring student learning independence.

Table 2. Percentages of Questionnaire Distribution Results

Indicators	Average Score	Percentage (%)
Independence in Planning Learning	11.8	78.67
Independence in the Implementation of Learning	11.4	76.00
Independence in Controlling and Evaluating Yourself	10.5	70.33
Independence in Finding Learning Resources	11.2	74.67
Independence in Solving Problems	11.5	76.33
Average Total	11.4	76.67

Source: Processed Data by Researchers (2024)

The survey results on 30 students at SMA Negeri 3 Lhokseumawe showed a relatively optimistic picture of their learning independence, especially in physics related to local culture. From the results of the questionnaire shared, each statement was evaluated based on the categories of "Strongly Agree" (SS), "Agree" (S), "Disagree" (TS), and "Strongly Disagree" (STS). From a total of 600 answers (30 students \times 20 statements), it can be seen that students tend to give more positive responses, with a total of 229 votes for the "Strongly Agree" category and 230 votes for the "Agree" category. This shows that students feel highly motivated to learn independently and find solutions to physics problems faced in daily life.

From the analysis, the independence indicator in planning learning has the highest average score of 11.8, with a percentage of 78.67%. This shows that students can manage their study time and set their learning goals well. On the other hand, the indicator of independence in controlling and evaluating oneself showed the lowest average score, 10.5, with a percentage of 70.33%. This indicates that while students are comfortable with ethnopedagogical approaches, they may still need to be fully capable of assessing their understanding of the physical material being studied.

Based on the data, some areas, such as problem-solving and self-evaluation, need more attention. Although most students feel confident using traditional tools to understand physics, a small percentage still feel doubtful. This highlights the importance of holding additional discussion sessions to discuss students' learning difficulties. Reinforcement in disagreeing areas will encourage students to be more active in finding solutions and understanding more in-depth physics concepts.

Overall, the results of this questionnaire show that students at SMA Negeri 3 Lhokseumawe show a positive attitude toward learning independence. The use of ethnopedagogical approaches in physics teaching has positively impacted student motivation and initiative. However, it is essential to remember that success is determined by positive outcomes and how we can improve the learning experience of undersatisfied students. By providing more personalized guidance and additional support, students can be more confident in learning and overcome their challenges. Recommendations from the results of this analysis include the provision of training for teachers so that they can better understand how to support students in self-learning and self-evaluation settings. Additionally, encouraging students to actively engage in group discussions and share their experiences can help create a more collaborative and supportive learning environment. Thus, teaching strategies focusing on local wisdom and ethnopedagogical methods can be further strengthened to produce more effective and relevant physics learning for students. The graphic description of the percentage data distribution of the questionnaire is as follows:

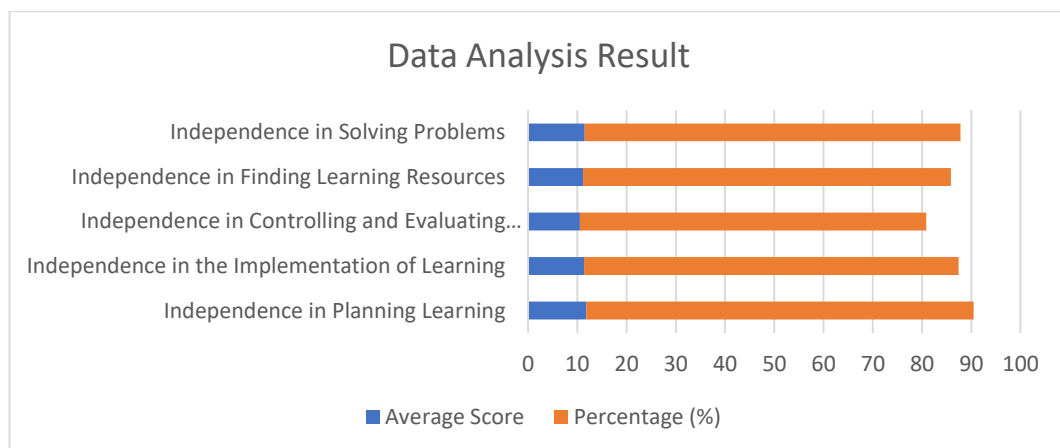


Figure 1. Questionnaire Distribution Results

The graph above shows the average score of student learning independence from SMA Negeri 3 Lhokseumawe based on five leading indicators. Each indicator reflects essential aspects of learning independence, namely:

1. Independence in Learning Planning had the highest average score (11.8), indicating that students generally feel able to plan their own study time, especially regarding physics related to local culture.

2. Independence in Problem Solving also showed promising results, with an average of 11.5. This indicates that many students can independently face physics challenges related to local culture.
3. Independence in Learning Implementation (11.4) and Independence in Finding Learning Resources (11.2) showed that students actively carried out the learning process and took the initiative to seek additional information.
4. Independence in Controlling and Self-Evaluating had the lowest average score (10.5), indicating that students feel less confident in assessing their learning progress and self-evaluating. This can be an area that needs more attention in learning.

The average score was 11.4, with a total independence percentage of 76.67%. These results show that most students have good independence in learning physics with an ethnopedagogical approach, but some areas, such as self-evaluation, require improvement.

Research Discussion

A study at SMA Negeri 3 Lhokseumawe entitled "Application of Ethnopedagogy-Based Peer-Teaching Digital Learning Media to Learning Independence" showed several significant findings related to student learning independence in physics learning related to local culture. The analysis of independence data in planning learning obtained the highest average score of 11.8 (78.67%). This shows that most students can manage time and independently plan their learning activities, especially in physics learning that uses a local cultural approach. This ability is essential because good planning is the foundation for more effective learning.

Independence in solving problems also showed promising results, with an average score of 11.5 (76.33%). Students feel capable of independently solving physics problems related to daily life and local culture. This shows that students can apply physics concepts in contexts relevant to their lives and strengthen the connection between science and local wisdom. In the implementation of learning, the average score of 11.4 (76%) shows that students are active in the physics learning process. They can follow learning without relying too much on the teacher and more actively participate in the learning process. In addition, students' initiative to find additional learning resources is also relatively high, with an average score of 11.2 (74.67%). This suggests that students are encouraged to seek further information through various sources, such as the internet, libraries, or the surrounding community, to deepen their understanding of Ethnopedagogy-based physics material.

However, independence in controlling and evaluating oneself got the lowest average score of 10.5 (70.33%). This indicates that many students need help

assessing their understanding of the physics material and conducting self-evaluations. This can be an area that requires more attention in the learning process. Developing self-evaluation skills is very important to encourage students to identify shortcomings in their learning process and improve their learning methods.

Overall, the average score of 11.4 with a percentage of 76.67% shows that most students have had good learning independence in studying physics with a pedagogy-based approach. This result reflects the success of peer-teaching digital learning media in encouraging learning independence, although self-evaluation needs improvement. This leads to recommendations to strengthen students' ability to reflect and evaluate their learning process, for example, through further teacher guidance or activities emphasizing self-evaluation. These findings indicate that a learning approach combining digital elements and local culture can effectively increase student learning independence. However, several areas still need reinforcement strategies to achieve more optimal results.

CONCLUSION

This study shows that, overall, students have a positive perspective on the integration of sustainable lifestyles through the use of coenzymes. The research results show that the coenzyme-based Strengthening the Pancasila Student Profile (P5) Project has effectively supported education and increased students' awareness of sustainable lifestyles. The level of student understanding is relatively high (84%), with a positive perception of using coenzymes (82%). This program was also considered effective in increasing education related to organic waste management (86%), although active student participation in the project was still moderate (76%). Students' awareness of the importance of reducing organic waste increased, reflected in student motivation (80%), and the project's impact on environmental awareness was excellent (90%). In addition, the integration of Pancasila Student Profile values in this project was also recognized by students (84%). Overall, this project succeeded in strengthening students' understanding and awareness of environmental issues and supporting the application of Pancasila values in everyday life. Next, a thematic learning module that integrates the concept of coenzymes and organic waste management needs to be developed to be used in the Strengthening Pancasila Student Profile Project activities and classroom learning.

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