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Implementation of a Puzzle Educational Game Based on Liveworksheet in Learning Science through the PAIKEM Method for Class VI

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Abstract: This study aims to describe the implementation of educational puzzle games based on Liveworksheet in teaching IPAS through the PAIKEM method in the sixth grade of SD Negeri Gunung Pati 01. The research method used in this study is descriptive qualitative. The data obtained from this research were collected through interviews, observations, and documentation. The data analysis technique employed in this research follows the Miles & Huberman approach, which includes data collection, data reduction, data display, and verification. Based on the results of the study, it can be concluded that the implementation of educational puzzle games based on Liveworksheet in IPAS teaching through the PAIKEM method in the sixth grade of SD Negeri Gunung Pati 01, Semarang City, has a significant impact on the IPAS learning process. The implementation of the liveworksheet-based educational puzzle game in IPAS learning for sixth-grade students at SD Negeri Gunung Pati 01 can be observed from the students' enthusiasm in participating in learning activities. Students became more active, their understanding of the learning material increased, and their interest in learning improved due to the use of the liveworksheet-based educational puzzle game. This media also helps develop students' critical thinking and problem-solving skills.

Keywords: Educational game; Liveworksheet; PAIKEM method; Puzzle

Introduction

Scientific knowledge plays a crucial role in the implementation of education at SD Negeri Gunung Pati 01 which is in line with the opinion of (Nsengimana et al., 2024). This field is not only a part of the curriculum but also serves as the core of ongoing development, significantly contributing to students' understanding of the world around them (Lederman et al., 2019). The challenges faced by educators at SD Negeri Gunung Pati 01, particularly in the sixth grade, are varied and complex. As educators, it is imperative to consistently maintain students' enthusiasm and engagement in the learning process (Audria et al., 2021; Cents-Boonstra et al., 2021). Moreover, educators frequently encounter greater challenges in teaching complex material, which often poses significant obstacles to students' understanding in the sixth grade (Sonia, 2019).

To address the challenges in the learning process and to strengthen students' understanding and enthusiasm, an innovative and engaging approach that aligns with students' cognitive characteristics is required (Herodotou et al., 2019; Muharram et al., 2023). An interesting and developmentally appropriate approach is crucial in the learning process (Idhayani et al., 2023). One intriguing solution is the use of the PAIKEM method, complemented by educational games as learning tools (Zuliana et al., 2023).

The Active, Innovative, Creative, and Joyful Learning Method (PAIKEM) is an approach that can enhance the quality of learning. According to Putri (2023), the PAIKEM method is a student-centered

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learning approach that allows students to experience, internalize, and draw lessons from their experiences. Generally, the goal of PAIKEM is closely related to stimulating students' learning motivation, as this method can encourage students' activities and creativity (Sabihi, 2019).

Media are tools that educators can use to support the success of the teaching and learning process (Amhag et al., 2019; Aulia et al., 2021). According to Febrita et al. (2019), media functions primarily as an aid in conveying learning messages. Through media, effective communication between teachers and students is established, fostering meaningful interactions that support social connections in life (Novaliendry et al., 2020). Media not only enhance students' interest and engagement in learning IPAS but also provide a platform for exploring complex concepts in a more enjoyable and interactive context (Dwijayani, 2019). The media used in this study involves educational games, specifically Liveworksheet-based educational puzzle games. The use of these games has proven effective in the learning process (Anjelina et al., 2022; Lu et al., 2020).

Educational games, as described by Marc Prensky in Windawati et al. (2021), are games specifically designed for educational activities but can also be used for play and enjoyment. These educational games serve as a medium for teaching, increasing users' knowledge (Rahmawati et al., 2022). The primary objective of educational games is to stimulate students' interest in the learning material. Additionally, they help enhance students' critical thinking and problem-solving skills (Rahma & Nurhayati, 2021). The type of educational game used is a puzzle game. According to Astini et al. in Mulyaningsih et al. (2021), a puzzle is an educational game that maximizes students' abilities and intelligence. Puzzle games are categorized as visual media because they are processed through the sense of sight. According to Dwi Permata (2020), these games fall under structured construction games that can sharpen children's thinking and problem-solving skills.

The educational puzzle games are created using the Liveworksheet platform, a web-based platform accessible at https://www.liveworksheets.com (Rhosyida et al., 2021). This site uses new technology in education to create sound, display videos, and produce audio. Liveworksheet is presented in the form of a link using Linktree. Teachers can use this site to apply videos, images, audio, and various types of questions, including multiple-choice, checkbox (Hazlita, 2021).

Like other media, Liveworksheet has its advantages and disadvantages (Prabjandee, 2023). According to Syifaul Fauda in Nurafriani et al. (2023) Liveworksheet has several attractive features that can increase students' motivation and save teachers' time. However, according to Nirmayani (2022), Liveworksheet motivates students to learn due to its various interesting features, thus making students more enthusiastic (Hashim et al., 2022). Despite these advantages, Liveworksheet has some drawbacks, including (1) the need for training and socialization for teachers on its use, (2) the necessity of further studies on its implementation, (3) its application is limited to classroom learning, and (4) the design of Liveworksheet still requires further development (Firtsanianta & Khofifah, 2022).

The implementation of Liveworksheet-based educational puzzle games in IPAS learning through the PAIKEM method is expected to provide several benefits. Firstly, it can increase student engagement through active and enjoyable interaction. Secondly, using technology in the form of educational games can make learning materials more interesting and easier to understand. Thirdly, this method can develop students' critical and creative thinking skills, which are crucial for facing future challenges.

This study thoroughly examines how the use of educational puzzle games positively impacts IPAS learning for sixth-grade students at SD Negeri Gunung Pati 01. Additionally, the study explores how these games affect students' critical thinking, creativity, problem-solving abilities, and the overall classroom dynamics, including student-student and student-teacher interactions. The study also investigates how educational puzzle games influence teachers' thinking patterns and instructional approaches.

This research aims to explore the effectiveness of implementing Liveworksheet-based educational puzzle games in IPAS learning through the PAIKEM method. The main focus is to determine how the use of this media can enhance students' learning motivation, concept understanding, and critical and creative thinking skills. This study is expected to contribute to the development of more effective and innovative teaching methods and provide alternative solutions for teachers to improve the quality of IPAS learning.

This research can be used as a reference material for the use media in IPAS learning. The results of this study can provide empirical evidence of how educational games can help develop students' critical and creative thinking skills and can strengthen previous research. And through the results of this study it is hoped that it can be used as material for evaluating learning, especially in IPAS subjects.

Method

The type of research used in this study is qualitative research. According to Sugiyono (2013), qualitative research is based on postpositivist philosophy and is

used to investigate natural objects where the researcher acts as the key instrument. This study is a form of descriptive qualitative research. According to Rusandi et al. (2021), descriptive qualitative research is conducted to describe events, whether natural or human-made. These events can include activities, characteristics, changes, relationships, similarities, and differences.

The use of this type of research allows the researcher to understand the context of learning and the interaction processes between students, teachers, and the learning environment (Kusumastuti & Khoiron, 2019). Additionally, the qualitative approach enables the researcher to describe in detail how the implementation of educational puzzle games impacts students' activities and learning outcomes. Therefore, the research can capture aspects that might not be quantifiable, such as student-teacher interactions, learning dynamics, and changes in student behavior (Nartin et al., 2024). This will provide a more tangible picture of the challenges and successes in the implementation.

This research is located at SD Negeri Gunung Pati 01, Semarang City, and was conducted over two weeks. The researcher chose this location for several underlying reasons related to the research topic. This study aims to explore the implementation of educational puzzle games in IPAS subjects. The results of this study are expected to contribute to understanding and improving IPAS learning in sixth-grade levels in similar schools in similar regions.

The data sources for this research include documents or informants (people) from whom information or data is obtained. The primary data sources are directly obtained from the source or research object. In this study, there are two data sources: primary and secondary. The primary data sources are the sixth-grade teacher and students at SD Negeri Gunung Pati 01. The data obtained from the teacher is based on interviews about the use of educational puzzle games in IPAS learning. The data obtained from students include observations of their activities during the learning process. Secondary data sources include documents obtained during the research process, such as student lists and photos taken during the activities.

According to Abubakar (2021), data sources can be classified into three categories, known as P3: person, place, and paper. Person refers to data sources from individuals, place refers to data sources from locations, and paper refers to data sources from symbols, numbers, or images. In this research, the data sources used are as follows: Person: the sixth-grade teacher and students at SD Negeri Gunung Pati 01. Place: the classroom used for sixth-grade learning, learning facilities, and infrastructure. Paper: student data documents, documentation, and other data.

Data collection in this research was conducted using interview, observation, and documentation techniques. According to Creswell in Ardiansyah et al. (2023), an interview is a data collection technique involving direct interaction between the researcher and the informant. Observation involves directly observing using all senses (Teguh et al., 2023). The final technique is documentation, which involves collecting data through examining evidence that aligns with the research (Waruwu, 2023).

The data analysis technique used in this research follows the analysis method proposed by Miles and Huberman (Sugiyono, 2013). The analysis model by Miles and Huberman comprises four components: data collection, data reduction, data display, and conclusion drawing/verification.

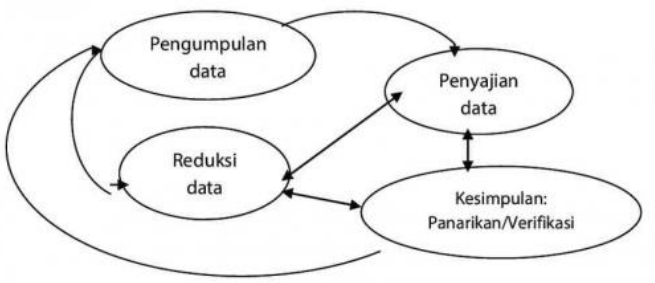

Figure 1. Data analysis components

Result and Discussion

Education is a series of activities that students receive in both formal and non-formal environments, which can develop and maximize students' potential (Zakirman & Aufiana, 2023). To cope with the rapid advancement of technology, educators must be able to adapt to these changes (Erfan et al., 2024). Educators today are required not only to act as facilitators but also as pioneers in creating positive, enjoyable, and contemporary learning experiences (Mulyasa, 2021).

Based on data collected through interviews with sixth-grade teachers and students at SD Negeri Gunung Pati 01, it was observed that before implementing the liveworksheet-based educational puzzle game, students were less active and not very focused on the lessons. However, with the rapid advancement of technology, teachers have begun to use media in teaching (Denny et al., 2023), utilizing the liveworksheet-based educational puzzle game for IPAS learning.

The use of the liveworksheet-based educational puzzle game in sixth-grade IPAS classes at SD Negeri Gunung Pati is very appropriate because it facilitates the teaching and learning process for both teachers and students (Maysara et al., 2023). The results from using the liveworksheet-based educational puzzle game can be seen in the students' enthusiasm for participating in

the IPAS learning process, becoming more active in class (Palumpun et al., 2022). This is one of the efforts made by teachers to deepen students' understanding of the material being taught, supported by the availability of facilities and infrastructure that support the learning activities at the school (Lahaya et al., 2023). The use of media should also stimulate students' enthusiasm for learning, especially among those who are less motivated, making the class more enjoyable.

Using the liveworksheet-based educational puzzle game has improved students' learning outcomes (Ghaisani & Setyasto, 2023), increased their enthusiasm for IPAS lessons, made the classroom atmosphere more lively and enjoyable, and enhanced teacher-student interactions (Niswah & Dewi, 2024). Implementing this learning media has resulted in better student learning outcomes (Alika & Radia, 2021). This aligns with the research conducted by (Hidayatulloh, 2020), which explains that there is a significant difference in understanding between groups using games in the learning process and those that do not.

From the interviews with the sixth-grade students, it can be concluded that the use of the liveworksheet-based educational puzzle game is an excellent medium for supporting learning and stimulating students' interest in studying. Consequently, students are expected to achieve satisfactory results after implementing the liveworksheet-based educational puzzle game in IPAS learning, enabling them to understand the material correctly and foster enthusiasm in the learning activities (Nofriza & Zen, 2024). Additionally, the use of the liveworksheet-based educational puzzle game can develop students' critical thinking skills and problem-solving abilities (Oxana et al., 2023). This is similar to the findings of (Dwi Permata, 2020), who explained that the use of puzzle games in early childhood can influence children's problem-solving abilities.

Based on observations, the researcher noted that when participating in the IPAS learning process using the liveworksheet-based educational puzzle game in the sixth grade at SD Negeri Gunung Pati 01, teachers did not randomly provide the media but ensured it was aligned with the lesson material. Additionally, teachers conducted question-and-answer sessions with students. Thus, students' understanding of IPAS subjects improved. In the learning process, teachers also applied the PAIKEM method (Active, Innovative, Creative, Effective, and Fun Learning). PAIKEM needs to be implemented in the learning process, especially in primary schools, as it requires both teachers and students to be actively involved (Asari et al., 2021). Teachers actively utilize their skills to design meaningful learning, while students actively participate in the learning process (Matulessy et al., 2021).

From the observations and documentation obtained at SD Negeri Gunung Pati 01, students became more active in class. When the teacher explained the material, students listened attentively, and when the teacher asked questions, students could respond. From the observation table below, using the liveworksheet-based educational puzzle game made students more active and enthusiastic in participating in the IPAS learning process in class.

Table 1. Observation Table

Aspect	Description
Enthusiastic in the learning process	Achieved
Interested in the learning process	Achieved
Answering teacher's questions	Achieved
Working in groups	Achieved
Discussing	Achieved
Presenting discussion results	Achieved
Responding to other group's discussions	Achieved
Asking about unclear points	Achieved
Taking notes on the lesson summary	Achieved
Completing evaluations	

Like other media, the use of the liveworksheet-based educational puzzle game does not always run smoothly. There are several obstacles encountered by teachers and students when using this media. The main issues are related to network problems, as the liveworksheet-based educational puzzle game can only be used with internet access. Additionally, not all students have smartphones, so they cannot access the media at home, and few teachers are familiar with this medium. Inadequate facilities and infrastructure are also common obstacles faced by teachers. If the creativity and initiative of teachers in using the media are not supported by adequate facilities and infrastructure, it will be challenging for teachers to deliver the learning material effectively.

Therefore, it is essential to provide training and socialization for teachers regarding digital media in the current era. The use of media in the learning process is crucial as it motivates students, making them more enthusiastic and active, and making learning more enjoyable and interactive.

Conclusion

Based on the research findings in the field, the conclusion regarding the liveworksheet-based educational puzzle game in IPAS learning through the PAIKEM method is that using this media makes learning more effective and efficient, and the classroom atmosphere becomes more enjoyable and less

monotonous. The implementation of the liveworksheet-based educational puzzle game in IPAS learning for sixth-grade students at SD Negeri Gunung Pati 01 can be observed from the students' enthusiasm in participating in learning activities. Students became more active, their understanding of the learning material increased, and their interest in learning improved due to the use of the liveworksheet-based educational puzzle game. This media also helps develop students' critical thinking and problem-solving skills.

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The authors declare no conflict of interest.

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