

Kahoot-based interactive game management in ipas learning to enhance students' learning motivation

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ABSTRACT

Learning in elementary schools is still dominated by conventional methods that make students passive and less motivated, especially in *Ilmu Pengetahuan Alam dan Sosial* (IPAS) subjects. This study aims to describe the application of Kahoot with the Plan-Do-Check-Act (PDCA) framework and analyze its influence on students' learning motivation. The study uses a phenomenological qualitative approach with the subjects of teachers and grade V students at SDN Leuwiorok and SDN Palasari, Sukabumi Regency. Data were obtained through participatory observation, in-depth interviews, and documentation, then analyzed with the Miles and Huberman model and tested for validity through triangulation of sources and methods. The results show that the integration of Kahoot in PDCA results in more systematic planning, the implementation of interactive learning, reflection-based evaluation, and continuous follow-up. Students showed increased enthusiasm, active participation, and motivation to learn compared to conventional methods. These findings confirm the novelty that Kahoot not only serves as an evaluation medium, but can also be integrated as an innovative, fun and supportive learning management instrument for 21st century skills.

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Introduction

1. Background

21st century learning demands an active, interactive, and student-centered approach. Teachers are required to play the role of facilitators who are able to spur student involvement, creativity, and initiative through innovative strategies and the use of digital technology. A number of studies show that the use of interactive learning media such as digital applications, multimedia modules, as well as differentiated and project-based learning models, can increase student motivation, engagement, and learning outcomes (Fitrianingtyas & Jumiati, 2023; Kurniawati & Rafsanjani, 2024; Tarigan et al., 2023). Similarly, the inquiry and problem-based learning (PBL) model has been proven to encourage students to think critically, collaborate, and be independent in learning (Shafira & Suratsih, 2023; Supriyanto et al., 2022). These findings are in line with the demands of the Kurikulum Merdeka which prioritizes creativity, collaboration, and problem-solving as core skills of the 21st century (Rusnilawati et al., 2023).

However, the reality in elementary schools shows that learning practices are still largely dominated by conventional methods based on lectures and memorization. This pattern makes students tend to be passive, less participatory, and not trained in critical thinking or cooperation (Ali et al., 2021; Susilowati, 2022). The impact can be seen in low motivation to learn, decreased interest in subjects, and academic achievement that is not optimal (Sari et al., 2021; Soel et al., 2022). This condition is also seen in the subject of Ilmu Pengetahuan Alam dan Sosial (IPAS), which is often considered difficult and less interesting by students, so it requires a more creative and interactive learning approach. Some studies even confirm that students who are actively involved in interactive learning have better critical thinking and social skills than those who are only exposed to traditional methods (Susanti et al., 2023).

The gap between the demands of 21st century learning and the reality of conventional learning in primary schools is an important issue that must be addressed immediately. Low motivation to learn not only impacts academic outcomes, but also hinders the development of 21st-century skills such as critical thinking, collaboration, and creativity (Ramadhani & Ulfah, 2021). This is even more relevant when associated with IPAS, because this subject requires critical thinking skills, problem solving, and the connection of concepts with real life. Therefore, innovative learning strategies are needed that are not only fun and interactive, but also able to foster student enthusiasm, encourage active participation, and support the development of attitudes. Thus, teachers are expected to be able to change teaching methods from traditional to a more dynamic, contextual, and student-oriented approach in the digital era.

2. Previous Literature Review

A number of studies show that the use of game-based digital learning media can increase student motivation, engagement, and learning outcomes. Plump & LaRosa (2017) found that Kahoot is able to create a fun and competitive learning atmosphere, so that students participate more actively. Bawa (2019) reported that the application of Kahoot had a positive impact on learning motivation because it gave rise to a sense of enthusiasm and emotional involvement. Wang & Tahir (2020) through a systematic review added that the use of Kahoot not only increases activeness, but also strengthens students' memory and achievement of learning outcomes. In addition, a number of studies emphasize the importance of systematic integration of learning management to maximize the effectiveness of interactive media. Learning management based on evaluation and follow-up cycles has been shown to increase student engagement and achievement of learning goals as Deming (2000) on his book *Out of the Crisis*. This is relevant because Kahoot is not just an entertainment medium, but also an instrument that can be optimized through structured learning management, resulting in increased motivation and better mastery of concepts. Furthermore, the theoretical framework of learning motivation is also an important basis for understanding this phenomenon. Ryan & Deci (2000) through Self-Determination Theory emphasized that students' intrinsic motivation is influenced by the fulfillment of the needs of competence, autonomy, and social connectedness. Kahoot can meet all three of these needs through challenging questions, opportunities for active participation, and healthy competitive interactions. Furthermore, the ARCS Model of Motivation Keller (2010) explains that increased attention, material relevance, confidence, and satisfaction can trigger higher learning motivation.

Overall, the results of previous research agree that Kahoot and other interactive learning media contribute to increased student motivation, engagement, and learning outcomes. However, most studies still emphasize the "fun learning" aspect without linking it deeply to the PDCA-based learning management system or quality management approach, and studies at the elementary school level on science subjects are still relatively limited.

Thus, this study is here to fill this gap by examining the application of Kahoot in social studies learning in elementary schools through the PDCA approach. This approach is expected to provide a more comprehensive understanding, not only regarding the effectiveness of Kahoot in increasing motivation, but also how the medium can be integrated in systematic, interactive, and sustainable learning management.

3. Research Novelty

Based on the review, several research gaps can be identified. First, studies on the use of Kahoot at the elementary school level, especially in Ilmu Pengetahuan Alam dan Sosial (IPAS) subjects, are still very limited. Second, previous research has tended to focus solely on increasing student motivation or engagement, without looking at how Kahoot can be managed within a systematic learning management framework. Third, there have not been many studies that integrate the use of Kahoot with education quality management approaches, such as the Plan-Do-Check-Action (PDCA) model offered by Deming.

Thus, this study is here to fill this gap by examining the application of Kahoot in IPAS learning in elementary schools through the PDCA framework. This approach is expected to provide a more comprehensive understanding, not only regarding the effectiveness of Kahoot in increasing motivation, but also how the medium can be integrated into the continuous learning management cycle.

4. Research Objectives and Hypotheses

The purpose of this study is to describe how Kahoot-based IPAS learning management can be implemented through the PDCA (Plan-Do-Check-Action) approach in elementary schools. This study also aims to analyze the effectiveness of the use of Kahoot in increasing students' learning motivation compared to conventional learning methods. In addition, this research is directed to produce a systematic, interactive, and sustainable IPAS learning management model, so that it can be a practical reference for teachers in integrating game-based learning into daily learning practices. Thus, this research is expected to not only contribute to increasing students' motivation to learn, but also provide guidance for elementary school teachers in creating an innovative learning atmosphere that is in line with the demands of the 21st century.

Method

This study uses a qualitative approach with phenomenological methods because the main focus is to understand the real experience of teachers and students in the application of social science learning management based on the interactive game Kahoot, as well as how the process affects students' learning motivation. The phenomenological method was chosen not only to describe practice, but also to explore the deep meaning of the research subject's experience in the natural setting as emphasized by Creswell (2018) that phenomenology seeks to reveal the essence of human experience experienced directly by participants.

The subjects of the study were teachers and students of Fifth grade at SD Negeri Leuwiorok and SD Negeri Palasari, Sukabumi Regency. Informants were determined purposively by considering their direct involvement in Kahoot-based IPAS learning. The teachers selected are IPAS teachers who have used Kahoot for at least one semester, while the students selected are those who actively participate in learning activities. The number of informants is determined based on the principle of data saturation, as suggested by Bogdan & Taylor (1975) and Adzibah et al. (2025), who state that phenomenology generally involves 6–12 participants until the meaning studied reaches a saturation point.

In this study, the researcher acted as the main instrument equipped with auxiliary instruments in the form of observation guidelines, in-depth interview guidelines, field notes, and visual documentation. This is in line with Moleong (2017) view that in qualitative research, researchers are key instruments because their involvement determines the depth of data obtained. Data was collected through participatory observation during the learning process, in-depth interviews with teachers and students to understand their perceptions and experiences, and documentation in the form of notes, photos, and recordings of learning activities Sugiyono (2023).

The research procedure was carried out in four stages. The first is the planning stage, which is the preparation of research instruments as well as the design of the implementation of PDCA (Plan-Do-Check-Action) in learning. The second stage is implementation, in the form of observation and assistance during the application of Kahoot in IPAS learning. The third stage is evaluation, which is carried out by collecting reflection data from teachers and students regarding their experiences. The last stage is follow-up in the form of data analysis, withdrawal of findings, and preparation of research report results.

Data analysis was carried out using the model of Miles et al. (2014) which includes data reduction, data presentation, and conclusion drawn. This analysis process is enriched by the identification of meaning units to strengthen the phenomenological interpretation of the subject's experience, as proposed by Giorgi (2009) in the tradition of psychological phenomenology. The validity of the data is guaranteed through triangulation of sources and methods, member checks to informants, and visual documentation, as recommended by Lincoln et al. (1985) regarding credibility in qualitative research. The researcher also pays attention to the ethical aspects of the research by seeking informed consent from teachers, students, and parents, maintaining the confidentiality of the informant's identity, and ensuring that their participation does not have a negative impact (Cohen et al., 2018).

Result

1. Planning

Kahoot-based IPAS learning planning at SD Negeri Leuwiorok is carried out systematically and collaboratively by involving teachers, principals, students, and school community support. Teachers develop Kahoot-based teaching modules that contain objectives, activity steps, and formative evaluation. *Kahoot* is not only positioned as a game medium, but also a means of evaluating students' understanding directly. In planning, teachers adjust the material, quiz content, and learning objectives to the characteristics of the students. Questions are designed to be short, clear, varied, and relevant to students' daily experiences. The strategy also includes inclusive participation mechanisms, such as group work for students who do not have gadgets. In addition, teachers simulate the use of *Kahoot* to ensure technical smoothness and learning effectiveness. Planning also emphasizes the aspect of student motivation, both through competitions, attractive visual displays, and simple rewards. Teachers reflect on previous teaching experiences, then design more innovative, humanistic, and contextual activities. Learning objectives remain based on the curriculum, but are directed not only to cognitive achievement, but also to affective aspects and character of students according to 21st century competencies.

2. Learning Implementation

Teachers make optimal use of *the Kahoot* feature in IPAS, from quizzes, *leaderboards*, to *timers*, to create a fun competitive atmosphere. The learning process begins with perception, explanation of objectives, and technical simulations, then continues with *the game of Kahoot*

which is able to significantly increase student involvement. Students show high enthusiasm, even students who are usually passive become more courageous to participate. Teachers act as active facilitators by giving appreciation, guiding the use of the application, and associating the results of the quiz with the subject matter. Thus, *Kahoot* is not only an entertainment medium, but also an interactive means that motivates and deepens the understanding of concepts

3. Learning Evaluation

Evaluation is carried out in a formative manner by utilizing scores and quiz results reports to map student understanding. Teachers not only look at the final results, but also analyze the pattern of answers, response speed, and difficulties faced by students. The results of the quiz are used as the basis for improving the material and the next learning strategy. Evaluation is seen not as just a number, but a learning experience that shapes students' awareness of their strengths and weaknesses. Students who achieve high scores feel proud and more motivated, while students with low scores are encouraged to do self-reflection to improve their understanding.

4. Reflection

Teachers conduct continuous reflection by noting the advantages and disadvantages of using *Kahoot*, such as increased student participation, network constraints, and device limitations. Input from students regarding questions, answer times, and game variations is also used as evaluation material for learning improvement. From the student's side, the use of *Kahoot* causes a higher sense of pleasure, curiosity, and motivation than conventional methods. They feel that the evaluation is more fun, less stressful, and brings out a healthy spirit of competition. Overall, *Kahoot* has been shown to increase learning motivation, participation, and class interaction in science learning.

5. Follow-up

Based on the results of data triangulation through observation, interviews, and documentation, the follow-up of Kahoot-based interactive game-based IPAS learning is carried out through two main aspects:

- a. Improvement of Learning Questions and Strategies
 1. Teachers conduct thorough reflections on the learning experience to assess students' responses and motivations.
 2. Improvements were made in the variety of questions, difficulty levels, and suitability with learning indicators.
 3. Advanced strategies include diversifying materials, making better use of *Kahoot* features, and integration with other methods such as group discussions, presentations, and student reflection.
 4. Adjustments were also made to the teaching tools (Teaching Modules) to be more interactive and participatory, as well as to improve teachers' digital skills.
 5. Students are involved in providing input on the form of the game and the difficulty of the questions so that learning is more contextual.
- b. Mentoring Students with Low Scores
 1. Teachers pay attention to the quality of the evaluation instruments by reviewing questions that are not in accordance with the indicators or are too difficult.
 2. The questions are corrected to be valid, reliable, and include high-level thinking skills (HOTS).

3. The teacher invites students to do collective reflection to evaluate the learning experience, both from the cognitive and emotional aspects.
4. The follow-up results were documented and shared in the KKG forum as a good practice for the development of interactive learning methods.

Overall, this follow-up confirms that *Kahoot* is not only a means of evaluation, but also a vehicle to build a participatory, reflective, and fun learning ecosystem.

6. Planning

IPAS learning planning based on the interactive game *Kahoot* at SD Negeri Palasari begins with the preparation of teaching modules that are tailored to the students' cognitive development stages and contextual approaches so that they are easy to understand. Teachers choose *Kahoot* because it has been proven to increase participation, motivation, and make the classroom atmosphere more enjoyable. The teaching module is focused on methods and evaluation, where *Kahoot* is used as an exercise as well as a formative evaluation. The principal and supervisor provided support, although they still emphasized the need to anticipate technical obstacles such as the internet network and teachers' skills in operating the application.

7. Implementation

In implementation, teachers use the quiz and poll features on *Kahoot* to explore initial knowledge, monitor student understanding, and create a participatory atmosphere. The teacher also adjusts the use of timers so that students are more focused on understanding the problem. As a result, students who were originally passive became more courageous and confident to answer and ask questions. Obstacles in the form of limited devices and internet networks still appear, but teachers try to overcome them with personal initiative. Overall, *Kahoot* is considered effective in increasing students' motivation, interaction, and activeness in learning.

8. Evaluation

Evaluation is carried out through the results of *the Kahoot quiz* which is used as a reflection, not as a final assessment. Scores are used to map pupils' understanding and determine follow-up strategies. The teacher carries out reflection with the students through a short discussion, even though time constraints are an obstacle. Students feel valued because their opinions are heard, even though not all input can be implemented immediately. They also found learning with *Kahoot* to be more fun, boosting confidence, and encouraging active participation. However, the students proposed additional time when answering questions to be calmer and more optimal.

9. Follow-up to Kahoot's Interactive Game-Based Learning Management in Increasing Students' Learning Motivation in Elementary Schools

a. Problem Correction

Teachers always pay attention to students' responses when taking Kahoot quizzes as part of the quality evaluation of the questions. Students' expressions, enthusiasm, and confusion in answering are important indicators to find out if the questions are in accordance with their level of understanding. Not only from attitude, teachers also monitor the accuracy of students' answers to assess the extent to which mastery of the material has really been achieved. The results of these observations are used to map problems that are too easy, too difficult, or less relevant to the learning indicators. Questions that are considered inappropriate will be corrected, both in terms of redaction, level of difficulty, and alignment with learning objectives. Thus, Kahoot quizzes are not only an evaluation tool, but also a fun and meaningful learning medium.

b. Follow-up of students with low scores

For students who get low scores, the teacher provides follow-up in the form of additional guidance after learning. The teacher reviews the questions that are answered the most, explains the concepts simply, and gives examples of similar problems with a gradual level of difficulty. Students who are still having difficulties are directed to study in groups so that they can help each other understand the material. In addition, teachers also encourage students with low scores to remain confident by providing motivation that mistakes are part of the learning process. This follow-up is expected to strengthen students' understanding, increase their confidence, and keep them motivated to stay active in the next learning.

Discussion

The results showed that the use of Kahoot in IPAS increased student engagement and motivation. Pupils who are usually passive become more enthusiastic, dare to participate, and show better social interaction. These findings are in line with research by Plump & LaRosa (2017) and Bawa & Shukla (2017), which showed that Kahoot creates a fun and competitive learning atmosphere, resulting in emotional engagement and active participation of students. This confirms that the effectiveness of Kahoot does not only lie in the "fun learning" aspect, but also in the ability of the medium to build active involvement and interaction in the classroom.

Theoretically, increased learning motivation can be explained through Self-Determination Theory Ryan & Deci (2000) and the ARCS Model Keller (2010). Kahoot meets competency needs through question challenges that suit students' abilities, provides autonomy in actively answering quizzes, and builds social connectedness through healthy competitive interactions. The ARCS principle is also visible, where Kahoot attracts students' attention (Attention), is relevant to their experience (Relevance), increases confidence (Confidence), and provides learning satisfaction (Satisfaction) through instant feedback and simple rewards. In addition, the success of Kahoot implementation is also closely related to PDCA cycle-based learning management. In the Plan stage, the teacher plans the material, prepares questions, and adjusts the strategy to the characteristics of the students, as exemplified in the teaching modules and technical simulations. In the Do stage, the implementation of learning involves the optimal use of Kahoot features to create a fun competitive atmosphere, according to the Do principle in PDCA. Evaluation or check is carried out through the analysis of quiz results, student reflection, and teacher observation to identify strengths, weaknesses, and difficulties faced by students. Finally, the Act stage is implemented through follow-up in the form of problem improvement, strategy diversification, and assistance to students with low scores, which is in line with the principle of continuous improvement (Deming, 2000).

By combining empirical findings and motivational theory frameworks, it can be understood that the increase in student motivation occurs not only due to the entertainment aspect of Kahoot, but also due to the systematic, reflective, and continuous management of learning. This underscores the importance of integrating interactive media with structured learning management to achieve academic goals while shaping 21st century skills, such as critical thinking, collaboration, and active participation. Overall, this discussion shows that Kahoot is effective in increasing student motivation, participation, and interaction in IPAS learning, especially when combined with PDCA management approaches and the support of innovative learning strategies, and confirms the relationship between empirical findings and existing motivation theories.

As for the Compatibility with the Deming Theory

1. Plan

The results of the study showed that teachers in both schools carried out Kahoot-based IPAS learning planning systematically and collaboratively. At SDN Leuwiorok, planning is carried out by compiling lesson plans and teaching modules that contain objectives, activity steps, and formative evaluations. Teachers also adjust the material, quiz content, and learning objectives to the characteristics of the students, and conduct technical simulations to ensure the smooth use of *Kahoot*. This is in accordance with *the Plan* principle in the PDCA, where planning must be needs-based, consider the characteristics of students, and anticipate obstacles that may occur.

2. DO (Implementation)

In the implementation stage, teachers utilize *Kahoot features* such as quizzes, leaderboards, polls, and timers to increase student engagement. Students who were originally passive become more active, enthusiastic, and dare to participate. The teacher acts as a facilitator by giving appreciation, guiding the use of the application, and associating the results of the quiz with the learning material. This condition reflects the *Do* principle in *PDCA*, which is to implement a plan that has been made with a measurable strategy and focus on achieving learning objectives.

1. Check (Evaluation)

The evaluation was carried out through *the results of the Kahoot quiz* which was not only seen from the final score, but also the answer pattern, response speed, and difficulty level of the questions. Teachers use quiz results reports to map students' understanding, as well as listen to their reflections on questions, answer times, and experiences using *Kahoot*. This evaluation emphasizes that assessment is not just a number, but a form of collective reflection. This is in line with the *Check* principle in *PDCA*, which is to review the results of implementation, identify strengths, weaknesses, and inhibiting factors that need to be improved.

2. Act (Follow-up)

Based on the results of the evaluation, teachers carried out follow-up in the form of improving problems, diversifying learning strategies, and assisting students with low scores. Improvements were made to the variety, redaction, and difficulty level of the questions to better match the learning indicators. Teachers also involve students in providing input related to the form of the game, as well as documenting good practices to be shared in the KKG forum. In *the Act stage*, the learning process does not stop at evaluation, but continues at continuous improvement, in accordance with the principle of *continuous improvement* in Deming's theory.

Conclusion

This study shows that the application of IPAS learning management based on the Kahoot interactive game with the PDCA (Plan-Do-Check-Act) framework is able to significantly increase the learning motivation of elementary school students. In the planning

stage, teachers develop collaborative and contextual learning strategies, by adjusting questions and participation mechanisms to suit the characteristics of students. In the implementation stage, the use of Kahoot features such as quizzes, leaderboards, and timers create a competitive and fun learning atmosphere, thus encouraging students who were originally passive to participate more actively.

The evaluation stage is carried out not only through the final score, but also by analyzing the answer pattern, response speed, and reflection of students. The results of the evaluation showed that students felt more motivated, confident, and considered the evaluation to be a meaningful learning experience. Meanwhile, at the follow-up stage, teachers improve questions, diversify learning strategies, and provide assistance for students with low achievements. This follow-up process emphasizes the importance of the principle of continuous improvement in learning management.

Overall, this study emphasizes that Kahoot is not just a technology-based entertainment or evaluation medium, but can be a strategic instrument in innovative, interactive, and sustainable learning management. The application of the PDCA framework has been proven to provide systematic direction for teachers to plan, implement, evaluate, and improve learning on an ongoing basis. Thus, this model can be used as a practical reference for other elementary schools in an effort to increase students' motivation to learn and develop a more participatory and humane learning ecosystem.

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