

Development of Flash Card Instructional Media in the Context of Game-Based Volleyball Learning to Improve Collaboration Skills and Student Achievement

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Received: 2 Feb 2024 **Received:** 20 Apr 2024 **Issued:** 30 Apr 2024

Abstract

Effective education at the primary school level requires developing students' collaboration skills in an appropriate learning environment. However, there are still challenges in creating an environment that encourages student collaboration and improves their achievement. This study aims to develop flashcard learning media in the context of game-based volleyball learning with the aim of improving students' collaboration skills and achievement. The current development research (R&D) involved the stages of needs analysis, flashcard media design, media development, implementation in the learning environment, and evaluation of students at the elementary school level. The population of this study was 4th and 5th-grade elementary school students who received game-based volleyball learning. Based on the findings of the media expert validation test (83%; very valid) and the material expert test (87%; very valid), the results demonstrated that the development of flashcard learning media in the context of game-based volleyball learning was legitimate. Furthermore, with a significance level of $0.000 < 0.05$, the paired sample t-test findings for student collaboration skills indicated a statistically significant relationship. Students' collaboration and academic performance can be enhanced by including flashcards as instructional media in a volleyball learning game.

Keywords: Flash card instructional media; game-based volleyball learning; collaboration skills; student achievement

1. Introduction

Collaboration skills are crucial in forming successful individuals, helping children learn to work together, respect differences of opinion, and resolve conflicts constructively (Griffiths et al., 2021). In addition to supporting social development, according to Roy and Giraldo-Garcia (2018), collaboration skills also trigger communication, leadership, and problem-solving skills that are important for the future. Flashcard media development also plays an important role in improving children's achievement in elementary school. Collaboration skills are the foundation for children's social development, while other aspects are also crucial in shaping their achievement. Children's achievement is a learning success indicator. Good achievement shows the teacher's skill and shapes children's intellectual development (Munna & Kalam, 2021). Improving primary school children's achievement involves factors such as effective teaching methods, teacher quality, and parental support. (Naite 2021). Thus, encouraging improved achievement through innovation in learning needs to be prioritized. Teacher-centered learning tends to make children more passive and individualistic. The

impact is the lack of development of collaboration skills such as sharing ideas, working together, and communicating effectively with peers (Castañer & Oliveira, 2020). Children are more inclined towards competition than cooperation, which can hinder the development of social skills. The conventional learning that some teachers still apply also makes it difficult for children to collaborate and interact socially. As a result, children lacking collaboration skills may feel isolated, have difficulty forming healthy social relationships, and struggle to participate in group activities. This can hinder their ability to solve complex problems and achieve expected milestones, leading to stunted personal development.

According to data from the Central Statistics Agency (*Badan Pusat Statistik/BPS*) in 2020, the absenteeism rate of students in primary schools reached 2.7%, which can significantly impact their academic performance. According to Vadivel et al. (2023), socioeconomic background and family support also affect elementary school student achievement. A 2021 UNESCO report states that children from lower economic backgrounds often face the constraints of limited access to quality education and issues of lack of facilities and qualified teachers in their neighborhoods. Sengkey (2022) revealed that academic anxiety problems in primary school children can have a significant negative impact on their achievement. More innovative and creative ways are needed to encourage children to improve their achievement. Flashcard media is one of the effective media in improving the academic ability of elementary school children. Flashcards are cards that contain information or images used to help children learn and remember important concepts (Filosofi & Harisanty, 2020). The use of flashcards helps children hone their reading skills, recall information, and develop an understanding of various subjects (What & Clearinghouse, 2018). In volleyball learning, flashcards help students understand the basic concepts of the game. They trigger discussion, collaboration, and student communication, ultimately improving their volleyball team ability.

One theory that supports the use of flashcards is cognitive theory, which emphasizes the importance of short-term memory in learning. Flashcards enable the movement of information from short-term memory to long-term memory, enhancing pupils' ability to recall and apply gaming principles (Center, 2020). In addition, the theory of constructivism is also relevant in this context, as flashcards can help students build their own understanding of volleyball game rules and strategies through play experiences. Flashcard learning media in the context of game-based volleyball learning has not been widely developed and researched. Previous research found that the use of flashcards improved children's vocabulary acquisition (Castañer & Oliveira, 2020). Developed digital flash card media for early reading learning and found that the media is valid, useful, and effective in elementary schools. Naite (2021) conducted research using flash cards as learning media and found that the media can improve students' reading skills at school. Meanwhile, in this study, researchers developed flashcard learning media in the context of game-based volleyball learning to improve students' collaboration and achievement skills.

This research is essential because it focuses on developing game-based learning media in the context of volleyball learning that can increase the attractiveness of learning for students. Overall, this research has significant urgency as it incorporates innovative approaches to volleyball learning and directly improves students' collaboration skills and achievement. This research supports the development of a more holistic education and helps students prepare for the future with relevant skills.

2. Methods

This study used the experimental quantitative approach and the analysis, design, development, implementation, and evaluation (ADDIE) model. It employed a quasi-experimental design featuring a non-equivalent control group comprising control and experimental classes. Both classes consisted of a maximum of 30 participants, and the study lasted two weeks. This study was structured into two distinct phases: the pretest and the posttest.

Table 1. Pretest-posttest control group design

Group	Pretest	Care	Posttest
Experiment (Learning by using Flashcard Learning Media)	O ₁	X	O ₂
Control (Conventional Learning)	O ₃	-	O ₄

This research was conducted at Gunungsari Madiun Elementary School. Purposive sampling was used where the experimental and control groups were not randomly selected. The criteria for research subjects included fourth and fifth-grade students who took volleyball sports subjects, had low scores on the initial ability test in volleyball games and had low levels of cooperation and achievement before learning with flashcard media. The samples in this study consisted of two groups: 1) thirty students in grades 4 and 5 who were chosen using purposive sampling, and 2) experts who were selected using a purposive sampling approach and had around 5 years of teaching and scientific experience.

3. Results

Table 2. Material expert validity test

No	Aspects of Material Expert Assessment	N Item	Score	Total Ideal Score	Validity Score (%)	Category
1	Content Feasibility	3	14	15	93%	Very Valid
2	Presentation Eligibility	3	14	15	93%	Very Valid
3	Language Assessment	3	12	15	80%	Fairly Valid
4	Contextual Content Assessment	3	12	15	80%	Fairly Valid
Total		12	52	60	87%	Very Valid

Based on Table 2, the average score of material validity on flashcard instructional media in a game-based volleyball learning context was 87%. This shows that the material on flash card instructional media in a game-based volleyball learning context can be said to be very valid when applied. The results of the media expert validity test are presented in Table 3.

Table 3. Media expert validity test

No	Aspects of Assessment	N Item	Score	Total Ideal Score	Validity Score (%)	Category
1	Visual Communication Design Aesthetics	3	14	15	93%	Very Valid
2	Media Accuracy & Effectiveness	3	13	15	87%	Very Valid
3	Media Efficiency and Ease	3	12	15	80%	Fairly Valid
4	Media Relevance	3	11	15	73%	Fairly Valid
Total		12	50	60	83%	Very Valid

Table 3 shows that the average validity score on flashcard instructional media in a game-based volleyball learning context was 83%. This shows that the game-based volleyball learning media can be said to be very valid for use. The test results to see the effect will be presented in Table 4.

Table 4. Paired sample t test results on student collaboration skills

No.	Group	N Student	Average Profit	t-count	t-table	Sig.	Note
1	Control	30	16.67	3.234	2.04	0.00	Significant
2	Experiment	30	25.83				

Table 4 reveals that the control group had a notable rise of 16.67 points in the average of all components of Collaboration Skills. Implementing flashcard instructional media in a game-based volleyball learning context resulted in a significant gain of 25.83 points in the average pretest score within the experimental group. The paired sample t-test revealed a t-count value of 3.234, greater than the critical value of 2.04. Additionally, the significance value of 0.000 was less than the predetermined threshold of 0.05. These results supported the statistically significant impact of volleyball games, both traditionally and with the use of flash card instructional media, on enhancing students' collaboration skills. The results suggested that implementing flashcard instructional media in the game-based volleyball learning setting substantially positively impacted students' collaboration ability. A paired sample t-test was undertaken to assess the efficacy of game-based volleyball media in enhancing student learning achievement. The test results demonstrating the impact are displayed in Table 5.

Table 5. Paired sample t test results on student achievement

No.	Group	N Student	Average Profit	t-count	t-table	Sig.	Note
1	Control	30	18.33	3.635	2.04	0.00	Significant
2	Experiment	30	30.00				

Table 5 reveals that the control group witnessed a mean improvement of 18.33 points across all measures of student learning achievement. In contrast, the experimental group, which received the flashcard instructional media intervention in a game-based volleyball learning context, experienced a significant increase in the average student learning achievement by 30.00 points. The paired sample t-test yielded a t-count value of 3.6345, which was greater than the critical value of 2.04. Additionally, the significance value of 0.000 was less than the threshold of 0.05. These results confirmed the considerable impact of volleyball games, both with conventional methods and flashcard instructional media, on enhancing student learning achievement. The results suggested that using flashcard instructional media in a game-based volleyball learning context was helpful in considerably enhancing student learning outcomes.

4. Discussion

Design and Development of Flashcard Learning Media in the Context of Game-Based Volleyball Learning

The development of flashcard instructional media in the context of game-based volleyball learning was carried out using the ADDIE method, which included needs analysis, media prototype design, media development, media implementation, and evaluation. At the analysis stage, learning objectives focused on collaboration skills and student achievement in the context of volleyball games were carefully identified (Riivari, Kivijärvi, & Maija, 2021). The design stage involved determining the media format, using interactive flashcards that presented information through images and text related to the game of volleyball. The media content was carefully selected to include game rules, techniques, and collaborative strategies relevant to the game (Riivari et al., 2021).

At the development stage, attractive and informative flashcards were created by using multimedia elements such as images and text. The visual design not only supported comprehension but also

motivated students to learn more effectively. The media prototype was tested with a limited number of students to get initial feedback before entering the implementation stage (Karrenbauer, Brauner, and König, 2023). The media was tested on the experimental group in this implementation stage. Furthermore, the evaluation stage was carried out formatively and summatively to measure the effectiveness of the media (Xu et al., 2023). Feedback from teachers and students became the basis for further improvement by revisiting the original objectives and updating the media as needed.

The Effectiveness of Flashcard Instructional Media in a Game-Based Volleyball Learning Context to Improve Collaboration Skills

The data showed that the average collaborative skills in the control group increased by 16.67 points. In comparison, the experimental group, with the intervention of flashcard instructional media in a game-based volleyball learning context, increased by 25.83 points. The paired sample t-test results show a t-count value of $3.234 > 2.04$ with a significance of $0.000 < 0.05$, indicating a significant effect of volleyball games, especially with flashcard instructional media in a game-based volleyball learning context, in improving students' collaborative skills. The results of this study are supported by Paraskevaidis and Fokides (2020) who also reported a positive effect of the play method on student motivation in volleyball learning. This research underscores the importance of game-based learning and teaching methods in improving collaborative skills in volleyball.

Research conducted by Johnson and Johnson (2019) on Cooperative Learning Theory highlights that cooperative learning, where students work together to achieve a common goal, can improve social, interaction, and collaboration skills. The application of game-based media, such as interactive flashcards with a focus on game rules and collaborative strategies in the sport of volleyball, supports the theory of constructivism (Sohrabi, 2021). This theory emphasizes that hands-on experience plays an important role in effective learning and helps students connect concepts to their practical experience (Parker et al., 2022). Overall, game-based media not only present information in an engaging way but also provide real opportunities for students to develop collaboration skills through practical and interactive learning (Nadeem & Oroszlanyova, 2023).

The Effectiveness of Flashcard Instructional Media in a Game-Based Volleyball Learning Context to Improve Student Achievement

The study results showed that the average student achievement in the control group increased by 18.33 points. In the experimental group with the intervention of flashcard instructional media in a game-based volleyball learning context, the average student achievement increased more significantly, which was 30.00 points. The paired sample t-test results showed a t-count value of $3.6345 > 2.04$ with a significance of $0.000 < 0.05$, confirming the significant effect of volleyball games, especially with flashcard instructional media in a game-based volleyball learning context, in improving student learning achievement. This indicates that the intervention has a greater positive impact than conventional learning in the context of improving student achievement. This is supported by Samsuddin, Indra, and Herli (2022) who found that e-learning video media improved students' service skills. Chu et al. (2022) further emphasized the long-term benefits of such an approach, indicating that implementing multiple seasons of the same sport in sports education leads to sustained improvements in game performance.

The efficacy of media in the context of game-based volleyball learning to enhance student achievement can be elucidated through various underlying factors (Khalifa et al., 2021). According to the theory of constructivism, which is emphasized by Hisbollah and Hassan (2022), learning that involves interactive activities and hands-on experience can facilitate better knowledge construction. They furthermore support this concept, indicating that situations where the level of skill is in line with the

level of challenge can create an engaging experience, increase focus, and ultimately improve student achievement. Overall, the effectiveness of game-based volleyball learning in improving student achievement is based on interactive factors, hands-on experience, and understanding of concepts in the game context (Batez & Petruši, 2021).

5. Conclusions and Recommendations

Based on the study results, the game-based volleyball learning media and flashcard instructional media in the context of game-based volleyball learning showed a high level of validity. Hypothesis testing showed that the flash card instructional media intervention significantly improved collaborative skills and student achievement compared to the control group. The results confirm that the development of flashcard instructional media in the context of game-based volleyball learning effectively improves collaboration skills and student achievement in the context of volleyball learning.

Further research should be conducted to explore the effectiveness of flashcard instructional media in a game-based volleyball learning context in other sports learning contexts or student groups with different characteristics. In addition, further research could consider factors that influence the acceptance and implementation of flashcard instructional media in a game-based volleyball learning context in a formal learning environment. These recommendations will contribute significantly to developing innovative learning methods in education.

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