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Implementation of The VAK-Based QuizWhizzer Game: A Case Study At SDN Naru Ranggasolo Bima

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A B S T R A C T

The objectives of this research are: (1) To examine the influence of using a VAK model-based QuizWhizzer game on the Civics cognitive PPKn (2) To determine the effectiveness of the VAK model-based QuizWhizzer game in improving the Civics cognitive PPKn, and (3) To identify the factors that influence the Civics cognitive PPKn. This research uses a quantitative approach with a pre-experimental method and a One Group Pretest-Posttest design. The research was conducted in Class V of SDN Naru Ranggasolo.The data collection techniques used in this research include test and non-test methods. The test instrument consisted of pretest and posttest questions. The non-test instrument was in the form of documentation. The results of the research showed a significant increase in the average score, from 57.50% in the pretest to 85.83% in the posttest. The paired sample t-test results showed a significance value of 0.000 ($p < 0.05$), which confirms a significant influence of using the VAK model-based QuizWhizzer game on the Civics cognitive abilities of students. Therefore, the use of interactive games has proven to be influential and effective and is one of the factors supporting the improvement of these abilities.

1. Introduction

Education is a conscious and structured effort to create a learning environment that supports the learning process. As an academic discipline, education can be understood as a systematic and scientific study of the teaching and learning process (Amanda et al., 2025). Through education, students are actively encouraged to develop their potential in various areas, including spiritual and religious values, self-awareness, character, intelligence, morality, and skills that are beneficial to themselves, society, and the nation (Mahmudah et al., 2021) In a more specific context, education is associated with a formally planned learning process aimed at producing a high-quality future generation through the guidance of teachers as educators (Santika et al., 2023). Therefore, teachers not only serve as educators but

also as facilitators who must be capable of mastering various learning resources to achieve optimal learning objectives (Shibgho & Alfiansyah, 2022). In the era of the Industrial Revolution 5.0, students are required to possess a variety of skills such as critical thinking, communication, collaboration, creativity, and problem-solving abilities, all of which involve cognitive aspects (Safitri et al., 2024).

Cognitive ability is one of the key aspects in the intellectual development of students, encompassing skills such as thinking, understanding, memory, reasoning, imagination, creativity, and problem-solving (Bahira, 2024). When cognitive abilities develop well, students are more likely to achieve progress in various other areas (Ramadhina et al., 2024). At the elementary school level, cognitive ability is not only determined by the understanding and mastery of subject matter but also by how students recognize and comprehend their surrounding environment (Wahyuni et al., 2023). This becomes a particular challenge in PPKn, which aims to enhance students' understanding of Pancasila, their rights and obligations as citizens, and their sense of responsibility toward the nation and the state (Desi, 2022). However, in reality, many students still struggle to grasp the basic concepts of PPKn due to a lack of active engagement in the learning process, which ultimately results in low cognitive performance (Arfiani, 2021).

One of the contributing factors to the low engagement of students in PPKn learning is the lack of use of interactive media or evaluation games. This aligns with the opinion of (Adila et al., 2024), who state that students' low understanding of the material is often caused by the absence of relevant and interactive learning media or approaches (Carolina, 2022). PPKn is not merely a subject that can be mastered through memorization, but one that also requires direct experience and active involvement in the learning process (Ishaq et al., 2022). Therefore, there is a need for engaging learning media that can enhance student interaction and understanding of the material—one of which is through the use of interactive games such as QuizWhizzer (Triyoga et al., 2024).

QuizWhizzer is an Android-based game application designed to support interactive activities in the form of engaging quizzes and questions. This application allows multiple players to participate simultaneously, creating a more enjoyable and competitive learning experience (Fajriani et al., 2024). With features that can be tailored to students' learning styles, QuizWhizzer serves as an appealing evaluation tool in the field of education (Hakim & Jannah, 2024). According to a study by (Hidayati & Aslam, 2021), the use of technology-based interactive games can increase student engagement in learning, which in turn positively impacts students' understanding of the material and improves their cognitive abilities. Furthermore, research by (Faijah et al., 2022) shows that educational games supported by QuizWhizzer are considered suitable to be used as learning media (Ilhami et al., 2024).

(Said, 2023) stated that the use of technology-based media, such as interactive games, is highly effective in increasing student engagement. One approach that can be combined with the use of QuizWhizzer is the VAK learning model (Laeli & Kasmui, 2024). The VAK model integrates three key aspects of the learning

process: visual through observation, auditory through listening, and kinesthetic through movement (Janah & Nurachadijat, n.d.). This approach is designed to align with students' learning styles to improve their ability to understand and process information more effectively (Mustahibah et al., 2024). Thus, the integration of QuizWhizzer with the VAK model can help enhance student engagement and their understanding of PPKn material (Naidu et al., 2024)

Based on the initial observations conducted in December, specifically from Monday the 9th to Thursday the 12th at SDN Naru Ranggasolo Bima, it was found that the cognitive abilities of fifth-grade students in the PPKn subject were still low. The observations revealed that out of 12 students, only 30% were able to correctly answer questions related to basic PPKn concepts, while the remaining 70% encountered difficulties. Furthermore, the results of the initial test showed that the average student score was only 65 out of a scale of 100, which is still below the minimum competency standard (KKM) of 70.

Most students had difficulty understanding the PPKn learning concepts. They tended to be confused, struggled with memorization, and were unable to connect and apply PPKn concepts to daily life. One of the main causes of this issue is the lack of interactive evaluation tools that can help students deepen their understanding. Until now, the evaluation in PPKn learning has been conventional, relying solely on lecture methods and cognitive-based tests, such as written exercises, written exams, or oral tests. This method tends to be one-way and does not provide room for students to actively participate in learning. As a result, students quickly become bored, lack motivation, and find it difficult to absorb and apply the knowledge they have acquired.

Given these conditions, it is clear that PPKn learning needs to be improved, especially in terms of methods, media, and evaluation. There is a need for more interactive and innovative evaluation tools to engage students more actively, allowing them to understand and apply PPKn concepts in their daily lives.

The use of engaging learning media, such as technology-based interactive games like QuizWhizzer, can serve as a solution to enhance students' cognitive abilities. Through interactive games, students not only learn theoretical concepts but also directly apply what they have learned through interesting and relevant questions related to everyday life. In addition, an approach that takes into account various learning styles, such as the VAK (Visual, Auditory, Kinesthetic) model, can help reach more students in ways that align with their individual learning preferences. Therefore, students' understanding of PPKn can be improved through a more creative, enjoyable, and relevant approach that connects with their daily lives, ultimately fostering stronger character development and social awareness. Based on the explanation above, this study aims to examine the impact and effectiveness of using the QuizWhizzer game based on the VAK model in improving the cognitive abilities of fifth-grade students at SDN Naru Ranggasolo Bima, as well as to identify the factors that influence students' cognitive abilities in the PPKn subject.

2. Methodology

This research was conducted at SDN Naru Ranggasolo Bima. A quantitative approach was chosen for this study, using an experimental pre-test (pre-experimental) method as the research design. The pre-experimental method was selected because it allows the researcher to compare the results before and after the use of the QuizWhizzer game based on the VAK model to determine if there is an improvement in students' cognitive abilities in PPKn. Furthermore, this method is more efficient and suitable given the resource limitations at SDN Naru Ranggasolo Bima, as it is easier to implement. The research design used is the One Group Pretest-Posttest Design.

This study involves all the fifth-grade students at SDN Naru Ranggasolo Bima as the population, meaning all students in the class are the subjects of the research to examine the impact of the QuizWhizzer game based on the VAK model on students' cognitive abilities in PPKn. The sampling technique used is saturated sampling or total sampling, where all members of the population are included as the sample, specifically 12 fifth-grade students. Data collection techniques in this study include both test and non-test methods. The test method is used to measure the cognitive abilities of PPKn students before and after the use of the QuizWhizzer game with the VAK model.

The non-test method is used to complement the test results with information that cannot be directly measured through tests. The test instruments consist of pretest and posttest questions that are used to measure improvements in students' cognitive abilities in PPKn before and after the intervention. The non-test instrument is in the form of documentation. The data obtained are analyzed using descriptive statistical analysis, which is used to summarize and describe the data so that it is easier to understand. This helps identify patterns or trends in the data before hypothesis testing. The hypothesis test is performed using SPSS 25 for Windows. The conclusion of the research is drawn by comparing the results obtained and considering the normality of the score distribution at a significance level of $p = 0.05$.

3. Result and Discussion

The results and discussion in this study are based on data obtained from research activities aimed at examining the implementation of the QuizWhizzer game based on the VAK (Visual, Auditory, Kinesthetic) model to improve the cognitive abilities of fifth-grade students in the subject of PPKn with a case study conducted at SDN Naru Ranggasolo, Bima. This study was carried out over five systematically structured sessions. In the initial stage, the researcher conducted an introduction and coordination with the school authorities, presented the objectives of the research, and approached the students selected as the sample. The students were given an understanding of the flow of learning activities that incorporated technology through the QuizWhizzer game based on the VAK learning model. Following this, a pretest was administered to measure the students' initial cognitive

abilities in understanding Civic Education material. The results of this pretest served as a baseline for evaluating the effectiveness of the treatment given in the subsequent sessions. The treatment phase began in the third session, where the researcher delivered Civic Education material using a scientific approach combined with the cooperative learning model of the STAD type. The delivery of material was systematically designed with the goal of actively involving students in the learning process. In the following session, additional material was presented using the same approach but concluded with the implementation of the educational QuizWhizzer game as an evaluation instrument.

The researcher shared the previously designed game link, and students were instructed to access the link, enter their names, and answer a series of interactive questions aligned with the material that had been taught. The use of this game proved effective in increasing students' active participation in the learning process while simultaneously enhancing their understanding through an engaging and enjoyable evaluation method. In the final session, a posttest was administered to measure the improvement in students' cognitive abilities after the learning process and treatment had been carried out. The posttest results were then compared with the pretest results to determine the extent of the influence and effectiveness of the QuizWhizzer game based on the VAK model in improving students' cognitive abilities in PPK. The learning process can be seen in Figure 1 and Figure 2.

Figure 1. A student Answering Questions in the Quizwhizzer Game

Figure 2. Learning Process

a. Descriptive Analysis Test

Based on the descriptive statistical results, the average pretest score was 57.50%, while the average posttest score significantly increased to 85.83%. This indicates a substantial improvement in posttest results compared to the pretest. These findings suggest that the intervention or instructional approach implemented had a positive impact on students' cognitive abilities (performance). The distribution of pretest scores tends to be skewed to the left (negative skewness) and is more dispersed, with a variance of 61.364. In contrast, the distribution of posttest scores is more concentrated, slightly skewed to the right (positive skewness), and has a smaller variance of 53.788. Data consistency is also reflected in the narrower Interquartile Range (IQR) in the posttest, indicating that most students achieved more uniform scores compared to the pretest. The descriptive results are presented in Table 1 below.

Table.1. Descriptives

Pre Test	Mean		57.50	2.261
	95% Confidence Interval for Mean	Lower Bound	52.52	
		Upper Bound	62.48	
	5% Trimmed Mean		58.06	
	Median		60.00	
	Variance		61.364	
	Std. Deviation		7.833	
	Minimum		40	
	Maximum		65	
	Range		25	
	Interquartile Range		14	
	Skewness		-1.021	.637
	Kurtosis		.694	1.232
Post Test	Mean		85.83	2.117
	95% Confidence Interval for Mean	Lower Bound	81.17	
		Upper Bound	90.49	
	5% Trimmed Mean		85.65	
	Median		85.00	
	Variance		53.788	
	Std. Deviation		7.334	
	Minimum		75	
	Maximum		100	
	Range		25	
	Interquartile Range		10	
	Skewness		.488	.637
	Kurtosis		-.403	1.232

b. Data Normality Test

Based on the results, the p-values from both normality tests (Kolmogorov-Smirnov and Shapiro-Wilk) for the pretest and posttest data are greater than 0.05. Specifically, the significance value for the pretest in the Kolmogorov-Smirnov test is 0.157, while the posttest significance value is 0.183. Meanwhile, the Shapiro-Wilk test shows a significance value of 0.067 for the pretest and 0.448 for the posttest. Therefore, it can be concluded that both the pretest and posttest data are normally distributed, as shown in Table 2 below.

Table.2. Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Pre Test	.209	12	.157	.871	12	.067
Post Test	.203	12	.183	.936	12	.448

c. T-Test Hypothesis (Paired Sample T-Test)

Based on the results, the p-value (Sig. (2-tailed)) is 0.000. Since this value is less than 0.05, it indicates a significant difference between the pretest and posttest scores. Therefore, the use of the QuizWhizzer interactive media based on the VAK model in Civics Education (PPKn) learning for Grade V students at SDN Naru Ranggasolo Bima is effective in enhancing their cognitive abilities in the subject. This can be seen in Table 3 below.

Table.3. Paired Samples Test

Paired Differences								
					95% Confidence Interval of the Difference			
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Pair 1	Pre Test - Post Test	-28.333	11.348	3.276	-35.544	-21.123	-8.649	11	.000

This research was conducted based on real conditions observed during the initial observation at SDN Naru Ranggasolo, particularly in Grade V. It was found that the students' cognitive abilities were low, and there was a lack of interactive evaluation instruments in the learning process. To address this issue, the researcher conducted an experiment by implementing the "QuizWhizzer Game Based on the VAK Model to Improve the Cognitive Abilities of PPKn Students in Grade V: A Case Study at SDN Naru Ranggasolo Bima."

Before implementing the QuizWhizzer Game Based on the VAK Model as an interactive media, an initial measurement was carried out through a pretest to assess the students' starting abilities. The pretest results showed that the students had low cognitive abilities and found it difficult to understand the questions. Based on the descriptive statistical analysis, the mean score of the students before the application of the QuizWhizzer Game based on the VAK model as an interactive media was 57.50%, indicating limited cognitive abilities in the PPKn subject, specifically regarding Pancasila and the rights and obligations of citizens. After the implementation of the QuizWhizzer Game based on the VAK model as interactive media, an evaluation was conducted to measure the improvement in cognitive abilities in PPKn. This evaluation was carried out through a posttest. Based on the posttest results from the descriptive analysis, the score significantly increased to

85.83%, showing an improvement compared to the pretest score before the intervention. Therefore, the use of the QuizWhizzer Game based on the VAK model as an interactive media in Grade V at SDN Naru Ranggasolo Bima successfully enhanced the cognitive abilities of PPKn students. The increase in posttest scores, along with the results of the observation, indicates that the cognitive abilities of PPKn students have improved. This game has proven to be effective in creating positive changes in the elementary school environment and has become one of the factors in improving cognitive abilities in PPKn.

Based on the descriptive statistical analysis in Table 2, the average score of students after the intervention significantly increased to 85.83%, compared to the average pretest score before the intervention, which was 57.50%. Meanwhile, the t-test results showed a significance value of 0.000, which is smaller than the probability of 0.05, meaning that the null hypothesis (Ho) is rejected, and the alternative hypothesis (Ha) is accepted. This indicates that the use of the QuizWhizzer Game based on the VAK model has a significant effect on improving the cognitive ability of PPKn students in Grade V at SDN Naru Ranggasolo.

This study aligns with the findings of a research conducted by (Mustahibah et al., 2024) titled "Development of the QuizWhizzer Educational Game with the VAK (Visual-Auditory-Kinesthetic) Model". In this research, it was found that the student satisfaction level reached 82.73%, indicating that the use of the educational game-based learning media QuizWhizzer, which adopts the VAK model, is effective in enhancing student engagement and learning outcomes. Therefore, it can be concluded that the use of this media has a positive impact on the learning process. Furthermore, a study conducted by (Suhaliah et al., n.d.), titled "Development of the QuizWhizzer Educational Game Oriented Towards Student Motivation and Cognition in Theme 6: Land and Life", supports the previous findings.

The results of the study showed that the QuizWhizzer educational game achieved a very high validity level, with an overall average percentage of 87.50%. Specifically, the validation from subject matter experts reached 81.25% (categorized as very valid), media experts scored 90.42% (categorized as very valid), and the validation from science subject teachers obtained 90.83% (categorized as very valid). Additionally, the media's efficiency was rated very good with a score of 84.85%.

Based on these findings, it can be concluded that QuizWhizzer is a suitable and efficient interactive learning media. Another study conducted by (Yani et al., 2023), titled "The Effect of QuizWhizzer Educational Game Media on Student Learning Outcomes at SMA Sint. Gabriel Maumere," found that the implementation of QuizWhizzer significantly improved students' learning outcomes. Students in the experimental class showed an increase in average scores from 62.57 to 81.38, while the control class experienced a decrease from 69.14 to 68.23. Hypothesis testing using an independent t-test yielded a p-value of 0.000, which is less than 0.05, indicating that the difference between the two groups is statistically significant. Therefore, it can be concluded that the use of QuizWhizzer as an educational media has a positive impact on students' learning outcomes at SMA Sint. Gabriel Maumere. In conclusion, this study was successful.

The factors influencing the improvement of students' cognitive abilities are as follows:

a. Use of Technology and Digital Tools in Learning.

Digital educational games can provide an engaging learning environment that actively involves students in the learning process, leading to a positive impact on the enhancement of their cognitive abilities (Gui et al., 2023). This was demonstrated after the implementation of the QuizWhizzer Game in the 5th grade at SDN Naru Ranggasolo Bima.

b. Physical Activity and Mental Health

Physical activity can significantly boost cognitive abilities. For every 1% increase in physical activity time, cognitive abilities increase by 0.273 points, equivalent to 0.714% of the average cognitive ability. This benefit is particularly noticeable in adolescents with initially lower cognitive abilities. Physical activity also improves educational expectations and learning behaviors, which in turn supports cognitive development (Cui et al., 2024).

c. Social Interaction and Collaborative Learning.

Social interactions with peers and group activities can stimulate critical thinking and problem-solving skills. Discussions, debates, and teamwork help students develop higher-order thinking skills through the exchange of knowledge and collective problem-solving (Zhang et al., 2024)

d. Impact of Screen Time and Learning Applications

Moderate screen time, ranging from 2 to 4 hours per day, can improve visual-spatial skills and problem-solving abilities in children. However, this effect is influenced by factors such as socioeconomic status, geographical location, and the role of parents in mediating technology use. Balanced and guided technology use can support cognitive development in students (Mesra et al., 2022).

Based on the findings of this study and relevant research, it can be concluded that the implementation of the QuizWhizzer Game based on the VAK Model is impactful and effective in enhancing the cognitive abilities of PPKn, and plays a significant role in improving students' cognitive abilities at SDN Naru Ranggasolo Bima.

4. Conclusion

This study demonstrates that the use of the VAK Model-based QuizWhizzer Game significantly impacts the improvement of students' cognitive abilities in PPKn at SDN Naru Ranggasolo Bima. Furthermore, the implementation of the VAK Model-based QuizWhizzer Game has proven effective in the learning process, as it actively engages students while also enhancing their cognitive abilities in PPKn. Moreover, this research identifies several factors that contribute to the improvement of

students' cognitive abilities in PPKn, including the utilization of technology and digital tools in learning, students' physical and mental health, social interaction and collaborative learning, as well as the impact of device screen time and learning applications. These key findings are supported by the research results, which show an improvement in students' PPKn cognitive abilities following the implementation of the VAK model-based QuizWhizzer Game. Further statistical analysis confirms that the VAK Model-based QuizWhizzer Game, as an interactive game, has a positive impact on enhancing students' cognitive abilities in PPKn. This Game also increases learning effectiveness, which is reflected in the students' more active engagement during the learning process. This makes the game an appealing, effective, and relevant alternative for evaluation because it can accommodate various student learning preferences. Thus, integrating the QuizWhizzer Game with the VAK Model has the potential to be a significant solution in advancing cognitive abilities and the quality of PPKn education at the elementary school level.

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