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Boosting Engagement and Reducing Anxiety: The Impact of Quizizz on Science Learning in Elementary Classrooms

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ABSTRACT

Science education in elementary schools often encounters challenges related to technological accessibility, particularly when integrating digital tools such as Quizizz for assessment. Institutional policies, including restrictions on mobile phone usage, are typically implemented to maintain student concentration and prevent technological distractions. While shifting students' mindset toward new learning methods can be challenging, school support can foster a high-quality learning environment that benefits all students. This study aims to explore the implementation and impact of the Quizizz game on students' anxiety levels during elementary science evaluations. Using a quantitative quasi-experimental design with a Pretest-Posttest Control Group approach, data were collected through questionnaires involving all 43 sixth-grade students. The results indicate that the use of Quizizz as a learning evaluation tool significantly improved student engagement in the experimental group. Overall, 52% of the experimental group fell into the "Moderate" anxiety category, compared to 73% in the control group. The analysis also revealed a significant difference in anxiety levels between the two groups, demonstrating that Quizizz effectively reduces student anxiety during evaluations. These findings highlight the potential of Quizizz as an innovative tool to enhance learning experiences and lower anxiety in classroom assessments.

Keywords
Anxiety
Elementary School
Engagement
Science Learning
Quizizz

Introduction

Science learning is one of the subjects in elementary school that discusses natural phenomena found in our surrounding environment. According to Wahyuni [1], science learning in educational units is conducted interactively, inspiringly, enjoyably, challengingly, and motivates students to always be active during the learning process. Science learning can help students think critically and objectively in facing problems in daily life [2]. This learning process can be observed in the conditions and demands of the environment that continue to evolve in line with human development. In the learning process, the role of the teacher is crucial and influences student learning outcomes in the classroom.

Teachers are individuals who conduct the teaching process in the classroom, and the success of teaching determines the success of education in general [3]. The roles of teachers include being a learning resource, providing services to facilitate students in learning, and acting as guides who understand the children they are mentoring and have the ability to plan goals and competencies to be achieved. To achieve optimal learning, it is necessary to use methods or strategies that support learning so that students are interested and can increase their learning motivation. This learning motivation can be interpreted as the students' desire to learn and understand something that drives them to learn more and achieve their best performance by utilizing technology [4]. The use of technology in the learning process not only enriches students' learning experiences but also allows access to broader and more interactive learning resources.

Teachers are required to design learning that aligns with current conditions, one of which is by creating innovative, creative, and enjoyable learning media [5]. The presence of learning media can stimulate students' interest in learning new things in the material presented by the teacher, making it easier to understand [6]. By using innovative learning media, teachers can increase student engagement in the learning process and help them better understand the concepts being taught. Additionally, teachers must assess learning success through evaluations given to students after each classroom learning session. Learning success can be measured by teachers through achievement tests or learning evaluations.

The evaluations typically conducted by teachers involve answering questions on previously discussed material, usually in the form of written and oral tests. Students who score

below average may feel nervous or anxious during evaluations because they are unprepared, leading to suboptimal performance in answering questions. Furthermore, teachers have limited time to prepare the questions to be tested [7]. In facing these challenges, the use of technology in the learning process is becoming increasingly important.

With the advancement of time, everyone has adopted digital tools and media, especially in education. The use of technology has changed perspectives, particularly among students, and offers new possibilities for delivering learning materials in more engaging ways. Teachers and students now have access to various online learning platforms, educational applications, and other digital resources that enrich the learning process [8]. Therefore, the integration of technology in education is not just an option but a necessity to ensure that education can adapt to changing times and prepare future generations to face future demands.

Based on observation results, the use of textbooks or student worksheets remains the primary approach in school learning. Although schools have used evaluation tools to support learning, their utilization is still limited. The main factor restricting schools from adopting more modern methods, such as prohibiting students from bringing mobile phones to school, reflects long-standing school traditions or cultures. Changing students' mindsets may be difficult and time-consuming in adapting to new methods as learning media in the classroom. Through the use of media created by teachers, students will construct knowledge on their own [9]. The influence of using learning media in education creates a conducive environment for the teaching and learning process, and can enhance students' learning motivation because teaching materials using learning media are more attention-grabbing [10]. One of the learning media used by teachers is Quizizz.

By using this application, teachers can encourage students to be more active during the learning process. According to Salsabila et al. [11], the Quizizz application offers several features that teachers can utilize as a tool for assigning tasks or evaluations. Additionally, students can experience less stressful learning when thinking about answers because the media has an interface equipped with enjoyable features [12]. In practice, teachers can prepare sheets of paper with QR codes to distribute to students, who will answer questions on the screen based on their chosen answers, and the teacher will record the students' responses using a downloaded mobile phone.

The implementation of Quizizz games affects the level of anxiety among students during science learning evaluations. Quizizz games can increase students' enthusiasm when completing science learning evaluations [13]. The success of Quizizz games can be measured based on pretest and posttest scores. This research was conducted in the sixth grade of SDIT Cahaya Insani (a private elementary school) during the evaluation of science learning on the

Solar System material. This research aims to determine the implementation and impact of Quizizz games on the anxiety levels during science learning evaluations. Furthermore, the use of technology in learning evaluations can provide a more dynamic learning experience and support the development of students' abilities in understanding science material.

Materials and Methods

This research employs a quantitative approach. The research method used is Quasi-Experimental. This method aims to determine the impact or effect resulting from certain behaviors in the classroom. The method is used to measure the level of student anxiety in the experimental group after receiving treatment in their class. The study involved a limited sample of 43 sixth-grade students from two classes at SDIT Cahaya Insani. While this sample provides insight into the effectiveness of Quizizz within a specific instructional context, the findings are not intended for broad generalization. Instead, the study serves as an exploratory contribution to the growing discourse on digital tools in formative assessment and student emotional responses. The sample used in this study is class A (21 students) as the experimental group, and class B (22 students) as the control group. The research sample was selected using simple random sampling. The technique used involves questionnaires or surveys. The validation of the questions in this study includes content validation and construct validation, with validity testing using point biserial correlation. Meanwhile, the reliability test used is KR-20. The research data is analyzed using descriptive statistics (mean, median, mode, and standard deviation) and further analyzed through Normality tests (Kolmogorov-Smirnov), Homogeneity tests (Levene), and T-tests (Mann-Whitney U test and Wilcoxon test).

Results

A. Implementation of Elementary Science Learning

1. Implementation of Science Learning in the Experimental Group

During the first meeting, the teacher began the lesson by greeting the students and leading a prayer together. The teacher then checked attendance and ensured the students' attire and seating arrangements were neat. To create a conducive classroom atmosphere, the teacher initiated an ice-breaking activity. Next, the teacher explained the learning objectives and asked the students to prepare their learning materials. Before diving into the main lesson, the teacher conducted an initial assessment using the Quizizz game with QR cards. After completing the assessment, the teacher delivered the core material on the "Solar System," followed by group discussions and worksheet activities. The first meeting concluded with a review of the material covered and an outline of the activities for the next session.

In the second meeting, the teacher again started by greeting the students and leading a prayer. Attendance and the neatness of attire and seating were checked once more. The teacher then reviewed the material from the previous session. The teacher prepared the materials and tools needed for creating a miniature model of the Solar System with the students. After completing the miniatures, the students were given time to present their group work in front of the class. Following the presentations, the teacher and students conducted a learning evaluation using the Quizizz game in paper mode, similar to the initial assessment activity. The session ended with a review of the material, a group reflection, and an announcement of the next learning activities.

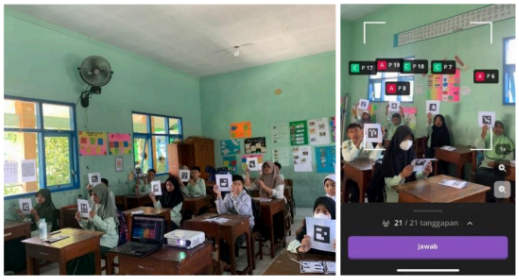

Fig. 1. Implementation of learning evaluation using paper-based Quizizz

2. Implementation of Science Learning in the Control Group

In the first meeting, the teacher began by greeting the students and leading a prayer. Attendance and the neatness of attire and seating were checked. The teacher then explained the learning objectives and asked the students to prepare their materials. The core material on the "Solar System" was delivered, followed by group discussions and worksheet activities. The first meeting concluded with a review of the material and an outline of the next session's activities.

In the second meeting, the teacher started by greeting the students and leading a prayer. Attendance and the neatness of attire and seating were checked again. The teacher reviewed the material from the previous session and prepared the materials and tools needed for creating a miniature model of the Solar System with the students. After completing the miniatures, the students presented their group work in front of the class. The session ended with a written learning evaluation. The teacher then reviewed the material, conducted a group reflection, and announced the next learning activities.

Fig. 2. Implementation of written evaluation activities

B. Results of Student Anxiety Level Measurement

1. Results of Anxiety Level Measurement in the Experimental Group

The students' anxiety levels in this study were measured using pretest and posttest based on indicators adjusted to the researcher's needs. The pretest and posttest results for the experimental group are presented in Figure 3.

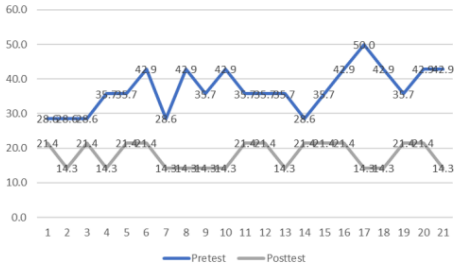

Fig. 3. Diagram of pretest and posttest anxiety levels in the experimental group

As illustrated in Fig. 3, the anxiety level in the experimental class decreased after the implementation of the Quizizz intervention. The diagram shows that during the first meeting (pretest), before the Quizizz game intervention, the anxiety level was moderate. After the intervention, during the second meeting (posttest), the anxiety level decreased compared to the pretest. This indicates that the Quizizz game had an impact on reducing student anxiety.

2. Results of Anxiety Level Measurement in the Control Group

The students' anxiety levels in the control group were also measured using pretest and posttest based on the same indicators. The results are presented in Fig. 4.

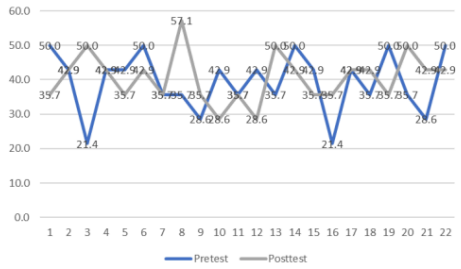

Fig. 4. Diagram of pretest and posttest anxiety levels in the control group

The diagram shows that the anxiety levels during the first meeting (pretest) and the second meeting (posttest) did not decrease after the written evaluation. This indicates that the written evaluation did not significantly impact or change the students' anxiety levels.

C. The Influence of Quizizz Game on Student Anxiety during Learning Evaluation

The influence of the Quizizz game on student anxiety during learning evaluations was determined through prerequisite testing. This testing included normality tests, homogeneity tests, and t-tests to prove that the Quizizz game effectively reduced student anxiety during evaluations in sixth-grade students. The analysis was conducted using IBM SPSS Statistics 22.

1. Prerequisite Testing

   The normality test using the Kolmogorov-Smirnov test is presented in Table 1.

Table 1. Normality Test Results (Anxiety levels)

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Groups	Statistic	df	Sig.	Statistic	df	Sig.
PreTest Experiment	.207	21	**.019**	.871	21	.010
PostTest Experiment	.348	21	**.000**	.640	21	.000
PreTest Control	.205	22	**.017**	.894	22	.022
PostTest Control	.209	22	**.013**	.909	22	.046

Table 1 summarizes the results of the Kolmogorov-Smirnov normality test, indicating that the data were not normally distributed. The results show that the significance values for anxiety levels in both the experimental and control groups were less than 0.05, indicating that the data were not normally distributed. The results of the homogeneity test using Levene's test are presented in Table 2.

Table 2. Test of Homogeneity of Variance (Anxiety levels)

	Levene Statistic	df1	df2	Sig.
Based on Mean	2.358	1	41	.116
Based on Median	2.656	1	41	.111
Based on Median and with adjusted df	2.656	1	37.869	.111
Based on trimmed mean	2.550	1	41	.114

The significance value (Sig.) was 0.116, which is greater than 0.05, indicating that the data were homogeneous.

2. Hypothesis Testing

After completing the prerequisite tests, hypothesis testing was conducted using the Mann-Whitney U test and Wilcoxon test to determine the difference in the impact of the Quizizz game on student anxiety during evaluations (experimental group) compared to evaluations without the Quizizz game (control group). The Mann-Whitney U test is a non-parametric test used to compare the medians of two independent groups when the data are not normally distributed. The results are presented in Table 3.

Table 3. Mann-Whitney U Test Results

	Anxiety levels
Mann-Whitney U	0.000
Wilcoxon W	231.000
Z	-5.735
Asymp. Sig.e (2-tailed)	0.000

The results show a significance value (Sig.) of less than 0.05 (0.000 < 0.05), indicating a significant difference in anxiety levels between the two groups.

The Wilcoxon test was used because the data did not meet the assumptions for parametric tests. This test is equivalent to the paired t-test and is used to determine if there is a significant difference between two related samples. The results are presented in Table 4.

Table 4. Wilcoxon Test Results

	PostTest - PreTest
Z	-4.038[b]
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.

The significance value (Sig.) was less than 0.05, indicating that the Quizizz game significantly influenced student anxiety during evaluations.

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Discussion

Based on the research conducted, it can be concluded that the anxiety levels of students during science learning evaluations using the Quizizz game were lower compared to the class that conducted evaluations through written tests. Quizizz has been proven to be an effective tool for supporting classroom learning [14]. The version of Quizizz used by the researcher was the paper-based mode equipped with QR codes. This "Paper Mode" is a new feature in Quizizz that allows for an interactive learning experience through digital devices. With this feature, students' understanding of the learning material can improve significantly, creating a more enjoyable learning atmosphere. The use of technology can also stimulate students' interest and increase their engagement in the classroom learning process.

Quizizz is an educational game that involves learning activities and makes classroom activities interactive, fun, reduces tension, eliminates student boredom during learning, and allows students to compete with each other to study harder [15]. This application is an effective innovation in modern education [16][17]. The integration of technology and learning is becoming increasingly important. With Quizizz, teachers can create more engaging learning experiences and encourage students to improve their concentration and competitiveness [18]–[20]. The implementation of Quizizz in classroom activities, especially during learning evaluations, provides students with opportunities for independent learning and fosters positive attitudes [21][22].

While the findings suggest that the use of Quizizz contributed to reduced student anxiety during evaluations, it is important to acknowledge that other variables, such as teacher behavior [23], peer interactions [24], and overall classroom climate [25], may have also played a role. These factors were not explicitly measured in the current study, representing a limitation that future research could address through mixed-method approaches or classroom observations [26]. Through Quizizz, students are allowed to test their understanding directly, allowing them to identify their strengths and weaknesses in learning. Their weaknesses can be observed in their performance, especially when scores are displayed publicly, and they feel anxious comparing their scores with their classmates. Thus, Quizizz presents learning materials in a more engaging and interactive format, helping to create a motivating learning environment in the classroom. The implementation of Quizizz has great potential in increasing students' interest in learning and making the classroom atmosphere more enjoyable [27]–[29]. The relaxed and competitive environment can make students more enthusiastic about learning while minimizing monotony and boredom in the classroom.

The use of Quizizz as a learning medium has been proven to improve the quality of student learning [14] [30]. Quizizz motivates students to actively engage in learning and

enhances their understanding of the material. Furthermore, the timed feature in Quizizz evaluations encourages students to improve their concentration and focus during the evaluation process [31] [32]. Additionally, the positive experience gained from using Quizizz can help reduce students' negative thoughts, such as anxiety or doubt, as they feel more confident in their learning abilities. Therefore, the use of Quizizz not only improves the quality of student learning but also has the potential to reduce the influence of negative thoughts that may disrupt the evaluation process in the classroom.

The research data provides an overview of students' anxiety levels before and after implementing Quizizz as a learning evaluation tool. Data on student anxiety levels were collected through pretest and posttest activities in both the experimental and control groups. Data analysis was conducted using SPSS to test the impact of Quizizz on student anxiety levels. The results of the analysis show a significant difference in anxiety levels between the two groups. The experimental group showed a more significant reduction in anxiety levels compared to the control group.

Conclusion

This study demonstrates that using the Quizizz game for science evaluations in the experimental group was effective. Students exhibited increased enthusiasm, engagement, and reduced anxiety, highlighting the potential of game-based assessment tools to foster a psychologically safer classroom environment. The broader implications of this finding lie in its relevance to global educational contexts where test anxiety is a widespread issue across various age groups and cultures. Digital assessment platforms such as Quizizz offer scalable, low-cost solutions that can be adapted to different classroom settings, including underserved or resource-limited environments, without the need for personal devices. By reducing performance-related stress, such tools improve immediate learning outcomes and support the long-term emotional well-being of students. Given the increasing emphasis on student mental health in global education policies, this study underscores the importance of integrating affective support within digital pedagogical frameworks.

Conflict of Interest

The authors declare that there is no conflict of interest.

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