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THE USE OF QUIZIZZ AS AN INTERACTIVE BIOLOGY LEARNING MEDIA ON STUDENTS' MASTERY OF CONCEPTS

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ABSTRACT

Quizizz is a digital-\ased interactive biology learning medium that presents quizzes incorporating gamification elements, which are used as a tool to assist students in understanding and strengthening their mastery of concepts in the learning process. This study aimed to determine the effect of using Quizizz as an interactive biology learning medium on students' concept mastery and activeness in Grade X at SMA Negeri 2 Pekanbaru. The population of this study consisted of all Grade X students of SMA Negeri 2 Pekanbaru in the 2026/2027 academic year. This research employed a quantitative method with a quasi-experimental design, namely the matching-only pretest-posttest control group design. The research sample consisted of 44 students in the experimental class and 44 students in the control class, selected using purposive sampling technique. The research instruments included teaching modules, student worksheets, pretest and posttest questions, as well as observation sheets for student activeness and teacher activities. Data were collected through Concept mastery tests and observations. The results showed that the mean N-Gain score of concept mastery in the control class was 0.38 (moderate category), while in the experimental class it was 0.54 (moderate category). The t-test results on the N-Gain scores indicated a significance value (Sig. 2-tailed) of 0.000 < 0.05, therefore H_0 was rejected. This indicates that there was a significant difference between the experimental and control classes in terms of students' concept mastery. It can be concluded that the use of Quizizz as an interactive biology learning medium has a significant effect on students' concept mastery on bacterial topics at SMA Negeri 2 Pekanbaru.

Keywords: Quizizz; Interactive Learning; Student's Concept Mastery; Bacteria

1. INTRODUCTION

Education is a key pillar in national development, with the quality of learning being a key indicator of the success of the national education system. With the advancement of the digital era, education is required to adapt to advances in information and communication technology (ICT). Today's education system is inextricably linked to the integration of digital technology, which not only enriches the learning process but also shifts the paradigm of how teachers and students understand, absorb, and reflect on subject matter. Learning in schools is a series of interactive activities between students, teachers, and learning resources, pre-

planned by teachers to guide students in learning and enable them to explore their individual abilities (Hidayat, 2020).

The key to successful learning is the teacher. Teachers are key to improving the quality of education, and their teaching skills influence student learning outcomes (Lisa et al., 2022). Teachers must be able to master and apply cutting-edge innovations in learning. Teachers must master information and communication technology (ICT) to improve the quality of learning. In the context of 21st-century learning, innovative, interactive learning media are needed, capable of stimulating critical thinking, creativity, collaboration, and effective communication (the 4C skills). One of the main challenges in 21st-century learning is how to integrate digital technology into learning activities to effectively enhance student conceptual mastery and engagement.

Biology, as a branch of science, is characterized by complex material, primarily because many of its concepts are abstract, microscopic, and difficult to visualize directly. One topic that often presents challenges for students is bacteria, as it involves understanding the structure, classification, and role of microorganisms that cannot be observed without the aid of special tools. This results in low conceptual mastery and low student interest in the topic. According to Putra & Meiryani (2021), one of the main obstacles in learning Biology is the lack of interactive learning media capable of explaining abstract concepts concretely. Learning media are tools that can assist the teaching and learning process, functioning to clarify the meaning and message conveyed by the lesson objectives so that they can be carried out more effectively. Learning media are also a means to improve the quality of teaching and learning. With various types of media available, teachers must be able to choose these media carefully so that they can be used appropriately (Kustandi & Darmawan, 2020).

One learning medium that is increasingly being used and proven effective in interactive learning is Quizizz, a game-based learning platform that allows teachers to create interactive quizzes with a game-like interface. Quizizz offers features such as interactive videos, leaderboards, interactive quizzes, flexible timers, automatic feedback, and learning outcome analysis that can help teachers monitor student mastery of concepts. The fun gameplay element has been shown to increase intrinsic motivation and encourage students to be more active in learning.

Hidayah et al., (2021) showed that using Quizizz increases student engagement in the learning process. The competitive element in Quizizz motivates students to provide the best answers, resulting in significantly higher participation compared to learning without gamification. Various studies have shown that using Quizizz can increase student engagement and motivation. Research by Sari & Setiawan (2021) found that using Quizizz significantly improves concept mastery because students are more focused.

However, despite substantial empirical evidence demonstrating the effectiveness of Quizizz in various biology learning contexts, research specifically examining its application to bacteria at the secondary school level is still limited. Therefore, this study is important to determine the extent to which Quizizz can improve students' conceptual mastery of bacteria

and provide a practical contribution to the development of digital technology-based interactive learning media in biology.

Based on interviews with biology teachers at Pekanbaru State Senior High School 2, the average student conceptual mastery score for bacteria in the 2024/2025 academic year was 70.2, still below the Minimum Completion Criteria (KKM) of 75. Furthermore, approximately 58% of students were less active in discussions and interactive learning activities. This situation indicates the need for more engaging and participatory learning media. Quizizz, as an interactive learning media, is considered capable of improving student conceptual mastery through quizzes, videos, and online discussions. This research is relevant to improve biology learning in the digital era.

Based on this background, this study aims to examine the use of Quizizz as an interactive biology learning medium on students' conceptual mastery of bacteria. This research is expected to contribute scientifically to the development of technology-based learning strategies and serve as a reference for teachers and educational institutions in improving the quality of biology learning to be more contextual, enjoyable, and meaningful.

2. METHODOLOGY

This research refers to the type of quantitative research with a quasi-experimental design method. This study uses the matching only pretest-posttest control group design. It was conducted in the odd semester in classes X6 and X8 of the 2026/2027 academic year of SMAN 2 Pekanbaru. The population in this study were class X students with samples of class X8 as the experimental class using Quizizz and X6 as the control class using conventional learning taken by purposive sampling technique. The research parameter is student concept mastery. The data collection instrument used was a concept mastery question, namely multiple choice questions that have been tested for validity, reliability, discrimination power, level of difficulty and observation sheets. Data were collected using test methods and observations of students and teachers. Data analysis used parametric statistics t test because the data was normal and homogeneous with the help of SPSS software.

The data analysis techniques used in this study were:

Quantitative data analysis. To determine the improvement in learning outcomes, the N-Gain formula was used. The formula is as follows:

Information :

Spost : Posttest score

Spre : Pretest score

Smax : Ideal maximum score

To test the comparative hypothesis, a two-sample t-test (independent sample t-test) is used for parametric (if the data is normally distributed) or the Mann-Whitney U-test for non-

parametric. The t-test is used if the data is normal or homogeneous. To determine normal data, normality and homogeneity tests are used (Sugiyono, 2010).

a. Normality Test

A normality test is needed to determine the distribution of data. One method used to test data normality is the Kolmogorov-Smirnov method (KS-21). The Kolmogorov-Smirnov test formula is:

$$KS = | Fn_{(Yi-1)} - Fo_{(Yi)} |$$

Description:

KS : Calculated KS value

Fn(Yi – 1) : Cumulative percentage frequency at time before i Fo(Yi): Frequency of normal distribution data at the current time

b. Homogeneity Test

Homogeneity testing is conducted to determine the uniformity of research data. In good regression analysis, research data must have a homogeneous distribution, and the method used to test this is the Levene's test.

The Levene's test formula is as follows (Sugiyono, 2010):

$$L = \frac{(N-k)\sum ni\,(\bar{V}i - \bar{l})}{(k-1)\sum(\bar{V}ij - \bar{V})}$$
$$V_{ij} = |X_{ij} - \bar{X}$$

Description:

L: Levene's calculated value

X: Residual data value

x: Average residual data

N: Number of samples

K: Number of groups

c. T-test

Sugiyono (2010) states that hypothesis testing can be done using the t-test formula as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{S_1^2 + S_\tau^2}}$$

Description:

X1 : Average value of the experimental group

X2 : Average value of the control group

S12 : Variance of the experimental group's values

Sτ2 : Variance of the control group's values

To test the research hypothesis, first formulate the statistical hypothesis as follows:

H0 = The use of Quizizz has no effect on students' mastery of concepts.

H1 = The use of Quizizz has an impact on students' mastery of concepts.

3. RESULTS AND DISSCUSION

Based on the analysis carried out on the pretest and posttest data parametrically using the t-test because the data was normal and homogeneous, the following was found:

Table of t-Test Results of Pretest and Posttest Data

Jenis data	**Sig. (2-tailed)**	**a**	**Keputusan keterangan**
Pretest	0.366	0.05	Terima H_0 (tidak berbeda signifikan)
Posttest	0.000	0.05	Tolak H_0 (berbeda signifikan)

The table above shows that the pretest t-test results show a value of 0.366> 0.05, so H0 is accepted, meaning there is no significant difference in the pretest scores between the control and experimental classes. Meanwhile, the posttest t-test results show a value of 0.000 < 0.05, so H0 is rejected, meaning there is a significant difference in the posttest data between the control and experimental classes.

Students' conceptual mastery of bacteria before treatment showed no significant difference, as indicated by the pretest t-test results. This indicates that students in the control and experimental classes had relatively similar initial abilities regarding the material studied. This occurred because neither the control nor the experimental class had participated in

formal bacterial learning at the time of the pretest, resulting in students' initial knowledge remaining at a similar level.

The results of the posttest t-test showed a significant difference between the experimental and control classes. This means that students in the experimental class had better conceptual mastery than those in the control class. This difference occurred because the experimental class used Quizizz as a learning medium, while the control class used conventional learning.

The N-Gain data for the control and experimental classes also shows differences, this can be seen in the following table:

Descriptive Statistics Table of N-Gain Data in Control and Experimental Classes

Kelas	**Skor minimum**	**Skor maksimum**	**Rerata kategori**
Kontrol	0,10	0,77	0,38 (sedang)
Eksperimen	0,20	1,00	0,54 (sedang)

Based on the data obtained, it can be seen that the minimum, maximum, and average N-Gain values of the experimental class are higher than those of the control class. The minimum value in the experimental class is 0.20 while in the control class it is 0.10. The maximum value in the experimental class is 1.00 while in the control class it is 0.77. The average value in the experimental class is 0.54 while in the control class it is 0.38. So it can be concluded that the N-Gain in the experimental class is higher than the N-Gain in the control class.

The results of this study are in line with research conducted by Asiah and Vitriani (2024) which stated that the use of Quizizz in Biology learning showed an increase in student activity by 76% to 88% after using Quizizz, and the number of students who understood the concept increased from 52% in conventional learning to 79% in learning with Quizizz (Asiah & Vitriani, 2024). Furthermore, Nurhayati's research (2020) showed that student activity in online learning increased from an average response of 65% before treatment to 84% after using Quizizz, with a significance value of $p < 0.05$, so it can be concluded that the use of Quizizz has a significant effect on student activity.

To determine the significance of the increase in N-Gain data, a parametric t-test was performed, as the data were normal and homogeneous. The results of the t-test are shown in the following table:

Table 3. N-Gain t-Test Results

Kelas	*Asymp. Sig. (2-tailed)*	α	Keputusan	Keterangan
Eksperimen dan Kontrol	0,00	0,05	Tolak H_0	Berbeda signifikan

From the table above, it can be seen that the t-test for the N-Gain data of the control and experimental classes α (significant level) 0.05 obtained an Asymp. Sig. (2-tailed) value of 0.00. From these results, the decision obtained was to reject H0 because the Asymp. Sig. (2-tailed) value of 0.00<0.05 was significantly different. This means that students in the control and experimental classes had different improvements in mastery of concepts in the Bacteria material.

The N-Gain results in the table show that there was a difference in conceptual mastery of bacteria between the control and experimental classes, with the experimental class using Quizizz being higher than the control class using conventional learning. This improvement occurred because the experimental class implemented Quizizz as an interactive biology learning medium that was able to increase student enthusiasm, attention, and activeness in participating in the learning process.

4. CONCLUSION

Based on the research results and discussion regarding the use of Quizizz as an interactive biology learning medium for student concept mastery, it can be concluded that the use of Quizizz has been proven to have a significant effect on improving student concept mastery. This is indicated by the difference in posttest scores between the experimental and control classes, where the average score of the experimental class is higher than the control class, as well as the results of the posttest t-test which shows a significance value of less than 0.05, so there is a significant difference between the two classes.

The results of the N-Gain analysis showed that the increase in students' conceptual mastery in the experimental class was higher than in the control class, with the average N-Gain of the experimental class being in the medium category and greater than that of the control class. The results of the N-Gain t-test also showed a significant difference, so it can be concluded that the use of Quizizz is effective in improving students' conceptual mastery. Teachers' activities in managing learning in the experimental class also showed more optimal results than in the control class, where teachers were able to carry out learning systematically and interactively by utilizing Quizizz features optimally.

The use of Quizizz can create a more engaging, enjoyable, and student-centered learning environment, resulting in more effective learning because students are more motivated to learn, actively participate, and are able to better understand biology concepts. Therefore, it can be confirmed that the use of Quizizz as an interactive biology learning medium has a positive and significant impact on students' conceptual mastery.

REFERENCES

Asiah, A., & Vitriani, V. (2024). Pemanfaatan quizizz dalam penilaian pembelajaran pada mata pelajaran biologi di sma negeri 15 pekanbaru. *Edukasi Elita: Jurnal Inovasi Pendidikan*, *1*(2), 13-23.

Hidayah, N., Hambali, S. U., & Millenia, T. F. (2021). Pemanfaatan Media Quizizz Sebagai Media Pembelajaran Bahasa Indonesia Cerita Rakyat Kelas X. Prosiding Samasta, 1-12.

Hidayat, R. (2020). Studi Pendahuluan tentang Dampak Penerapan Model Pembelajaran CCTT terhadap Aktivitas Belajar Biologi. Biodik: *Jurnal Ilmiah Pendidikan Biologi*, 6(1), 23-34

Kustandi, C. & Darmawan, D. (2020). *Pengembangan Media Pembelajaran*. Jakarta: Kencana.

Lisa, R., Indrawan, & Hirza, B. (2022). Peningkatan Hasil Belajar Siswa SMA Negeri di Lubuklinggau Menggunakan Laboratorium Virtual. Biodik: *Jurnal Ilmiah Pendidikan Biologi*, 8(2), 162-170

Nurhayati, E. (2020). Meningkatkan Keaktifan Siswa dalam Pembelajaran Daring Melalui Media Game Edukasi Quiziz pada Masa Pencegahan Penyebaran Covid-19. *Jurnal Paedagogy*.

Putra, A., & Meiryani. (2021). *Pengembangan Media Interaktif dalam Pembelajaran Biologi untuk Menjelaskan Konsep Abstrak*. Yogyakarta: BioEdu Press.

Sugiyono. (2010). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, kualitatif, dan R&D*. Alfabeta: Bandung