



The Effect of Interactive Media Quiz Using Kahoot on Students' Learning Outcomes

Dini Andriani ¹, Purwati Kuswarini Suprpto ², Samuel Agus Triyanto ³ *

Biology Education, Faculty of Teacher Training and Education, Universitas Siliwangi, Tasikmalaya-Indonesia

¹ 182154099@student.unsil.ac.id; ² purwatikuswarini@unsil.ac.id; ³ samuel.agus@unsil.ac.id

*Corresponding author: samuel.agus@unsil.ac.id

Submission : 18/11/2022

Revision : 15/01/2023

Accepted : 12/02/2023

ABSTRACT

The development of information technology is increasing rapidly in the era of globalization, making educators required to adapt to technological developments, one of which is by learning interactive quizzes. This study aims to determine the interactive quiz media using the Kahoot application on student learning outcomes on the material of the human excretory system in Class XI MIPA SMAN 10 Tasikmalaya Academic Year 2021/2022. The research method uses a quasi-experimental research design with Nonequivalent Pretest-Posttest Control Group Design. The population in this study were all class XI MIPA SMAN 10 Tasikmalaya, as many as four classes totalling 141 students. The sampling technique used is purposive sampling, with the sample used class XI MIPA 2 as the experimental class and XI MIPA 3 as the control class with several students 71 people. The instrument used in this study was to measure student learning outcomes through a multiple-choice test of 30 questions referring to indicators C1, C2, C3, C4, and C5. The data analysis technique used is the independent t-test. The results showed a significant effect of the interactive quiz method using the Kahoot application on student learning outcomes with a significance value (of 0.002). These positive results can be used as a reference for educators to use Kahoot in supporting teaching and learning activities.

This is an open-access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



Keywords: Interactive Quiz, Kahoot, Learning Outcomes

Introduction

The development of information technology is increasingly rapid in the current era of globalization. This is inevitable its influence on the world of education. Global demands demand that the world of education can continuously adapt to technological developments to improve the quality of education using information and communication technology in the learning process. In line with this, according to [Sutanto \(2011\)](#), 21st-century lea integrates literacy abilities, knowledge skills, skills, attitudes, and mastery of technology. Using technology in learning is a positive way for teachers to encourage students to think reflectively ([Triyanto et al., 2022](#)). The rapid development of technology encourages students to be more adaptive by acting quickly in doing something that can improve their learning outcomes.

The development of science and technology has an exponential characteristic, which is getting faster and faster because the results of one stage become the basis and reason for the next stage ([Munthe, 2019](#)). Technology is directly relevant to learning and is adapted to the meaning of learning itself. Learning is essentially reciprocal transactional communication between educators and students and students and the learning environment to achieve learning objectives ([Munthe, 2019](#)). Learning a core means that learning must contain elements of communication and information. Thus, the products and technological processes needed in learning are by these characteristics.

Lack of communication between students and teachers and low activity of questions and answers and discussions are problems in learning biology in the classroom. Students often view biology subjects as complex subjects to learn. According to [Cimer \(2012\)](#), many things make biology difficult for students, including 1) the characteristics of each biology subject, biology subjects contain complex concepts and problems that students must learn due to the many biological organisms that cannot be observed directly and often use Latin; 2) lack of mastery of the material by the teacher where the learning process is more dominant in the transfer of knowledge contained in the book; 3) Study habits of students who do not study biology regularly and do not relearn the subjects taught in class due to lack of communication between students and teachers, lack of questions and answers during learning, and lack of discussion.

In addition, biological materials that are considered difficult are those related to internal organs, organ systems, and mechanisms that occur in organs ([Henno & Reiska, 2008](#)). The excretory system is one of the materials that is considered difficult and crucial; in line with this, according to [Fauzi & Mitalistiani's research \(2018\)](#), the human excretory system material is the material with the 4th most challenging rank with the most Difficult to Understand category or material that is difficult to understand with a percentage of 26.7%. Based on an interview with one of the teachers of biology subjects, getting recommendations related to the material to be studied, namely excretory system material, which is often found as the material with the most misconceptions, this is in line with [Luzyawati & Hidayah's \(2019\)](#) research which states that there have been misconceptions of students in the low category of excretory system material with an average percentage of 18.8%.

Based on the results of observations that have been made previously, namely in January 2022 at SMA Negeri 10 Tasikmalaya through an interview with one of the teachers, information was obtained that the implementation of biology learning was highlighted when there was a phenomenon in carrying out learning that was only fixated on many notes. In addition, the tools used by students in working on Student Worksheets (LKPD) tend to be boring because they only use stationery, as well as the lack of technology in the learning process. Contrary to this fact, technology and information help the success of learning activities in the 21st-century era as an unlimited provider of information, such as the use of the

internet in learning, which provides opportunities for students to process information and build the information into a solution to the problems faced (Triyanto et al., 2016; Triyanto & Prabowo, 2020).

Gadgets in the era of technology, like now, are supporting tools for students in learning. Gadgets can also be used as a means of support in the learning evaluation process at school, one of which is by utilizing applications in it. Gadgets can be said to have become an inseparable part of human life, including students who study at school. Gadgets can help students to learn more (Irmeilyana et al., 2022). This can be a reference for teachers to design more engaging learning in supporting and evaluating learning. In an era where science and technology are developing rapidly, it should be a reminder for professional teachers that it is not enough to have the ability to teach students but also to manage information and the environment to facilitate student learning activities (Daryanto, 2016).

Educators facing students less interested in learning must immediately find alternate fads so that students can become interested in the learning process. The success of the teaching and learning process of students can also be influenced by learning media (Indriyani, 2019). One alternative solution that can be used to improve the quality of learning is by applying interactive quiz media to strive for better student learning outcomes through learning evaluation activities. Interactive quizzes are applications that contain learning materials in the form of questions or quizzes that allow students to add insight into learning material independently by pressing one button on the application display (Meryansumayeka et al., 2018). Learning media in the form of interactive quiz media that can be used to strive for better learning outcomes is by using the Kahoot application.

An application is a program developed to meet the needs of use in carrying out specific jobs (Fatmawati, 2021). The use of technology to support the learning process is a basic need that must be met so that students can cope with life's challenges in the era of globalization games or quizzes are most popular and available as educational platforms that can be used to support the learning process, including the Quizizz and Kahoot applications. Features on both platforms can be accessed for free and work on laptops, PCs, tablets and devices with iOS and Android operating systems. The features in Quizizz are not as complete as Kahoot has in supporting the learning process, such as only selecting question types in the form of multiple choices, checkboxes, filling in blanks, surveys/selections, and open ends/essays. In addition, Quizizz does not have a team mode feature in which working on questions cannot be done in groups, and when working, students open a new tab and can quickly enter to find answers (Salsabila et al., 2020).

The shortcomings of Quizizz's features can be covered with the Kahoot application. According to research by Utomo et al., (2021), Kahoot has various features unavailable on the Quizizz and Google Form platforms, including displaying photos and videos. There are various types of ability tests, including quiz type, True or False, Type Answer, Puzzle, and Quiz and Audio, and there are two game modes, including classic mode and team mode. The application can be set automatically or manually filled in in team mode. In addition to having more complex features, the appearance of Kahoot is also more varied, with exciting animations.

According to Iwamoto et al., (2017), Kahoot is an online application where quizzes can be presented in a game format. The Kahoot app contains questions in a game-show view that can be used for free through the Google Play store. The question displayed in this application can be equipped with pictures or videos that can clarify the question's meaning. The operation of this application is effortless to do. Kahoot can be accessed in the application or website version, so it is practical to use. System evaluation using Kahoot supports teachers in knowing the student's learning outcomes directly. Directly in Kahoot, the points obtained can be displayed immediately after students answer questions. Unlike conventional evaluation systems that take a long time to find out students' learning outcomes because, in conventional evaluation systems, teachers must correct students' work first, especially in the era of rapid technological

development like today, evaluation in conventional ways is no longer practical to continue to use.

Methods

This research is Quasi Experiment research. The population in this study is the entire class XI MIPA SMAN 10 Tasikmalaya, consisting of 4 classes with 141 students. The sampling technique used is Purposive Sampling. The research sample used two classes totaling 71 students, XI MIPA 2, consisting of 36 students as an experimental class and XI MIPA 3, 35 as a control class. The research design used Nonequivalent Pretest-Posttest Control Group Design. The variable tied to this study is the learning outcomes of learners, while the independent variable is interactive quiz media using the Kahoot application. Learning is done using the Discovery Learning model.

The data collection technique used is a test of student learning outcomes given in the experimental class and the control class. The research instrument used was a written test on human excretory system material with 30 compound choice questions per the indicators of Bloom's Taxonomy. Data processing techniques are carried out with N-gain calculations to determine the increase in learning outcomes between before and after learning. The data analysis technique uses an independent t-test which was previously carried out data normality test using the Kolmogorov-Smirnov test and the homogeneity test using the Levene test. All data analysis was done with the help of SPSS software, Windows version 25, to compare pretest-posttest values using N-gain with the help of Microsoft Excel 2013.

Results and Discussion

The data obtained from this study are Pretest-Posttest data of the experimental class and control class which can be seen in Table 1.

Table 1. Statistical Data Pretest-Posttest Learning Outcomes of Experimental Class Students

Statistics	Experimental Class	Experimental Class
	Pretest	Posttest
Maximum Score	20	28
Minimum Score	11	19
Range	9	9
Average (Mean)	16,22	23,83
Standard Deviation	1,98	2,10
Variations	3,95	4,42

Table 1 shows that the average pretest score of learning outcomes in the experimental class of 16.22 is smaller than the average posttest score of learning outcomes in the experimental class, which obtained a value of 23.83.

Table 2. Pretest-Posttest Statistical Data on Learning Outcomes of Control Class Students

Statistic	Control Class Pretest	Posttest Control Class
Maximum Score	17	24
Minimum Score	8	15
Range	9	9
Average (Mean)	14,71	19,22
Standard Deviation	2,13	2,22
Variations	4,56	4,94

Table 2 shows that the average pretest score of learning outcomes in the control class of 14.71 is smaller than the average posttest score of learning outcomes in the control class obtained a value of 19.22.

Based on the results of research and analysis prerequisite tests, population data have been normally distributed and homogeneously varied. Overall analysis prerequisite test results are presented in Table 3 and Table 4.

Table 3. Data Normality Test (Kolmogorov-Smirnov Test)

		Tests of Normality					
		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
Learning Outcomes	Pretest Experiment	.144	36	.058	.950	36	.104
	Posttest Experiments	.124	36	.178	.965	36	.297
	Pretest Control	.157	35	.064	.936	35	.097
	Posttest Control	.124	35	.193	.946	35	.083

The results of the prerequisite analysis test in Table 3 obtained a significant value of > 0.05 taken from the experimental class pretest value of (0.058) and experimental class posttest of (0.178), while the control class pretest value of (0.064) control class posttest of (0.193). The value can be concluded that Ho is accepted, which means that the pretest and posttest data of student learning outcomes are all data that are usually distributed.

Table 4. Data homogeneity test (Levene Test)

		Test of Homogeneity of Variance			
		Levene Statistic	df1	df2	Sig.
Learning Outcomes	Based on Mean	.547	3	138	.651
	Based on Median	.762	3	138	.517
	Based on the Median and with adjusted df	.762	3	129.922	.517
	Based on trimmed mean	.726	3	138	.538

Based on Table 4, the data homogeneity test was carried out with the Levene test. The data homogeneity test analysis results amounted to 0.651, which can be concluded that the data taken is homogeneous variance. At the same time, the t-independent test is used to test the research hypothesis.

Next, the hypothesis test data is less than 0.05, which can be said that in this study, Ho was rejected. So that there is an influence of the interactive quiz method using Kahoot on students' learning outcomes on the material of the human excretory system in class XI MIPA SMAN 10 Tasikmalaya. In line with previous research, [Irwan et al., \(2019\)](#) stated that Kahoot can be an alternative interactive learning media in higher education because it is proven to improve student learning outcomes significantly. [Chaiyo & Nokham \(2017\)](#) also stated that Kahoot could make students more concentrated, collaborative, and comfortable in learning and increase their learning motivation. Based on this, the Kahoot application, which is part of interactive quiz media, can trigger efforts to improve the quality of learning.

In the experimental classroom, learning uses interactive quiz media with the help of the Kahoot application and according to the Discovery Learning model. As for the use of the Kahoot application, there are several advantages found in students in practical classes, including increasing effective and active question-and-answer interactions, being able to train students to manage time-related to working on questions, students are also more responsible in the learning process, and an active and conducive learning atmosphere does not saturate students in learning activities. In line with research (Irwan et al., 2019), there is an interesting thing in Kahoot every question that students have answered will immediately display the answer whether the answer is right or wrong so that students will know the right or wrong answer and will switch automatically to the next question.

While the obstacles found by researchers during the learning process took place in the experimental classroom using the Kahoot application, namely the internet network to access Kahoot, was limited. Hence, educators tried to do hotspots to facilitate the work on the questions; students who still could not set the time for filling in the questions so that in the middle of the questions, the time was up. At the beginning of the meeting, the classroom was in an uproar because the new students felt they were learning using Kahoot! It can be seen in the comparison diagram as an interpretation of the learning outcomes of students in the experimental class during the Pretest-Posttest presented in Figure 1.

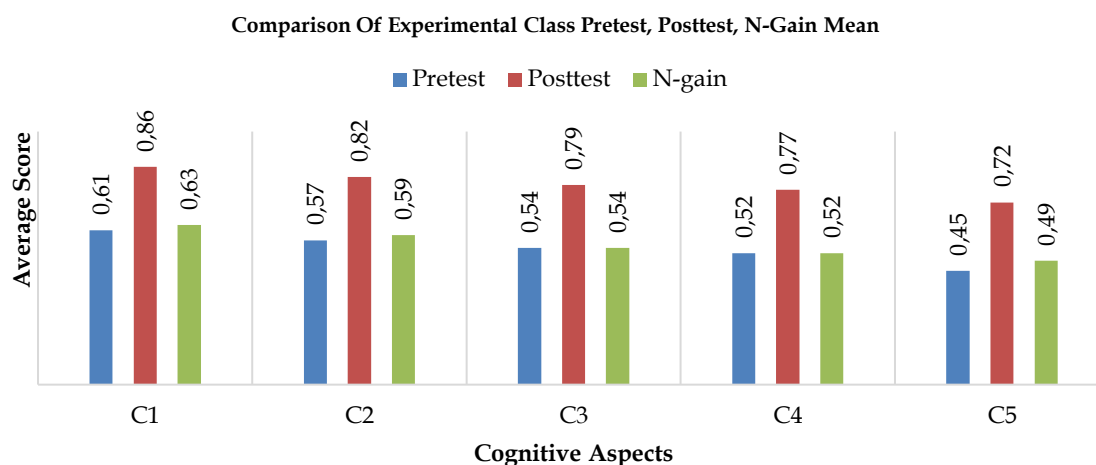


Figure 1. Pretest-Posttest score comparison diagram Experimental Class Learning Outcomes

Based on figure 1, it shows that the highest average pretest score is on the C1 indicator by obtaining an average of 0.61 and the lowest pretest score is on the C5 indicator of 0.45. While the highest average posttest score on indicator C1 was 0.86 and the lowest posttest score on indicator C5 was 0.72. The highest N-gain score obtained by the C1 indicator with several 0.63 shows that students memorize concepts and theories according to the material of the human excretory system. Students more easily remember the problems that have educators have given In line with research (Kurnia & Wulandari, 2020), a person can train his memory in many ways, one of which is with media that can help to make students' memory increase by taking notes during the direct learning process.

Meanwhile, the lowest N-gain score on the C5 indicator was 0.49. This is because students still have difficulty in evaluating the questions given so that students consider the questions given to be the most difficult questions to do and require a long time to complete. The C5 question is based on constructivist learning theory, which assumes that by doing predicting, observation and then explaining from observation, it will be well-formed (Rosa, 2017).

Collaboration of students with other students at the time of learning is more interested in observing and understanding the material delivered by the teacher. So, in all levels of cognitive processes, learners as a whole increase in the moderate category according to the N-gain category.

Unlike in the control class, students are given pretest questions by the educator by distributing questions that the educator has printed, students fill in the pretest questions based on the reading of the questions listed on the question paper by referring to the Discovery Learning model. It can be seen in the comparison diagram as an interpretation of the learning outcomes of learners in the control class at the time of the Pretest-Posttest presented in Figure 2.

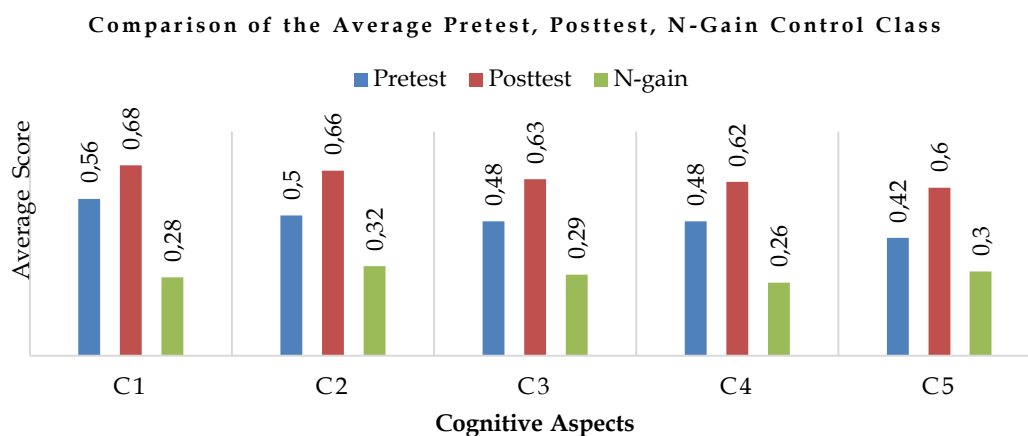


Figure 2. Pretest-Posttest score comparison diagram of Control Class Learning Outcomes

Figure 2 shows that the highest average pretest score is on the C1 indicator by obtaining an average of 0.56, and the lowest is on the C5 indicator at 0.42. While the highest average posttest score on indicator C1 was 0.68, and the lowest on indicator C5 was 0.60. The highest N-gain score obtained by the C2 indicator, with a total of 0.32, shows that students find it easier to work on the C2 indicator and understand the educator's explanation based on concepts and theories delivered according to the material of the human excretory system. According to research by [Kurnia & Wulandari \(2020\)](#), the C2 indicator increases can be seen in students' independence, ability, and activeness in learning where students are active in recording learning delivered by educators who can help students improve their level of understanding.

Meanwhile, the lowest N-gain score on the C4 indicator was 0.26. This is because students find it challenging to work on questions, especially questions related to analysis; students are more deceived by the questions given; students feel they have not understood the overall material delivered by educators, so they need a more profound explanation related to the material of the human excretory system. Meaningful learning will be realized when students can connect the information obtained with relevant concepts in the cognitive structure of students ([Wartiningsih, 2018](#)).

This influence exists because interactive quiz media using the Kahoot application can increase student learning activities that can affect student learning outcomes. The Kahoot application effectively encourages and strengthens student learning so that students can better understand learning material ([Plump & LaRosa, 2017](#)). Kahoot is believed to be a cognitive tool that can make students become more engaged and think more deeply, which can facilitate student knowledge ([Correia & Santos, 2017](#)).

The use of the Kahoot application is supported by technological advances currently, which from time to time continue to grow so that students are trained to balance with current

circumstances. Technology that is getting better and integrated into learning will increase the involvement of students to continuously explore their knowledge (Licorish et al., 2018). The Kahoot application can help students be more active in class with collaborative learning (Suharsono, 2020). Kahoot applications affect the learning outcomes of students who are carried out effectively. The comparison of the average pretest- posttest score along with the N-gain of learning outcomes between the experimental class and the control class shows a difference in improvement for more details, which can be seen in Figure 3.

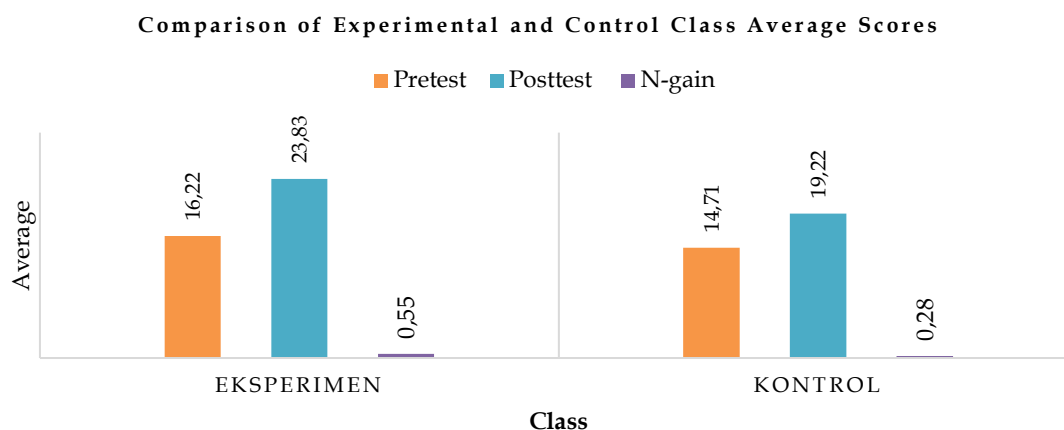


Figure 3. Comparison of the Average Scores of the Experimental Class and the Control Class

Based on figure 4.3, it shows that the pretest score of students in the experimental class gets a score (16.22), and the posttest in the experimental class gets a score (23.83). While the pretest score of students in the control class got a score (of 14.71), the posttest in the control class got a score (of 19.22). The N-gain value in the experimental class was higher at (0.35) than in the control class at (0.28). This shows that the experimental class N-gain falls into the medium category while the control class N-gain falls into the low category.

This shows that experimental class students have a much higher score than the control class because the experimental class gets treatment through learning using the Kahoot application. A lesson if the educator can package attractively, the learning will run effectively. Interactive quiz media with Kahoot makes a difference between classes that use Kahoot compared to conventional classes (Sinaga et al., 2022). However, Kahoot applications need to be used continuously so that students can continuously improve learning outcomes. As educators, they must also be able to ask various types of questions to encourage students to think at a higher level (Hariyatmi et al., 2021). If students use the Kahoot application in their learning, it is ensured that the average score of students is included in the outstanding category. Therefore, the Kahoot application will support student learning to increase learning outcomes and higher-order thinking, and students will be more focused on learning when it is ongoing.

There are several rankings contained in the Kahoot application, including the category "ranking is not suitable to showcase good performance", which has reasons for filling in students such as "the ranking will tell who can answer fast and accurately, but in truth answering faster is not important for good performance" which means that the ranking of students is sorted based on the largest score not from the number of questions answered correctly more (Omar, 2017). Therefore, it is better to answer the questions quickly and precisely because the filling time affects the score, and the correct answer greatly affects the score of Kahoot. The disadvantages of using Kahoot are that students need internet quota, an

adequate internet network, and comfortable classroom management to increase focus when students fill in questions.

The use of the Kahoot application results is higher than usual learning. This is caused by students doing pretest-posttest work on the paper provided by educators, then given time to work. Students read questions per page to fill in answers, but what is different is that in manual work, good students who are fast in solving questions do not affect the value because what is assessed is only the correctness of the answers filled in by students. So, both the sooner and the later ones that collect will still be judged on the correctness of the answer. In addition, the disadvantage of the control class is that there are students in the question who ask their colleagues for answers. However, this has received a reprimand from the educator, so the work is done independently.

Conclusion

Based on the results of data analysis and hypothesis testing, it was concluded that there is an influence of interactive quiz media using the Kahoot application on student learning outcomes on human excretory system material in class XI MIPA SMAN 10 Tasikmalaya. The positive results of using the Kahoot application in helping learning evaluation activities need to be considered for teachers to use it in learning activities. These positive results are also not recommended as absolute conclusions, meaning that further effectiveness tests must be carried out using the Kahoot application in learning activities, especially subjects other than biology.

References

- Chaiyo, Y., & Nokham, R. (2017). The effect of Kahoot, Quizizz and Google Forms on the student's perception in the classrooms response system. *2nd Joint International Conference on Digital Arts, Media and Technology 2017: Digital Economy for Sustainable Growth, ICDAMT 2017*, 178–182. <https://doi.org/10.1109/ICDAMT.2017.7904957>
- Çimer, A. (2012). *What makes biology learning difficult and effective : S tudents ' views*. 7(3), 61–71. <https://doi.org/10.5897/ERR11.205>
- Correia, M., & Santos, R. (2017). Game-Based Learning: The Use of Kahoot in Teacher Education. *International Symposium on Computers in Education, SIIE 2017, 2018*(September 2021), 1–4. <https://doi.org/10.1109/SIIE.2017.8259670>
- Daryanto. (2016). *Media pembelajaran : peranannya sangat penting dalam mencapai tujuan pembelajaran*. Yogyakarta: Gava Media.
- Fatmawati. (2021). Pengaruh Penerapan Media Kuis Berbasis Kahoot Terhadap Minat Belajar Matematika Di Sekolah Menengah Atas Budi Luhur Pangkalan Kresik. *Skripsi*.
- Fauzi, A., & Mitalistiani, M. (2018). High School Biology Topics That Perceived Difficult By Undergraduate Students. *Didaktia Biologi: Jurnal Penelitian Pendidikan Biologi*, 2(2), 73. <https://doi.org/10.32502/dikbio.v2i2.1242>
- Hariyatmi, H., Fildzah, A. T., & Zakiyah, I. A. (2021). Kecenderungan Profil Soal Ulangan Harian Biologi SMA Semester Genap TA 2019/2020 Ditinjau dari Perspektif HOTS. *Seminar Nasional Pendidikan Biologi dan Saintek, 2016*, 191–205. <https://proceedings.ums.ac.id/index.php/snpbs/article/view/33>
- Henno, I., & Reiska, P. (2008). Using concept mapping as an assessment tool in school biology. *Proceedings of the 3rd International Conference on Concept Mapping.*, 3(1), 86–95.
- Indriyani, L. (2019). Pemanfaatan Media Pembelajaran Dalam Proses Belajar Untuk Meningkatkan Kemampuan Berpikir Kognitif Siswa. *Prosiding Seminar Nasional Pendidikan FKIP Universitas Sultan Ageng Tirtayasa*, 2(1), 17–26.

- Irmeilyana, I., Ngudiantoro, N., Ngudiantoro, N., Maiyanti, S. I., Maiyanti, S. I., Setiawan, A., & Setiawan, A. (2022). Pemanfaatan Gawai Pada Adaptasi Teknologi Untuk Media Pembelajaran Bagi Guru Sdn 9 Tanjung Batu Di Desa Limbang Jaya Kabupaten Ogan Ilir. *Jurnal Vokasi*, 6(1), 16. <https://doi.org/10.30811/vokasi.v6i1.2448>
- Irwan, I., Luthfi, Z. F., & Waldi, A. (2019). Efektifitas Penggunaan Kahoot! untuk Meningkatkan Hasil Belajar Siswa. *Pedagogia: Jurnal Pendidikan*, 8(1), 95–104. <https://doi.org/10.21070/pedagogia.v8i1.1866>
- Iwamoto, D. H., Hargis, J., Taitano, E. J., & Vuong, K. (2017). Analyzing the efficacy of the testing effect using Kahoot™ on student performance. *Turkish Online Journal of Distance Education*, 18(2), 80–93. <https://doi.org/10.17718/tojde.306561>
- Kurnia, I. W. S., & Wulandari, R. (2020). Analisis kemampuan kognitif dalam pembelajaran IPA SMP. *Jurnal Pendidikan Dan Pembelajaran Sains Indonesia (JPPSI)*, 3(2), 145–152.
- Licorish, S. A., Owen, H. E., Daniel, B., & George, J. L. (2018). Students' Perception of Kahoot!'s Influence on Teaching and Learning. *Research and Practice in Technology Enhanced Learning*, 13(1), 1–24. <http://dx.doi.org/10.1186/s41039-018-0078-8>
- Luzyawati, L., & Hidayah, H. (2019). Profil Miskonsepsi Siswa dalam Materi Sistem Ekskresi melalui Penugasan Peta Konsep. *Jurnal Biologi and Pendidikan Biologi*, 3 (2). <https://doi.org/10.31943/mangiferaedu.v3i2.20>
- Munthe, E. (2019). *Pentingnya Penguasaan Iptek bagi Guru Di*. 443–448.
- Omar, N. (2017). the Effectiveness of Kahoot Application Towards Students' Good Feedback Practice. *PEOPLE: International Journal of Social Sciences*, 3(2), 2551–2562. <https://doi.org/10.20319/pijss.2017.32.25512562>
- Plump, C. M., & LaRosa, J. (2017). Using Kahoot! in the Classroom to Create Engagement and Active Learning: A Game-Based Technology Solution for eLearning Novices. *Management Teaching Review*, 2(2), 151–158. <https://doi.org/10.1177/2379298116689783>
- Rosa, F. O. (2017). Eksplorasi Kemampuan Kognitif Siswa Terhadap Kemampuan Memprediksi, Mengobservasi dan Menjelaskan Ditinjau dari Gender. *Jurnal Pendidikan Fisika Universitas Muhammadiyah Metro*, 5(2), 111–118. <http://dx.doi.org/10.24127/jpf.v5i2.987>
- Salsabila, U. H., Habiba, I. S., Amanah, I. L., Istiqomah, N. A., & Difany, S. (2020). Pemanfaatan Aplikasi Quizizz Sebagai Media Pembelajaran Ditengah Pandemi Pada Siswa SMA. *Jurnal Ilmiah Ilmu Terapan Universitas Jambi |JIITUJ|*, 4(2), 163–173. <https://doi.org/10.22437/jiituj.v4i2.11605>
- Sinaga, I. T. D., Rahan, N. W. S., & Azahari, A. R. (2022). Pengaruh Media Pembelajaran Kahoot Terhadap Motivasi Belajar Siswa SDN Nanga Bulik 6 Kabupaten Lamandau. *Journal of Environment and Management*, 3(1), 55–61. <https://doi.org/10.37304/jem.v3i1.4286>
- Suharsono, A. (2020). The Use of Quizizz and Kahoot! in the Training for Millennial Generation. *International Journal of Indonesian Education and Teaching*, 4(2), 332–342. <https://doi.org/https://doi.org/10.24071/ijiet.v4i2.2399>
- Sutanto, P. (2011). *Direktorat pembinaan sekolah menengah atas direktorat jenderal pendidikan menengah kementerian pendidikan dan kebudayaan tahun 2011*.
- Triyanto, S. A., & Prabowo, C. A. (2020). Efektivitas Blended-Problem Based Learning dengan Lesson Study Terhadap Hasil Belajar Effectiveness of Blended-Problem Based Learning with Lesson Study toward Learning Outcomes. *Bioedukasi: Jurnal Pendidikan Biologi*, 13(1), 42–48. <https://doi.org/10.20961/bioedukasi-uns.v13i1.37960>
- Triyanto, S. A., Susilo, H., & Rohman, F. (2016). Penerapan Blended-Problem Based Learning dalam Pembelajaran Biologi. *Jurnal Pendidikan*, 1(1), 1252–1260. <http://dx.doi.org/10.17977/jp.v1i1.6526>
- Triyanto, S. A., Wahidin, W., Hartania, N., Solihat, A., & Sutrisno, S. (2022). Blended-problem

- based learning with integrated social media-based learning media in improving students' critical thinking skills. *Biosfer*, 15(2), 242–254. <https://doi.org/10.21009/biosferjpb.25792>
- Utomo, M. C. C., Putra, M. G. L., & Prambudi, D. A. (2021). Perbandingan Fitur Pada Platform Kuis Terpopuler. *Inspiration: Jurnal Teknologi Informasi Dan Komunikasi*, 11(1), 38. <https://doi.org/10.35585/inspir.v11i1.2596>
- Meryansumayeka, Virgiawan, M. D., & Marlini, S. (2018). Pengembangan Kuis Interaktif Berbasis E-Learning Dengan Menggunakan Aplikasi Wondershare Quiz Creator Pada Mata Kuliah Belajar Dan Pembelajaran Matematika. *Journal Pendidikan Matematika*, 12(1), 29–42.
- Wartiningsih, D. A. (2018). *Pengaruh Meaningful Learning Ausubel terhadap Motivasi Belajar Tematik Bagi Siswa Kelas V SDN Bareng 3 Malang*. Universitas Islam Negerti Maulana Malik Ibrahim.