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Implementation of Digital Quizizz as A Tool for Technological Innovation in Learning Mathematics of Circle Materials to Increase Student Learning Motivation

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Abstract—The Quizizz application can monitor students' understanding of the subject matter teachers teach in digital-based learning. This study aims to examine the implementation of the Quizizz application as a technological innovation tool in mathematics learning, especially in the circle material, to improve student motivation and learning outcomes. The research method used is descriptive qualitative with a case study involving 25 8th-grade students of SMP Negeri 2 Suranenggala, Cirebon Regency. Data were collected through observation, interviews, and documentation, then analyzed descriptively to evaluate the effectiveness of using Quizizz. The results showed that Quizizz increased student motivation by creating an interactive and enjoyable learning atmosphere. Students became more enthusiastic and motivated to understand the circle material that was previously considered difficult. Of the 25 students, 72% (18 students) managed to achieve a score above the Minimum Completion Criteria (KKM), while 28% (7 students) still had not achieved that score. This study makes an important contribution to the field of education by proving that Quizizz can be an effective tool to improve student motivation and learning outcomes, especially in mathematics learning. These findings complement previous studies focusing on other subjects or more general contexts. The practical implications of this study are recommendations for teachers to utilize Quizizz as an innovative learning medium, especially in teaching materials that are considered difficult.

Keywords— *Quizizz Application; Circle Material; Motivation; and Student Learning Outcomes.*

I. INTRODUCTION

Education is one of the main foundations of national development. Through education, the younger generation can acquire the knowledge, skills, and values needed to become productive, competitive, and responsible citizens [1]. The spirit of education lies in the Curriculum and cannot be separated. This Curriculum is the most important component in implementing the education process [2], where the design of its development needs to pay attention to the needs, characteristics, and experiences of learning outcomes, as well as students' interests according to time [3]. The current Curriculum carries the concept of "Independent Learning," which means giving schools, teachers, and students the freedom to innovate, be independent, and be creative [4]. Although the independent learning curriculum offers flexibility, its implementation still has many challenges, especially in utilizing digital technology to improve students' motivation and learning outcomes.

With the increasing development of digital technology in the educational environment, the importance of incorporating technology in the teaching and learning process can increasingly develop to enrich student's learning experiences and meet their various needs [5]. It is expected to utilize innovative, effective, and efficient digital-based learning media to improve student learning outcomes.

In the world of education itself, technology is a tool and means that are channeled to facilitate learning. In this case, educators, both teachers and lecturers, must have competence in mastering technological developments [6]. Many digital learning media have been present and can be applied by teachers, one of which is interesting and game-based learning media; in addition to learning media, there are various applications for digital-based assessments, one of which is the Quizizzi application [7]. Although many digital learning media have been used by teachers in learning so that they can be better understood by students, such as this Quizizz learning media, there are still many gaps in optimal utilization.

Quizizzi contains an online application I created, and students can access dynamic quizzes through devices and smartphones. In digital learning, I use this Quizizzi application to increase student participation in learning and strengthen learning outcomes [8]. According to Mulyati, this quiz contains a game-based educational application that presents multi-game activities for interactive and fun exercises [9].

Similarly, Quizizzi explained that, according to Nurahmanah, web-based learning media creates interactive quiz games in classroom learning, such as formative assessments [10]. Its use is easy; the interactive Quizizz created can have up to 4 answer choices, including the correct answer. In addition, images can be added to the background of the question, and the question settings can be adjusted to your liking and based on the material explained [11]. Quizizzi can be used as a stimulus to increase student learning motivation. This learning can be the level of speed and accuracy of students in answering, which can be known together on the screen so that they can compete in doing assignments to improve their learning outcomes. The Quizizzi application can monitor students' understanding of the subject matter that the teacher teaches in digital-based learning. In this case, assessing the Quizizz application's process is easy and fast, so it is worthy of being an innovative digital-based learning and a learning application that supports revolutionary student learning in the digital era.

In addition to helping students recall the teacher's material, Quizizzi media can also bring out competencies among students to explore the activities and potentials that students have well [12]. This application can increase student motivation and student interest in learning and understanding their material, especially in circle material that students find challenging and complicated; students studying subjects sometimes give up and are most often avoided by students so that students think that studying in mathematics lessons is very difficult to complete [13]. However, these studies are still limited to certain contexts and have not in-depth examined the effectiveness of this quiz application in improving students' understanding of material that is considered difficult, such as mathematics, especially in circle material.

Mathematics is a field of study that has an important role in education. Various efforts have been made to improve the mathematics learning system with a lecture learning approach or methods widely used by educators today, such as starting to use technology. Teachers make efforts so that students can understand mathematics learning well, correctly, and easily

understood by their material. This is so students are more enthusiastic and have good learning motivation to improve learning outcomes.

Mathematics learning is part of education that is often used in everyday life and involves logical thinking patterns that can build and develop students' thinking [14]. School environment and society understanding of mathematics must be understood well and correctly; however, in reality, mathematics is still considered a subject related to arithmetic, which makes it very difficult to solve problems in mathematics, so students do not have mathematical characteristics from the beginning so that knowledge becomes certain and continuous with each other [13]. Mathematics is a material often associated with everyday life, and its use can solve various difficult problems but can be solved well. Providing mathematics material to students and various other mathematics materials is very important so that one of the concepts of circles can be applied to solve everyday problems. However, in reality, students still cannot understand the concept of circles well, and this can be observed from several mistakes made when working on problem circles, especially in basic circle material. When students are bored with mathematics, it will cause laziness in solving problems given by the teacher, which can reduce student learning outcomes. As a breakthrough, Quizizz media can help students understand the material well and provide motivation to learn in the era of the digital revolution to improve student learning outcomes.

According to Sudjana, the success of learning can be seen from the motivation students show during the learning process. Thus, teachers are expected to be able to foster student motivation. Because of the diversity of motivation in each individual, some students have high learning motivation, and some are unaffected by external factors. On the other hand, the learning motivation of some students is influenced by factors outside themselves [15].

In line with the research conducted by Afianii and its results, the Quizizzi application can be used well by students to improve mathematics learning outcomes in elementary schools [16]. Of course, this is in line with the research conducted by Rica, in which I showed that my motivation and my students' learning outcomes using the Quizizzi application were effectively used in mathematics subjects at school, and my motivation and my students' learning outcomes experienced better improvements [17]. Although teachers make various efforts to improve mathematics learning, including digital technology, many gaps exist in applying effective digital learning media to overcome this problem. Therefore, further research is needed to examine how applications such as Quizizz can be used for technological innovation in learning media in mathematics subjects, especially circle material, which aims to improve students' motivation and learning outcomes.

Based on the background above, the researcher wants to study and solve a major problem: the gap in the use of digital technology, which is still lacking in increasing student motivation and learning outcomes. Furthermore, there are still many difficulties for students found in field research in

understanding circle material; this material is often considered the most difficult by students, which causes decreased motivation and student learning outcomes; this indicates a need to determine a very effective learning method and can be interesting in the learning process. Moreover, finally, regarding the lack of in-depth research on the effectiveness of Quizizz in learning mathematics, there are many limitations in research examining the effectiveness of the Quizizz application in depth, which is used in learning mathematics on circle material.

This study makes a new contribution, namely exploring the Quizizz application more deeply as a technological innovation that teachers can use to improve students' effective learning, understanding, and motivation. It can be interesting to understand the circle material taught by the teacher.

Furthermore, the novelty in this case as a source of reference input for teachers further enhances creativity and motivation; this provides a more fun mathematics subject matter Circle of new experiences to encourage the spirit of learning through technology that is currently developing so that they can pay attention to providing the essence of the learning objectives themselves. So, this research is fundamental to presenting and innovation for teachers in teaching, which can produce understanding related to digital competence and the latest innovation tools in learning media that can be used in more innovative and creative learning.

II. METHOD

The method used in this study is a qualitative descriptive study with methodology and investigation into social phenomena and problems in humanity. This study uses a case study technique to find digital technology innovations such as Quizizz to increase students' learning motivation, especially in mathematics subjects on circle material. The subjects in this study were 25 respondents of grade 8 students of SMP Negeri 2 Suranenggala, Cirebon Regency, focusing on learning mathematics on circle material using digital technology such as Quizizz.

Data collection in this study, namely 1) observation method, which is carried out to observe students' understanding of mathematics subjects, especially on the material of circles. To what extent do students understand the material and various learning outcomes that differ from other students due to differences in students' learning motivation? 2) documentation: In data collection, the researcher documented all implementation of research activities both in the learning process of students before using digital technology, the implementation of learning in using digital technology, and the results of lessons using digital technology such as Quizizz. 3) Interviews: annotation of data collection in this study; interviews are needed as complementary documents in the study 19). The interview process was carried out with class teachers in mathematics subjects regarding the learning methods used in everyday life. Innovation is needed in learning so that students can continue to improve their learning motivation and the desired learning outcomes.

Thus, researchers can obtain detailed and in-depth data on the research results and observe students intensively to find changes or enthusiasm in the learning process by using digital technology learning media such as poetry in the mathematics subject of circle material.

This study uses descriptive data analysis that prioritizes how to process and the results obtained as material and indicators in analyzing the validity of the research so that both parties, researchers and research subjects, can accept the research process. This study uses data analysis techniques to collect and compile information from observation interviews and documentation. Raw data collected through observation, interviews, and documentation is a summary based on the focus of the research, which will be simplified as data reduction. of course, this will be done periodically and continuously during the research process. This data reduction stage is then grouped based on the main discussion so the research can quickly conclude. Moreover, the last stage contains the conclusions of the data obtained from the research appropriately and competently based on the focus of the research objectives [18].

Data validity: To ensure the validity of the data, this study uses data triangulation techniques, which compare data obtained from observation, interviews, and documentation. This ensures that the findings in the study are consistent and reliable.

This research method is expected to obtain in-depth and detailed data on how digital technology such as Quizizz will increase learning motivation, especially in mathematics subjects with circle material. It is certainly more creative, innovative, and effective, which will be useful in the future.

III. RESULTS AND DISCUSSION

The Quizizz media application is a breakthrough for educators in implementing the learning process so that it can be fun, innovative, and creative, involving students learning while playing [18]. The study was conducted at SMP 2 Negeri Suranenggala, Cirebon Regency, with 8th-grade students and as many as 25 respondents.

Based on the results of initial observations of the implementation of mathematics learning activities, teachers tend to use lecture methods and do not actively involve students. This can be boring for students in the learning process, so using innovative digital technology such as the Quizizz application can be an effective breakthrough and can be applied to mathematics subjects. The application of digital game media such as Quizizz aims to increase students' learning motivation and mindset regarding difficult and difficult-to-understand mathematics learning, so this Quizizz application can make it easier for students to understand mathematics lessons on circle material.

Teachers are required to understand students' various learning motivations, so teachers are encouraged to continue improving learning motivation by utilizing digital technology as appropriate and innovative learning. (Prasetya) Based on the results of interviews with mathematics teachers with the topic of discussing the use of technology in improving

learning motivation and student learning outcomes, it can be concluded that several factors can improve learning motivation, one of which is important, namely the use of learning media that can improve students' learning motivation. Learning media can certainly increase students' interest in continuing to understand the material through technology learning media so that students can be enthusiastic about learning through learning media in the form of quizzes and playing games related to the material of circles.

Learning using the Quizizz application, which teachers in the mathematics learning process carry out, will create interactive student learning achievements and enjoyable learning. Interactive achievements can be achieved by collaborating to provide an understanding of circle material using the Quizizz application and by adding interesting and enthusiastic practice questions to the learning process. In the learning process, of course, there must be student interaction with the teacher regarding the circle material being studied so that the interaction becomes direct feedback that can determine that students understand the material well [19].

Implementation of Quizizz in mathematics subjects can be done through several stages: 1. Analysis: The first stage is to observe the condition of students and the problems they face; 2. Design is the stage to design learning scenarios based on the desired learning objectives achieved in mathematics subjects; 3. The development stage is to compile innovative learning media using technology according to the previous design; 4. Implementation is the stage to develop innovative learning media in the classroom. The implementation is evaluated by measuring the value of the shortcomings, advantages, and benefits of the Quizizz application in the classroom [20].

The analysis stage is carried out by analyzing aspects of the problems and conditions of students; the results of the observations analyzed are students' interest in learning mathematics and student preparation in the learning process. It was found from observations that most of them did not have the awareness to understand the material taught by the teacher because the teacher still used less innovative and creative methods. Furthermore, students showed that almost all students in the class already had smartphones or cellphones and adequate internet connections; in this case, learning using the digital method of the Quizizz application was considered quite adequate and efficient according to the conditions of the students.

The next stage is about designing a learning process that will be used to meet student needs based on the analysis results and the students' conditions. Designing a digital-based learning media such as the Quizizz application hopes that students learn mathematics through the application, which contains learning materials for the 8th-grade student circle and several practice questions on the material that has been explained. Using the Quizizz application in the learning process makes it easier for students to continue understanding the material explained and can be used outside of class hours.

In the development stage, whose contents are by the objectives of the scenario that has been designed from the previous stages, the Quizizz application contains materials that

will be taught in the form of circle material, as well as several questions that are arranged directly using the Quizizz application with various types of questions used, namely in the form of multiple choice questions, each of which has been determined the time for the process of working on which is by the level of difficulty of the question. The implementation stage contains the application of Quizizz to mathematics learning, especially circle material, by sharing the Quizizz link or procedure. The last stage is the evaluation where, this stage is to assess the benefits, advantages, and disadvantages of implementing the Quizizz application in circle learning [21].

Before using Quizizz, teachers must be able to prepare several things that students will use; teachers can also prepare several questions using materials that are by the Curriculum and then summarize so that teachers can start using digital technology innovation learning media with the following steps: 1) create an account, namely by registering using an active email and then adjusting it to the required data; 2) create a quiz on circle material along with answers; 3) choose the type of Quizizz to be used; 4) teachers can condition students well; 5) before teachers start and play Quizizz, it is necessary to condition students regarding the tools that will be used in the form of cellphones, stable internet quotas, and procedures for using Quizizz; 6) then the teacher shares the code with students so they can access Quizizz. Furthermore, students can use the digital Quizizz application with the following steps: 1) students enter the website address shared by the teacher for the Quizizz application; 2) students then enter Quizizz by entering the code given by the teacher and immediately enter the game; 3) then students can start working with the duration determined by the teacher on the application [22].

The results of using Quizizz in mathematics subjects, especially circle material in grade 8, show that the number of students is 25 respondents. These results are students' answers after students can complete all questions given by the teacher through the Quizizz application; it can be concluded that 25 students who have participated in the implementation of Quizizz, there are 18 students (72%) who have completed or can exceed the specified KKM score, but seven students (28%) have not yet completed or have not yet met the KKM score. Of these students who have completed Quizizz with 10 questions, 18 have received fairly good scores by exceeding the above-average KKM score. While seven students have not yet achieved a score above the average KKM score, implementing Quizizz in grade 8 of SMP Negeri 2 Suranenggala, Cirebon Regency, can be carried out well.

The implementation of quizzes on 8th-grade students with a total of 25 students gave the best results based on the data above that 18 students had achieved scores above the average of students or had achieved the KKM score so that the implementation of Quizizz effectively and efficiently can be understood by students. This is in line with research conducted by Saputra et al., which explains that the use of this interactive media can improve learning outcomes in the cognitive and efficient aspects of students, this also explains that the use of interactive media can improve student learning

outcomes which are very effective in the cognitive aspect and have a positive influence on good learning outcomes, but there are differences between previous learning that did not use Quizizz learning media and learning that used the Quizizz application [23]. Of course, researchers conducted interviews with several students to support the study's results.

Interviews were conducted with five students regarding the application of digital-based technology learning media such as Quizizz on circle material to determine student learning outcomes. Overall, students responded to Quizizz learning well and enthusiastically because, according to students, this learning is fun, so students can easily understand the material and be explained by the teacher. It is more efficient in increasing students' learning motivation. According to one student who seemed quite good at learning activities using Quizizz, it was more exciting and easier to understand the circle material in detail because the Quizizz media did not feel boring. They thought some questions were difficult, but with a high enthusiasm for learning and curiosity about the answers, the students slowly tried to understand and find the answers well.

Students explained that Quizizz made them think more focused and faster and liked the challenge. They studied more diligently after completing the questions on Quizizz. In the Quizizz application, students can also see the ranking order with the points already in the application, so they try to find the best position because other students can also see.

There is a difference in learning circle material before using the Quizizz application and using the Quizizz application; this is also explained from the overall interview with five respondents that before using Quizizz, they were still confused about the material and formulas on the circle, namely circumference, and area. In the learning process explained by the teacher, teachers often do not involve students in understanding the circle material so that students certainly feel confused and have difficulty memorizing formulas because the teachers explain the formulas at length, not briefly or easily understood by students. However, after using Quizizz, students understand the material better because the questions can be repeated and there is an explanation from the answer; the explanation certainly uses formulas that can be easily understood by students so that students find it easy to remember and easily understand how to calculate formulas quickly from the Quizizz explanation in learning, this also sees the condition of changes in self-confidence experienced by students in the process of working on questions so that they are more motivated to study enthusiastically and try to find out the simplest formulas that can be used in the learning process.

Various technological learning media used in mathematics learning at the junior high school level include several media such as Wondershare Filmora, Zoom Meeting, learning videos, Geogebra, and Microsoft Match, so there is a comparison with the Quizizz learning media.

Video-based learning media developed using the Wonder Share Filmora application explains that this media reaches 96% of media experts and 98% of material experts, with high student learning outcomes; this is seen regarding the

advantages of Wondershare Filmora, which explains the material development project in audio-visual format can improve students' understanding of mathematical concepts [24]. Furthermore, Zoom meeting learning media and learning videos can increase student participation in learning, involving students actively in the learning process and accessing the material [25]. Moreover, finally, geogebra in this media is an educational software for geometry and algebra; of course, this geogebra media is very effective and worthy of use in increasing students' creativity and mathematical understanding; this can certainly support active learning [26].

So, the Quizizz learning media is an effective medium in improving learning outcomes and motivation to learn mathematics for junior high school students compared to other media. The interactive and competitive characteristics prove this. Quizizz improves understanding and motivates students to participate actively in the learning process. Combining media such as Quizizz with better methods enriches the learning experience and achieves better learning outcomes.

The Quizizz learning media that students feel has a positive impact on increasing learning motivation because this media does not make students feel bored and makes it easier for students to understand the material during the learning process; this is in line with research conducted by Fitriana, which explains that the Quizizz learning media is the right learning media to increase student learning motivation. Implementing the Quizizz learning media can improve the learning process and allow learning to be carried out effectively and efficiently [27].

IV. CONCLUSIONS

Implementing the Quizizz application as a technological innovation tool in mathematics learning, especially on circle material, increases student motivation and learning outcomes. Based on the research findings, the use of Quizizz can significantly increase student learning motivation and help them understand circle material that is considered difficult. Quizizz has created a fun and interactive learning atmosphere to motivate students to learn more. Students feel enthusiastic and challenged to solve the questions given through this application. Of the 25 respondents, 72%, or 18 students, achieved a score above the KKM, while 28%, or seven students, still had not achieved that score; this shows that Quizizz effectively improves students' understanding of circle material. Interactive and competitive features in Quizizz, such as ranking and point systems, make students more focused and enthusiastic about learning so that they feel motivated to compete and improve their performance. This study complements existing information by providing empirical evidence of the effectiveness of Quizizz in the context of mathematics learning, especially on circle material that is often considered difficult by students. Previous research on Quizizz has focused more on other subjects or more general contexts. This study describes more deeply how quizzes can be used as an innovative tool to improve students' motivation and learning outcomes in mathematics. Overall, this study shows that Quizizz is an effective and innovative tool to

improve students' motivation and learning outcomes in mathematics learning on circle material.

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