



DEVELOPMENT OF GAME-BASED LEARNING MEDIA USING THE QUIZWHIZZER APPLICATION ON THE TOPIC OF MATHEMATICAL LOGIC

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ABSTRACT

This study aims to develop a game-based learning media using the Quizwhizzer application for 12th-grade students at SMK Muhammadiyah 1 Sleman. This product is created based on the analysis of students' needs and issues. Data for the analysis is derived from student surveys and interviews with mathematics teachers. The game-based learning media is developed using the ADDIE model, with the first step being Analysis, the second Design, the third Development, the fourth Implementation, and the fifth Evaluation. The product is developed based on validation results from media and content experts. It is found that the game-based learning media using the Quizwhizzer application falls into the category of highly valid, with an average media expert validation score of 3.00 and content expert validation score of 3.33. Furthermore, student responses indicate that the developed product is highly practical for use among 12th-grade students at SMK Muhammadiyah 1 Sleman, with a practicality percentage of 84.16%.

Keywords: *Quizwhizzer, Mathematical Logic, Game.*

ABSTRAK

Penelitian ini bertujuan mengembangkan media pembelajaran berbasis game dengan aplikasi Quizwhizzer untuk siswa kelas XII SMK Muhammadiyah 1 Sleman. Produk ini dibuat berdasarkan analisis kebutuhan dan permasalahan siswa. Data analisis diambil dari hasil angkat siswa dan wawancara guru matematika. Media pembelajaran berbasis game ini dikembangkan dengan model ADDIE dengan langkah pertama Analysis, kedua Design, ketiga Develpoment, keempat Implementation, dan kelima Evaluation. Produk ini dikembangkan berdasarkan hasil validasi oleh ahli media dan materi. Diketahui bahwa media pembelajaran berbasis game aplikasi Quizwhizzer termasuk dalam kategori sangat valid, dimana mendapatkan rata-rata skor validasi ahli media sebesar 3,00 dan validasi ahli materi sebesar 3,33. Kemudian hasil respon siswa menunjukkan bahwa produk yang dikembangkan sangat praktis untuk digunakan pada siswa SMK Muhammadiyah 1 Sleman kelas XII dengan persentase kepraktisan sebesar 84,16%.

Kata Kunci: Quizwhizzer, Logika Matematika, Game.

INTRODUCTION

Technology is developing very rapidly and producing diverse product innovations, such

as mobile phones which were previously limited to communication tools, but now smartphones are equipped with various types of supporting features and most people

own them. Now almost everyone uses Android-based mobile phones, which are even used in various sectors. In the education sector, mobile phones can facilitate students in understanding a material, so that the learning process is well-constructed and the achievement of effective and enjoyable learning is realized.

Educators in the millennial era must be able to collaborate between teaching media and technology. Mustaqim (2016) states that teaching media can support the learning atmosphere to become fun and interesting, as well as being able to foster student enthusiasm; ultimately, the goals of teaching and learning activities can be easily achieved. Teaching media has become very varied, whether in the form of printed teaching media or electronic teaching media (Winarsih, 2022). Certainly, teaching media must be appropriate and aligned with learning objectives so that learning goals can be achieved.

Mathematics is a crucial branch of science that must always be improved, because mathematics hones the focus on developing creativity in solving a problem; through this process, students' reasoning can grow (Maryam et al., 2019). Nevertheless, Jeheman et al (2019), Putra et al (2018), and Rahmawati (2017) convey that the subject that is complicated to learn (difficult) is still held by mathematics. Thus, to eliminate this stigma, there is a need for an innovation so that learning becomes fun and more effective, such as the creation of mathematics learning media as a companion to the learning process. However, the implementation of learning media with advanced technology is still very rare due to the limited ability of teachers to use technology.

Interviews were conducted with two mathematics teachers at Muhammadiyah 1 Sleman Vocational High School; for the first, some information was obtained that students enjoy playing games in class and are more enthusiastic when using digital-based learning media such as PowerPoint and Quizizz software, because they can display various features that can increase students'

learning enthusiasm. However, digital-based learning media has not been optimally implemented in the mathematics learning process at school.

Furthermore, the same results were obtained during interviews conducted with other mathematics teachers, showing that learning is still centered on the teacher's explanation on the whiteboard, so that mobile phones have not been utilized to their maximum potential. Therefore, many students play with their mobile phones during the learning process without the teacher's knowledge. This is in agreement with Slameto (2015:65) that if the learning methods and strategies applied by the teacher are still simple, it is likely to make students bored and lazy to follow the lesson.

One of the mathematics subject materials that can hone students' creativity is mathematical logic; however, the fact is that the daily test scores for mathematical logic in class XII show that only 5 students managed to get scores higher than the Minimum Completeness Criteria of 75. Based on the results of interviews with several students, information was obtained that students still find it difficult to understand mathematical logic, and students tend to be confused in distinguishing mathematical logic sub-materials such as conjunction, negation, implication, and other sub-materials.

Furthermore, the researcher also distributed a pre-research questionnaire via Google Form to 26 students of class XII Multimedia 1 and 2 at SMK Muhammadiyah 1 Sleman. Information was obtained that the learning media used by teachers was not sufficient for studying mathematics material, and students needed innovative learning media as an addition to study mathematics material and hone their abilities. This information is presented in **Figure 1**.

From Figure 1 and considering the information that 22 out of 26 students liked learning media that are colorful and contain images because they are not boring, 17 out of 26 students liked playing games using mobile phones, and all students brought mobile phones to school. Thus, students need innovative learning media presented

through mobile phones that are colorful and illustrated to help them learn mathematics. Therefore, in this research, a game-based learning media will be developed using the Quizwhizzer application.

Quizwhizzer is one of the educational game-based applications that can be utilized to deliver material and serve as a platform for learning evaluation with a competition system, because students are required to get many points to reach the first position (Juhaeni et al., 2023). To help educators, Quizwhizzer provides several features to package questions so they become a game. This is suitable for use during mathematics learning because students can be more enthusiastic and it increases students' curiosity about the material being studied. The use of the Quizwhizzer application can be done in class or while learning from home as students' homework. In addition, Quizwhizzer provides features that allow users to run several games at once, set and adjust the types of questions to be asked, the time to work on each question, the score obtained, the rules of each player's journey, and the position of the game board (Faijah, 2022). Some advantages of the Quizwhizzer application include the availability of various game templates that can be used, questions can be presented in a very attractive game,

and there is a discussion at the end of the game. Besides these advantages, the disadvantage of the Quizwhizzer application is that there are additional features that can be accessed by paying (Juhaeni et al., 2023). From the pre-research questionnaire, information was obtained that 46 out of 70 students considered mathematical logic material to be difficult to understand. This is supported by the interview results of one of the mathematics teachers at SMK Muhammadiyah 1 Sleman, stating that only 5 students received scores above the KKM. This understanding difficulty is specifically in distinguishing sub-materials of mathematical logic such as conjunction, negation, implication, and other sub-materials. Mathematical logic material will be suitable if assisted by game-based learning media using the Quizwhizzer application because students are not focused on calculating numbers with formulas, so when answering questions, each student does not need a long time.

Therefore, this research will develop a game-based learning media that utilizes and maximizes students' mobile phones, using the Quizwhizzer application so that a valid and practical learning media is obtained.

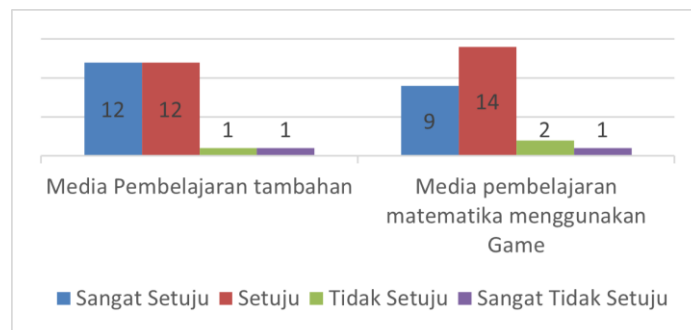


Fig. 1. Needs assessment result

METHOD

This article applies Research and Development (R&D) research with the development model being ADDIE (Analysis,

Design, Development, Implementation, Evaluation). According to Teguh et al (2014:41), the ADDIE model is considered a simple and systematic development model. It consists of 5 sequential stages that support problem-solving regarding students' needs

related to learning resources. On the other hand, the stages of the ADDIE model are equipped with evaluation to minimize errors and deficiencies in the developed product (Tegeh et al, 2014).

The first stage of the ADDIE steps is the analysis phase, which is reviewed from the characteristics of students, needs, as well as the curriculum and materials. The design stage consists of the preparation of the product framework, formulation of questions, and the preparation of validation questionnaire instruments as well as student response questionnaires. The development stage is the interpretation of the design stage into a real or physical form, so that a product will be produced in this stage. It begins with product creation followed by validation by material experts and media experts. The implementation stage involves testing the practicality of the validated media by implementing it with students. Finally, the evaluation stage is the analysis of the validity and practicality of the product. The research subjects include material experts, media experts, and students of class XII Multimedia 1 and 2 at SMK Muhammadiyah 1 Sleman consisting of 26 students.

The data analysis techniques used are validity and practicality data analysis. Validity data analysis is obtained from the results of the material expert and media expert validation questionnaires with the scoring guidelines shown in Table 1.

Table 1. Validation Instrument Scoring Guidelines

Criteria	Score
Strongly Agree (SS)	4
Agree (S)	3
Disagree (KS)	2
Strongly Disagree (TS)	1

(Source: Mulyatiningsih, 2014:29)

The formula for calculating the average total score from each validator is as follows:

$$\bar{V} = \frac{\sum_{i=1}^n v_i}{n}$$

Description:

$\bar{V}_i$ = average total validity

V_i = score of the i-th aspect

n = number of question items

(Source: Mahmudah, 2022)

The next step is the calculation of the total average from all validators, namely:

$$\bar{x} = \frac{\sum_{i=1}^n \bar{V}}{n}$$

Description:

$\bar{V}$ = total average from all validators

$\bar{V}_i$ = average total validity

n = number of validators

(Source: Riyani et al, 2017)

The results obtained are then interpreted into qualitative data based on the guidelines in the following table.

Table 2. Validity Categorization Guidelines

Score Interval	Category
$3 \leq \bar{V} \leq 4$	Very Valid
$2 \leq \bar{V} < 3$	Valid
$1 \leq \bar{V} < 2$	Less Valid
$0 \leq \bar{V} < 1$	Invalid

(Source: Riyani et al, 2017)

Meanwhile, the media practicality data analysis is obtained from the results of student response questionnaires calculated by the formula:

$$RS = \frac{R}{SM} \times 100\%$$

Description:

RS = Percentage of student response

R = Score obtained

SM = Maximum score

(Source: Sadewa et al, 2022)

The results obtained are then interpreted into qualitative data based on the guidelines in the following table.

Table 3. Student Response Categorization Guidelines

Score	Category	Range	Category
$75\% \leq RS \leq 100$	Very Practical		
$50\% \leq RS < 75\%$	Practical		
$25\% \leq RS < 50\%$	Less Practical		
$0\% \leq RS < 25\%$	Not Practical		

(Sadewa et al, 2022)

RESULTS AND DISCUSSION

The development of educational game media was designed to address the specific needs and challenges of mathematics learning in classes XII Multimedia 1 and 2 at SMK Muhammadiyah 1 Sleman, utilizing the Quizwhizzer software. This product was developed as an online-based tool accessible via the <https://quizwhizzer.com/> platform. The following sections elaborate on the development steps conducted using the ADDIE model:

3.1 Analyze

The analysis phase was conducted to gain a comprehensive overview of the students' initial conditions, the teachers' pedagogical approaches, and the types of media currently utilized in the classroom. Observations revealed that several students frequently played games on their mobile phones during lessons. Furthermore, it was noted that teachers often relied on less interactive learning media, which tended to make students passive. Based on this analysis, game-based learning media was selected as the strategic solution to capture students' interest and encourage active participation in teaching and learning activities. This is supported by the principle that effective learning media serves to increase learning motivation, thereby preventing boredom

during the educational process (Muhson, A., 2010).

3.2 Design

The design phase focused on creating a blueprint for the learning media to be developed. In this study, the design process involved crafting an interactive game-based learning framework using the Quizwhizzer application. During this stage, the researcher designed the fundamental structure of the interactive game, which included formulating questions and answer keys. To enhance engagement, player icons were designed using cartoon and fictional characters, while the game background was themed as an adventure. Additionally, "weaponry" features were included for players to foster a competitive yet fun atmosphere, ensuring students remain interested and actively involved.

3.3 Development

Development is the stage where the design is translated into a tangible or physical form, resulting in the final product (Tegeh et al, 2014). The primary output of this stage is the game-based learning media created through the Quizwhizzer application. To ensure quality, the product underwent a rigorous validation process by both media and material experts, followed by several revisions to refine the tool based on professional feedback.

The validation results demonstrated high levels of technical and substantive quality. The media expert validation yielded an average score of 3.00, which falls into the "Very Valid" category. Similarly, the material expert validation achieved an even higher average score of 3.33, also placing the content in the "Very Valid" category. These results indicate that the product is conceptually sound and ready for classroom application.

3.4 Implementation

During the implementation phase, a trial process was conducted to assess the practicality of the learning media from the students' perspective. This trial was carried

out in a large-scale class setting after the product had been revised based on the experts' suggestions.

The feedback collected from the students was overwhelmingly positive across several assessed aspects. In terms of overall appearance, the media received a total score of 689; for the presentation of material, it earned a score of 170; and for its perceived benefits, it garnered 454. Based on the calculations from 26 questionnaires distributed to students of class XII Multimedia 1 and 2, the total accumulated score reached 1313, resulting in a final percentage of 84.16%. According to the practicality interpretation guidelines, this percentage indicates that the media is "Very Practical" ($75\% \leq RS \leq 100\%$) for use in a real educational environment.

3.5 Evaluation

Evaluation is the final stage where the researcher administers tests and surveys to students to determine the effectiveness and practicality of the developed media. The success of the media is reflected in the positive student responses and the high validity scores from experts. As emphasized by Trianto (2009:20), learning can only be considered effective if it meets the primary requirement of aligning the accuracy of the instructional content with the students' actual abilities.

CONCLUSIONS

The game-based mathematics learning media using the Quizwhizzer application for grade XII at SMK Muhammadiyah 1 Sleman has been successfully developed through the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The process began with an analysis of student needs and problems through observations and interviews to identify the required innovations.

In the design phase, the media was tailored to meet those specific needs, followed by a development phase that integrated expert feedback. The validation and revision process confirmed that the Quizwhizzer-

based media is highly credible, with a media validation score of 3.00 and a material validation score of 3.33, both categorized as "Very Valid." Furthermore, the implementation results showed that the developed product is "Very Practical" for students, achieving a practicality percentage of 84.16%. This suggests that the media is a viable and effective tool for enhancing mathematics education in a vocational school setting.

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