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Development of Quizwhizzer Gamification Media in Bank Financial Industry Learning on Students' Learning Outcomes

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Abstract

This study aims to develop gamification-based learning media using QuizWhizzer on the topic of the Bank Financial Industry. The research uses a Research and Development (R&D) approach with the 4D development model, which includes Define, Design, Develop, and Disseminate stages. The research subjects were Grade X students of SMAN 3 Banjarmasin enrolled in Economics, specifically in the topic of the banking financial industry. The sampling technique used was purposive sampling, involving 36 students per class. Data collection techniques included expert validation questionnaires, student response questionnaires, and learning outcome tests (pre-test and post-test). Data analysis techniques included validity analysis by media and material experts, practicality analysis based on student responses, and effectiveness analysis using the N-Gain formula to measure learning improvement. The results showed that the developed media was considered valid by experts, practical according to student assessments, and effective in improving learning outcomes, with an average N-Gain score of 0.7468, which falls into the high category. These findings highlight the importance of integrating digital learning media to enhance students' academic performance. It is recommended that teachers adopt interactive and gamified learning platforms like QuizWhizzer to improve student understanding, engagement, and knowledge retention, leading to better overall learning outcomes in economics education.

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INTRODUCTION

Education plays an important role in developing students' competencies to achieve the expected learning goals. One of the benchmarks for the success of education in formal schools is the achievement of learning outcomes, which reflect students' mastery of aspects of knowledge, skills, and attitudes (Azka et .al., 2024; Indrawathi et al., 2021; Mutiaramses et al., 2021). This achievement is influenced by various factors, both from within the students such as motivation and interest in learning, and from outside, such as the learning approaches and media used (Faizah & Kamal, 2024; Sarah et al., 2021). The use of creative and interesting learning media can increase students' understanding and active participation in the learning process (Wulandari et al., 2023; Wulandari & Jaelani, 2023).

One innovative approach that has proven effective is gamification, which is the application of various game elements in the learning process that aims to increase student motivation and participation (Valentinna et al., 2020; Aditya et al., 2023). Arious studies have shown that gamification can increase student engagement, memory, and learning outcomes (Isma et al., 2023; Purba et al., 2021; Septiani & Santi, 2022). Platforms such as Kahoot!, Quizizz, and Wordwall have been widely used, and QuizWhizzer has emerged as an interesting alternative because it presents virtual game board-based quizzes with avatar, map, and random mode features (Laeli & Kasmui, 2024; Septiani & Santi, 2022).

QuizWhizzer has been proven to improve learning outcomes and student motivation at various levels and subjects (Nursafitri et al., 2024; Riana & Setiawan, 2024; Ekaputra, 2023; Iskandar et al., 2023). Its advantages lie in the automatic assessment system, direct feedback, and a competitive and fun learning atmosphere (Yani et al., 2023; Ismail et al., 2023). However, the implementation of this media faces challenges such as teacher readiness, infrastructure, and access to technology (Sholeh, 2025), so the right implementation strategy is needed so that gamification can run effectively.

In the context of learning economics in high school, especially in the banking financial industry material, QuizWhizzer media has great potential to improve students' understanding of complex concepts and support financial literacy (Anggarini et al., 2021; Alifah et al., 2020). Data from SNLIK 2024 shows that the student age group has the lowest level of financial literacy, compared to other age groups. Based on the survey results, the level of financial literacy among students aged 15-17 years is still relatively low compared to other age groups. In composite investment instruments, the literacy level of this age group only reached 50.70%, while in conventional investments it was 51.50%. A more worrying condition is seen in sharia-based investments, where the student literacy level only reached 25.54%, the lowest among all age categories. This finding shows that students do not yet have an adequate understanding of various financial instruments. (OJK & BPS, 2024). Therefore, a more interesting and contextual approach to economic learning is needed to foster financial literacy and skills from an early age (Amadi et al., 2023).

Initial observations were conducted to understand the ongoing economic learning situation. The results of the observations showed that the economic learning process at SMA Negeri 3 Banjarmasin still relies heavily on traditional lecture methods. This approach tends to make students less active in participating, so they have difficulty understanding the material, especially those that require analytical skills and their application in everyday life. As a result, student learning outcomes have not been maximized (Rahmatullah et al., 2022). In fact, supporting facilities such as LCD projectors and cellphone usage policies are already available, which should be utilized to use interactive learning media. Therefore, the use of gamification-based media such as QuizWhizzer is seen as a potential solution to

create a more enjoyable and meaningful learning process, and can improve student learning outcomes more optimally.

The literature review indicates that the use of gamification in learning. Several early studies have explored the potential of gamification to enhance student engagement and motivation during evaluation processes; however, findings related to its direct impact on learning outcomes have been inconsistent and require further investigation (Attali & Arieli-Attali, 2015; Dichev & Dicheva, 2017; Turan & Meral, 2018). Therefore, there is still a gap in the literature concerning the effectiveness of gamification in improving students' academic achievement.

From a theoretical perspective, the use of gamification in learning can be explained through the principles of Self-Determination Theory Deci & Ryan, 2000 and Constructivist Learning Theory Piaget, 1972 and Vygotsky, 1978. Self-Determination Theory posits that learners' motivation increases when the learning environment fulfills their needs for autonomy, competence, and relatedness—conditions that can be effectively fostered through game elements such as challenges, feedback, and rewards. Meanwhile, Constructivist Learning Theory emphasizes that knowledge is actively constructed through meaningful experiences, which gamified media like QuizWhizzer provide by engaging students in interactive, problem-based learning contexts. Within economics education, this theoretical linkage suggests that gamification not only enhances motivation and engagement but also promotes deep conceptual understanding and application of financial principles. Consequently, the integration of gamification is expected to improve students' financial literacy, as it bridges abstract economic concepts with practical financial decision-making experiences.

This study focuses on the introduction of QuizWhizzer as an innovative and interactive gamification-based learning media, considering its use at the high school level, especially in economics subjects, is still relatively minimal. QuizWhizzer is expected to be an attractive option for educators in delivering material, because it is able to combine game elements with fun and challenging learning activities. The low utilization of interactive digital media such as QuizWhizzer in economics learning is an important background for this study, with the aim of encouraging increased motivation and student learning outcomes through an approach that is more relevant to the characteristics of today's digital generation.

METHODS

This study uses the Research and Development (R&D) method which refers to the 4D (Four-D) development model developed by Thiagarajan in 1974 consisting of four stages, namely defining, which functions as the needs analysis stage; designing, which focuses on compiling the conceptual framework of the model and learning media; developing, which includes the validation test process to assess the feasibility of the media; and finally disseminating, which is the stage of implementing learning media to research subjects (Maydiantoro, 2021; Sugiyono, 2023).

The sampling technique used in this study was purposive sampling, which was chosen to ensure that the participants involved met specific criteria relevant to the objectives of the research. The students selected as subjects in both the small and large group trials were from class XA and XB at SMA Negeri 3 Banjarmasin. The criteria for selecting these students included: (1) having previously received learning materials related to the topic under study, (2) representing a range of academic abilities high, medium, and low to obtain comprehensive feedback, and (3) demonstrating active participation and willingness to be involved in the learning activities. The purposive selection of these groups aimed to provide meaningful insights into the practicality and effectiveness of the developed learning media when applied in real classroom contexts.

The validation process in this study involved four expert validators consisting of two experts in instructional media and two experts in learning content. The media experts were lecturers who teach instructional media courses and possess a deep understanding of the development and implementation of media in the teaching and learning process. Meanwhile, the content experts were practitioners directly involved in teaching activities using instructional media and experienced in delivering the subject matter relevant to this study. The selection of both lecturers and practitioners as validators was based on the consideration that their competencies and experiences complement each other, thus providing comprehensive feedback on both the feasibility of the media and the appropriateness of the learning content.

In this study, several instruments were used to collect data, namely validation sheets, student response questionnaires, and test questions. Validation sheets consist of two types, namely media validation and material validation, which function to assess the level of feasibility of the developed learning media. This validation instrument was compiled by adapting from several sources, including Candra et al. (2022), Miftah & Rokhman (2022), and Mertasari & Ganing (2021). Meanwhile, the student response questionnaire was used to determine the extent to which the media was considered practical by users, with an instrument modified from Alpian et al. (2023). Meanwhile, to assess the effectiveness of the media on learning outcomes, test questions were used in the form of pretests and posttests which were given before and after the use of learning media.

The analysis process in this study includes three main aspects, namely validity, practicality, and effectiveness of learning media. Evaluation of validity is carried out based on assessments from material experts and media experts to assess the feasibility of the media that has been designed. Practicality is analyzed through student responses to the use of media in learning activities. Meanwhile, effectiveness is assessed from the achievement of student learning outcomes. Assessment of learning outcomes is carried out in two stages. The first stage involves analyzing test instruments, including testing validity, reliability, difficulty level, and discriminatory power, to ensure that the pretest and posttest questions used are appropriate as measuring instruments. The second stage is carried out with statistical analysis using the N-Gain test on pretest and posttest data to determine the increase in learning outcomes after using the media. N-Gain criteria can be explained in Table 1.

Table 1. N-Gain Range

N-Gain Range	Improvement Category
N-Gain $\geq$ 0.70	High
0.30 $\leq$ N-Gain < 0.70	Moderate
N-Gain < 0.30	Low

Source: Processed Primary Data, 2025

All of these stages aim to evaluate the extent to which the developed learning media is able to provide a positive impact on improving student learning outcomes.

RESULTS AND DISCUSSION

The research results are compiled following the stages in the 4D development model which includes four main steps: define, design, develop, and disseminate. In the define stage, researchers collect various information relevant to the needs of Economics learning at SMA Negeri 3 Banjarmasin. One of the steps taken is an interview with the Economics teacher to explore learning needs and obstacles faced in class. From the interview results, it is known that the learning media used are still limited and less interesting, thus contributing to the low interest in learning and student learning outcomes. In addition, an analysis of student characteristics shows the need to use gamification-based media so that the learning

process becomes more enjoyable and interactive. Researchers also analyze the tasks that students need to master based on the contents of the module, such as understanding the definition, function, principles, types, and banking products and the role of the Deposit Insurance Agency. Concept analysis aims to determine the main topic, namely the banking financial industry, while the analysis of learning objectives is focused on formulating the final achievement of phase E so that students can understand and evaluate the material critically.

The second stage, namely design, researchers compiled instruments in the form of material and media expert validation questionnaires, student response questionnaires, and pretest and posttest questions used to collect data related to the quality of the media developed. Furthermore, researchers chose gamification-based learning media using QuizWhizzer, because it is in accordance with the characteristics of the material and the needs of students who previously tended to be passive due to the use of monotonous media. This media is expected to increase student interest, motivation, and learning outcomes. The media format is designed by integrating various elements such as map-based game boards, text, images, videos, and practice questions that are arranged in an interesting and interactive way. This stage also includes the preparation of the initial media design that is adjusted to the needs of the material and learning objectives.

The third stage, namely develop, researchers validated the media experts and material experts to assess the validity and feasibility of the learning media. In addition, small group trials were conducted involving a number of students to assess the practicality of using the media in the learning process. Table 2 show the results of media expert validation of the developed media.

Table 2. Recapitulation of Expert Validation Results

No	Assessment Aspect	SH	V1	V2	%	Des.
A. Media Expert Validation						
1	Suitability with learning objectives	20	7	10	85	Valid
2	Relevance to the content material	20	7	10	85	Valid
3	Teacher's skill in using the media	20	8	9	85	Valid
4	Ease of accessing the media	30	13	13	87	Highly Valid
5	Availability of time for use	10	3	5	80	Valid
6	Suitability with students' thinking level	30	12	13	83	Valid
7	Media display	20	9	9	90	Highly Valid
8	Text	20	8	9	85	Valid
9	Image	20	8	9	85	Valid
10	Audio	10	4	5	90	Highly Valid
Subtotal (Media Expert)		200	79	92	86	Highly Valid
B. Material Expert Validation						
11	Curriculum	20	10	9	95	Highly Valid
12	Material	50	23	24	94	Highly Valid
13	Language	20	10	9	95	Highly Valid
14	Evaluation	10	5	4	90	Highly Valid
Subtotal (Material Expert)		100	48	46	94	Highly Valid

Source: Processed Primary Data, 2025

The validation results show that the learning media developed using QuizWhizzer is highly valid and feasible for use.

The media expert gave an overall score of 86% (Highly Valid), indicating that the design, accessibility, and visual-audio aspects are well-developed and suitable for learning.

The material expert gave a score of 94% (Highly Valid), confirming that the content, language, and curriculum alignment meet pedagogical standards. Overall, both validations indicate that the QuizWhizzer-based gamification media is appropriate, effective, and ready for classroom implementation.

After being declared feasible by media experts and material experts, the process was continued to the trial stage. This trial aims to determine the extent to which the media is practical to use in learning activities. The results of the recapitulation of the media practicality test are presented in Table 3.

Table 3. Recapitulation of Student Response Results

No.	Trial	PC (%)	Category
1.	Small group	80.2	Practical
2.	Large group	75.8	Practical
Average		78.0	Practical

Source: Processed Primary Data, 2025

Table 3 presents a summary of student responses with an average percentage of achievement of 78%, which indicates that the gamification-based learning media developed is relatively practical to use. This classification refers to the practicality rating scale used in the study, where a score between 61%–80% falls into the "practical" category, as described in the methods chapter. After going through the validation and practicality test stages, and receiving various inputs from validators and students, improvements were made to perfect the media. Based on the series of processes, the final product was produced in the form of gamification-based learning media utilizing QuizWhizzer, which is presented Figure 1 - Figure 7.

Figure 1. Instructions for Use

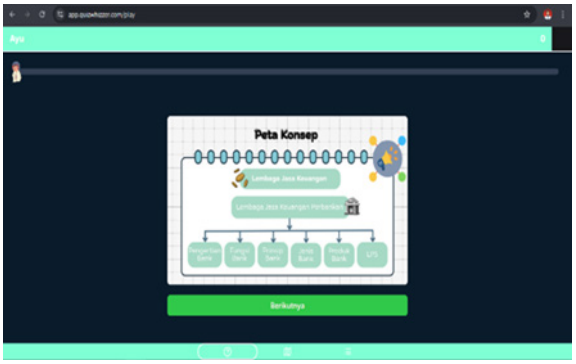

Figure 2. Concept Map

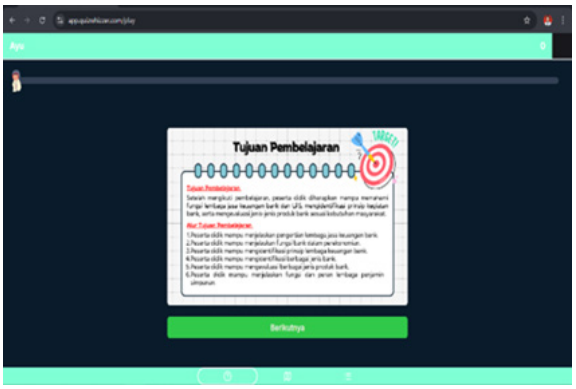

Figure 3. Learning Objectives

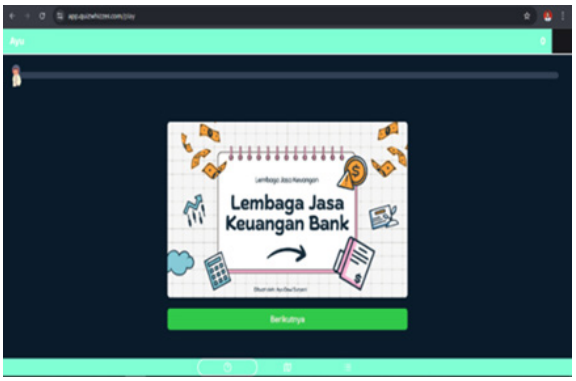

Figure 4. Initial View

Figure 5. Material Display

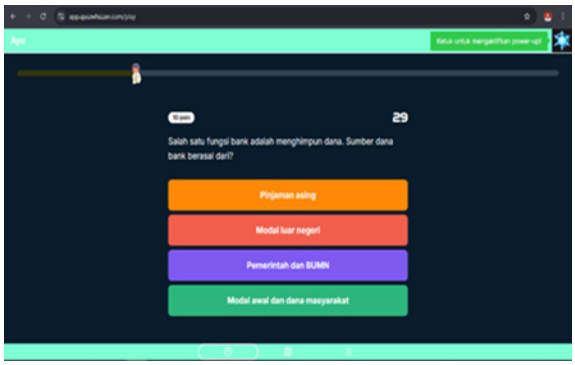

Figure 6. Question View

Figure 7. Map View

Table 4. Pretest and Posttest Results

Test	Min	Max	Mean
Pretest	20	100	49.7
Posttest	72	100	86.7

Source: Processed Primary Data, 2025

Table 5. N-Gain Test Results

	Descriptive Statistics		
	Minimum	Maximum	Mean
NGain	0.45	1.00	0.7468

Source: Processed Primary Data, 2025

The final stage in the development process is the dissemination stage. In this study, dissemination was carried out on a limited basis to Economics subject teachers and class X students at SMA Negeri 3 Banjarmasin. The purpose of dissemination to teachers was to introduce gamification-based learning media that had been developed. Meanwhile, dissemination to students aimed to evaluate the effectiveness of the media through the implementation of pretests and posttests. The results of both tests were used as a basis for assessing improvements in learning outcomes and the effectiveness of media application in the learning process. The results of the pretest and posttest are presentedin Table 4.

Table 3 shows a comparison of students' pretest and posttest results. The average pretest score was recorded at 49.7, while the posttest average increased to 86.7. To assess the extent to which the gamification-based learning media being developed is able to improve learning outcomes, analysis was carried out using the N-Gain test on these two data. The N-Gain test is used to measure the level of improvement in student learning outcomes after using this learning media. The results of the N-Gain analysis are presented Table 5.

Table 5 shows the results of the N-Gain test which obtained an average value of 0.7468 with a minimum value of 0.45 and a maximum of 1.00. Referring to the N-Gain interpretation category, this value is included in the high category.

Gamification-based learning media with QuizWhizzer has gone through a validation process by media experts and material experts to assess its level of feasibility. Based on the validation results, a validity percentage of 86% was obtained from media experts and 94% from material experts, with an overall average reaching 90%, which is included in the very valid category. The assessment covers several aspects, including technical, visual appearance, material content, language use, and suitability to the applicable curriculum. These findings indicate that the media can be used in learning activities and are consistent

with the results of previous studies which also concluded that gamification-based learning media are valid and feasible to implement. Kholisna (2025) developed gamification media for reading comprehension and received a very feasible assessment from experts. Li et al. (2023) found that gamification had a significant effect on learning outcomes, with an emphasis on the importance of design validity and gamification principles. Setyaedhi (2023) also stated that gamification media is feasible to use after validation tests and class trials. These findings support that gamification media is proven to be valid and has the potential to improve student learning outcomes.

However, this validation process did not fully address technical limitations such as required infrastructure readiness, internet connectivity stability, and device compatibility, which may influence the effectiveness of implementation in various educational contexts, especially in areas with limited technological access.

After being declared valid, this learning media was continued to the practicality test stage. The test was carried out on two scales, namely small groups and large groups, each of which obtained a practicality percentage of 80.2% and 75.8%, with an overall average reaching 78%, so it was categorized as practical. This media is considered easy to operate, interesting, and helps students understand the material more effectively. Positive responses from students indicate that the gamification elements in the media are able to create motivation and a pleasant learning atmosphere. This finding is in line with previous studies which concluded that gamification-based media are practical to implement. Pulungan et al. (2024) stated that gamification media is very practical and easy to use in learning. Research by Jatawitika et al. (2024) also shows that this type of media received a positive response from teachers and students, and was considered feasible and efficient to use. In addition, according to Limpo et al. (2024), gamification elements have been shown to increase student engagement, motivation, and participation, thus creating more interactive and enjoyable learning.

Nevertheless, potential biases in the practicality test must be considered, such as the novelty effect where students are more enthusiastic simply because the tool is new as well as the possibility that teacher guidance during trials may have influenced student responses. Furthermore, the testing group may not represent the broader student population in terms of digital literacy or socioeconomic background, which may affect generalizability.

In terms of effectiveness, this learning media has been proven to be able to provide significant improvements to student learning outcomes. The results of statistical tests show a real difference between the pretest and posttest scores, which is indicated by an increase in the average value. The average N-Gain value obtained was 0.7468 indicating a high level of effectiveness. The presence of gamification elements in this media also plays a role in increasing student motivation and active participation during the learning process. This finding is in line with the research results of Yani et al. (2023), which shows that the use of QuizWhizzer contributes to improving learning outcomes because it is able to present more interesting and easy-to-understand learning. Something similar was expressed by Oktafia & Fitrayati (2024), who stated that gamification media is effective for use in financial institution material because it is able to encourage student motivation and understanding. Meanwhile, Adhi et al. (2023) stated that QuizWhizzer increases students' enthusiasm for learning in class.

From a theoretical perspective, the success of this media can be linked to key gamification principles such as the use of reward systems (e.g., points, badges, rankings) that stimulate extrinsic motivation, and feedback loops that provide students with immediate responses to their performance, encouraging continuous improvement. These principles align with self-determination theory, which emphasizes competence, autonomy, and re-

latedness as motivational drivers. The media also leverages elements of game-based learning theory by incorporating challenge, progression, and engagement mechanics to enhance learning retention. However, the balance between extrinsic rewards and intrinsic motivation should be critically monitored to avoid overreliance on surface-level engagement.

CONCLUSION

The results of the study indicate that the gamification-based learning media using QuizWhizzer that has been developed is considered very valid and feasible to be applied in the learning process, as evidenced by the validation results from media and material experts. In addition to its high level of validity, this media is also considered practical and easy to use by students during learning activities. Furthermore, this learning media has proven effective in improving the learning outcomes of class X students in the Bank Financial Industry material, which is indicated by the positive and significant influence between the pretest and posttest scores.

Optimizing the use of gamification-based learning media such as QuizWhizzer requires synergy between students, teachers, and schools. Students are expected to be more active in participating in interactive learning, teachers need to integrate gamification elements creatively, and schools should provide adequate facilities and technology training for teachers. Considering that this study was limited to grade X students and focused on a single topic, it is recommended that future research involve a wider range of subjects, expand the scope of learning materials, compare the effectiveness of different gamification media, and investigate long-term effects. Further studies could also explore cross-variable impacts such as on students' motivation, collaboration skills, and digital literacy to gain a more comprehensive understanding of the benefits of gamification-based learning.

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