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Development of Gamification Learning Media Based on Google Sites Website for Technical Drawing Projection Material in Vocational Schools

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Abstract

The conventional use of media induces boredom among students, largely due to the limited exploration of creativity among teachers in crafting innovative and engaging learning materials using digital technology in teaching and learning processes. One application of digital technology involves developing gamification media based on the Google Sites website for technical drawing projection material in 10th grade in SMK. This research applies the Research and development (R&D) method. The research design chosen was the ADDIE model, which consists of five stages, namely Analysis, Design, Development, Implementation, and Evaluation. The unit of analysis for this research is the development of gamification learning media based on the Google Sites website. The instruments used in this research were (1) assessment sheet and (2) feasibility questionnaire. The validity of the assessment sheet is obtained from CVR calculations and reliability using the ICC formula. The validity of the effectiveness questionnaire uses rcount and reliability uses the Cronbach's Alpha formula. The data analysis used in this research is (1) categorical to determine the level of eligibility; (2) and N-Gain difference test using the t test. The research results show that the feasibility test for responses from media experts and material experts is very feasible, while the effectiveness test is quite effective and significant in increasing student understanding. Therefore, it can be concluded that the development of gamification learning media on the Google Sites website can improve understanding among the students.

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INTRODUCTION

Education plays a crucial role in the development of a nation by shaping quality human resources. Marlinah (2019) emphasizes the importance of cultivating learners with spiritual strength, self-control, personality, intelligence, noble character, and necessary skills for themselves, society, nation, and country. This aligns with Article 1 of the National Education System Law No. 20 of 2003, which states that education is a conscious and planned effort to create a learning atmosphere and learning processes so that learners actively develop their potential (Fatimah et al., 2022).

Learning in the classroom requires interaction between teachers and students, with the aim of achieving effective learning. The efficacy of learning manifests in the capacity of students to absorb, comprehend, and articulate instructional content. In the context of globalization, information and communication technology plays a crucial role in improving the quality of education. The use of website-based learning media, such as Google Sites, offers accessibility, interactivity, and flexibility (Mulyono, 2012). Learning media serves various important functions in the educational context, as outlined by Kristanto (2016), including aiding in standardizing the delivery of learning messages to avoid differing interpretations among teachers. The success of learning is measured by the interaction between teachers and learners, which can be assessed by the participation of students during the learning process, their responses to the taught material, and their understanding of the concepts (Rohmawati, 2015).

Research conducted by Japrizal and Irfan (2021) as well as Pambayun (2021) presents interesting findings regarding the use of website-based learning media, especially the use of Google Sites. Both studies indicate that Google Sites received positive ratings from experts in the field of content and media, and it provided good user-friendliness according to teachers. Students also rated the media fairly well. Based on previous research also confirms similar findings, highlighting the effectiveness of Google Sites as a learning medium based on expert assessments and field test results (Putri, 2021). The results of these studies indicate that significant contributions to understanding and learning outcomes are made by the utilization of Google Sites in the learning context.

In the context of SMK N 1 Petarukan, the fundamentals of mechanical engineering subjects, especially Technical Drawing, still rely on conventional methods such as PowerPoint, leading to student boredom and ineffective learning. The use of website-based learning media, especially Google Sites, could be a solution with relevant, interactive content, and the application of gamification concepts. However, there has not yet been specific research on the influence of content and the implementation of gamification in Google Sites-based learning media on the achievement of Technical Drawing learning at SMK N 1 Petarukan. Therefore, this study aims to develop website-based learning media using Google Sites that integrate relevant content and apply gamification concepts in Technical Drawing learning at SMK N 1 Petarukan.

METHODOLOGY

1) Research Design

This research involves three locations: SMK N 1 Petarukan as the experimental class, SMK Satya Praja 2 as the control class, and SMK Nusantara Comal as the trial class. The research instruments used include Material Feasibility Instruments, Media Feasibility Test Instruments, and Gamified Learning Media Effectiveness Instruments.

2) Media Development Design

The media development design in this research adopts the ADDIE development model, consisting of five development stages: Analysis, Design, Development, Implementation, and Evaluation. The selection of the ADDIE model is chosen for its simple and systematically structured nature, facilitating clear understanding of the basic development stages. These five stages are interconnected and systematically organized (Rayanto, 2020).

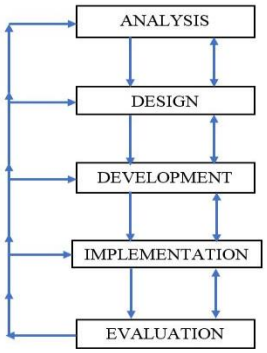


Figure 1. Media Development Procedure with ADDIE Model

This research method adopts the ADDIE development model consisting of five stages, starting from analysis, design, development, implementation, to evaluation. The analysis stage involves problem analysis and needs analysis to identify shortcomings in the learning media used and determine the needs for developing new media. In the design stage, learning media is designed considering schedules, project teams, media specifications, lesson structures, and quality assurance. The development stage involves creating gamified learning media based on Google Sites and then evaluated by validators and tested in the trial class. Implementation is carried out by applying learning media in the experimental class, while formative and summative evaluations are conducted to assess the feasibility and effectiveness of the media, using N Gain tests and independent t-tests with the assistance of SPSS software.

RESULT AND DISCUSSION

Result

The research entitled 'Development of Gamification Learning Media Based on Google Sites Website' has been conducted at SMK Negeri 1 Petarukan in the second semester of the academic year 2023/2024. This study aimed to increase enthusiasm for learning and facilitate understanding of the subject matter, thereby improving abstract cognitive and psychomotor skills.

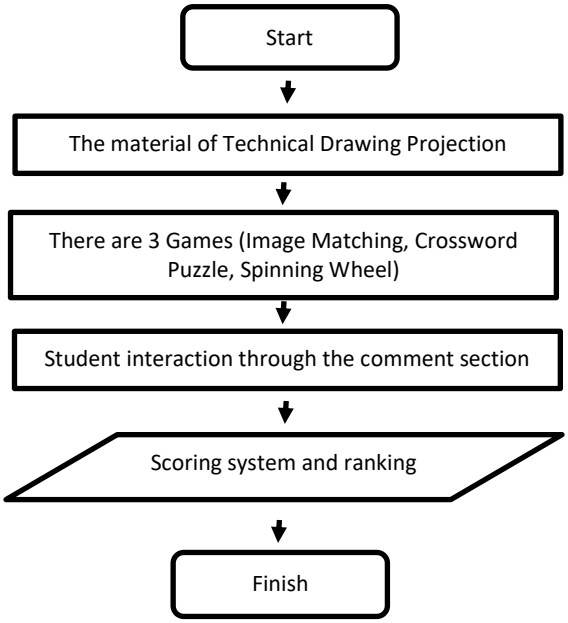
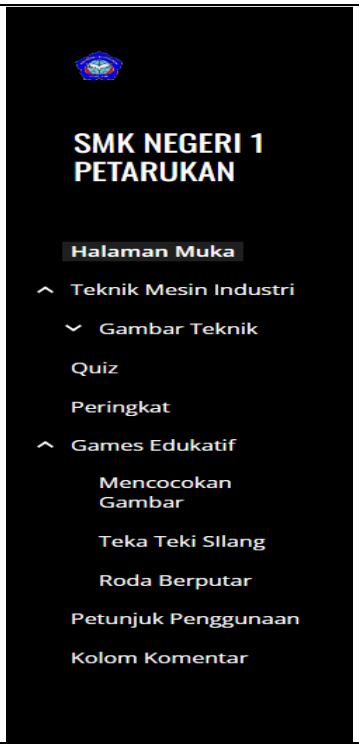
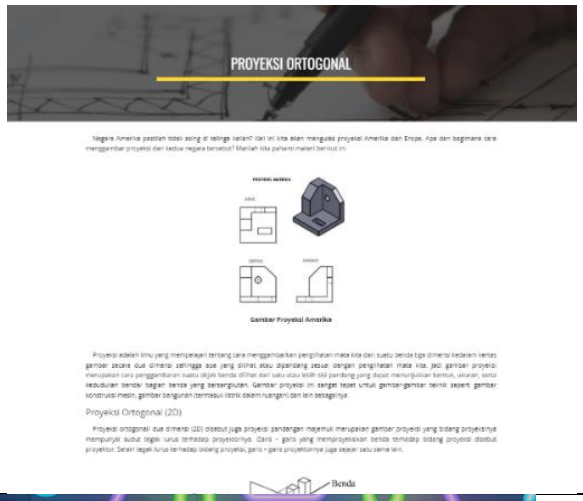
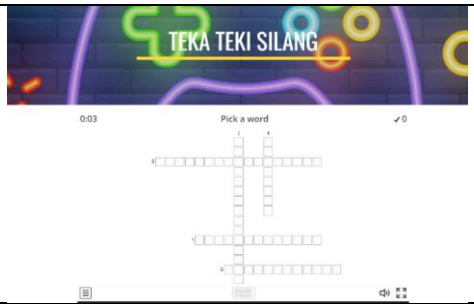
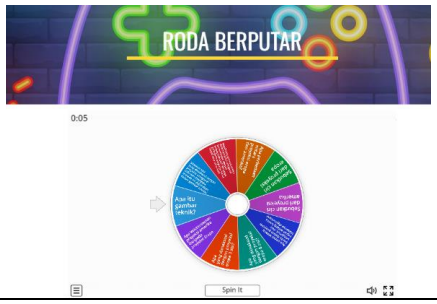


Figure 2. Gamification Concept in Technical Drawing

The gamified learning media developed in this study consists of media containing technical drawing projection material and three games: crossword puzzle games, image matching games, and spinning wheels games. In each game, after completion, a score will be displayed immediately for the students to evaluate if they have achieved maximum scores. Below is the visual representation of the gamified media based on Google Sites website.

No	Gamification Media Display	Part
1.		Website Navigation
2.		Projection Material
3.		Image Matching Games

4.		Crossword Puzzle Games
5.		Spinning Wheel Games

Feasibility Test Result

Experts who provided validation for the gamified learning media based on Google Sites website consisted of media experts and material experts. Media experts validated the website design, while material experts validated the technical drawing projection material content inserted into the website. The validators for media experts included one lecturer from Universitas Negeri Semarang (UNNES) and one Director of Professional Certification Institution P1 SMK Satya Praja 2 Petarukan. Meanwhile, the material expert validators comprised three teachers from Industrial Mechanical Engineering SMK Negeri 1 Petarukan with a master's degree education background.

Tablel 1. Material Expert Assesment

No	Assessment Aspect	Expert 1	Expert 2	Expert 3	Average	Criteria
1	Material Accuracy	5	5	5	5	Highly Feasible
2	Language Usage	5	5	5	5	Highly Feasible
3	Media Materials	5	5	5	5	Highly Feasible
4	Benefit	5	4.66	4.66	4.77	Highly Feasible

The feasibility of instructional media as assessed by material experts is categorized as highly feasible based on the suitability of each aspect, including the accuracy of the material, language usage, media content and language.

Table 2. Media Expert Assesment

No	Assessment Aspect	Expert 1	Expert 2	Average	Criteria
1	Page Design	5	5	5	Highly Feasible
2	Media Presentation	4.83	5	4.91	Highly Feasible
3	Google Sites	5	5	5	Highly Feasible
4	Gamification	4.75	4.75	4.75	Highly Feasible

The feasibility of learning media as assessed by media experts is categorized as highly feasible based on the suitability of each aspect, including page design, media presentation, Google Sites, and gamification.

Effectiveness Test Results

Normality tests were conducted to determine whether the data used in the experimental and control groups were normally distributed. Normality tests were performed using

IBM SPSS software using the Kolmogorov-Smirnov method with a significance level of 0.05. If the significance value is greater than 0.05, the data is considered normally distributed. However, if the significance value is less than 0.05, the data is considered not normally distributed. The normality test results for the pre-test and post-test data of the experimental and control groups are shown in the table below.

Table 3. Normality Test Results of the Effectiveness of Gamified Website-Based Learning Media Questionnaire

Tests of Normality							
Class		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Learning Outcome	Pretest Experimental	.127	32	.200*	.958	32	.235
	Posttest Experimental	.145	32	.086	.949	32	.134
	Pretest Control	.159	30	.051	.941	30	.100
	Posttest Control	.132	30	.190	.958	30	.270

Based on the results of the Kolmogorov-Smirnov normality test, the significance values (Sig.) of the pre-test and post-test data for both the experimental and control groups are greater than 0.05, which is 0.235 and 0.134 for the experimental group pre-test and post-test, respectively, and 0.100 and 0.270 for the control group pre-test and post-test, respectively. From these values, it can be concluded that the data in the Kolmogorov-Smirnov normality test are normally distributed. Therefore, it can be considered that the residual data from this test have a normal distribution, allowing further testing to be conducted.

Subsequently, homogeneity testing was performed using the homogeneity of variances test with a significance level $\alpha = 0.05$. The acceptance criterion in this test is if the significance score is greater than 0.05, the data is considered homogeneous; whereas if the significance score is less than 0.05, the data is considered not homogeneous.

Table 4. Homogeneity Test Results of the Effectiveness of Gamified Website-Based Learning Media

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Pretest	Based on Mean	.413	1	60	.523
	Based on Median	.229	1	60	.634
	Based on Median and with adjusted df	.229	1	56.194	.634
	Based on trimmed mean	.429	1	60	.515
Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Posttest	Based on Mean	.077	1	60	.782
	Based on Median	.084	1	60	.772
	Based on Median and with adjusted df	.084	1	59.992	.772
	Based on trimmed mean	.070	1	60	.792

The homogeneity test results for the based on mean Pre Test show a significant value of 0.523, indicating data > 0.05, hence the data is homogeneous. Meanwhile, the score for based on mean Post Test shows a significance of 0.782, indicating data > 0.05, therefore the data is homogeneous. Next, to determine the N-Gain value from the test data to assess the effectiveness of learning media, a normalization gain (N-Gain) test was conducted.

Table 5. N-Gain Test Results

No	Experimental Class	No	Control Class
	N-Gain Score (%)		N-Gain Score (%)
Average	58.98	Average	9.68
Minimum	35.59	Minimum	5.41
Maximum	84.62	Maximum	35.14

Based on the calculation results of the N-Gain score test in this study, the average N-Gain score for the experimental class is 58.98, falling into the moderate category with an interpretation of quite effective. Meanwhile, the average N-Gain score for the control class is 9.68, categorized as low with an interpretation of not effective. Furthermore, an Independent Sample t-test was conducted to determine if there is a significant difference in how Post-Test scores are used between the experimental and control groups. Based on the test results, a sig (2 tailed) value of 0.000 < 0.05 was obtained, thus it can be concluded that there is a significant difference between the results in the experimental group and the control group.

Discussion

From the data analysis results, it can be inferred that the development of gamified learning media based on Google Sites websites is highly feasible for technical drawing projection material. Research by Saleem et al., (2022) highlights that the use of technology such as Google Sites websites in gamification implementation can expand educational accessibility and enable more personalized and adaptive learning experiences. Furthermore, research by Jubaidah and Zulkarnain (2020) demonstrates that the use of Google Sites has proven its ability to simplify the supervision, guidance, and direction of students within a structured learning framework. Moreover, this plays a crucial role in meeting the learning demands set by the government during the Covid-19 pandemic.

Another study by Pambudi (2018), aiming to create an Android-based learning application using gamification concepts for web programming subjects, referring to the model proposed by Alessi & Trolli. The final result of the product assessment received a 'good' predicate and was considered 'feasible' for use in web programming learning. Furthermore, based on the Paired Sample T-test conducted, this application successfully improved student learning outcomes.

Furthermore, research by Imanulhaq and Prastowo (2022) in their analysis shows that creating interactive English quizzes with Wordwall is very easy, thus boosting student learning enthusiasm. Therefore, it can be concluded that all these studies indicate that digital-based learning media, such as Google Sites and websites, have been proven feasible, user-friendly, and effective in enhancing student learning outcomes in various educational contexts. Based on previous research, it can be concluded that the use of website-based learning media greatly aids learning and enhances the understanding and learning outcomes of learners.

The novelty of this research lies in the use of gamified learning media based on Google Sites websites by students of SMK Negeri 1 Petarukan, categorized as highly feasible, sufficiently effective, and significant in improving cognitive understanding and abstract psychomotor skills of students. Another aspect is the development of media used as a complement or addition to learning media for 10^{th} grade students of SMK industrial engineering programs digitally, in the form of electronic media that facilitates independent learning for students, featuring sequentially presented steps accompanied by colorful images, directly applicable on smartphones by students and industrial engineering teachers.

The operation of this learning media is very straightforward, merely by accessing the Google Sites website page prepared beforehand. Access to the website page can be done through Android smartphones, computers, or laptops. This ease of access allows learners to study whenever and wherever they are, as long as they are connected

to the internet. Thus, this learning media can be integrated with high flexibility in various learning situations, both inside and outside the classroom.

The prepared Google Sites website page has a user friendly and intuitive interface, facilitating learner interaction with learning content. The gamified materials presented add attractiveness and learner engagement in the learning process. The interactive features embedded in this media, such as online quizzes, games, or challenges, provide enjoyable and captivating learning experiences for learners.

With easy to use functionality and engaging content, gamified learning media based on Google Sites websites become an effective tool for enhancing student motivation and learning outcomes. By leveraging this technology, innovative learning approaches can be implemented, providing a more interactive and satisfying learning experience for students at SMK N 1 Petarukan.

This learning media can be operated without the need to install any software, making it very easy to use. The implementation of gamified learning media is capable of providing an interactive learning atmosphere to learners because it enables a detailed, thorough, and flexible understanding of the learning material. The advantage of this learning media applied to technical drawing projection material is its ability to stimulate learners thinking patterns, indicating that learning does not always have to be conventional but can be enjoyable and non-monotonous by implementing learning methods that can present images, videos, and text in a single medium. Additionally, the development of technology in the form of gamified learning media can fulfill the need to enhance learners creativity skills, improve learners cognitive abilities to think critically, and facilitate learners in understanding abstract and complex concepts.

Another advantage of this learning media is its ability to provide an interactive learning atmosphere to students. With a gamification approach, students can actively engage in learning, following challenges or games provided in the learning media. This not only enhances their understanding of learning material but also gives them the freedom to learn in a more enjoyable and non-monotonous way. Moreover, the implementation of gamified learning media also aligns with ongoing technological developments. By utilizing modern learning media, students can be better prepared to meet the demands of an increasingly complex and diverse job market. Thus, the use of gamified learning media not only meets the effective learning needs of students but also prepares them to be competent and adaptable individuals in the future.

CONCLUSION

Based on the discussion of research results, it can be concluded that gamified learning media based on Google Sites websites can be used as a learning media for technical drawing projection material, providing students with ease in understanding the material and flexibility in accessing the material. This learning media can be used as an enjoyable learning medium and can create a new and interactive atmosphere in the learning process of SMK industrial engineering program students. The student response to gamified learning media is very high, capable of boosting student enthusiasm during the learning process. It can be said that the development of gamified learning media based on Google Sites websites is highly feasible, sufficiently effective, and significant.

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