

Development of Application-Based Gamification for Illustration Drawing Material in Eighth Grade Junior High School Students

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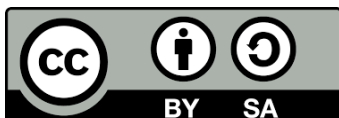
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Abstract

Learning at SMP Islam Sultan Agung Sudimoro uses a flipped classroom model due to the dense curriculum, with each topic covered in just 1–2 meetings. Students must study independently at home, but existing media like books and digital modules are seen as unappealing. To address this, a gamified, interactive illustration-based application was developed to boost interest and improve independent learning. This study aims to analyze students' needs, develop the gamified media, and test its effectiveness in teaching cultural arts to eighth-grade students. The method used is R&D with the 4D model (Define, Design, Develop, Disseminate). The results show that students highly need interactive media. Expert validation of content and media achieved very valid scores (87.50% and 90.32%), practicality tests reached 93% (highly feasible), and the effectiveness test based on the N-Gain Score was 0.89 (high category). Thus, the application-based gamification was proven to be highly effective in helping students understand illustration drawing material.

Keywords: Interactive application, Gamification, Illustration drawing



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INTRODUCTION

Education plays a crucial role in shaping high-quality human resources who can think critically, adapt to technology, and contribute to economic growth (Siregar et al., 2022). Along with technological advancements, learning media must also adapt to the needs of the times. One significant development in ICT is the increasing use of smartphones in Indonesia, creating vast opportunities for developing educational applications (Irawan et al., 2018).

SMP Islam Sultan Agung Sudimoro implements the flipped classroom model due to the dense curriculum each semester. Students are encouraged to study independently at home before in-class sessions. However, learning media such as printed books and digital modules are considered less appealing. Therefore, there is a need for alternative, interactive media that can increase students' interest in learning, particularly in illustration drawing material.

Gamification offers an innovative solution by integrating game elements into the learning process, thereby enhancing student motivation and engagement (Jusuf, 2016). Effective learning media can simplify the understanding of abstract and complex concepts (Adlin, 2019). In this context, interactive application-based gamification is seen as relevant to support cultural arts education, especially since most students at SMP Islam Sultan Agung Sudimoro already own Android smartphones.

This study aims to analyze students' needs for alternative learning media, develop gamified illustration drawing materials based on an interactive application, and test its effectiveness and practicality. Through this approach, the developed media is expected to improve students' understanding, motivation, and learning outcomes, while supporting the learning process in the digital era.

RESEARCH METHODS

This study employs the research and development (R&D) method to create and validate a new product, bridging basic and applied research (Okpatrioka, 2023). The product developed is a gamified illustration drawing material based on an application, using both qualitative and quantitative approaches. Qualitative research is descriptive and analytical (Wekke, 2019), while quantitative research involves numerical data and statistical analysis (Balaka, 2022). The study follows the 4D model by Thiagarajan Define, Design, Develop, and Disseminate to evaluate the process and effectiveness of the material for eighth-grade students at SMP Islam Sultan Agung Sudimoro.

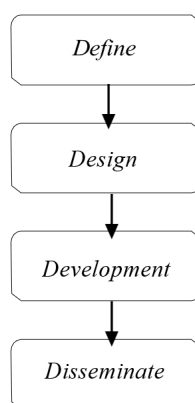


Figure 1. Structure of the 4D Model (Sumber: <https://lp2m.uma.ac.id/>)

The 4D model by Thiagarajan was chosen for its systematic approach to developing learning materials. In the Define stage, eighth-grade students at SMP Islam Sultan Agung Sudimoro were selected, and the material was aligned with the Merdeka curriculum. The Design stage involved creating an application-based gamified material suited to the curriculum and student needs. In the Develop stage, the product was validated by subject and media experts. The Disseminate stage included distribution to arts teachers and students. Data analysis

used both qualitative and quantitative methods, with Likert scale testing for validity and practicality, and N-Gain for effectiveness (Al Ansyorie & Arisandi, 2018).

RESULT AND DISCUSSION

The development of gamified illustration drawing material based on an application was carried out using the Research and Development (R&D) method to evaluate the product's feasibility for eighth-grade students. Feasibility was assessed through evaluations by subject matter experts, media experts, and students. The model used was the 4D model by Thiagarajan, which includes the following stages:

1. *Define Stage*

In this stage, the researcher identifies problems through interviews and observations.

(1) Front-end analysis: focuses on eighth-grade students learning cultural arts through a flipped classroom model, but lacking interactive learning media. (2) Learner analysis: students have diverse learning styles, yet no media currently supports these variations. (3) Concept analysis: the Merdeka Curriculum is used with illustration drawing material to foster students' critical thinking and creativity. (4) Task analysis: students must answer questions correctly to proceed, and each slide cannot be replayed. (5) Instructional objectives: to understand illustration concepts, identify types and functions, and develop ideas both independently and collaboratively.

2. *Design Stage*

In the planning stage, the researcher develops the design of the application-based gamification device for illustration drawing material, which consists of three main sections: introduction, content, and conclusion, each with relevant subsections. This design is based on the information collected to determine the media and present a product that is effective and aligned with the students' needs and the learning objectives. The design process involves several steps to ensure the desired outcome.

2.1 Media Selection

This research results in the design of a gamified learning media in the form of an interactive application for illustration drawing material, aligned with the Merdeka curriculum, using Android technology and animations designed in Microsoft PowerPoint, and involving supporting media.

These media are divided into three criteria: 1) Media development, using Microsoft PowerPoint for creating learning media. 2) Media design, with Adobe Illustrator and Freepik used for designing and creating media. 3) Educational technology, using iSpring Suite 11 and 2 APK Builder Pro for creating e-learning content, converting it into an Android app, and utilizing YouTube for additional illustration drawing material understanding.

2.2 Product Presentation Format

The product is presented as a gamified, interactive application for illustration drawing, enabling students to easily access and engage with the learning content. The table below outlines the presentation format of this application.

Table 3. Presentation Format of Gamified Illustration Drawing Material Based on Interactive Application (Source: Personal Document)

Section	Description
Cover	Includes the material title, logos (Merdeka Curriculum, Universitas Negeri Malang), school level, start button, and exit button.
User Guide	Provides instructions for using the app, such as reading material, watching videos, reviewing summaries, and completing exercises. Important notes are

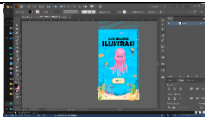
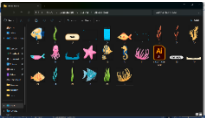
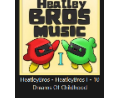
Section	Description
	included.
Agenda	Main menu contains material, video tutorials, summaries, and practice questions.
Material	Covers 10 main topics such as the definition, function, and types of illustration, illustrated with images to aid understanding.
Video Tutorial	Features a tutorial on how to draw illustrations, linked to YouTube.
Summary	A brief recap of the material with supporting images to enhance understanding.
Practice Questions	Contains 15 simple questions with feedback: positive response for correct answers and a "try again" button for incorrect ones.
Scoring	Displays scores once all questions are answered correctly.

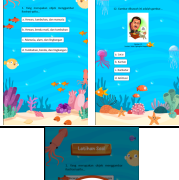
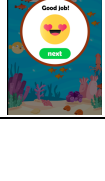
As shown in the table, the app consists of eight main sections designed to facilitate interactive learning, with images included to stimulate students' imagination. This app serves as an engaging out-of-school learning tool, increasing students' interest in learning illustration drawing.

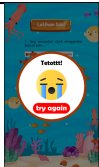
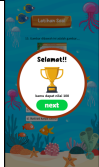
2.3 Product Design

In the design process of gamifying the illustration drawing material, various elements were created to engage students, based on insights from field observations. These elements were tailored to meet student needs, enhancing the learning experience and deepening understanding. Below is the design table for the development of the gamified interactive illustration drawing material.

Table 4. Product Design (Source: Personal Document)

Product Design	Description
 	The illustration for the gamified interactive application uses a marine life theme, with a large octopus as the app's cover icon. Marine life, such as coral reefs and various fish species, provides visually appealing imagery and can be animated as fun characters in the learning media.
	The app's cover display features an octopus character as the app's icon, with the title "Belajar Ilustrasi" (Learn Illustration) below the cover.
	The cover display includes the Kurikulum Merdeka logo, the Universitas Negeri Malang logo, the app title "Ayo Belajar Ilustrasi" (Let's Learn Illustration), and the user level, which is for SMP grade VIII.
	The selection of bright and colorful colors creates a cheerful impression, making the app more appealing, and users are less likely to feel sleepy when seeing these vibrant colors.
	Here is the music title obtained from YouTube for free; this music was chosen as the background music for the app because of its cheerful and playful theme, making it suitable for the oceanic atmosphere.

Product Design	Description
Berlin Sans FB Demi Calibri (Body) Comfy Feeling	The application uses 3 types of fonts: Berlin Sans FB Demi, Calibri (Body), and Comfy Feeling. The font size is adjusted according to the design needs and user requirements.
	The user guide provides steps: 1. Read and understand the material, 2. Watch the video, 3. Review the summary, 4. Complete the exercises. Notes: 1. Pages can only be visited once, 2. Skipped sections cannot be revisited. Click "Start" to proceed to the agenda.
	The agenda displays 4 main topics: material, video tutorial, summary, and exercises, with a "next" button to proceed to the next page.
	Here is the material menu section, presenting 10 main topics for students to read and understand carefully.
	One example of the material section is presented briefly and clearly to prevent students from getting bored and to make it easier for them to understand the material. The material is accompanied by supporting images to help students better understand and develop their creative imagination for illustration drawing.
	The bridge section is the part that connects the material to the video tutorial, and the video tutorial to the practice exercises.
	In the video tutorial menu, when clicked, it will directly show how to draw a cartoon illustration, specifically the character Squidward Tentacles from the Spongebob movie. If the video is clicked, it will open directly on YouTube, requiring a stable internet connection to maximize the learning experience.
	The summary contains a brief recap of the material, accompanied by supporting images to enhance students' understanding and imagination in creating illustrations.
	The quiz section contains multiple-choice questions with four options to assess students' understanding. Correct answers trigger a smiling reaction and a "next" button, while incorrect answers prompt a sad reaction and a "try again" button to encourage further learning.
	The correct answer reaction will automatically appear when the student answers correctly, allowing them to click "next" to proceed to the next question. This reaction is given to motivate students and make the exercise more engaging.

Product Design	Description
	The sad reaction will automatically appear if the student answers the exercise incorrectly. The "try again" button means the question will repeat until the student answers correctly.
	At the end of the lesson, students will receive a trophy as a sign that they have completed each stage diligently and answered the exercises correctly.

Based on the design table, the application combines character illustrations, theme selection, font choices, supporting images, tutorial videos, summaries, and practice questions. Its goal is to enhance students' knowledge and understanding by presenting concise and clear material, making it easier for students to grasp the information.

3. Develop Stage

The development of learning media meets students' needs through educational technology, which facilitates learning and improves performance by using appropriate resources (Salsabila & Agustian, 2021). During development, product validation is essential to ensure the media is suitable for students. Validation involves expert feedback to refine the product and assess its feasibility before field testing. Experts in content and media, including faculty from Universitas Negeri Malang and a teacher from SMP Islam Sultan Agung Sudimoro, review the product.

After expert validation, the product moves to field testing with eighth-grade students using pre-test and post-test methods. A questionnaire measuring the product's effectiveness is then completed. This testing evaluates the product's validity, practicality, and efficiency, with results from content experts presented in graphs.

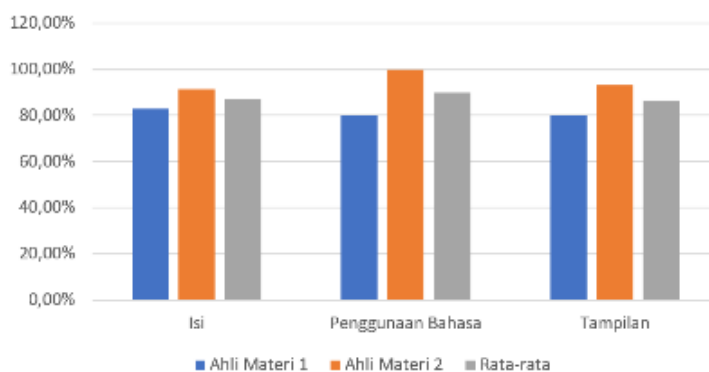
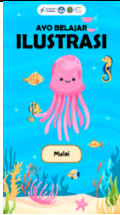


Figure 2. Results of Data Analysis for Content Validation Tests I and II (Source: Personal Document)

The content validation test for material experts covered three aspects: content, language use, and appearance. The content aspect averaged 87.14%, language use 90%, and appearance 86.67%, all rated highly valid. The overall average score was 81.87%, meeting the highly valid criteria. Expert recommendations are summarized in the table below.

Table 5. Product Revision Results After Content Expert Validation Test (Source: Personal Document)

Before Modification	After Modification	Description
		On the cover display, a description of the class and school level was added below the title.
		In the material section, the explanation was made more detailed, and illustrative image examples were added to make it more engaging and easier to understand.
		In the material explanation section with accompanying images, the source of each image used is cited.

The researcher has made improvements based on input from subject matter experts to enhance the quality of the application. The three main aspects improved are: 1) adding class and school level information on the cover, 2) developing the content in more detail and adding supporting images, and 3) including image sources in each section of the material.

After the content validation, the next step is a media evaluation by media experts to assess the feasibility and quality of the gamified illustration drawing material application. This evaluation aims to ensure that the application not only meets academic standards but is also engaging and interactive. Feedback from media experts is expected to enhance the application's design and interactivity. The following is a graph of the data analysis results from the first and second media expert evaluations.

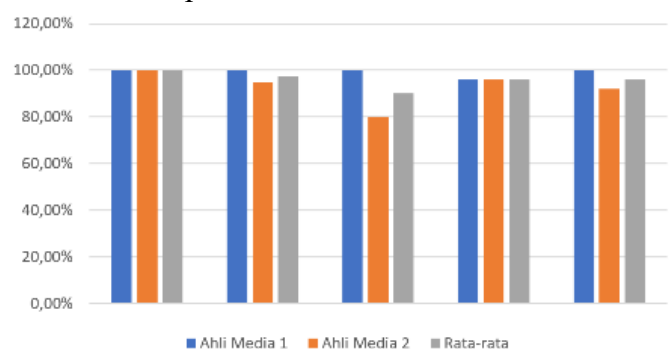
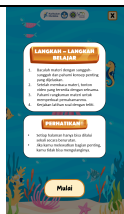
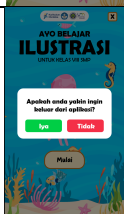


Figure 3. Data Analysis Results of Media Validation Test I and II (Source: Personal Document)

Based on the graph, the media validation test covers five aspects. The Navigation aspect scored 100%, Text scored 97.50%, Language scored 90%, Appearance scored 96%, and Media Presentation scored 96%. Overall, all aspects were considered highly valid, with average scores as follows: Navigation 100%, Text 97.50%, Language 90%, Appearance 96%, and Media Presentation 96%. The input and recommendations from Media Experts I and II regarding the developed product can be seen in the following table.

Table 6. Product Revision Results After Media Expert Validation Test (Source: Personal Document)

Before Modification	After Modification	Description
		Here is the translation: After the cover, a page is added that explains the learning guide and media usage instructions.
		Here is the translation: On the cover display, an "X" button is added at the top right corner, indicating an option to exit the application.
		Here is the translation: In the menu display, the order has been changed to "Agenda," which includes the main stages of the media: material, tutorial video, summary, and questions at the end.

The researcher revised the product based on media expert feedback to improve quality. Key changes include: 1) adding a learning guide after the cover, 2) an "X" button to exit the app, and 3) rearranging the menu to material, tutorial video, summary, and questions. Next, a practicality test was conducted with eighth-grade students using questionnaires to assess the application's usability and effectiveness. The graph below shows the results of this test.

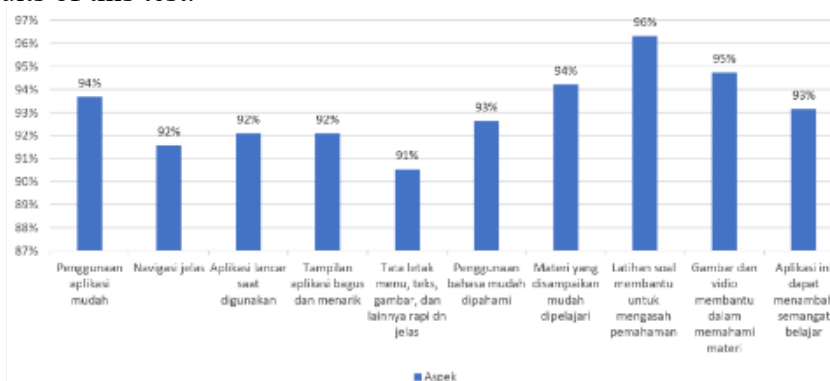


Figure 4. Graph of Practicality Test Results (Source: Personal Document)

Here's the translation and shortened version: Based on the graph above, the researcher conducted a practicality test of the gamified illustration drawing material using 10 aspects. The scores are as follows: 1) Easy app use (94%); 2) Clear navigation (92%); 3) Smooth app performance (92%); 4) Attractive display (92%); 5) Organized layout (91%); 6) Easy-to-understand language (93%); 7) Learnable content (94%); 8) Helpful exercises (96%); 9) Visual aids support understanding (95%); 10) Motivates learning (93%). All aspects were rated very valid, with an average score of 93%.

After the practicality test, the next step is to assess the app's effectiveness in measuring students' knowledge after using the gamified illustration drawing material. The effectiveness can be calculated using the N-Gain formula. Below is the graph showing the analysis results of the effectiveness test on eighth-grade students' knowledge after using the

gamified application for illustration drawing material.

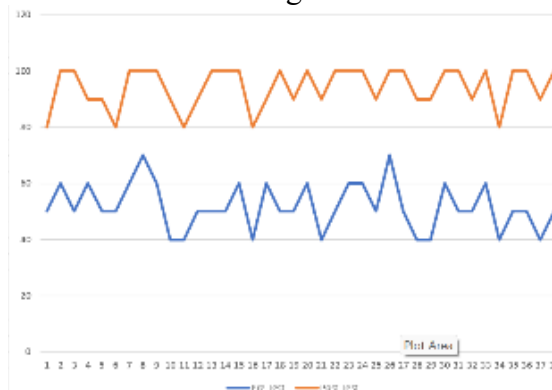


Figure 5. Data Analysis Results of Knowledge Effectiveness Test (Source: Personal Document)

The effectiveness test measured students' understanding through pre- and post-tests using interactive gamified illustration material. Pre-test scores ranged from 40 to 70, while post-test scores improved to 80–100. The test included 10 multiple-choice questions (10 points each), designed based on Bloom's Taxonomy. The graph below shows 8th-grade students' comprehension scores using the N-Gain formula.

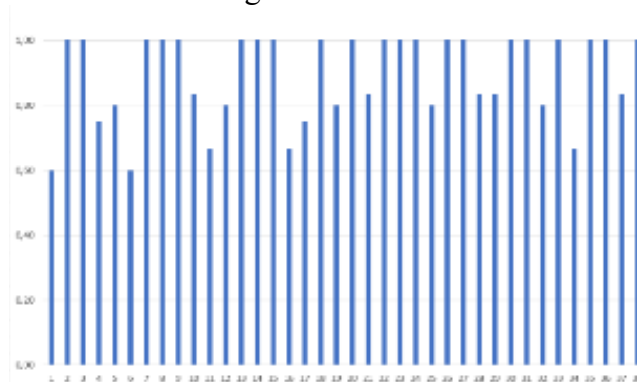


Figure 6. Data Analysis Results of Knowledge Effectiveness Test (Source: Personal Document)

Based on the N-Gain analysis, the average score of 0.89 indicates a high level of effectiveness. This shows that the interactive gamified illustration material significantly improved students' knowledge comprehension.

4. Disseminate Stage

The dissemination stage involves sharing the developed product with other users. In this study, the gamified illustration drawing material based on an interactive application was distributed on a limited scale by the researcher, specifically to art and culture teachers and eighth-grade students at SMP Islam Sultan Agung Sudimoro.

Discussion

This study aims to develop a gamification-based interactive application for illustration drawing material for eighth-grade students at SMP Islam Sultan Agung Sudimoro. The application is designed to support the curriculum and meet students' needs, allowing them to learn independently using technology. It serves as an engaging and efficient learning media, utilizing Microsoft PowerPoint to present the material interactively (Warkintin & Mulyadi, 2019). This gamification offers content accessible on various devices and is more efficient than printed books, enabling students to learn anytime and anywhere (Lestari et al., 2019).

In the problem definition stage, interview and observation results showed that teachers need interactive learning media that integrates technology for independent learning. Currently, learning materials rely on printed books and unengaging digital summaries. With the gamification-based application, students can learn independently with available guidance and assess their understanding through game-based quizzes (Hayati & Wathon, 2018).

The application provides four main menus: illustration material, video tutorials, material summaries, and game-based quizzes. Each element is designed to enhance student motivation and engagement. Visual elements, such as colors, fonts, animations, and music, are also chosen to capture students' interest in learning. The validity test results indicate that the application is highly valid, with an average score of 87.5% from subject matter experts and 96.32% from media experts. Practicality testing with students scored 93%, and effectiveness testing using the N-Gain formula showed an average score of 0.89, indicating that the application is highly effective ($N\text{-Gain} > 0.7$).

CONCLUSION

The development of gamification based on an interactive application aims to increase independent learning interest and measure the knowledge of eighth-grade students at SMP Islam Sultan Agung Sudimoro regarding illustration drawing. This is driven by the lack of interactive learning resources that can enhance students' understanding, as they tend to get bored with monotonous learning and rely on printed books. Using the Merdeka Curriculum, this application is designed with consideration of students' learning styles and utilizes animation-based Microsoft PowerPoint. The application includes materials, tutorial videos, summaries, and practice questions. The validation results show that the application is highly valid (87.5% from subject matter experts, 96.32% from media experts), and the effectiveness test shows a score of 93% and an N-Gain of 0.89, indicating that this application is effective in improving students' understanding.

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