

DEVELOPING GAME-BASED LEARNING ON UNITY IN DIVERSITY USING GAMEMAKER STUDIO

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Abstract

Learning “Unity in Diversity” is hard to implement. Students are bored with what the teacher says. Learning is not enjoyable, especially for the young generation. In an increasingly diverse world, fostering an understanding and appreciation of different cultures, perspectives, and backgrounds is paramount. This article introduces the development of a game-based learning approach to promote diversity education, using GameMaker Studio as the primary development tool. With the potential to reach and engage a broad audience, game-based learning offers a unique platform to explore and celebrate diversity. This article outlines the critical components of the development process, from conceptualization to implementation, highlighting the advantages of using GameMaker Studio. The article discusses the significance of incorporating technology and gamification into diversity education and offers insights into the practical implementation of such educational games. Developing the application, the researcher conducts qualitative approaches to the Game Development Life Cycle (GDLC), which contains six stages: initiation, pre-production, production, testing, beta, and release. It is the utmost hope that the new game-based learning model could facilitate more accessible, more fun, and exciting things, especially for youth. Research findings show that mobile-based learning, including games, are the most feasible model to be implemented.

Keywords: game-based learning, Unity in Diversity, GameMaker Studio, gamification, multicultural awareness, technology in education

I. INTRODUCTION

Behavior and learning are an act of communication in which human beings intentionally make their presence known to each other, to show attention to, and to suggest a type of relationship (usually cordial) or social status (formal or informal) between individuals or groups of people encountering each other. Greetings are sometimes used just prior to a conversation or to greet in passing, such as on a sidewalk or trail. While greeting customs are highly culture and specific situation and may change within a culture depending on social status and relationship [1], they exist in all known human cultures. Greetings can be expressed both audibly and physically, and often

involve a combination of the two. A greeting, or salutation, can also be expressed in written communications, such as letters and emails.

On a global scale, we read in an incredible pace like never before. We spend a great deal of time glued to a screen, reading digital media, social networks, and other discussion forums. [3]. Although the internet is considered a crucial part of contemporary life, it also represents the state of emergency in risky behavior. Many studies show that people can be addicted to the internet, resulting in harmful effects on social behaviors, habits and abilities [2]. Young children need to experience a wide range of pedagogical approaches including play in all its forms, to ask their questions, to initiate, to investigate and move beyond the ‘religion lesson circle’ into, in, though, across and around the environment. There are still many identified and unidentified challenges awaiting.

The concept of quality in education is complex and multidimensional and has been defined in a variety of ways in different contexts by different stakeholders. Defining what quality means in higher education is hindered by the complexity of educational theory and practice. Different stakeholders, from practitioners and students to professional bodies and society in general have broad and competing views as to how they perceive quality to be [1]. These provide the impetus for the need to have continued quality improvements in the different educational processes.

The profile of youth changes over time, and the nature of parenting and community involvement deviates as well. However, the teaching methods in schools and universities is just about the same, with little understanding of how big the generation gap is [1]. How young people learn is arguably linked to their future opportunities and well-being. For this reason, it is critical to identify each generation in how they process the world around them, how they engage with authority, how this impacts the family and the community, and what should be done to maximize the likelihood of them achieving their goals. A number of concepts have been brought together in an attempt to find teaching opportunities in the diverse and complex influences on the learning processes of the 21st century learner. We shall focus on three generations: Generation X (Gen X, 1965–1985); Generation Y (Gen Y, 1978–2000), also known as the Millennials; and Generation Z (Gen Z, 1995–2012) [3]

A. Digital Learning

Digital learning, or e-learning, is an educational approach that leverages digital technologies to deliver and enhance the learning experience [4]. It encompasses various online tools, resources, and platforms, allowing students to access educational content and interact with instructors and peers virtually. Digital learning removes the constraints of traditional classroom settings, enabling flexible, self-paced, and personalized learning. It can involve various media, such as video lectures, interactive simulations, digital textbooks, and collaborative online spaces. This approach not only expands access to education but also promotes engagement, interactivity, and adaptability, making it a crucial component of

modern education, especially in an increasingly connected and technology-driven world.

1. Why are games used for learning?

The greatest takeaway from technology has become a valuable lesson in how to deliver a more powerful, memorable learning. While these principles came out of hearing people speak, nowadays they apply across many mediums [5]. People want to hear positive, life-affirming things. They want optimism, hope, belief. They want the art of possibility. Give people an idea or dream of how life COULD be, if only we took action, or changed our behavior. Rally people around a common vision.

An estimated 62.9 percent of the population worldwide already owned a mobile phone in 2016. The number of mobile phone users in the world is expected to pass the five billion people by 2019. The mobile phone penetration is forecasted to continue to grow, rounding up to 67 percent by 2019 [6].

B. Diversity

Pancasila is the official foundational philosophical ideology of Indonesia [7]. The word “Pancasila” is derived from Sanskrit and means “Five Principles.” These five principles, as outlined in the preamble of the Indonesian Constitution, are:

1. Belief in one supreme God: This principle emphasizes the belief in a single, all-powerful God, although it is open to various religious interpretations.
2. Just and civilized humanity: This principle promotes the values of justice, humanity, and civilization in Indonesian society.
3. Unity of Indonesia: This principle emphasizes the importance of national unity and the integrity of the Indonesian state.
4. Democracy guided by the inner wisdom in the unanimity arising out of deliberations amongst representatives: This principle supports a democratic system in which decisions are made collectively through deliberations and the guidance of wisdom.
5. Social justice for all Indonesian people: This principle underscores the commitment to social justice and equitable distribution of resources for all Indonesians.

Pancasila serves as the philosophical foundation for Indonesia's national ideology, guiding principles, and governance. It was formulated to promote unity, tolerance, and social justice in a diverse and multi-ethnic nation. This article introduces the development of a game-based learning approach to promote diversity education, using GameMaker Studio as the primary development tool. With the potential to reach and engage a broad audience, game-based learning offers a unique platform to explore and celebrate diversity.

II. RESEARCH METHOD

A. Method

This study uses Game Development Life Cycle (GDLC) [8], a game development method with stages that are carried out systematically to build a digital game and consists of several stages as in Figure 1. Development is carried out by game developers, who are usually between one person to a large game industry [6].

Game Development Life Cycle covers six phases, including: (1) Initiation. The developer determines the type of game to be made; (2) Pre-Production. Before a game is produced, it needs to be made: (a) Game Design Document. The document covers all aspects that are close to reality, so the making of the game includes aspects of prototype; (b) First prototype. At this stage a prototype is created that allows you to develop a method which fully implements your ideas; (c) Bug fixing and balancing. Identify bugs and overcome them in programming; (3) Production. In this stage, making game assets and source code is made. The results of this stage are games that can be played in the form of: (a) Formal Details prototype - a game that can be played with win-lose rules, the relationship between views, and works well; (b) Refinement prototypes - most mature prototypes only require beautifying work and are almost perfect to market; (4) Testing. Thorough evaluation of the game in seeing its suitability in appearance, values, concepts, and design. Testing is done to determine whether the game can run well, after programming. The result of this stage is that all bugs must be removed, or changes made in the programming; (5) Beta. Beta testing is done by several stakeholders for general use. Many developers do this testing by distributing their products widely through on-

line, so that more input is obtained. The result of this stage is the readiness of the game to be marketed; (6) Release. In this stage several things are done namely bug fixes, special show premiere, marketing, community management.

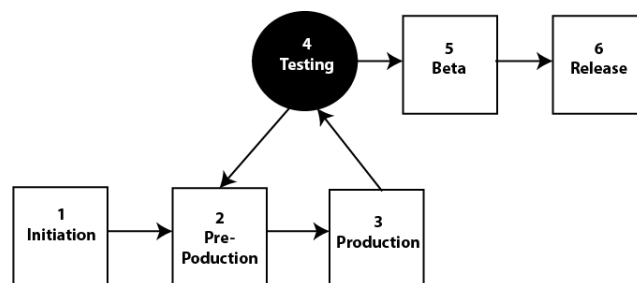


Figure 1. Game Development Life Cycle [8]

B. Research Location

The research was conducted at Senior High School Medan from January to July 2023. This location provided an ideal environment to engage with students and teachers, who played a crucial role in the development and evaluation of game-based learning content focused on diversity and multicultural awareness. By collaborating with this educational institution, the study aimed to gain valuable insights into the practical application and impact of game-based learning on diversity in a school context. The active participation of students and teachers in the research ensured that the developed educational games aligned with the educational needs and expectations of the local community.

C. Research Object

The research object of this study is game-based learning centered around the theme of "Unity in Diversity." To promote multicultural awareness, foster inclusivity, and celebrate diversity, the study focuses on the development, implementation, and evaluation of educational games. These games are designed to provide an interactive and engaging learning experience for students, enabling them to explore and appreciate various aspects of diversity, including cultural pluralism, religious harmony, language diversity, traditional practices, and cultural heritage. The primary goal of this research is to assess the effectiveness of game-based learning as a tool for instilling the values of unity and diversity, particularly within the context of Pancasila, the philosophical foundation of Indonesia.

D. Data Analysis

The data is analyzed using the analytical descriptive method and interpreted in a narrative way based on the research findings. Analyzing and data processing carry out with six stages including data gathering, preparing data for analysis, careful reading, developing the code, presenting the data and analyzing the data [9]. The data is collected from interviews and questionnaires with details: (1) Questionnaires with open-ended questions are used to find useful information that supports the theory, the information is needed for model development, information on whether a student can perform the command to play the game-based learning on Unity in Diversity, as well as assessing the quality of the learning model that is developed, (2) Interviews with open-ended questions are used, hence respondents can give information that is not limited from different perspective. Depth interviews are necessary to obtain data about the product and the learning process to play the game. All interview transcripts are stored in text documents; (3) Observations are conducted to obtain data about the learning process while playing the game.

III. RESULTS AND DISCUSSION

A. Initiation

The first phase of Game Development Life Cycle data collection was conducted using open-ended questionnaire and interview in three cities. The respondents were mostly students with smartphones and gave answers to these questions in Table 1.

Table 1. Questionnaires used in the first phase

1. If you compare digital learning with printed one, could you explain which one is interesting and easy to use?
2. How do you find resource learning? There are many methods as reading books, watching television, browsing information using smartphones?
3. People need interactive media using smartphones, playing augmented reality, and games, but some people still like printed books. How about you?
4. According to your opinion, which parts of text of learning is interested to you?
5. According to your opinion, which parts of text of learning is not interested to you?

Data was collected from students and teachers. After processing the data using NVivo qualitative data processing software, the greeting model

may be designed. In answering the questions in Table 1, most of the respondents stated the following statements in Table 2.

Table 2. Research findings after data processing

1. Most of the respondents prefer internet and social media over book and printed media.
2. Most respondents prefer searching information through smartphones.
3. Most of respondents always use smartphone for everyday activities, getting information for enhancing their knowledge, and sending message.
4. Almost all respondents agree that the image of the learning is interesting.
5. Many respondents are not fond of the long text in the learning.

B. Pre-production

During the second phase of Pre-production, the research focuses on the critical task of conceptualizing the applications that will be developed and creating a detailed storyboard design. This stage lays the foundation for the development process, guiding the direction in which the applications will be built. Conceptualization involves identifying the core ideas, goals, and functionalities that the applications should encompass, aligning them with the overarching theme of promoting unity in diversity.

Storyboard design, on the other hand, delves into the visual and structural representation of how these applications will unfold. It outlines the sequence of interactions, the flow of content, and the integration of various elements, such as images, text, animations, and interactive features.

1. Game design document

Based on the research findings and discussion of the researchers and clients, the learning model would be formed as described in Table 3.





Table 3. The concept of digital learning application

Object	Description
User	Children, Youth
Topics	<ul style="list-style-type: none"> - Pancasila as the Foundation: - Cultural Pluralism: - Religious Harmony: - Language Diversity: - Traditional Practices: - Cultural Heritage:
Application	Mobile game <ul style="list-style-type: none"> - Mobile game will be able to be download from Play Store
Multimedia object	image, animation, text
Interactivity	Games, using button, touch screen
Character style	Created based on Indonesian stylw

2. First prototype

Storyboards were used to present the whole story of the application. An example of a storyboard can be seen in Table 4.

Table 4. Storyboards

Scene	Elements	Objective
	Start: Pancasila as the Foundation Button: Start and Exit Description: Players should click Start button to start playing.	Explore the principles of Pancasila and how they promote the idea of Unity in Diversity. Discuss how these principles form the basis for Indonesia's national identity.
	Cultural Pluralism Image: Indonesian culture Button: Check button Description: Players should search the number symbol that corresponds to the culture.	Investigate the rich cultural diversity of Indonesia, including traditional arts, music, dance, clothing, and cuisine. Highlight how this cultural pluralism contributes to the nation's uniqueness.
	Religious Harmony Image: Religiosity environment Button: Check button Description: Players should search the number symbol that corresponds to the religion.	Discuss the coexistence of multiple religions in Indonesia, such as Islam, Christianity, Hinduism, Buddhism, and indigenous beliefs. Examine how religious tolerance is a core aspect of Pancasila.
	Language Diversity Image: People with different languages Button: Check button Description: Players should search the number symbol that corresponds to the language.	Indonesia is home to hundreds of languages and dialects. Explore how Bahasa Indonesia became the official language, unifying the nation's linguistic diversity.

C. Production

The third phase Production was the stage that the preliminary game was produced. GameMaker Studio 2 was used to produce the game, that the display can be seen in Figure 2, Figure 3, and Figure 4. GameMaker Studio 2 is the latest and greatest incarnation of GameMaker [10]. It has everything you need to take your idea from concept to finished game. With no barriers to entry and powerful functionality, GameMaker Studio 2 is the ultimate 2D development environment [11] [12].

Figure 2 in the context of your description, which displays the first scene's content with an image of the Indonesian flag and a title. The image of the Indonesian flag is a powerful symbol of the nation's identity and unity. Analyze how the use of the flag in the first scene connects with feelings of patriotism and pride among the audience, which is an essential aspect of fostering

national identity. Using an image of the flag in the first scene indicates the importance of visual communication. Examine how visual elements, such as the flag's design and colors, contribute to conveying the learning of unity, a fundamental aspect of the Indonesian national spirit.

Figure 3, which shows the table of contents of the game, provides insights into the themes and topics covered in the game, aligning with the principles of Pancasila. The table of contents reflects a structured approach to understanding the diverse facets of Indonesian society and culture through the lens of Pancasila. Each section likely offers educational content, interactive elements, or storytelling related to the topic. By exploring these sections, the game aims to engage players in a comprehensive exploration of Pancasila's principles and their real-world manifestations in Indonesia's cultural, religious, and linguistic diversity.

Figure 4 depicts one of the games within the broader context of the virtual environment dedicated to exploring Pancasila's principles and Indonesia's cultural diversity. Specifically, the game displayed in the figure is a matching game, where players are likely presented with a set of images or concepts and must match them to corresponding pairs. Matching games are often designed to challenge players' memory, concentration, and problem-solving skills while reinforcing educational content. In the context of this virtual environment, the matching game may serve as an interactive and engaging way to reinforce the understanding of Pancasila's principles or other cultural aspects covered in the game's content. Players might be tasked with matching concepts related to Pancasila with their descriptions or matching images of cultural practices with the correct terms.

Matching games [13] are a popular choice for educational games because they encourage active learning and provide immediate feedback to players. As players successfully match pairs, they reinforce their knowledge of the subject matter. It's an effective way to make learning fun and interactive. By incorporating a matching game into the virtual environment, the creators aim to enhance players' comprehension of Pancasila and Indonesia's cultural diversity, providing an engaging and enjoyable educational experience.



Figure 2. First display of the game



Figure 3. Display the table of content

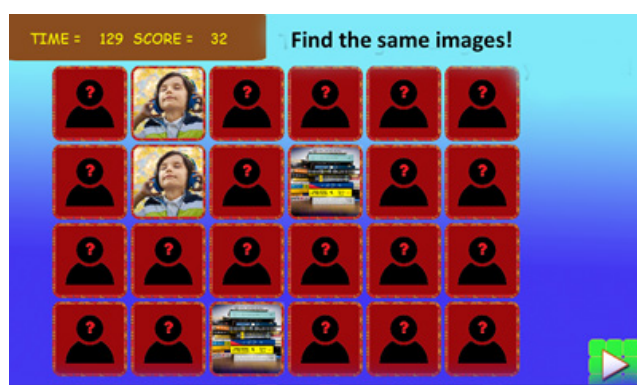


Figure 4. Display the table of content

D. Testing

The fourth phase Testing was the stage that the preliminary game was tested. The evaluation of preliminary product was conducted by subject matter expert in education technology, computer science, and social science, individual testing, and testing of small groups, then the product was revised. Table 3 shows the questions that should be used by subject matter expert to evaluate the application.

Table 3. Questionnaires used in the first phase

1. Is the content organized well in order completing the topic?
2. Does the graphic interface meet the principle of graphic design?
3. Does the flow of information meet the general user requirement?
4. Can user access the scene they need in proper time without an error?
5. Can the application run on variety of mobile device?
6. Can the application run on mobile device anywhere?
7. What is the feature to be improved?

As a result of answering the above questions, the expert of three kinds of fields namely education, information technology, and computer science can be seen in Table 4.

Table 4. Answers of questions in the first phase

1. The content organized well
2. Most of respondents stated that the backgrounds and text looked good. It would be better if the resolution of images could be improved.
3. Most of respondents stated that the flow of information was moderate.
4. Most of respondents stated that the user can access the application moderately. The application could not be accessed using internet network. One of the experts was not sure if it would run on mobile phone using internet well without delay. Audio and image should be synchronized.
5. Unfortunately the application cannot run on mobile device easily. Some users do not know how to install the file with APK format on their mobile device.
6. The application can be accessed anywhere using internet network, unless the bandwidth is too low. But it is good including the multimedia content access.
7. The application could be built in the APK format and published at Play Store and AppStore, so audience can download using their mobile phone easily.

As a result of the Testing phase, the application should be revised and fix the problem based on the evaluation.

E. Limitations of Research

Limitations of research in model development: (1) The research and development that consists of five phases is still in progress, and only the first until fourth phase was conducted: and (2) The fifth and sixth phase will be conducted after the application will have been revised.

IV. CONCLUSION

Based on the objectives and the results obtained in this initial study, it can be concluded as follows:

- (1) The information derived from the initial research is used as a guideline for developing mobile learning.

- (2) The Developing Game-based Learning on Unity in Diversity using GameMaker Studio based on Game Development Life Cycle that consists of five phases.
- (3) The first until fourth phase has been conducted. The research findings show that game-based learning is a model of learning that can be implemented.

For future work, the Game-based Learning model needs to be developed in the next phases.

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