IMPLEMENTATION AND EVALUATION OF INTERACTIVE EDUCATIONAL GAME OF WADAI BANJAR AS AN EFFORT TO PRESERVE TRADITIONAL CAKES OF SOUTHERN KALIMANTAN

Aulia Akhrian Syahidi\textsuperscript{1}\textsubscript{1}, Rizky Pamuji\textsuperscript{2,3}\textsubscript{2}, Nuruddin Wiranda\textsuperscript{3}\textsubscript{3}

\textsuperscript{1}\textsuperscript{1}Program Studi Sistem Informasi Kota Cerdas, Politeknik Negeri Banjarmasin
\textsuperscript{2,3}\textsuperscript{3}Program Studi Pendidikan Komputer, Universitas Lambung Mangkurat
Jl. Brigjend H. Hasan Basri, Kota Banjarmasin, Kalimantan Selatan 70123, Indonesia

\textsuperscript{1}aakhriansyahidi@poliban.ac.id\textsuperscript{1}, \textsuperscript{2}rizky.pamuji@ulm.ac.id\textsuperscript{2}, \textsuperscript{3}nuruddin.wd@ulm.ac.id\textsuperscript{3}

\textbf{Corresponding Email: aakhriansyahidi@poliban.ac.id}

\begin{abstract}
When tourists visit an area, they will definitely look for food and cakes typical of the area to taste or as souvenirs. Including when tourists visit South Kalimantan, tourists will also look for special cakes often called Wadai Banjar, there are various types of Wadai Banjar and must be preserved. Among the younger generation now, Wadai Banjar must also be introduced and strived to be preserved. Based on the information, the purpose of this research is to design, developing, and evaluating the Wadai Banjar educational game. The method used is the Game Development Life Cycle (GDLC) which consists of initiation, pre-production, production, testing, beta, and release, followed by an evaluation of the use of the game application. A total of 100 users have been involved in evaluating the use of the application. The result of this study is that the educational game that has been designed and built can function according to the features provided and can be released to users. The evaluation of use provides results that the Wadai Banjar educational game application can provide fun, comfort, a fitting and attractive user interface, can find out and learn in recognizing the types of Wadai Banjar, useful and as an effort to introduce and preserve traditional cakes typical of South Kalimantan. Then as many as 70 users are more interested if this Wadai Banjar educational game is desktop-based, because interaction is more flexible and a mouse is needed as the main input media in performing actions.

\textbf{Keywords:} usage evaluation, game development life cycle, educational game, traditional specialty cakes, game mechanics, mobile games.

\section{INTRODUCTION}

The tourism sector is now seen as a key sector in driving sustainable economic growth [1], [2]. The Indonesian government is focusing on expanding the tourism sector and hopes that this sector will become the foundation of the Indonesian economy, ultimately making Indonesia a developed country by 2045 [3]. Including in South Kalimantan, the tourism sector is expected to drive the economy of the South Kalimantan community, this is also in line with the statement from Commission II on Economics and Finance of the South Kalimantan Regional House of Representatives (DPRD) which hopes that the tourism sector in South Kalimantan can become a driver of the community's economy [4].

South Kalimantan itself has a lot of potential that can be utilized to attract local and foreign tourists. One of them is the traditional cake of South Kalimantan which is often referred to as Wadai Banjar. Based on Imania in her research [5] say that which states that traditional cakes can usually be served at traditional ceremonies such as birth, marriage, or death. The cakes served are certainly not arbitrary. The types of cakes served at the ceremony have certain meanings and purposes. According to Rahmawati [6], there are 41 types of typical South Kalimantan traditional cakes or Wadai Banjar that have their own meaning, purpose, and cultural value. These are special cakes that have been passed down from generation to generation. The different colors of the cakes also symbolize the meaning of life for the South Kalimantan people.

But along with the times, this typical cake is increasingly less recognized by local residents and from outside the island of South Kalimantan [7]. This is also in line with the results of interviews with several local South Kalimantan residents and tourists outside South Kalimantan, they stated that they were less familiar with Wadai Banjar and its types. Therefore, it would be unfortunate if its existence is no longer known by its citizens. If this traditional regional specialty cake is not preserved, it will be endangered and only become a legend.

According to Nazmi, Subiyakto, & Handy's research [8], this shift is also due to the fact that the younger generation prefers modern cakes over traditional specialties, as a result it will also have an impact on the shifting position of this traditional specialty cake. Another reason is the lack of regional efforts to promote traditional
specialties, resulting in less well-known traditional specialties and starting to be influenced by modern/foreign cakes [9]. Actually, regional efforts in South Kalimantan to preserve Wadai Banjar during the month of Ramadhan, where there is a Ramadhan market that sells Wadai Banjar, but the effort is still not optimal.

So, one of the steps to preserve it is to socialize it to the community through media that is interesting, acceptable to all circles, and recommended to utilize the latest technology so that they get to know and love the heritage of traditional cakes. The form of continuous socialization to preserve Wadai Banjar can be recommended through various efforts, one of which is in the form of game applications. Some similar studies that propose a form of game application to preserve traditional cakes [10] who designed and built a simulation game to introduce and preserve traditional cakes typical of West Java using the MDA Framework (Mechanics-Dynamics-Aesthetics) approach. This simulation game has an interaction that users will mix ingredients based on the appropriate flow so that they can produce the desired traditional cakes such as Kue Awug, Kue Gemblong, and Ali Agrem. The results of their research show that this simulation game can function and be recommended as a medium for cultural preservation in the field of regional culinary specialties.

Furthermore, research from developed an educational game application to introduce regional culture in South Kalimantan, especially Wadai Banjar with game mechanisms in the form of material introduction and simulation quizzes in the form of guessing words in Banjar language, guessing the type of cake by dragging and dropping, and guessing through true or false [11]. It also records the interactions made by users using data log media.

The results of their research show that the developed media can strive to preserve and introduce Banjar Culture. Then, other research from who built a game application as an educational media on how to make and cook traditional Indonesian snacks such as Kue Cucur, Kue Klepon, Kue Galang, Kue Lontar, and Es Pallu Butung [12]. Role Playing Game (RPG) based game interaction and the Finite State Machine (FSM) method which presents the process of how to make and cook these traditional snacks. The results of their research show that when the game is used almost all users cannot do the process of making and cooking correctly, then it can increase efforts in understanding the process of making and cooking these traditional snacks.

Based on some of the research that has been described, the objectives of this study are to design and build an application called the Wadai Banjar educational game based on desktop and mobile devices with interactions, namely users recognizing the names of Wadai Banjar and then users acting as Wadai Banjar traders to serve customer requests, after the game is used then an evaluation of its use is carried out to determine the resulting interaction and recommendations for efforts to introduce and preserve Wadai Banjar through the application that has been built.

II. METHOD

The method used in this research is the Game Development Life Cycle (GDLC), adapted from the model developed by Ramadan & Widyani in 2013 [13]. The stages of the GDLC can be seen in Figure 1. The GDLC is a guideline that covers the game development process. We chose the GDLC model developed by Ramadan & Widyani (2013) because it ensures quality and successfully produces high-quality games. Other types of GDLC models are discussed more generally and do not provide the same level of detail as the derivative stages of the GDLC we selected.

The main principles of the GDLC model we chose emphasize clear stages, implementing an iterative approach to allow for higher flexibility to changes during game development, and meeting the quality criteria of each prototype stage to maintain the quality of the final product.
The general explanation of the GDLC stages presented in Figure 1 are as follows:

1. **Initiation**: This is the first step that must be taken in creating a game, which is to develop a rough concept of what kind of game will be made. The output of initiation is the game concept and a simple game description (which can be presented in the form of a wireframe or storyboard).

2. **Preproduction**: This is one of the first and most important phases in the production cycle. Pre-production involves creating and revising game designs and developing game prototypes. Game design focuses on defining the game genre, gameplay, mechanics, storyline, characters, challenges, fun factors, technical aspects, and documenting all elements in the Game Design Document (GDD). Pre-production ends when revisions or changes to the game design have been approved and documented in the GDD. When discussing game mechanics, gameplay, and game experience [14], these three elements are crucial in a game. Game mechanics focus on the rules in the game and have an objective nature, gameplay focuses on the actions that players can take in the game and has an objective nature, and the relationship between game mechanics and gameplay is arranged in such a way that it has an impact on the game experience, which focuses on users's experience while playing the game and has a subjective nature. The relationship between these three elements can be seen in Figure 2.

3. **Production**: This is the core process that revolves around asset creation, source code development, and the integration of both elements. The related prototype in this phase is the formal detailing and refinement.

4. **Testing**: In this context refers to internal testing, usually related to functionality testing. The output of testing is bug reports, change requests, and development decisions. The results will determine whether it is time to move on to the next phase (Beta) [15] or to repeat the production cycle. During this phase, efforts are also made to minimize errors and improve the quality of the game as quickly as possible.

5. **Beta**: This is the phase for conducting third-party or external testing, also known as beta testing. Beta testing still uses the same testing method as the previous testing method, which tests functionality, as the related prototype in beta testing is the formal detailing and refinement. There are two types of tester selection methods: closed beta and open beta. Closed beta only allows invited individuals to participate, while open beta allows anyone who registers to participate.

6. **Release**: This is when development has reached its final stage and is ready to be released to the public. Release involves product launch, project documentation, and planning for maintenance as well as the expansion/evolution of the game.

After the application is released, end-users are given the opportunity to use the Wadai Banjar game on either a desktop/laptop or mobile device. Afterwards, when they finish interacting with the game, end-users in this section become respondents to evaluate the use of the game. A questionnaire tool is used to evaluate it, with the question items adapted [16], consisting of eight questions.

The respondents use answer options with a Likert scale or a closed-ended recommendation choice. For questions 1 to 7, we ask respondents to answer using a Likert scale, where 4 = Strongly Agree, 3 = Agree, 2 = Disagree, and 1 = Strongly Disagree. For question 8, we ask respondents to choose between 3 = desktop-based and mobile-based, 2 = mobile-based, or 1 = desktop-based. After that, each result from the answers to questions 1 to 7 is given a conclusion with reference to the final result category of the average value, which is 1.00-2.00 = Very Poor, 2.01-3.00 = Poor, 3.01-3.50 = Good, and 3.51-4.00 = Very Good. For the conclusion on question 8, we look at the highest value as the recommendation result.

### III. RESULTS AND DISCUSSION

#### A. Initiation

The researcher has discussed with the team from South Borneo Province Tourism Office and also the Wadai Banjar traders in Banjarmasin. As a result, the concept of this Wadai Banjar game was developed, which in general is to provide knowledge about the types of Wadai Banjar and then interact by serving customer requests, so that it can be attempted to identify and remember the types of Wadai Banjar. A brief storyboard of the game can be seen in Figure 3, which consists of six scenes. Scenes four and five will repeat the same scene but adjust to the level, as it will be related to the types of Wadai Banjar presented and the success text for the
mission at each level.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|}
\hline
\textbf{Scene: 1} & \textbf{Scene: 2} & \textbf{Scene: 3} \\
\hline
\textbf{Game Edukasi WADAI BANJAR} & \textbf{Game Edukasi WADAI BANJAR} & \textbf{Jenis-Jenis Wadai Banjar} \\
75% & Mulai & Deskripsi Wadai Banjar (makna, nilai budaya, rasa, dan lainnya) \\
\textbf{Kembali} & \textbf{Kembali} & \textbf{Kembali} \\
\hline
\end{tabular}
\caption{Figure. 3. Story board game}
\end{table}

**B. Preproduction**

At this stage, we have determined the genre of the game, gameplay, mechanics, storyline, characters, challenges, fun factor, and technical aspects, each presented in Table 1.

**Tabel 1. Preproduction Aspect**

<table>
<thead>
<tr>
<th>No.</th>
<th>Pre-production elements</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Genre Game</td>
<td>• <strong>Educational</strong> (Educating game users)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The player performs actions by pressing all available buttons.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• In Scene 3, users's action is to learn about the types of Wadai Banjar and then move on to the next type.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• In Scene 4, users's action is to check the types of Wadai Banjar along with the requested quantity, and then perform a drag-and-drop action by quickly and accurately moving the Wadai Banjar object onto the customer's plate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• In Scene 5, users's action is to receive feedback on the success of the mission at the current level. If time runs out and there are still outstanding requests, users is required to repeat the mission until it is correct. If it is correct, users can proceed to the next level.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Scene 6 marks the end of the gameplay, where users receives a notification of the completion of all missions, views the final score, and ensures that they have contributed to the effort to recognize and preserve Wadai Banjar.</td>
</tr>
<tr>
<td>2</td>
<td>Gameplay</td>
<td>• The game system is set up through a random generation process that can generate requests for types and quantities of Wadai Banjar that users must take.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Users are given a total of 300 seconds (5 minutes) to complete each level by quickly and accurately adjusting the request and type of Wadai Banjar, with 60 seconds per level.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The types of wadai available depend on the level, as follows: #Level 1 has only 2 types of wadai = 5 requests #Level 2 has 3 types of wadai = 6 requests #Level 3 has 4 types of wadai = 7 requests #Level 4 has 5 types of wadai = 8 requests #Level 5 has 6 types of wadai = 9 requests #Level 6 has 7 types of wadai = 10 requests</td>
</tr>
<tr>
<td>3</td>
<td>Mechanic</td>
<td>• If the provided time runs out and there are still requests, the system will display a notification that the mission has failed and must be repeated until correct.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If users presses the serve button and the wadai is not in accordance with the request, the score will not increase, but</td>
</tr>
</tbody>
</table>
the next request process will continue if available and there is still time.

• Users cannot return to the previous level.
• Users cannot proceed to the next level if the mission is not completed.
• When users is in the challenge scene in serving the request, users is not given access to the page recognizing the types of Wadai Banjar in the previous scene at all, because users must really remember them.
• The score calculation is the total number of requests x 5 points.
• The final score calculation is obtained by adding up the total scores obtained in each mission by calling the temp function (temporary value storage) in the system.

<table>
<thead>
<tr>
<th>4</th>
<th>Story Line</th>
<th>Represented on story board.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Character</td>
<td>3D objects of Wadai Banjar, cake tray, plate, serving table, and hand objects are using hygienic covers.</td>
</tr>
<tr>
<td>6</td>
<td>Challenge</td>
<td>There is the passage of time, requests for types of cakes along with their quantities, and the score obtained.</td>
</tr>
<tr>
<td>7</td>
<td>Fun Factor</td>
<td>Getting to know the types of Wadai Banjar and then implementing them into memory when serving customer requests for presenting the Wadai Banjar according to their respective types and quantities.</td>
</tr>
<tr>
<td>8</td>
<td>Technical Aspect</td>
<td>Using mouse input media when based on desktop to facilitate interaction and also audio to listen to instructions.</td>
</tr>
</tbody>
</table>

C. Production

After the pre-production process is completed, the next step is to enter the production phase of the game, where the design and elements from the pre-production phase are accommodated and transformed into program format. Character assets are created using the Blender application to make 3D objects, source code is created using the C# language, and the two elements are integrated using the Unity Engine application, resulting in a user interface that can be seen in Figures 4 and 5.

![Figure. 4. User Interface of Game Education Wadai Banjar Based on Desktop](image1)

Figure 4 shows user interface of the Wadai Banjar educational game based on desktop with .exe file extension running on laptop/PC. The interaction requires users to use the mouse to perform access when dragging and dropping Wadai Banjar objects from the tray to the customer’s plate.

![Figure. 5. User Interface of Game Education Wadai Banjar Based on Mobile](image2)

Figure 5 is user interface of the mobile-based Wadai Banjar educational game with an .apk file extension for
use on Android smartphones. The interaction is that user only need to touch to access the drag-and-drop process of Wadai Banjar objects, which are moved from the tray to the customer's plate. However, caution is needed because the cake object may come off if it is not placed correctly in the drag-and-drop position.

D. Testing and Beta

The testing process in this research focuses on internal functionality testing by the research and development team. The results of the testing are presented in Table 2.

<table>
<thead>
<tr>
<th>No.</th>
<th>Test Features</th>
<th>Test Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>When users start running the Wadai Banjar educational game, a loading process will appear to go to the home page.</td>
<td>Success</td>
</tr>
<tr>
<td>2</td>
<td>After the loading process is complete, the home page will appear.</td>
<td>Success</td>
</tr>
<tr>
<td>3</td>
<td>Users can press the &quot;ketahui wadai&quot; button, which will display a page introducing the types of Banjar desserts.</td>
<td>Success</td>
</tr>
<tr>
<td>4</td>
<td>Users can press the &quot;wadai selanjutnya&quot; button to navigate to the next page featuring different types of Banjar desserts.</td>
<td>Success</td>
</tr>
<tr>
<td>5</td>
<td>Users can press the back button to return to the home page.</td>
<td>Success</td>
</tr>
<tr>
<td>6</td>
<td>Users can press the start button, and it will bring up the dessert presentation page.</td>
<td>Success</td>
</tr>
<tr>
<td>7</td>
<td>Users can drag and drop each object of Wadai Banjar and move it to the customer's plate.</td>
<td>Success</td>
</tr>
<tr>
<td>8</td>
<td>Users can see the reduction of time for each mission within the level.</td>
<td>Success</td>
</tr>
<tr>
<td>9</td>
<td>Users can see the addition of score on each mission within the level.</td>
<td>Success</td>
</tr>
<tr>
<td>10</td>
<td>Users can see the number and types of Wadai Banjar requested</td>
<td>Success</td>
</tr>
<tr>
<td>11</td>
<td>Users can press the &quot;serve&quot; button, so the game system will check the correctness. If correct, the score will increase and if incorrect, the score will remain the same.</td>
<td>Success</td>
</tr>
<tr>
<td>12</td>
<td>Users can receive a notification when a mission is completed in each level.</td>
<td>Success</td>
</tr>
<tr>
<td>13</td>
<td>Users can press the &quot;continue to level x&quot; button to proceed to the next mission on the next level.</td>
<td>Success</td>
</tr>
<tr>
<td>14</td>
<td>Users can receive a notification when all levels are completed.</td>
<td>Success</td>
</tr>
<tr>
<td>15</td>
<td>If all levels are completed and a notification is displayed, then the user will be automatically directed back to the homepage.</td>
<td>Success</td>
</tr>
<tr>
<td>16</td>
<td>Users can press the exit button to end the Wadai Banjar educational game and fully exit the application.</td>
<td>Success</td>
</tr>
</tbody>
</table>

E. Release

After the application was tested and went through the beta process, it was finally handed over to users for use. 100 users were involved in using it, and the research team distributed the application by providing a download link and then directing them to install it on their laptops or smartphones, and accompanied them when using the application. However, they did not provide guidance on remembering the types of Wadai Banjar. Users were asked to explore their knowledge when learning about the types of Wadai Banjar and forced to remember it, because it would have an impact on the next interaction, where the user becomes a seller who must provide the best service to meet the customer's requests.

F. Usage Evaluation

In the process of evaluating the use of the Wadai Banjar educational game application, 100 respondents who were users in the release phase were involved in filling out the evaluation. The distribution of respondents consisted of 10 domestic tourists who were visiting Banjarmasin, 30 representatives of native Banjarmasin students, 20 representatives of primary school students who were native to Banjarmasin, and 40 representatives of junior high school students who were native to Banjarmasin. The results of the evaluation of the use of the Wadai Banjar game application are presented in Table 3.

<table>
<thead>
<tr>
<th>No. Item</th>
<th>Question</th>
<th>Answer</th>
<th>Result</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Did you enjoy playing the Wadai Banjar educational game?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Did you feel comfortable when playing Wadai Banjar educational game?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Does the user interface of the Wadai Banjar educational</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
game feel appropriate and attractive?
Could this educational game help in introducing and preserving the traditional cakes of South Kalimantan?
Could this educational game be beneficial in introducing and preserving the traditional cakes of South Kalimantan?
Do you recommend the use of the educational game Wadai Banjar for other users and tourists visiting South Kalimantan?
Did the interaction when choosing types of Wadai Banjar according to customer requests provide an experience in remembering and knowing the types of Wadai Banjar?
Desktop-based, mobile-based, or both, which one do you recommend as better for running the educational game application of Wadai Banjar?

Based on the results presented in Table 3, it can be explained that for question 1, with the highest response from 95 respondents strongly agreeing that the Wadai Banjar educational game app provides enjoyment when playing it, with an average score of 3.95, which falls into the category of Excellent. During the gameplay, the researchers asked for verbal feedback, and they enjoyed the game due to the interesting challenges presented in the form of customer requests. Then, for question 2, with the highest response from 92 respondents strongly agreeing that the Wadai Banjar educational game app provides comfort to its users, with an average score of 3.92, which falls into the category of Excellent. The result of question number three showed that 90 respondents strongly agreed that the user interface of the game was appropriate and attractive, but there were five respondents who rated it as bad, mainly because the placement of the Serve button was too large and interfered with some of the Wadai Banjar names. The average score for question number 3 was 3.85, which falls into the category of Excellent.

Furthermore, for question number four, with the highest response from 98 respondents stating that the Wadai Banjar educational game application can contribute to introducing and preserving Wadai Banjar or South Kalimantan traditional snacks with an average score of 3.98 in the Excellent category. The highest response for question number five is from 93 respondents who stated that the game is useful for introducing and preserving Wadai Banjar or South Kalimantan traditional snacks, with an average score of 3.93 in the Excellent category.

The last question number eight, received a response from 70 respondents who expressed a preference for the game to be installed on a laptop or desktop computer rather than on a smartphone or mobile device. They feel more comfortable playing the game on a desktop computer because the interactions are more suitable and aided by the use of a mouse for actions related to the cakes. If they use a smartphone, the action of dragging and dropping the cakes into the plate feels difficult.

IV. CONCLUSION

Based on the design, development, and user evaluation results, it can be concluded that this educational game application can function according to the expected test features, has elements that can provide pleasure, adopts user comfort, has a suitable and attractive user interface, although some buttons need improvement, the developed game can strive and have the potential to provide benefits as a medium for introducing and preserving the existence of Wadai Banjar, can be recommended for a wider range of users, and also as a means of remembering and recognizing the types of Wadai Banjar.

Finally, the desktop-based application is recommended for users to use comfortably and appropriately. Future research recommendations are to add artificial intelligence methods and additional scenes to enhance the enjoyment and higher challenges for users.

V. ACKNOWLEDGMENT

Thank you to all the lecturers and students of the Interactive Media, Game, and Mobile Technologies (IMGM) research group and the Augmented Reality and Virtual Reality (ARVR) Laboratory of Politeknik Negeri Banjarmasin who have actively participated in supporting the implementation of this research.
REFERENCE


