Development of Multilingual Educational Game UI/UX Design for Animal Introduction and Interactive Learning Evaluation in Elementary Schools

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Abstract— **Technology-based education plays a vital role in enhancing student engagement in the digital age. This research focused on creating a UI/UX design and prototype for a multilingual educational game tailored for elementary school students. The game emphasizes animal recognition in both English and Indonesian, categorizing animals into herbivores, carnivores, and omnivores, while also featuring interactive learning evaluations. The study utilized the Design Thinking framework, which comprises five stages: Empathize, Define, Ideate, Prototype, and Test. Data collection involved surveys and interviews with 60 students and 3 teachers. The findings revealed positive feedback, with students giving high ratings for visual appeal (4.65), ease of navigation (4.52), and learning effectiveness (4.47). Teachers also rated the game highly for ease of use (5.0) and its suitability for students' needs (4.67). However, the interactive evaluation component requires improvement, particularly in diversifying question types and offering more adaptive feedback. This research highlights the potential of thoughtfully designed educational games to enhance student motivation and comprehension. Future recommendations include enriching content, increasing platform accessibility, and collaborating with schools for broader implementation.**

Keywords - Multilingual Educational Game, UI/UX Design, Interactive Learning Evaluation, English Education, Elementary School

I. INTRODUCTION

Education in the digital era is witnessing a profound shift as technology becomes a cornerstone of modern teaching and learning processes. Traditional methods, such as lectures and textbook-driven activities, are increasingly perceived as insufficient for fostering meaningful engagement, particularly among primary school students. These conventional approaches often rely on teacher-centered instruction, which inherently limits student interaction and active participation in the learning process [1]. As a result, students are frequently placed in a passive role, where they receive and memorize information rather than actively engaging with the material or applying critical thinking skills [2]. This shift is further influenced by the evolving characteristics of Generation Z learners, who are growing up in a world dominated by digital tools and instant access to information. Unlike previous generations, these students exhibit a strong preference for inquiry-based learning models, where exploration, questioning, and problem-solving take centre stage. They are also more inclined toward interactive and technology-driven educational experiences that cater to their digital fluency and encourage active involvement [3].

Technology-driven learning methods are becoming increasingly essential in modern education as they provide dynamic ways to engage students more effectively. Traditional educational methods often rely on passive learning, where students are recipients of information, but technology-infused approaches, such as interactive platforms and digital tools, can transform the learning process. Arvind (2024) [4] emphasizes that using technology to enhance learning not only allows students to receive real-time feedback but also incorporates gamified elements like those found in platforms such as Kahoot! and Google Forms [5]. These tools provide an enjoyable way to interact with the material, making learning more engaging, personalized, and adaptive to the needs of students.

In addition to gamified platforms, interactive educational games represent a highly effective alternative for enhancing the learning environment. Unlike traditional textbook-based methods, educational games foster active participation, increasing both student interest and motivation. When students are actively involved in the learning process, they are more likely to retain information, improve their problem-solving skills, and stay motivated. These games often incorporate challenges, rewards, and competition, which not only make learning enjoyable but also allow students to track their progress in a way that feels rewarding and motivating [6]. According to research by Krisdiawan (2018) [7], implementing the Game Development Life Cycle (GDLC) and algorithms like the Linear Congruential Generator in educational puzzle games has been proven to enhance student engagement. The study suggests that such tools not only make learning more enjoyable but also contribute to deeper learning and retention by creating an interactive, hands-on experience.

The success of educational games heavily relies on the design of the user interface (UI) and user experience (UX). A well-designed, intuitive, and child-friendly UI/UX enables students to engage with the learning content without being hindered by technical difficulties. An effective UI/UX design

enhances the appeal, engagement, and overall effectiveness of the game as an educational tool [8]. This underscores the importance of employing design thinking principles in developing an efficient UI/UX. Research by Ramadhanti et al. (2023) [9] further highlights that user engagement plays a critical role in the success of UI/UX design, emphasizing the value of incorporating user feedback throughout the design process.

Despite the success of some learning apps in capturing student interest, many still face challenges related to their user interface (UI) and user experience (UX) design. Unintuitive layouts and unclear navigation often confuse students, especially younger ones, making it difficult for them to understand the flow of the game or app. This lack of clarity can disrupt their learning process, leading to frustration or disengagement. For early childhood students, the importance of a child-friendly UI/UX design cannot be overstated. At this developmental stage, children are still learning to navigate technology, and a complex interface can overwhelm or distract them from the educational content. A poorly designed app can create cognitive overload, hindering the learning experience rather than enhancing it. Therefore, the interface must be both visually appealing and easy to navigate.

The integration of multilingual learning content, such as animal recognition in both English and Indonesian, is essential to support foreign language acquisition and enhance students' vocabulary. Previous research has contributed significantly to the development of educational games. For instance, Krisdiawan (2019)[10] successfully applied the Game Development Life Cycle (GDLC) system development model in mobile-based games, which boosted student engagement through interactive gameplay. However, many of these studies have yet to incorporate a Design Thinking-based UI/UX design with multilingual content. Additionally, game-based learning evaluations often overlook the importance of incorporating user personas that reflect the diverse needs of learners based on their age and educational level. This integration would ensure that educational games are tailored more effectively to meet the varied learning requirements of students.[11].

Building on previous research, this study focuses on developing a multilingual educational game for elementary school students. The game aims to introduce animals in both English and Indonesian, teach about animal types (herbivores, carnivores, omnivores), and provide an interactive learning assessment through gameplay. The main focus of the research is on creating an innovative UI/UX design, using a design thinking approach to ensure the game effectively meets users' needs. This research is particularly relevant given the growing demand for learning media that align with technological advancements and global educational trends. By combining a user-centered UI/UX design with multilingual learning content, the study aims to offer an interactive solution that enhances students' motivation to learn while making it easier for teachers to assess their understanding.

The research novelty is in its unique approach by combining Design Thinking-based UI/UX design principles with a multilingual learning framework in game-based education. The core innovation lies in the thoughtful integration of these elements, ensuring that the design not only caters to the needs of young learners but also facilitates a deeper engagement with the educational content. By focusing on an intuitive and user-friendly interface, the research seeks to enhance the learning experience, making it easier for

elementary school students to navigate and interact with the game. The inclusion of multilingual content, specifically for animal recognition in both English and Indonesian, offers students an opportunity to learn new vocabulary while reinforcing important concepts like animal classification (herbivores, carnivores, and omnivores). In terms of theoretical contribution, this study enriches the field of educational technology by exploring how effective UI/UX design principles can be applied in the context of multilingual, game-based learning platforms. It also provides insights into how these platforms can be optimized for primary school students, a demographic that is increasingly exposed to digital learning tools.

Practically, this research holds the potential to provide tangible solutions for educators and developers seeking to create more effective, engaging, and accessible learning environments. It offers an innovative way to enhance student learning by combining technology with pedagogical strategies that consider language diversity, cognitive development, and interactive learning. The results of this study could therefore inform future educational game designs and contribute to shaping a more engaging and efficient digital learning ecosystem for elementary school students.

II. LITERATURE REVIEW

A. *Educational games and multilingual learning*

Educational games are technology-based learning tools that combine game elements with educational content, aiming to provide an enjoyable, interactive, and effective learning experience. According to Nam et al. (2024), educational games foster a fun learning environment, reduce stress, and boost student motivation [12]. To meet the global demands of modern education, integrating a multilingual approach into educational games has become increasingly important. Multilingual educational games promote cognitive development by engaging students in an interactive way. These games not only facilitate language acquisition but also enhance critical thinking and problem-solving skills, as students learn to navigate different linguistic structures [13]. Additionally, gamification increases student engagement and satisfaction, making learning more compelling and effective, especially in multilingual classrooms [14].

B. *UI/UX in Educational Games*

Research by Ramadhanti et al. (2023) found that the lack of navigation guides and unintuitive layouts often hinder students' understanding in using learning applications (Link). Therefore, in designing the UI/UX of Educational games, it is important to use user-centered approaches, such as Design Thinking, to ensure the interface meets the needs of elementary school students. [9].

User interface (UI) and user experience (UX) design are fundamental to the effectiveness of educational games, as they significantly influence how students interact with and benefit from the content. A child-friendly UI/UX ensures that the game is visually appealing, easy to navigate, and intuitive, creating an environment where students can focus on learning without being hindered by technical complexities. When the design aligns with the cognitive and emotional needs of elementary school students, it enhances both their engagement and retention of the material.

Research by Ramadhanti et al. (2023) emphasizes that unintuitive layouts and the lack of clear navigation guides are common barriers in educational applications. These issues can cause frustration, reduce motivation, and ultimately diminish the learning outcomes. For example, students may struggle to understand how to progress through the game or access specific features, leading to disengagement and lost opportunities for learning. Addressing these challenges requires a deliberate focus on user-centered design principles.

One effective approach is applying Design Thinking, which involves iterative processes such as empathizing with users, defining their needs, ideating solutions, prototyping designs, and testing them with real users. This methodology ensures that the design reflects the preferences, abilities, and limitations of elementary school students. For instance, features like large, visually distinct buttons, colorful and age-appropriate graphics, and guided tutorials can make the game more accessible and engaging. Additionally, incorporating feedback from students during the design process can identify and resolve potential usability issues early on.

C. Evaluation of Game-based Learning

Game-based assessment is an evaluation method seamlessly embedded within the gameplay, designed to directly measure student comprehension. This approach offers real-time feedback, enabling students to quickly identify and correct mistakes, enhancing the learning process. [15]. The immediate nature of the feedback helps to reinforce learning and allows for adjustments in the student's approach to the game's challenges, promoting active engagement and continuous improvement. Furthermore, this method can create a non-threatening environment, reducing anxiety around assessments and allowing students to learn at their own pace. Game-based assessments often include a variety of question types and scenarios, which can make the learning experience more diverse and adaptable, ultimately leading to deeper comprehension and retention of the material.

In the context of educational games, game-based assessment allows students to actively engage in the learning process while measuring their understanding. For example, the game of matching pictures and animal names can provide immediate data on students' level of understanding of the material. Krisdiawan's (2018) research also shows that algorithms, such as the Linear Congruential Generator, can be used to create variety in assessment content, thus avoiding monotony in learning. [7].

D. Design Thinking Approach

Design Thinking approach is a human-centred methodology used to solve complex problems by focusing on the needs and experiences of users. It encourages designers to adopt a deep understanding of the people they are designing for, ensuring that the solutions are not only innovative but also practical and relevant.

Design Thinking is particularly effective in addressing challenges where user needs are central to the solution. By involving users throughout the design process, it ensures that solutions are both innovative and practical, leading to products, services, or systems that resonate with the target audience and effectively solve their problems. The iterative nature of Design Thinking also allows for flexibility, making

it adaptable to changing requirements or insights during development. [16], [17], [18].

This approach focuses on empathizing with the end user, in this case elementary school students, to understand their needs and the challenges they face in learning. The stages of design thinking include Empathize, Gain insight through observation and direct interaction with the target users, students and teachers, to understand their learning experience.

1. Define: Develop a problem statement based on the data collected that helps clarify and focus on the most important issues.

2. Ideate: Generate a range of innovative and creative solution ideas for the defined problem.

3. Prototype: Build a simple prototype of the game that can be tested and evaluated.

4. Test: Test the prototype with end users to get feedback and iterate the design as needed.

Fig. 1. Design Thinking Stages

In the context of educational game development, design thinking can be used to ensure that the game's UI/UX design is not only attractive but also supports student learning. Ramadhanti et al. (2023) point out that this approach helps to identify user needs in depth, resulting in a more effective design. [9].

E. Research Novelty

Most previous research on educational games has focused on individual aspects of development, such as the integration of multilingual content, the evaluation of game effectiveness, or the design of user interfaces. However, this research stands out by combining three key elements into a cohesive framework: child-friendly UI/UX design, relevant multilingual content, and innovative game-based evaluation. By integrating these components with the Design Thinking approach, this study aims to offer a comprehensive solution that addresses the multifaceted needs of elementary school learners.

Furthermore, by focusing on multilingual education, this research also acknowledges the growing demand for tools that support language learning, particularly in regions where multiple languages are spoken. The combination of these aspects makes this research a valuable contribution to the field of educational technology and offers practical insights for developing future educational games that are both effective and accessible.

III. RESEACH METHODS

This study uses a development research approach by adopting the design thinking method to ensure that the UI/UX design and mechanism of the educational game developed are in accordance with the needs of the end users, namely elementary school students. The design thinking approach is a user-centered design with stages that include empathize,

define, ideate, prototype, and test. This method is relevant because it allows researchers to understand the needs of students and teachers, define key learning problems, generate creative ideas, and iteratively test prototypes.

This educational game prototype was developed using Figma as a design tool. Figma was chosen for its ability to create interactive prototypes that can realistically represent user interfaces, making it easier to test UI/UX designs before implementing them in the application development phase.

A. Research Stages

The research was conducted using the stages of the design thinking approach. These stages are described in the flowchart in Figure 2.
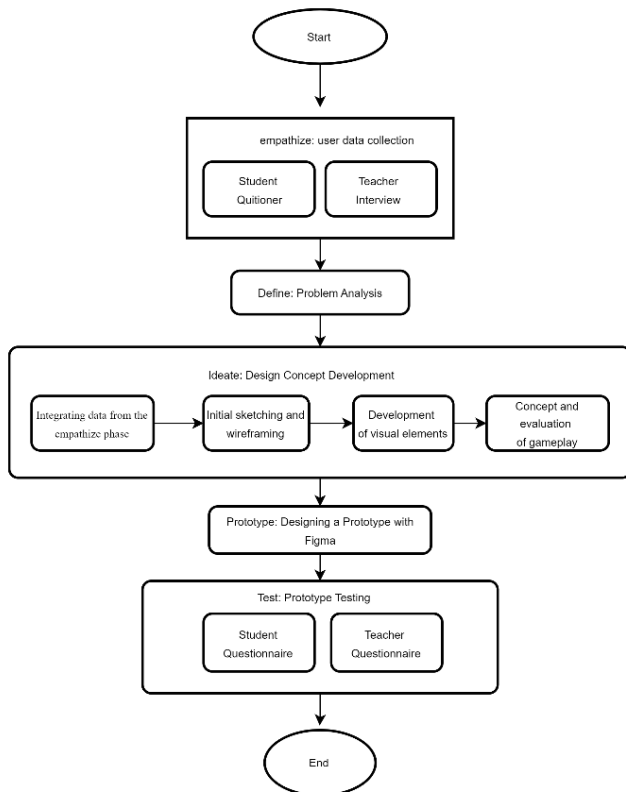

Fig. 2. Research Methods Flowchart

1. **Empathize**: User Data Collection
a. Student Statement Questionnaire
   At this stage, the researcher created a statement questionnaire used to collect data from students about their experiences using traditional and digital learning media. The questionnaire statements are structured with Likert responses 1-5, where 1=strongly disagree and 5=strongly agree. This questionnaire also includes preferences for UI/UX design elements, as shown in Table 1 for the questionnaire statements.

TABLE I.   QUESTIONNAIRE QUESTIONS FOR STUDENTS

No	Statement (P)
1	Textbook learning is very interesting to me.
2	I find learning with educational games more interesting than traditional methods.
3	Educational games help me understand the material better.
4	I prefer to learn by using English and Bahasa Indonesia together.
5	The attractive color design and animation make me more enthusiastic about learning.
6	Easy navigation makes educational games more fun to use.

From the results of collecting data on questionnaire statements to 60 respondents of grade 3 elementary school students, the data in Table 2 is obtained.

TABLE II.   QUESTIONAIRE RESPONDENT DATA

No	Statement (P)	SD	D	N	A	SA	Respondents
1	Textbook learning is very interesting to me.	8	12	11	18	11	**60**
2	I find learning with educational games more interesting than traditional methods.	0	0	21	20	19	**60**
3	Educational games help me understand the material better.	0	0	20	16	24	**60**
4	I prefer to learn by using English and Bahasa Indonesia together.	0	17	15	12	16	**60**
5	The attractive color design and animation make me more enthusiastic about learning.	0	0	19	15	26	**60**
6	Easy navigation makes educational games more fun to use.	0	0	24	21	15	**60**
	Total Score	8	29	110	102	111	

Score Description; Strongly disagree (SD) Disagree (D), Neutral (N), Agree (A), Strongly Agree (SA).

b. Teacher interview
   The interview technique was used by the researcher for teachers, focusing on curriculum needs, constraints in multilingual learning and their opinions on the use of educational games. The main points of the interview that the researcher compiled can be seen in Table 3.

TABLE III.   INTERVIEW QUESTIONS

No	Interview Questions	Purpose of the Question
1	What is the biggest challenge in teaching animal recognition to students?	Identify challenges in traditional learning methods.
2	What do you think about the integration of English in learning animal recognition?	Assess the importance of a multilingual approach to learning.
3	Have you ever used technology-based learning media? If so, what do you think?	Explore teachers' experiences and preferences towards technology-based learning media.
4	What elements do you think are important for the design of an educational game to appeal to students?	Understand teachers' preferences for UI/UX design elements of educational games.
5	How do you usually evaluate students' understanding in learning animal recognition?	Understand evaluation methods commonly used in learning.

From both data collection techniques, we wanted to focus on the learning content, which explores how students and teachers perceive animal recognition materials in English and Indonesian, both through traditional methods and game-based media. In addition, the researcher tried to see the design preferences needed by teachers and students by identifying visual elements that are considered attractive, such as animation style, text size, intuitive icons, and clarity of information.

2. **Define**: Problem Analysis

The data collected from the Empathize stage is analyzed to identify the primary issues, with the objective being to guarantee that the design of the educational game being developed truly addresses the needs of users. The results of the statement questionnaire administered to third-grade elementary school students, as well as the 60 data points obtained from the analysis results presented in Figure 3, are as follows.

The statements completed by students were evaluated using a Likert scale ranging from 1 to 5, with 1 representing "strongly disagree" and 5 representing "strongly agree."
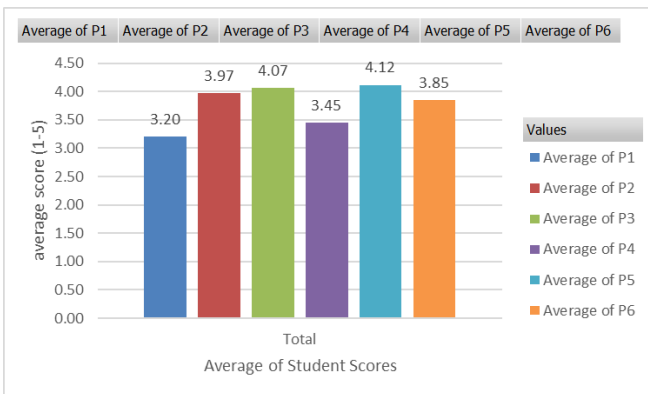

Fig. 3. Graphic Analysis Students Questionaire

According to the visualization above, the subsequent analysis will present the mean score of students' responses to the questionnaire statements:

a. **Learning Using Textbooks**

This statement has the lowest average score, indicating that students tend to be less interested in traditional textbook-based learning methods.

b. **Interest in Educational Games**

The average score for the statement about students' interest in educational game-based learning is higher than traditional learning, with most students giving a score of 4-5.

c. **Effectiveness of Educational Games**

The statement that the educational game helps students' understanding has a high average score, confirming that this media can improve students' understanding of the material.

d. **Multilingual Preference**

Statements about learning preferences using English and Indonesian showed good scores, indicating that the multilingual approach is favored by students.

e. **Visual Design and Navigation.**

The statement about the importance of color design, animation, and easy navigation has the highest average score, indicating that attractive UI/UX elements are a priority for students.

An examination of the data reveals a discrepancy between the conventional, textbook-based educational model and the contemporary demand for digital learning media among students. The data indicates a clear preference among students for interactive learning methods employing educational games that feature appealing UI/UX elements and straightforward navigation. Additionally, a multilingual approach is identified as a crucial element by students to enhance their learning experience.

3. **Ideate**: The development of the design concept

The Ideate stage in the Design Thinking approach endeavors to generate creative ideas that will be translated into initial UI/UX design concepts. In the context of this research, the primary objective was to devise a child-friendly, engaging, and functional design for a multilingual educational game that introduces animals and provides interactive learning evaluation. The following steps were taken in this stage:

a.   Integrate Data from Empathize Stage

The data collected from students and teachers at the Empathize stage constituted the primary foundation for developing the design concept. The design concept that was formulated is presented in table 4.

TABLE IV.   DESIGN CONCEPT

No	Concept Design	Description
1	Visual Preferences	Bright colors and engaging animations increase learning motivation.
		Simple navigation makes it easier for students to understand the game flow.
2	Content	The game should include the introduction of animals in two languages (English and Indonesian).
		Material about the types of animals (herbivores, carnivores, omnivores) needs to be presented interactively.
3	Learning Evaluation	The gameplay of matching animal names with pictures as the main evaluation method.

b.   Initial Sketching and Wireframe Creation

An initial skeleton of the user interface layout, including the main page, learning page, and evaluation page.
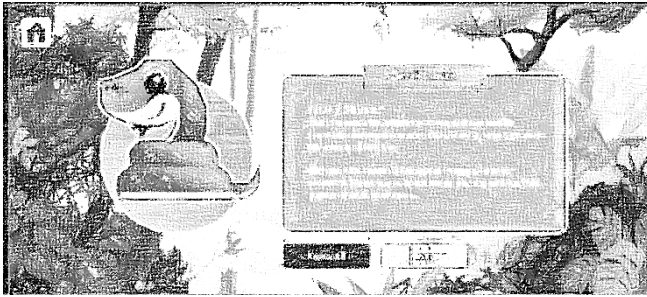

Fig. 4. Sketch of the Main Page

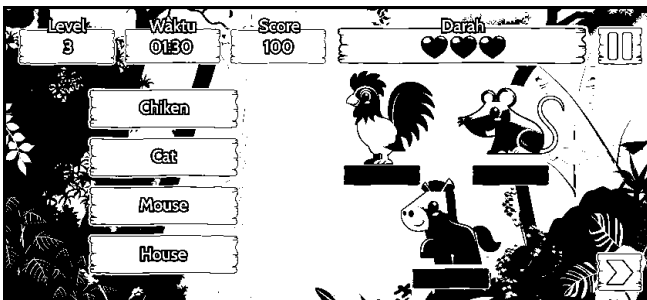Fig. 5. Sketch of Learning Page

Fig. 6. Sketch of learning evaluation page in the form of word and picture matching game

c. Visual element Development

Color palettes, fonts, iconography, and animations designed to create a child-friendly experience. The development of visual elements is presented in table V.

TABLE V.   DESIGN CONCEPT

No	Visual Element	Description
1	Color	A bright color palette such as blue, green and yellow was chosen to create a fun atmosphere.
2	Typography	Child-friendly fonts such as Comic Sans or Poppins are used to ensure the text is easy to read.
3	Iconography	Large, recognizable icons are used to make navigation easier.
4	Animation	Simple animations are added to enhance interactivity, such as animals that move or respond to touch.

d. Gameplay Concept and Evaluation

The concept of interactive gameplay entails the provision of prerequisites within the game itself. Specifically, students must first open and learn the material to play the game. In the interactive Evaluation stage, a game of matching animal names with pictures is implemented as the primary feature.

Further elaboration on the gameplay concept can be found in Table VI.

TABLE VI.   GAMEPLAY CONCEPT

No	Gameplay Concept	Description
1	Education	Students are invited to learn the names of animals in English and Indonesian, then match the animal names with the corresponding pictures.
2	Evaluation	Students are invited to complete an evaluation in the form of a picture matching game with text. The evaluation can be seen from the achievement of the level and the animal card that the two students get.
3	Leveling	Students can complete the game evaluation game levels from the easiest to the most difficult based on time and score achievements.
4	Reward	Students will get a reward and as a fun challenge in the form of animal cards that can be collected after completing level by level.

4. **Prototype**: Prototype Design Using Figma

The Prototype stage is the implementation of the UI/UX design that has been developed in the Ideate stage into an interactive prototype. This prototype is designed using Figma to provide a visual and interactive representation of the designed educational game, enabling users to assess its functionality prior to further implementation.

The prototype stage, as implemented by researchers, is presented in several images, which are described in Figures 6 through 9.
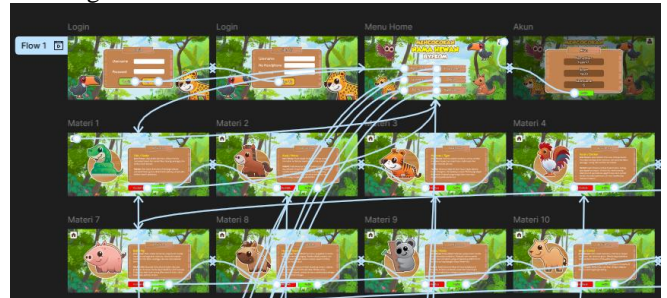

Fig. 7. Design Prototype Login, main menu, and materials

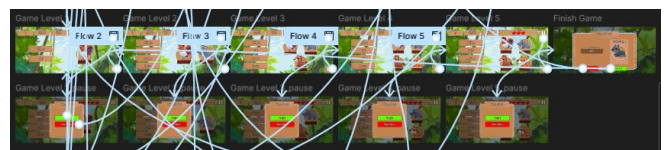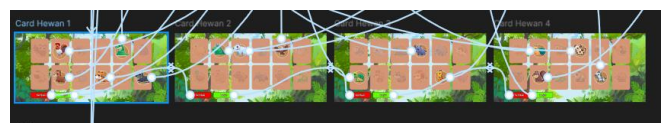In the prototype material, 50 animals and descriptions of animal types have been created..

Fig. 8. game level Prototype

The prototype game level consists of 5 levels that dynamically adjust the animal objects and answer choices in English.

Fig. 9. Animal Card Prototype

Animal cards serve as a crucial component in the evaluation process, providing a visual representation of students' achievements. The accumulation of animal cards is indicative of a student's progress through various levels of the game.
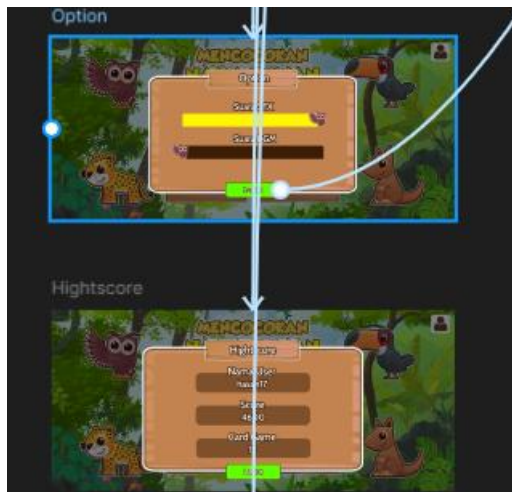

Fig. 10. Information prototype

In this prototype, there is information that facilitates navigation for students, such as audio controls, instructions, high scores, and game creator information.

5. Test: Prototype testing

The Test phase in the Design Thinking process is meant to evaluate the prototype created with Figma by end users. This phase focuses on assessing the clarity of the UI/UX design, user interactivity, and how effectively the gameplay supports students in grasping the learning content.

Testing purposes:
- Ensure the prototype meets the needs and preferences of elementary school students.
- Identify the strengths and weaknesses of the UI/UX design and gameplay features.
- Gather direct feedback from users for better design iterations.
- Measure the effectiveness of the gameplay in enhancing students' understanding of animal introduction content.

The prototype testing plan conducted by the researcher is presented in Table VII

TABLE VII.   TESTING-PLAN STAGES

Stages of Testing	Description	Expected Output
Protype Introduction	Provide a brief explanation to the students about the prototype, its features, and how to use it.	Students grasp how to operate the prototype and its features.
Direct Testing	Students interact with the prototype, navigate through the pages, and finish the evaluation gameplay.	Information regarding the students' experience with the prototype, including any challenges or difficulties they faced.
Observation	Observing student behavior while using the prototype, such as navigation difficulties, responses to visual elements, and interaction with gameplay.	Notes on how students respond to the gameplay and the difficulties they encounter.

Post-testing questionnaire	Students fill out a questionnaire to provide feedback on their experience, including satisfaction and understanding of the content.	Quantitative and qualitative data from the questionnaire to evaluate the effectiveness of the prototype.

The evaluation tools to be administered to students and teachers are outlined as follows:

a. Prototype testing instrument for students

The instrument provided to students is a questionnaire using a Likert scale ranging from 1 to 5 (1: Strongly Disagree, 5: Strongly Agree). Details of the aspects and items included in the instrument are presented in Table 8.

TABLE VIII.   INSTRUMEN PENGUJIAN PROTOTYPE UNTUK SISWA

Tested Aspect	Questions (Q)
User-friendly navigation	Navigating between pages or features in the educational game is effortless for me
Visual Appeal	The colors, icons, and animations in this game are very appealing
Clarity of Information	The text and information in the game are easy for me to understand
Thrill of Gameplay	The games in this app are fun and leave me eager to play again.
Effectiveness of evaluation	This game helps me better understand the names and types of animals

b. Prototype testing instrument for teachers

The instrument tested on teachers consists of a questionnaire with a Likert scale of 1-5 (1: Strongly Disagree, 5: Strongly Agree). The aspects and instruments provided can be seen in Table 9.

TABLE IX.   PROTOTYPE TESTING INSTRUMENTS FOR TEACHER

Aspects being tested	Question(Q)
Appropriateness of learning content	The material presented in the educational game aligns with the curriculum and learning needs.
Suitability of UI/UX Design with Student Needs	The user interface (UI/UX) design is easy for elementary school students to understand
User-Friendliness for students	This educational game is easy for students to use without excessive guidance
The Game's Effectiveness in Enhancing Understanding	This game is effective in helping students understand material about animals
The Game's Ability to Provide Interactive Evaluation	The interactive evaluation in this educational game provides relevant feedback for students

B. Research Object, Tools, and Data Collection Techniques.

1. Research Object

The research objects in this study are third-grade elementary school students in Kuningan Regency, with a sample size of 60 students, and 3 English teachers in elementary schools.

2. Research Tools

The tools used in this research are:
   a. Figma: Used to create an interactive prototype of the educational game's UI/UX design.
   b. Photoshop: Used to design assets for the game.
   c. Questionnaire and interviews: To collect data on students' preferences regarding the UI/UX design and game features.
   d. Audio Recorder: To record interview and observation results.

3. Data Collection Techniques:

Some data collection techniques used by the researcher are:

a. Observation: Observing how students learn using traditional learning media and understanding the challenges they face.
b. Interviews: Conducting structured interviews with students and teachers to gain insights into their needs for interactive learning media.
c. Surveys: Distributing questionnaires to students to identify design elements they prefer, such as layout, color, and navigation.
d. Prototype Testing: Using the Figma prototype, students are given the opportunity to try the game and provide feedback on their experience.

4. Data Analysis

The data analysis techniques used in this research include:

a. Qualitative data from interviews and observations are analyzed using thematic analysis to identify user needs patterns.
b. Quantitative data from surveys are analyzed using descriptive statistics to identify preferred design elements and evaluate the effectiveness of the prototype.

IV. RESULT AND DISCUSSION

The results of this research are in the form of a Multilingual Educational Game Prototype for Animal Introduction and Interactive Learning Evaluation in Elementary Schools, which was tested on elementary school students and teachers for further analysis.

A. UI/UX Prototype Figma Design
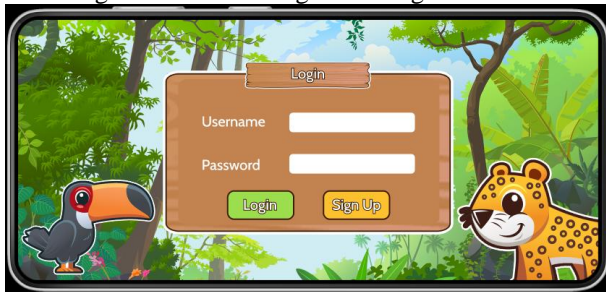
Main Page Interface for Login and Register

Fig. 11. Login/Register

Figure 11 shows the initial page of the game, where students can register and log in to access the main menu. This interface design is made as attractive as possible by adding elements that can capture children's attention to encourage interaction, as well as using bright colors and illustrations of animals with designs specifically created for children.

1. Main Page Interface

Fig. 12. Main Page of the game

Figure 12 shows the main page of the game. On this page, students can access the materials menu, play game, animal cards, high scores, and game creator information. The layout of the menus is designed to be as simple as possible, and the use of fonts that are tailored to create an appealing look, along with larger sizes, enhances visibility and ease of interaction. This contributes to a more comfortable user experience when exploring the various features available in the game.

2. Material Interface

Fig. 13. Material Interface

Figure 13 shows the material page that students must access before starting the game. On this screen, students are provided with information including animal images, names, and types of animals. This page is designed to enhance students' knowledge of various animal species and help them understand the characteristics and habitats of each. In this way, students can be better prepared and motivated to participate in the educational game that will test their knowledge of the animal world.

3. Play Game Interface/Learning Evaluation

Fig. 14. Play Game Interface

The playgame interface serves as a learning evaluation tool featuring 5 levels of difficulty. In this interface, the gameplay requires students to match images with the names of animals in English. The game components include levels, time, score, and hearts. The design of the playgame interface is specifically tailored to capture students' attention and make it easier for them to understand the concepts being taught, using bright colors and engaging, interactive animal images. Each level offers increasing challenges, encouraging students to improve their English skills while remaining entertained and motivated to continue learning.

4. Response Interface

Fig. 15. Response Navigation Interface

This response navigation provides ease for students in accessing the game by displaying a pop-up option to continue the game or return to the main menu. Students can also track their progress through an achievement system that provides positive feedback, creating an enjoyable and rewarding learning experience.

5. Card Game/Reward Interface

Fig. 16. Card Game and Reward

The card game and reward page is where students can view the animal cards they have earned. Animal cards are unlocked when students complete each level of the game. This page not only displays the collected animal cards but also provides interesting information about each species, allowing students to learn more while enjoying the process of collecting the cards. In this way, students are not only engaged in the game but also gain additional knowledge that enriches their learning experience.

6. High Score Interface

Fig. 17. High Score

The High Score interface provides information on students' achievements in the multilingual educational game for learning animal names and types. The design of this interface is crafted to offer an intuitive and engaging user experience, allowing students to easily track their progress and compare it with their peers, fostering a healthy sense of competition in learning.

7. Control Audio Interface

Fig. 18. Control audio Interface

The audio control interface is a display for managing several features such as BGM and SFX, allowing users to adjust the sound and music within the game. With this interface, the gaming experience is enhanced by offering better control over sound elements, enabling players to adjust the game atmosphere to their preferences. The design of this interface also allows developers to create a deeper and more immersive atmosphere, increasing player engagement through customized sounds.

8. Game Creator Information Interface

Fig. 19. Game Creator Information Interface

It is the interface providing information about the creators of the educational game for Animal Introduction and Interactive Learning Evaluation in Elementary Schools.

B. *Prototype Testing Result*

1. Testing Results by Students

The results of the prototype testing on 60 third-grade elementary school students show high average scores across all aspects tested. These results can be seen in the table and figure.

TABLE X. PROTOTYPE TESTING RESULT BY ELEMENTARY STUDENTS

N o	Aspects being tested	Result					Respondents
		SD	D	N	A	SA	
1	Ease of navigation	0	0	0	29	31	**60**
2	Visual Appeal	0	0	0	21	39	**60**
3	Information clarity	0	0	0	36	24	**60**
4	Gameplay Excitement	0	0	0	33	27	**60**
5	Effectiveness of Evaluation	0	0	0	32	28	**60**
	Total	**0**	**0**	**0**	**15 1**	**149**	

Score Description: Strongly disagree (SD) Disagree (D), Neutral (N), Agree (A), Strongly Agree (SA).
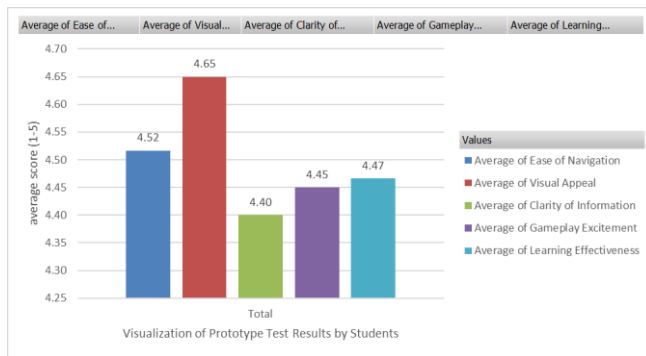
Fig. 20.   Graph of prototype testing results by students

The analysis of respondent data shows that visual appeal received the highest average score, 4.65, indicating that design elements such as color, icons, and animations are very attractive to students. The ease of navigation aspect also received a good score, with an average of 4.52, suggesting that the layout and navigation buttons are easy for students to use without excessive assistance. The effectiveness of learning scored an average of 4.47, indicating that the gameplay in this educational game helps students better understand the material.

2. Results of Testing by Teachers

The results of prototype testing on English teacher respondents, with a total of 3 respondents, show high average scores across all aspects tested. These results can be seen in the table x and figure 21.

TABLE XI.   PROTOTYPE TESTING BY TEACHERS

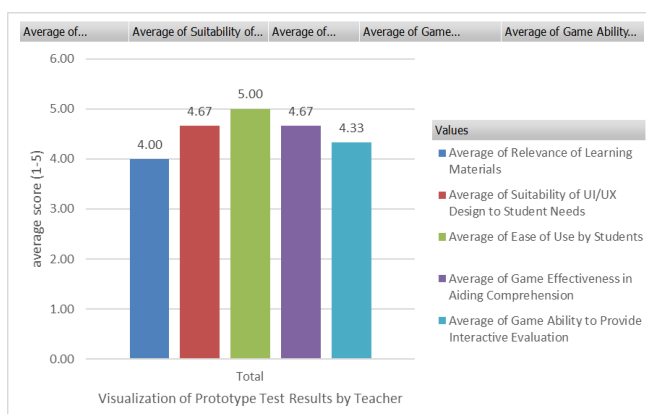| Relevance of Learning Material	Appropriateness of UI/UX design and students' needs	Ease of Use by Students	Effectiveness of the Game in Supporting Understanding	The Game's Ability to Provide Interactive Evaluation
4	5	5	5	5
4	5	5	5	4
4	4	5	4	4

Fig. 21. Graph of prototype testing results by teachers

Testing with three teachers showed that this educational game is very suitable for use in the learning process. The aspect of ease of use by students received a perfect score (5.0), indicating that teachers found the game highly intuitive for elementary school students. Additionally, the teachers

gave high ratings for the alignment of the UI/UX design with student needs (4.67) and the effectiveness of the game in helping student comprehension (4.67). However, the aspect of interactive evaluation capabilities received a slightly lower average score (4.33), indicating that although the evaluation feature is good, there is still room for improvement.

C. Discussion

1. **Effectiveness of UI/UX Design** The test results show that the UI/UX design of this educational game successfully meets the needs of elementary school students. Attractive visual elements and a simple layout provide a positive user experience. This aligns with previous research by Lee and Nguyen (2021), which emphasized that child-friendly UI/UX design enhances student motivation and engagement in learning.

2. **Impact of Gameplay on Student Understanding** The evaluation gameplay, such as matching animal names with images, helps students better understand animal introduction material. The average score of 4.47 for learning effectiveness indicates that students find this game more effective than traditional learning methods. This finding supports the research by Krisdiawan (2018), which stated that technology-based educational games can enhance students' understanding of lesson content.

3. **Challenges and Opportunities in Interactive Evaluation** Although the evaluation features in the game received fairly good scores, some teachers indicated the need for improvement, particularly in providing more varied feedback to students. This is consistent with the findings of Chen et al. (2018), who stated that gameplay-based evaluations need to be designed to offer more in-depth and personalized feedback.

4. **Novelty in Multilingual Content** The multilingual approach in this educational game received positive responses from both students and teachers. Students showed a strong preference for learning animal names in English and Indonesian, as evidenced by the average score of 4.47 for learning effectiveness. This strengthens the research by Zhao et al. (2020), which stated that multilingual learning helps students expand vocabulary and cognitive abilities.

D. Research Implications

The results of this study show that the development of a UI/UX-based educational game, designed with a Design Thinking approach, can meet the needs of elementary school students. The integration of interactive gameplay with multilingual content provides a more engaging and effective learning approach compared to traditional methods. However, there is still room for improvement, especially in the evaluation features. Future research can focus on developing more adaptive, personalized feedback for students.

V. CONCLUSION AND RECOMMENDATIONS

This study provides insights into the importance of effective UI/UX design in the development of educational games for elementary school students. The testing results show that integrating attractive visual elements, intuitive navigation, and multilingual content can create a more enjoyable and effective learning experience. The educational

game designed with the Design Thinking approach not only enhances students' understanding of the material but also motivates them to learn through interactive methods. Feedback from students and teachers confirms that this game has the potential to become a relevant learning tool for the educational needs of the digital era. However, some areas require improvement to ensure greater effectiveness and sustainability.

A. Conclusion

The study developed a UI/UX design and prototype for a multilingual educational game aimed at elementary school students, focusing on animal introduction and interactive learning evaluation, using the Design Thinking approach. The results demonstrated that the UI/UX design successfully facilitated easy navigation, engaging visuals, and intuitive gameplay, with high average scores from students for ease of use (4.52) and visual appeal (4.65). The integration of English and Indonesian content was positively received, aiding vocabulary expansion in both languages while learning about herbivores, carnivores, and omnivores. The interactive gameplay, including evaluation features like matching animal names with images, was effective in enhancing students' understanding of the material and aligned well with the elementary school curriculum, as noted by teachers. However, areas for improvement were identified, such as incorporating more varied feedback and adaptive gameplay. Overall, the research highlights the potential of technology-based educational games as an engaging and effective alternative to traditional learning methods.

B. Recommendations

Based on the research and prototype testing results, several recommendations for further development are provided. First, the interactive evaluation feature in the game should be improved by adding a variety of questions and more personalized feedback to enhance student engagement sustainably. Additionally, enriching the learning content, such as providing more detailed information about animal habitats, eating habits, and classifications, can expand the material and improve the students' learning experience. From a technological standpoint, developing the prototype into an Android or iOS-based application will ease user access and add accessibility features, such as text-to-speech, to support students with special needs. Future research is also recommended to test the game with a larger student population from various regions to ensure its general relevance. Finally, collaboration with schools is crucial to integrate this game into formal learning, including providing training for teachers to maximize the benefits of the game as an interactive learning tool. These recommendations are expected to serve as a guide for further development and wider application in technology-based education.

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