

DESIGN OF A BOARD GAME TO INTRODUCE FAUNA TO CHILDREN WITH LEARNING DISABILITIES

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Abstract

Education for slow learners requires special strategies due to intellectual and emotional barriers, such as anxiety and low self-confidence, which hinder the process of information digestion. This study aims to design character designs in the board game "ZooQuest" as an adaptive learning medium for fauna introduction for slow learner students at the elementary school level. The research method used is Research and Development (R&D) with the ADDIE (Analysis, Design, Development, Implementation, Evaluation) development model. Data were collected through interviews with special assistant teachers, observations of the teaching and learning process at Cikal Surabaya School, and literature studies. The results of the study indicate that the design of four main characters (Bobo, Jojo, Cici, and Mimi) with a chibi visual style and "little researcher" attributes is able to transform abstract material into concrete role-playing experiences. These characters function as an emotional bridge that increases student engagement and stimulates verbal communication through cooperative game mechanisms. The conclusion of this study is that character designs adapted to child psychology are effective in supporting the cognitive abilities and social interactions of slow learner students, making them suitable for use as a reference for inclusive learning media.

Keywords: board game, slow learner, adaptive learning media, character design

INTRODUCTION

Education is an endeavor undertaken with the aim of developing human potential (Amelia, 2016). Education itself is not limited to specific activities, forms, or practices, as long as they serve as a means to enhance knowledge and skills (Faizah & Kamal, 2024). In the field of education, one encounters the concepts of learning and instruction. Learning is a permanent change in a person's abilities acquired through experience and interaction (Faizah & Kamal, 2024). Instruction is fundamentally defined as the activity of educating students through the teaching-learning process while taking into account the needs and conditions of students who possess diverse personalities and individual differences (Mansyur & Bunyamin, 2022). These individual differences are the factors that cause each child to process information presented by the teacher differently (Mansyur & Bunyamin, 2022).

A child who has difficulty processing information is referred to as a slow learner. A slow learner is a condition in which a child falls under the category of children with special needs who have low intellectual ability, with an average IQ between 70 and 90, but cannot be classified into the category of children with special needs who have intellectual disabilities (National Agency for

Education Standards, Curriculum, and Assessment, 2022). Their low intellectual capacity means they require more time to process information. The challenges faced by slow learners stem from various factors, both internal and external, such as an inadequate learning environment (Wahyuningsih & Suranti, 2020). However, the challenges faced by slow learners do not stem solely from academic aspects but also from emotional aspects such as anxiety and low self-confidence, which hinder their academic and psychological development (Ultabaini & Pujaningsih, 2024). They have a lower ability to understand abstract and symbolic material—such as language, numbers, and concepts—compared to other typical children. Referring to the theory of cognitive development proposed by Jean Piaget, elementary school-aged children are in the preoperational stage transitioning toward the concrete operational stage, where they understand the world through images, simple symbols, and real objects. In this context, character design in board games serves as a concrete representation. Based on this, character design transforms abstract fauna material into a tangible experience, allowing children to learn through real visual and physical interactions.

Based on this, a learning strategy tailored to their needs is required. A learning strategy that can be used to address this issue is the use of learning media. Innovative and practical learning media can assist a student's learning process in achieving learning objectives (Juhaeni et al., 2021). The effective use of media can help students maximize their potential for various subjects, such as animal recognition (Tasti Adri, 2025). One type of learning media that can be used in the learning process is a board game. The topic of animal recognition can be incorporated into a board game because it is effective for developing children's potential (Tasti Adri, 2025). According to Simkin (2013), board games are effective tools for introducing new concepts to students, as they capture students' interest and stimulate their enthusiasm during the learning process. Board games can serve as engaging learning tools because their implementation involves communication and interaction among players (Afi Dliyaulhaq & Marsudi, 2021). Board games allow players to learn through repetition and social interaction, thereby enhancing their cognitive skills.

Unlike conventional learning, which is often one-sided, learning through board games involves fixed rules and rapid, direct interaction. For elementary school-aged children, *board games* can help develop problem-solving skills, strategic thinking, and creative and critical thinking (Chalik & Cahyani, 2024). By specifically designing the mechanics of a board game for, children with learning difficulties can continue to process information without feeling overwhelmed by academic learning. The social interaction created within the game's mechanics is also a key factor, as children are required to wait their turn, observe symbols, and respond to clues provided by opposing players. Game mechanics based on cooperation encourage children to

be active through repeated communication. The aspects contained in *board* games include visual, audio, and affective elements (Chalik & Cahyani, 2024). One of the key visual aspects in *board games* is character design. Character design is tailored to the background, personality, and physical traits of each character (Putri Biantoro et al., 2025). This character design must align with the story's theme within *the board game*. In this *board game*, character design serves not only as a decorative element but also as a representative of the character that guides players into the game (Putri Biantoro et al., 2025).

The design of these characters focuses on the task of identifying wildlife based on the animals' physical characteristics, with the aim of gradually stimulating children's cognitive abilities. Through character designs featuring supporting attributes such as school uniforms or observation tools, children *with learning difficulties* are helped to understand their role as "little researchers" on a mission. This transforms abstract information about fauna into a more tangible role-playing experience, making the process of processing information easier and less stressful for children with intellectual limitations (Afni et al., 2021).

This educational *board game*, designed to introduce *children* to wildlife, is titled "*ZooQuest*." "*ZooQuest*" is an adventure-themed educational game set in a zoo. In this game, players take on the role of young researchers who are given a task by their teacher during a visit to the zoo: to get to know the zoo's animal residents better. They are asked to find out the animals' physical characteristics, such as their color, number of legs, diet, sounds, and habitats, as well as other distinctive physical traits. Young researchers who successfully identify the animals will receive an animal token. Players must collect 10 animal tokens to win the game.

METHOD

To ensure the effectiveness of the character design, this study employs the *R&D (Research and Development)* method by adopting the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation). *R&D* is a research method used to produce a specific product and test its effectiveness (Rustandi & Rismayanti, 2021). According to Ketut Budaya Astra (2020), the ADDIE model is a programmed design research method with a systematic sequence. This approach was chosen because the researcher needed to ensure that each stage carried out had a strong theoretical foundation and precise technical aspects before conducting trials on slow-learning children.

Analyze Stage

The researcher collected primary data through interviews and observations, then analyzed the data obtained. Based on the results of interviews with special education teachers and observations

regarding the learning barriers faced by *slow learners*, the author identified visual elements that can help students feel comfortable and less stressed while learning and playing.

Design Phase

In this stage, the author develops character concepts that incorporate specific traits, backgrounds, and physical characteristics. The primary focus of this stage is to design characters as representations of young researchers, complete with supporting attributes such as school uniforms, observation tools, and other items. This is intended to help players immerse themselves in the game world.

Development Stage

During the development phase, the conceptual design is transformed into a functional physical prototype. This process involves visualizing the characters Bobo, Jojo, Mimi, and Cici—along with their signature tools—in final illustrations that use colors consistent with the adventure theme to facilitate visual identification for children *with learning difficulties*.

Implementation Stage

The implementation phase involved directly testing the prototype game pieces by having the target group—students *with learning difficulties*—play the *board game*. During this phase, the game was played cooperatively under the supervision of a teacher to observe the children's social interactions and cognitive abilities in identifying animal characteristics. This implementation aims to assess the extent to which the game medium can stimulate verbal communication among players as they provide each other with clues and collaborate to complete missions as "Little Researchers." During the gameplay, observations were conducted using a social skills assessment instrument to document changes in students' attitudes, such as their willingness to follow rules, take turns, and express emotions that emerged during the teaching and learning activities.

Evaluation Phase

This stage measures the effectiveness of the character design and game mechanics in addressing students' cognitive and social needs. The researcher analyzes whether the character design successfully serves as an emotional bridge and helps students understand the complex material on animal classification.

Data validation in this method is conducted comprehensively. The validation process involves two main stages: (1) validation by design experts to determine visual and functional aesthetics, and (2) validation by 5 Special Education Teachers (SETs) at Cikal School in Surabaya. To objectively measure the effectiveness of the character design, the study used a structured instrument validated by Special Education Teachers, divided into two main dimensions: cognitive and social. Measurements were taken using a 1–5 Likert scale to assess the frequency and accuracy

of students’ responses during play; cognitive assessment indicators focused on students’ ability to recognize physical characteristics and identify animal names. Meanwhile, social indicators measured the frequency of verbal communication, peer interactions, and adherence to game rules.

Table 1. Design Effectiveness Measurement Indicators

Evaluation Dimensions	Key Indicators	Measurement Scale
Cognitive Ability	Recognizing physical characteristics and identifying animals through visual cues.	1 (Not at all) 5 (Very often)
Social Skills	Compliance with rules, verbal communication, and emotional stability.	1 (Not at all) 5 (Interactions >9 times)

RESULTS AND DISCUSSION

The result of this project is a character design used in *a board game* that introduces wildlife to children *with learning disabilities*. The character design aligns with the *board game*’s theme, which focuses on introducing animals found in zoos. Accordingly, the characters are designed to resemble young researchers. The *board game* features four characters who facilitate gameplay and complement the overall design *of the game*.

A character can help players immerse themselves in a game; this character helps children translate their imagination into the game’s theme, making it easy for them to imagine themselves as that character. The character design in this *board game* serves as a bridge between the players’ emotional attachment and the animals, representing the relationship between living beings. According to Vygotsky, play is a source of development for children in terms of thinking. In elementary school, children begin to learn empathy, so the presence of characters with strong backgrounds and roles can serve as a fun and effective learning tool.

Visual Concept

The visual concept used in this *board game* features a children’s cartoon style with chibi characters, warm colors, and a diverse cast of characters. This visual style was chosen because it is suitable for appealing to the target audience, which consists of children aged 6–12. The character designs are diverse, depicting an inclusive representation through skin tones and hair colors. This is intended to make it easy for children to recognize the different characters in the game.



Image Source: <https://id.pinterest.com/maginapier/>

Figure 1. Visual Concept Reference

This *board game* is designed for 2–4 players, which means it requires 4 characters to represent each player. The characters are illustrated in the chosen art style. The character designs are based on the game's theme: an adventure in the zoo as young researchers. The four characters are depicted with various tools that help them study animals in the zoo. The four characters are named Bobo, Jojo, Cici, and Mimi. These names were chosen so that children can easily remember and spell them. Here are the four characters featured in this wildlife-themed *board game*.

Bobo Character Design

In the development of this educational wildlife *board game*, the character Bobo was designed to represent a student who is highly observant and has a strong curiosity about the physical characteristics of living creatures. The name "Bobo" was chosen based on child psychology; the use of repetitive syllables creates a friendly sound that is easy to pronounce and remember for children *with learning difficulties*, thereby fostering *an emotional bond* from the very start of the game. Bobo acts as the "Wildlife Physical Trait Observer," whose main task is to identify the unique physical characteristics of each animal. In the game mechanics, Bobo helps players dissect the physical details of the animals—such as the elephant with its large ears, the giraffe with its long neck, or the zeb with the stripes on its skin.

To enhance his role, Bobo is equipped with a functional tool: a *magnifying glass* designed to be ergonomic and child-friendly. Visually, Bobo's appearance draws on the *Field Trip Ranger* aesthetic with a cheerful, modern twist. He wears a cream-colored short-sleeved shirt and green pants. The choice of an earth-tone color palette combined with contrasting colors on accessory details aims to make this character visually stand out on the game board, while also conveying the image of a meticulous adventurer ready to explore the uniqueness of every animal at the zoo.

Alternatif 1



Alternatif 2



Alternatif 3



Image Source: personal documents

Figure 2. Comprehensive Design of the Bobo Character

Jojo Character Design

The Jojo character is designed as an intelligent, systematic figure who is deeply concerned about the health of the zoo's residents. Jojo serves as the "Fauna Diet and Nutrition Expert," with the primary responsibility of ensuring every animal receives food appropriate to its biological needs. In the game mechanics, Jojo serves as the key guide for players to classify animal food types, such as distinguishing between carnivores, herbivores, and omnivores.

As his primary support tool, Jojo is equipped with a functional device called the "Nutri-Scanner," a futuristic handheld tablet. Visually, Jojo wears the same uniform as Bobo. His skin tone and hairstyle are depicted to reflect the characters' diversity.

Alternatif 1



Alternatif 2



Alternatif 3



Image Source: personal documents

Figure 3. Comprehensive Design of the Jojo Character

Cici Character Design

Cici is designed to be quick-witted, creative, and sharp-eyed. She serves as a "Wildlife Behavior Documentarian," tasked with capturing moments and identifying unique animal behaviors. In the game mechanics, Cici acts as an observer who helps players recognize animal activities such as foraging, sleeping, or interacting.

As her main tool, Cici carries a "camera" with a *chunky* design that's comfortable for children to hold. This camera isn't just an accessory; it represents Cici's ability to capture the details of animal behavior. Visually, Cici wears the same uniform as the other characters, but she wears a green *scout* hat.

Alternatif 1



Alternatif 2



Alternatif 3



Image Source: personal documents

Figure 4. Comprehensive Design of the Cici Character

Mimi Character Design

The character Mimi is designed to be cheerful, caring, and highly organized. Mimi plays a crucial role as the "Habitat Exploration Guide," whose primary task is to help players understand how animals are grouped based on their habitats or zones within the zoo. In the game mechanics, Mimi acts as a navigator, guiding players to map out travel routes to the correct zones, such as distinguishing between the jungle area, the aquatic zone, or the bird area.

As the main supporting tool, Mimi brings an "Interactive Zoo Map." Visually, Mimi wears the same uniform as the other characters; through her always-ready and enthusiastic demeanor, she embodies the Little Researcher meticulous in planning and encourages every player to explore the zoo with confidence and organization.

Alternatif 1



Alternatif 2



Alternatif 3



Image Source: personal documents

Figure 5. Comprehensive Overview of the Mimi Character

Design Validation

Design validation was conducted after all comprehensive character designs were completed. The validation involved design experts and Special Education Teachers (GPK) from Cikal School in Surabaya. The validation was conducted through interviews with five design experts and GPKs. The researcher recorded the votes cast for each character design. The following are the results of the character validation.



Image Source: personal documents

Figure 6. Character Design Validation Results

The character development for ZooQuest is based on Lajos Egri's Character Design Theory, adapted to Piaget's concrete operational stage. Lajos Egri's Character Design Theory divides characters into three aspects: physiological, sociological, and psychological. Based on this, the *chibi* style was chosen for its simple proportions and bright colors to facilitate symbolic

recognition. Sociologically, the characters are equipped with physical attributes such as magnifying glasses, cameras, tablets, and maps as tangible observation tools. Psychologically, the characters’ expressions are designed to be cheerful and friendly to reduce students’ anxiety levels while playing.

Design “Alternative 1” was unanimously selected by 5 Special Education Teachers because the character’s proportional body composition makes it easier for the target audience to identify the character’s role without excessive cognitive load. A limited pilot study was also conducted with 6 students *with learning disabilities* to measure the effectiveness of the character as a concrete medium for improving cognitive abilities through *pre-test* and *post-test* instruments.

Table 2. Comparison of Average Subject Ability Scores (N=6)

Assessment Aspect	Score		
	Average Session 1	Average Session 2	Improvement (%)
Cognitive Ability (Identification of characteristics and animal names)	1.56	2.61	67%
Social Skills (Interaction & communication)	1.83	2.58	41%

Analysis of the test results shows a strong correlation between character design as an object of representation and improvements in students’ cognitive and social scores. According to Piaget’s theory of, children in the concrete operational stage (elementary school age) construct cognitive schemas through direct experience and real objects. This is evidenced by the improvement in scores on the cognitive ability assessment, which shifted from the “Rarely” scale in the first session to the “Often” scale in the second session.

The physical attributes of the characters—such as Bobo’s magnifying glass—serve as tangible visual elements, making them a key factor in the success of this character design. This improvement is also evident in the social aspect, where the character design—featuring a *chibi* art style and friendly expressions—successfully reduced students’ anxiety levels, leading to improved verbal communication. This underscores that *board game* characters serve not only as pawns or tools but also as a medium that bridges students’ cognitive and social barriers through appropriate visual representation.

CONCLUSION AND RECOMMENDATIONS

The design of this educational *board game* about wildlife is an adaptive learning tool specifically designed to meet the cognitive and social needs of children *with learning difficulties*. Through simple, repetitive gameplay, it enables children *with learning difficulties* to learn while

playing. With this adaptive learning tool, it is hoped that educational content can be delivered through methods other than conventional ones.

Character designs and teaching aids tailored to child psychology, combined with a scenario involving a visit to the zoo, help build emotional connections and increase student engagement in the learning process. As a result, this *board game* serves not only as a tool for introducing wildlife but also as a medium for social interaction that teaches children to cooperate, follow rules, and express themselves positively. It is hoped that this design can serve as a reference for creating character designs in future games.

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