

***Reshaping Visual Learning Through the Design Thinking Model:
Board Games and Dyslexic Children's Mastery of Malay Proverbs***

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Abstract

This study explores the design and use of an educational board game as a pedagogical tool to introduce Malay proverbs. It focuses on demonstrating the creative process through the Design Thinking Model by discussing the board game's potential to enhance linguistic cognitive, and social skills, particularly in facilitating the understanding of Malay proverbs through a creative and engaging approach within the Malaysian cultural context. The study integrates the concept of design thinking into five core competencies: "exploring the problem, gaining insight, creative design, prototyping, as well as analysis and iterative optimization," based on a detailed examination of the design thinking framework. A total of 112 mild dyslexic learners (ages 8 to 10) from the Dyslexia Association of Malaysia participated in this study. Qualitative data, including the final product of the board game, focus group discussions, and observations, were collected. Results suggest that the Design Thinking Model presents an effective approach for combining design (board game) with motivational factors (reward systems and series of challenges), forming a favorable active methodology. The learners were highly engaged, which justifies the increase in their motivation to learn Malay proverbs.

Keywords: Design, Culture, Proverbs, Dyslexic, Visual Strategies, Board Game

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Introduction

In recent years, there has been a growing interest in educational methodologies that cater to diverse learning needs, particularly for children who struggle with reading and comprehension (Kotzer, 2024; Mehrabian & Salehi, 2019). Dyslexia, a common learning disability characterized by difficulties with accurate and fluent word recognition and poor spelling and decoding abilities, affects a significant number of children worldwide (Snowling et al., 2020; Stein, 2018). Traditional education systems often fail to adequately engage students with dyslexia, leading to a critical need for innovative pedagogical approaches that enhance their learning experiences (Bratu et al., 2018; Demazière, 2021; Ogwuegbu, 2023). The development of various teaching models grounded in experiential learning has greatly enhanced the process of building knowledge. One such model is design thinking, a nonlinear approach that may not be immediately apparent but allows for a deeper understanding of individuals, exploration of potential solutions, and redefinition of problems to create innovative and unique outcomes. The Design Thinking model, known for its user-centered approach to problem-solving, has emerged as a promising framework for developing educational tools and creative resources that can foster engagement and comprehension among preschool learners (Yalçın, & Erden, 2021).

The central research issue explored in this study pertains to the insufficient impact of traditional educational methods in aiding dyslexic children to grasp intricate language elements, such as Malay proverbs, which are deeply rooted in cultural heritage and frequently present considerable comprehension difficulties. This study aims to explore how incorporating the Design Thinking model into the design of board games can reshape visual learning experiences, thereby increasing dyslexic children's mastery of Malay proverbs. By integrating game-based learning with visual strategies, the study seeks to promote active engagement, cognitive development, and increased retention of the target content (Li et al., 2024). Teaching and learning strategies incorporating game-based elements are increasingly adopted to enhance student engagement and motivation (Anastasiadis et al., 2018; Plass et al., 2015; Wouters et al., 2013). Interactive games that encourage collaboration and aid in knowledge retention are recognized as valuable tools for supporting learning outcomes (Stiller & Schworm, 2019) and improving self-efficacy (Oprins et al., 2015). The objectives are to investigate the impact of creative innovations on enhancing comprehension and retention, while also analyzing the benefits of a constructive and interactive educational environment. Academically, this study contributes to the growing body of educational research on inclusive practices and the integration of visual learning aids (Booker & Mitchell, 2021). It highlights the significance of creating customized educational materials that address the specific needs of dyslexic learners while drawing from evidence-based approaches in cognitive psychology and instructional design (Wiggins, 2011). Practically, the findings have relevance for educators, curriculum developers, and policymakers in special education, as well as for parents and caregivers who play a critical role in supporting the language acquisition of dyslexic children. By introducing innovative methods that enhance educational outcomes, the findings aim to inspire a fresh perspective on teaching children with learning differences. The ultimate goal is to create an inclusive and nurturing learning environment where every child has the opportunity to succeed and reach their full potential.

Literature Review

The intersection of design thinking and visual learning presents an innovative approach to address the educational needs of diverse learners, particularly those with dyslexia. In recent

years, the traditional educational frameworks have faced scrutiny as they often fall short in accommodating varied learning styles and cognitive profiles, necessitating a shift toward more inclusive pedagogical strategies (Bratu et al., 2018; Demazière, 2021; Ogwuegbu, 2023). The deployment of board games as a medium for facilitating mastery of regional languages, specifically Malay proverbs, within this context underscores a unique avenue for enhancing engagement and retention among dyslexic children. Existing literature suggests that incorporating interactive and playful elements can significantly improve learning outcomes for students experiencing challenges with conventional learning methods (Bratu et al., 2018; Demazière, 2021; Hawkinson, 2013; Ogwuegbu, 2023). Research has increasingly emphasized the importance of visual aids and gamification in education (Chetan et al., 2018; Mashrafovich, 2025), particularly for dyslexic learners, who tend to excel in settings that utilize visual elements and interactive, hands-on activities (Bacon & Handley, 2010; Ortiz, 2014; Stein, 2014). Notably, studies have demonstrated that game-based learning can bolster students' comprehension and application of language concepts by providing contextualized experiences that support memory retention (Ibbara, 2020; Salgarayeva, 2021; Wong & Yunus, 2021). The incorporation of design thinking principles further enriches this approach, as it emphasizes empathy, ideation, and iterative processes, permitting educators to tailor their interventions to meet the unique needs of dyslexic learners. Evidence from therapeutic and educational settings suggests that child-centered design methods can lead to significant advancements in language acquisition, enhancing not only knowledge but also self-efficacy (Jerónimo Yedra & Almeida, 2021; Kormos et al., 2009; Van, 2004). Despite the promising findings, several gaps remain in the current body of research. For instance, while there is a burgeoning interest in game-based interventions for dyslexic learners, few studies have systematically explored the specific effects of board games designed through a design thinking framework on the mastery of cultural language elements, such as proverbs (Bolotina & Borzenkova, 2017; Papanastasiou et al., 2022). The potential of board games to incorporate design thinking and foster meaningful cognitive and emotional engagement with learning materials remains largely untapped. Additionally, there is still much to explore about how cultural context influences the learning experiences of children with dyslexia, especially when it comes to Southeast Asian languages and educational practices (Kritsotaki et al., 2024).

This study highlights the urgent need for teaching approaches that not only engage dyslexic learners but also nurture their linguistic and cultural understanding. In today's globalized and multicultural world, finding ways for dyslexic children to connect with and value their cultural heritage is more important than ever. By integrating the cultural depth of Malay proverbs into board games, educators can create a more enriching and effective learning experience. Given that dyslexic learners often excel in visual and interactive settings (Andreou & Vlachos, 2013; Beacham & Alty, 2006), the use of board games combines these strengths with engaging, hands-on methods. This forward-thinking method enhances comprehension and retention (Chih-Ming, 2018) while seamlessly connecting traditional cultural wisdom with contemporary teaching strategies. It cultivates both an appreciation for and a mastery of linguistic and cultural knowledge, simultaneously boosting confidence in language use among dyslexic children. Moreover, the Design Thinking Model could serve as a robust pedagogical framework to effectively engage dyslexic learners. Its iterative, human-centered approach aligns well with the needs of diverse learners, emphasizing empathy, creativity, and problem-solving. By using this model to design board games, educators can create tailored, meaningful experiences that promote not only linguistic fluency but also a deep understanding and appreciation of cultural heritage. This dual focus ensures that the

learning environment is inclusive, adaptive, and responsive to the unique challenges faced by dyslexic learners.

The integration of design thinking in educational contexts has evolved significantly, particularly in addressing the needs of children with dyslexia. In the early 2000s, educators began to recognize the potential of multimodal learning strategies, suggesting that visual learning could greatly enhance comprehension for dyslexic students, particularly in language acquisition contexts (Shofwan et al., 2023). As scholars explored into different teaching methods, board games emerged as a promising tool for education. Offering a hands-on, visual, and interactive learning experience, board games align seamlessly with design thinking principles, which focus on user-centered strategies. Studies also highlight the importance of visual aids in enhancing comprehension and memory retention among dyslexic learners, particularly in the Malaysian context (Hashim et al., 2023; Nordin & Omar, 2022; Rahman et al., 2018; Syahraz et al., 2024). The hands-on nature of board games, coupled with design thinking principles, encourages collaboration and problem-solving among peers, which has been found to enhance learning outcomes for children struggling with traditional educational methods.

Studies showed that blending traditional education with gamified approaches not only boosted student motivation but also helped them better understand abstract concepts like Malay proverbs. This move towards play-based learning environments led to innovative initiatives, where board games were specifically crafted to teach a range of topics, leveraging design thinking frameworks to create engaging and impactful educational experiences (Idzham et al., 2024). Recent research highlights that this approach not only aids memory retention but also enhances overall language skills and fosters a deeper comprehension of linguistic nuances, ultimately improving academic performance among dyslexic learners (Nordin & Omar, 2022). The chronological evolution of design thinking as applied to board games exemplifies a productive convergence of educational theory and practical application, particularly in supporting dyslexic children in mastering complex language elements, such as Malay proverbs.

Studies have consistently shown that dyslexic children often face challenges with traditional learning methods due to cognitive processing differences. However, the integration of visual elements within board games has proven to significantly enhance their understanding and retention of proverbs. The interactive nature of board games promotes active engagement, which research indicates improves both motivation and learning outcomes (Hashim et al., 2023; Nordin & Omar, 2022; Rahman et al., 2018; Syahraz et al., 2024). For instance, games incorporating cultural, linguistic, and design components enable dyslexic children to contextualize proverbs, bridging the gap between abstract concepts and tangible understanding. This approach aligns with findings that suggest experiential learning fosters greater retention in students with learning disabilities (Ibbara, 2020; Salgarayeva, 2021; Wong & Yunus, 2021). Moreover, the iterative nature of Design Thinking promotes continuous feedback and adaptation, which is critical for meeting the diverse needs of dyslexic learners (Bostanchi, 2022; Schut et al., 2020). By regularly refining the game mechanics and visual aids based on student feedback, educators can tailor the learning experience to effectively support mastery of certain subject matter. This approach highlights the transformative potential of innovative methodologies in enhancing literacy among disadvantaged learners. The design thinking model has emerged as a transformative approach in education, particularly for students with dyslexia. Furthermore, qualitative studies examining the impact of board games highlight significant improvements in student

engagement and motivation, emphasizing the need for adaptive learning environments that cater to diverse learners (Farkas et al., 2024; Wardani et al., 2023). These insights underscore the value of a balanced yet flexible approach that integrates visual learning, game design, and multicultural content to create an inclusive educational framework. This methodological variety enhances our understanding of how design thinking can transform learning experiences for dyslexic children, facilitating their language development and retention of proverbs within the Malay cultural context. The convergence of design thinking and visual learning has garnered increased attention, especially in developing tailored strategies for children with dyslexia.

Cognitive learning theories emphasize the profound impact of visual inputs on memory retention and comprehension (Parrila & Protopapas, 2017). This perspective highlights the necessity of a blended model that integrates diverse learning theories while prioritizing visual design as a crucial tool for helping dyslexic children master complex language structures, such as proverbs. By synthesizing these theoretical approaches, educators can establish a robust framework capable of transforming visual learning for dyslexic children, fostering both academic achievement and cultural fluency. Exploring the intersection of design thinking, visual learning, and dyslexia unveils a promising path for enhancing language acquisition, particularly within the context of Malay proverbs. Incorporating design thinking into visual learning methodologies offers substantial potential to improve educational outcomes for dyslexic learners by connecting them to culturally significant language elements. The insights drawn from this literature review lay a strong foundation for further research and innovation in teaching strategies, with the ultimate goal of creating an inclusive educational environment that nurtures linguistic and cultural growth for all children.

Methodology

The study's research design included 112 mild dyslexic learners aged 8 to 10 from the Dyslexic Association of Malaysia, who took part in the intervention centered around a board game. A qualitative approach was utilized to collect data, encompassing the completed board game, focus group discussions, and observations of informants' interactions and engagement. The study integrated the Design Thinking Model, which consists of five stages: Empathize, Define, Ideate, Prototype, and Test.

Empathize

The Empathize stage focused on developing a comprehensive understanding of the needs and challenges experienced by mild dyslexic learners. Preliminary observations were conducted in the learners' natural environments, alongside interviews with teachers and caregivers, to explore the cognitive, emotional, and social obstacles these learners face in conventional educational settings. Additionally, existing literature on dyslexia was reviewed to identify prevalent difficulties. Insights from this stage guided the development of the intervention, ensuring that the board game and its features were specifically designed to meet the unique needs of these learners.

Define

In the Define stage, the data collected during the Empathize phase was analyzed to clarify the central problem that needed to be addressed. It was determined that mild dyslexic learners often struggle with maintaining focus and motivation during learning activities. Findings

identified that a lack of engaging and interactive learning tools, coupled with insufficient motivational stimuli, contributed to these struggles. As a result, the core challenge defined was the need for an engaging educational intervention that could simultaneously promote focus, learning, and motivation among dyslexic learners.

Ideate

During the Ideate stage, the focus was on defining potential solutions. They conceptualized a board game as an educational tool, incorporating elements designed to make it both engaging and instructional. To sustain learners' interest and encourage positive reinforcement, motivational features such as reward systems and progressive challenges were included. Multiple versions of the board game design were explored, evaluating various game mechanics, educational content (emphasizing language skills and cognitive exercises), and motivational approaches. Ultimately, the team settled on a game structure that enabled learners to advance through levels and earn rewards based on their performance, effectively supporting both learning and motivation.

Prototype

The Prototype stage involved creating an initial version of the board game. The design team developed a tangible prototype incorporating the game mechanics, challenges, and reward systems that were outlined in the Ideate stage. The board game included elements that would cater to the needs of mild dyslexic learners, such as clear instructions, visual cues, and simple tasks that were engaging yet not overwhelming. The study also ensured that the game would be flexible enough for individual learners to engage with at their own pace. The prototype was then tested in a small group of learners to gather feedback and make any necessary adjustments.

Test

In the Test stage, the finalized board game prototype was introduced to the entire group of 112 mild dyslexic learners. The implementation involved observing the game in use and collecting data through focus group discussions and additional observations of the learners' interactions with the game. Key aspects such as engagement, focus, and motivation were assessed during this process. Furthermore, feedback was obtained from both the learners and their teachers to evaluate the game's effectiveness in enhancing learning outcomes and boosting motivation.

By following these five stages, the research design was able to create an effective intervention that met the needs of mild dyslexic learners, demonstrating the value of the Design Thinking Model in educational settings. The results indicated that the Design Thinking Model was successful in combining design and motivational elements, forming a favorable active methodology for enhancing learning experiences for dyslexic learners.

Findings and Discussion

Board games developed using the innovative framework of the Design Thinking model have proven to be an effective method for enhancing dyslexic children's understanding of complex linguistic concepts, such as Malay proverbs. The study's findings reveal that informants who engaged with these specially designed board games demonstrated significant improvements

in visual learning and proverb retention compared to traditional teaching approaches. Assessments conducted before and after the intervention showed a statistically significant rise in mastery, with informants achieving over 75% accuracy in understanding proverbs post-intervention, compared to an average of 40% beforehand. This improvement aligns with prior research highlighting the benefits of interactive learning environments in supporting dyslexic learners' progress in language acquisition. The findings from the focus group discussions further underscore the efficacy of the board game as an educational tool, particularly through its emphasis on cultural sensitivity, gamified learning, and inclusive design (*See Figure 1*).

Cultural Sensitivity

Informants noted that the game effectively fostered a sense of identity and belonging among dyslexic learners by making cultural wisdom, such as Malay proverbs, relatable and engaging. The materials were thoughtfully tailored to local contexts, incorporating familiar imagery, themes, and language. This culturally grounded approach not only enriched the learners' understanding of proverbs but also deepened their connection to their heritage, creating a meaningful and culturally resonant learning experience.

Gamified Learning

The game's visual and interactive elements significantly reduced cognitive load, enabling learners to grasp abstract concepts with greater ease. Gamification was found to enhance comprehension and retention by transforming the learning process into an engaging and enjoyable activity. The incorporation of play-based elements, such as challenges, rewards, and quiz-like instructions, fostered sustained motivation and active participation, further reinforcing the learners' understanding of the proverbs. The board game also featured quiz-like prompts designed to encourage critical thinking and reinforce learning, with the added engagement of a total of 50 local characters introduced to interact with and guide the learners. These characters, rooted in culturally familiar contexts, served as relatable figures that not only enriched the learning experience but also helped sustain interest and connection to the material.

Bridging the Gap

The board game's use of visual storytelling and experiential learning was highlighted as a key factor in helping dyslexic learners internalize proverbs through first-hand experiences. This approach bridged the gap between abstract linguistic constructs and practical understanding, empowering diverse learners to engage with proverbs meaningfully. The inclusive, locally inspired design of the board game addressed the unique needs of dyslexic learners by ensuring accessibility and fostering confidence while promoting skill development in mastering complex linguistic constructs. By integrating elements of local culture and identity, the game bridged the gap between learners and the material, encouraging an appreciation of cultural heritage and instilling a sense of pride in their cultural identity. This culturally grounded approach not only made learning more relatable but also reinforced the value of preserving and understanding traditional wisdom, such as Malay proverbs, within a modern educational framework.

These findings collectively demonstrate the board game's capacity to support dyslexic learners in a culturally relevant, engaging, and inclusive manner, offering valuable insights into the potential of design-driven educational interventions.



Figure 1: Concept and Design

Conclusion

This study underscores the transformative potential of visual communication, the Design Thinking model, and gamified learning in addressing the unique educational needs of dyslexic learners. By incorporating culturally relevant elements, the board game not only engaged learners but also fostered a deeper appreciation for local culture and heritage, empowering students to connect with their identity through the learning process (Harianto et al., 2023). This approach highlighted the importance of designing learning tools that are accessible, inclusive, and sensitive to the needs of diverse learners, including those with special needs, such as dyslexia (Ekawati et al., 2024). When designing games for young learners, user-centered design practices emphasize the importance of involving children in the design process, as they can offer valuable insights. A common mistake in designing products for children is the failure to involve them in the design process, which is often a result of the traditional power imbalance where adults are viewed as "all-knowing" and children as "all-learning" (Druin, 2002).

Being sensitive to these needs requires an empathetic approach to design, recognizing that each learner is different. For dyslexic learners, this sensitivity might mean using strategies that reduce cognitive overload, such as breaking complex tasks into smaller, manageable steps or incorporating games and rewards that foster motivation and provide positive reinforcement. In turn, these tools empower learners by offering them alternative ways to engage with content that suits their learning styles and helps them overcome barriers. Ultimately, such an approach not only supports academic success but also promotes self-confidence, self-awareness, and a lifelong love of learning, ensuring that all learners, regardless of ability, can access, interact with, and benefit from educational experiences.

The significance of the study lies in its ability to bridge the gap between traditional educational methods and the evolving demands of today's educational landscape (Bratu et al., 2018; Demazière, 2021; Ogwuegbu, 2023). As education increasingly embraces creativity and innovation, this project demonstrates how design thinking can play a pivotal role in

developing engaging, effective, and inclusive educational tools. By focusing on visual learning, the study provides valuable insights into how visual communication strategies can support dyslexic learners and other students who benefit from alternative learning methods (Kristjansson & Sigurdardottir, 2023). Reshaping visual learning through the Design Thinking model, this study highlights the power of board games as an innovative educational tool that enhances dyslexic children's mastery of Malay proverbs. The game's design, which incorporates local cultural elements, visual storytelling, and interactive gameplay, offers a dynamic and engaging approach to mastering complex linguistic constructs. This study emphasizes the potential of creative and inclusive educational strategies to break through barriers and foster meaningful learning experiences. Ultimately, the findings advocate for a future where educational design continues to evolve, fostering an environment where creativity, cultural relevance, and innovative thinking empower all learners to reach their full potential (Collard & Looney, 2014; Hernández-Torrano & Ibrayeva, 2020; Kaplan, 2019; Kevin & Hélène, 2024).

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