



Gamification in Improving Reading Skills of Preschool Children: Blending Through Puzzle Game

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ABSTRACT

This study explores the effectiveness of puzzle games in improving the learning of Malay Language reading skills among preschool children. The study focuses on inculcating blending skills through puzzle games since one of the most critical elements in learning reading is phonics which involves the skills of letter recognition and phonemic segmentation. Two teachers and twenty-eight preschool children were involved in this study, consisting of 17 preschool children from one of the primary schools in Serian and 11 preschool children from one of the schools in Padawan. These preschool children between the age of five and six were divided into two teams of red and blue. Their preschool teacher monitored them during playday. Two methods were involved in collecting the data: interview and observation. Teachers' opinions on the interventions were acquired in semi-structured interviews, and preschool children were observed. These two preschools' findings show that blending through puzzle games in improving reading skills displays more significant learning benefits and is effective in collaboration, readiness, understanding, and shared mental models. Preschool children show more interest in participating in puzzle games' learning process. The game could be used for English classes and played in a larger space, such as a hall, to make it easier for preschool children to move. Future enhancements could focus on digitalised gamification that can provide more exciting and interactive gameplay.

Keywords: reading skills, gamification, puzzle game, preschool children

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1 INTRODUCTION

Malay is the national and official language in every government-funded public school in Malaysia (Kementerian Pendidikan Malaysia, 2013). However, as a multiracial country, the Malay Language is not considered the first language in some regions, such as Sarawak and Sabah, since they have various ethnicities and tend to use their mother tongue as their first language. Therefore, acquiring this first language is different, as it does not involve formal learning to master compared to the second language (Hwa & Subramaniam, 2017). Like other languages, making sense of the printed text is the process of reading (Akyol et al., 2021) and is crucial as a fundamental building block for learning regardless of the academic subject, whether it be language arts or even maths. According to Hall and Moats (2015), children must be literate to comprehend written texts, especially when vocabulary requirements are needed in the upper grades for content-related resources. It is a skill that enables preschool pupils to expand their understanding and acquire knowledge to serve as a starting point for additional learning and allow entry into the fantastical world of fantasy. Through reading, children can learn something based on what they read, and it is one of the best ways to teach children about something without having them go through it. Reading requires knowledge of the sound and blending the letters based on the letter sounds. Phonemic awareness instruction significantly impacts reading learning when paired with phonics instruction (Kart, 2021). In order to learn reading, one needs to know letter shapes, names and sounds to recall how to read words utilising grapheme-phoneme links (Ehri, 2020). Although it is becoming increasingly clear that preschool children need support in their reading development, there is little agreement on the most effective pedagogical strategy. Preschool teachers may emphasise the importance of incorporating reading activities into regular sessions. Preschool teachers may adopt a reading training curriculum to encourage reading skills. Since these approaches have not yet been comprehensively examined regarding the learning gains for all children and outcomes of children with different levels of skills, there is little research on their efficacy.

The current issue the class teacher faces regarding the reading is that the children cannot correctly blend the syllables into words. Reading is one of the most critical skills that pupils need to master for them to be able to catch up with the primary school's syllabus. Hence, they need to master reading skills before they go to Year One. From the researcher's observation during the teaching and learning process, it was not the only problem; the preschool children were also unmotivated to study. When attempting to construct two syllables, they often forget the sound of the first syllable. Some preschool children can remember the sounds of the letter but cannot blend the sound to form a word. One of the reasons why they cannot blend the sound into syllables or words is because they cannot memorise the letter sounds. According to Bialystok (1991), despite having an explicit understanding of letters and sounds, all children lacked symbolic awareness of how letters represent sounds. Preschool children tend to forget the letter sounds when blending the syllables alone without any other activity. According to Tunmer and Hoover (2019), most phonics programs assume children can only learn letter-sound patterns through direct instruction. Based on the interview with the preschool teachers, they mentioned that preschool children also confuse some of the letter sounds, such as the letter 'j' and 'g'. For example, 'gi' becomes 'ji', 'ga' becomes 'ja', and they pronounce 'gigi' as 'jiji'. One of the reasons for this issue is the method employed during teaching, which cannot stimulate preschool children's interest and active participation.

Based on this issue, the researcher has taken an approach to assist preschool children in mastering reading skills while also encouraging children to be actively involved in the learning process. One of the strategies to deal with this issue is to modify pedagogical practices that may boost children's motivation and desire. Preschool children's motivation influences self-engagement and involvement in the classroom, leading to the teaching-learning process's effectiveness. In order to fulfil the learning objective and create a relevant learning experience for the students, the instructor must encourage students' motivation (Dahlia, 2019). According to Green (2015), to increase student motivation, the teacher should be able to convey what is taught effectively and to do so, the teachers should change how they teach and develop students' intrinsic motivation. Success in learner-centred education depends on compelling student motivation. Regan (2003) states that motivation is one of the most critical psychological ideas in education today. Grades are a comparatively weak motivation for students learning. Instead, the learner-centred classroom will concentrate on creating a safe space for kids to study, encouraging realistic expectations for academic performance, and using an intrinsic motivation to give the learning objectives a high subjective worth (Green, 2015).

There are two objectives of this research. The first objective of this research is to motivate and engage children in reading activities, as research shows that children learn better when they are interested and motivated by the material they are learning. Gamification techniques such as reward systems, progress tracking, and competition can also be used to encourage children to read more and improve their reading skills. Using a puzzle game incorporating reading activities, children can develop their cognitive, linguistic, and problem-solving skills while enhancing their literacy abilities. The second objective of this research is to create an enjoyable and engaging learning experience that can help children develop their literacy skills and foster a love for reading through puzzle games. The puzzle game that involves reading can help children develop their phonemic awareness, vocabulary, and comprehension skills. The game can also provide opportunities for children to practice reading fun and interactively, increasing their confidence and interest in reading.

2 BACKGROUND

Mastering reading skills is one of the most challenging parts of preschoolers, especially when they do not know how to blend syllables into words. Based on the National Preschool Standard-Based Curriculum, preschoolers are children between five and six years old (Curriculum Development Division Ministry of Education Malaysia, 2017). At this age, pretend play is typical among children, such as when they pretend to read based on what they remember from things they hear or see. According to Lillard (2017), pretend play typically starts at roughly 12 to 18 months of age with object substitution, peaks at about three to five years with pretend identities and complicated social scenarios, and ends entirely at 11 years; however, some people continue to pretend play into adulthood. Pretended reading helped children develop in various ways and may have positively impacted their future experiences with books and reading (Welsch, 2008).

Reading is about blending the sounds of the letters into syllables or words. Lee et al. (2020) explained that the letter-name method is used to teach reading in Malay language classrooms, combined at the morpheme and syllable levels. Blending is vital because it is the only way to read

words or syllables. For example, to learn the word *buku* 'book', the letter names of the first syllable 'bu' is spelt and then blended to form /bu/. Then the second syllable in the word 'ku' is spelt out and blended to form /ku/. Finally, the first and second syllables (/bu/ and /ku/) are blended to form the word *buku* (Lee et al., 2020). According to Wagner and Torgesen (1987), both segmenting and blending skills are required for successful reading acquisition and sound-blending training to increase performance on the reading-analogue assignment.

Children can learn, develop and grow through play experiences. Blending skills can be taught in game-based learning or play since play is part of children's nature and positively impacts children's learning process. A child's social, emotional, linguistic, and intellectual development depends heavily on play (Lamrani & Abdelwahed, 2020). Ljubetic and Maglica (2020) describe the play as a complex, multifunctional, and intrinsic activity that contributes to the child's overall social-emotional, motor, cognitive, and verbal development. By playing, children satisfy their need to have fun, socialising, moving, exploring, collaborating, and building a positive self-image; they develop their creativity and the ability to cope with and solve problems successfully (Ljubetic & Maglica 2020). According to Cheep-Aranai and Wasanasomsithi (2016), play is a way in which children can express explicitly what they are interested in, how they learn, and how they would like to learn. The notion underlying gamification is that integrating gaming elements with learning materials helps increase motivation, task engagement, and performance outcomes.

Learning to read through games such as 'Word puzzles' can create fun learning for the children, and they will learn more when they are having fun in the learning process. Providing fun and interactive learning could attract the interest of younger children, hence improving teaching and learning (Rambli et al., 2013). Thus, play-based learning can help children in their emotional and academic development. The study by Ljubetic and Maglica (2020) described how children's play contributes to social and emotional development that helps children to have friends through participation in the play process with each other. Play teaches rules, social roles, relationships, and how to anticipate other people's behaviours.

Gamification has been used to improve learning outcomes in education. The use of games in education has a favourable impact on learning, and it helps young children with their arbitrary memory (Lamrani & Abdelwahed, 2020). According to Deterding, Dixon, Khaled and Nacke (2011 as cited in Wood, 2015), gamification consists of applying elements of games in a non-game context, such as education, of creating fun and passion in the tasks. They further defined it by stating that gamification can be applied to any task, assignment, process, or theoretical context.

Learning games increase intrinsic motivation to learn and academic content if that content is incorporated into the game. Learning games often involves rules to follow, and children learn how to take turns, share, and resolve differences among each other when they take part in games. Games using a number line (such as Snakes and Ladders) are particularly effective in supporting children's sense of numbers and introducing mathematical concepts. Playing a linear number board game with each other and an educator can increase children's knowledge in numerical magnitude comparison, number line estimation, counting, and numeral identification (Siegler and Ramani, 2009). Another classroom activity that promotes student-driven exploration is using games in the classroom. Serious games, created with the purpose of education in mind, help increase student

engagement and motivation (Young et al., 2012, as cited in White & McCoy, 2019). Teachers can focus on a specific learning skill when planning a lesson in learning games. Teachers structure the games, and children adapt to the rules of the games. The outcome of learning games usually aims to challenge children to stretch their thinking, language, social-emotional, and motor skills. The design of learning games should fit the cognitive ability of targeted children.

Gamified learning methods also can influence the traits of the children. Smiderle et al. (2020) conducted research to advance knowledge of how gamification affects participants differently depending on their traits. The finding shows that gamification's impact depends on unique user characteristics and has different effects on users based on their personality traits. This study helps improve preschool teachers' knowledge of how gamified environment systems affect users depending on their attributes. It helped to understand better how gamification influences preschool children's engagement and learning behaviour depending on their personality attributes.

Preschool children between the ages of five and six love to move. According to Sevimli and Johnson (2013), physical activity should be introduced into the regular school curriculum to promote children's thinking physically and joyfully. Kids learn more when they are having fun in the learning process. According to Tisza and Markopoulos (2021), fun has a beneficial effect on attitude, it serves as an enhancer for the willingness to study, and students who were observed having fun were found to learn more. So, implementing gamification in the blending activity will create a meaningful, fun learning environment.

Scaffolding is one of the essential parts of learning to read for preschool children. Without strong scaffolding, it will be hard for preschool children to master reading skills. In this study, blending is the scaffolding for preschool children to learn reading. Preschool children will struggle to read without the ability to blend because the whole word can be read by blending the syllable. The idea of scaffolding instruction as a teaching method came from Lev Vygotsky's sociocultural theory and his concept of the zone of proximal development. The zone of proximal development is the gap between what children can learn independently and the subsequent learning that can be facilitated with qualified guidance. In scaffolding instruction, a more experienced individual gives support or scaffolds to aid in the development of the learner. The scaffolds facilitate a student's capacity to build upon existing knowledge and internalise new information (Van Der Stuyf, 2002).

According to the Gamified Learning Theory, gamification has a mediating or moderating effect on learning rather than having an immediate impact. Based on the typical ways that children perceive, comprehend, and use information, learner-related behaviour may, to some degree, be anticipated. A study conducted by Zaric et al. (2021) investigates the moderator role of learning tendencies on gamification success concerning children's academic participation, engagement, and experience, indicates that gamification design impacts children's involvement in gamified settings, favourably influences academic participation and that children's learning inclinations limit children's engagement.

2.1 Reading Problem

Akubailo et al. (2015) have listed several causes that contribute to reading problems. They stated that children's socioeconomic background, physical abnormalities, mental imbalances, level of interest, familiarity with symbols, and teachers' capacity to support their learning are a few of the primary contributors to the reading deficit in children. In addition, the child's surroundings at home prevented them from using resources that are accustomed to the language they are learning. The environment plays a vital role in learning a language as it involves two or more interactions to help them practice and make meaning of the language (Hwa & Subramaniam, 2017). It has been shown that children who are emotionally and psychologically unstable have difficulties getting ready to read. Lack of a strong desire to read accelerates a child and prepares the child to be socially and emotionally fit for learning. Another factor contributing to children's reading difficulties is that some young children cannot distinguish words or symbols.

Celik (2020) studies the factors influencing the reading habits of Ronaki Hawler Education Company's Ishk Kindergarten children in Erbil, Iraq. The study's findings revealed that families are essential in encouraging children to develop reading habits. Furthermore, it was determined that the group of friends, the surroundings, different books and genres, kindergarten education, and libraries were all critical factors in this preparatory time.

Nation (2019) states that the reading problem is because of poor decoding and impairment in reading comprehension. In addition, poor oral language is also one of the causes. This research explores how deficiencies in one or both components of the Simple View contribute to children's reading comprehension issues.

According to Jamian (2021), research results, which seek to uncover problems linked to reading abilities and writing Bahasa Melayu among primary school children in a rural area located in Negeri Sembilan, Pahang, and Sarawak fail to grasp the substance of the information in the text and the meaning of the sentence. The study's findings also reveal that issues with reading abilities may be avoided by preparing exciting and favourable instructional activities for the teacher. Furthermore, a pleasant learning environment and encouragement from the instructor may promote motivation and nurture students' enthusiasm to continue to study.

3 METHODS

3.1 Research design

This study uses the qualitative approach as it involves observation to find out whether games improve their syllable blending. An interview was done to get instant feedback from the class teacher regarding the playday.

3.2 Sample

The sampling method for this research is convenience sampling, also known as a non-probability sample. In convenience sampling, the respondents' convenience and availability are considered when selecting them, and the sample size determination should be based on the researcher's analysis plan (Creswell & Creswell, 2018). Since the period for doing this study is short, finding the sample with easy access is not easy. Therefore, convenience sampling is the best sampling method for this research. The sample groups for this study consisted of 28 preschool pupils and two preschool teachers from one school in Serian and one school in the Padawan districts. There are two age groups among these preschool children, six and five years old. The sample will be divided into two teams of red and blue.

3.3 Game design thinking

The game design thinking used in this study was adopted from the research of Arnab et al. (2019). Figure 1 illustrates the design thinking process adopted in this study, focusing on game design. As shown in the figure below, the five critical missions within the main stages of design thinking were followed in this study in designing and executing the Word Puzzle game. Figure 2 shows an example of the design thinking process at the onboarding and discovery stages under 'empathise' and 'define'.

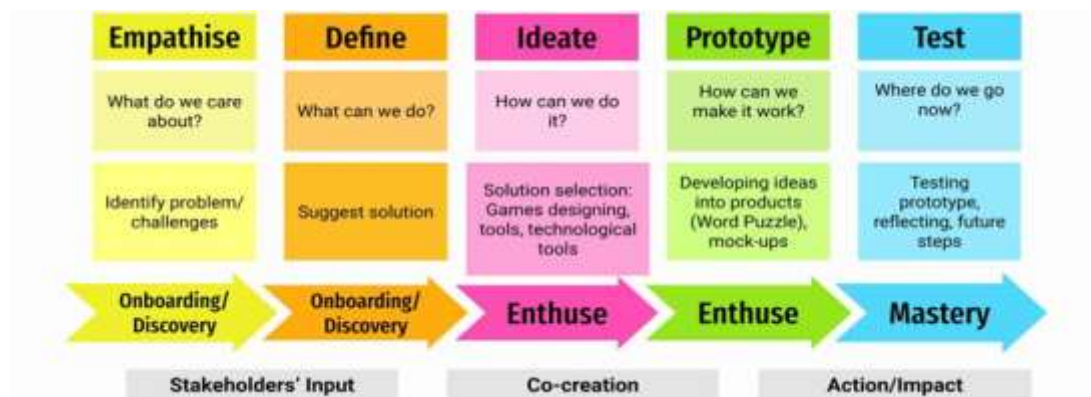


Figure 1. Word puzzle design thinking approach. (Source: Arnab, 2019).

Game design is based on the design thinking process, including Empathise, Define, ideating, Prototype, and Test. Understanding preschool children's problems in terms of reading becomes the focus of the game design. In the empathise stage, information was gathered regarding the preschool children's learning problems to deeply understand the learning issues encountered before concluding the ideate stage. We developed various hypotheses based on observation and experience to gain a better understanding. Miro Design Sprint was used to develop and identify potential problems or challenges preschool children may face. Following that, brainstorming sessions took place to better understand and propose solutions according to the learning goals as guidelines (Figure 2).

Narrowing down to the define stage, the reading problem's most significant challenges are emphasised. Defining the problem in terms of syllable blending has become one factor contributing to reading difficulties, so designing possible solutions that focus on the problem has become a strong reason for game design.

Based on the central problem identified, the ideate stage will be the next step to be done. As the learning goal is to engage students with the activity, we have chosen puzzle games as our learning game. Frugal education action cards are a guideline to incorporate education elements into the game.

1) Brainstorming the challenges, solution and learning goals

1.1 - Brainstroming board (Bahasa Melayu subject)

Name/Title	Problem/Challenges	Solution	Learning goals
Felicia	<ul style="list-style-type: none"> Not interested to read the storybook Have an reading difficulty Learning difficulty 	<ul style="list-style-type: none"> Design a game that can help them to learn to read Use a game that can help them to learn to read 	<ul style="list-style-type: none"> To be able to read the storybook with the help of the game
Kani	<ul style="list-style-type: none"> Pupil has excitement as teacher use the same teaching method Pupil having difficulty recognise syllable 	<ul style="list-style-type: none"> Teacher need to connect with learning method Engage student with activity to solve the problem 	<ul style="list-style-type: none"> Pupil get excited to learn syllable Pupil understand on how to combine syllable
Shireen	<ul style="list-style-type: none"> Some children are not interested to read Some children are not able to read 	<ul style="list-style-type: none"> Use a game that can help them to learn to read Use a game that can help them to learn to read 	<ul style="list-style-type: none"> Children can enjoy the reading activity
Tang	<ul style="list-style-type: none"> Unable to understand the meaning of words Not of interested to read the storybook 	<ul style="list-style-type: none"> Use a game that can help them to learn to read Use a game that can help them to learn to read 	<ul style="list-style-type: none"> Children can enjoy the reading activity
Yusimah	<ul style="list-style-type: none"> Some children are not interested to read Some children are not able to read 	<ul style="list-style-type: none"> Use a game that can help them to learn to read Use a game that can help them to learn to read 	<ul style="list-style-type: none"> Children can enjoy the reading activity

Figure 2. Example of design thinking process at onboarding and discovery stage (empathise and define) (Source: https://miro.com/app/board/uXjVPD6-CmY=?share_link_id=491293191434).

The Word Puzzle prototype is a model used to test gamification's effectiveness in teaching blending among preschool children. During the prototyping process, the idea was turned into a product. The concept of the word puzzle game was integrated into the actual puzzle. The prototype was based on a design sprint using Miro's online collaboration tool (Figure 3). Miro keeps the game design created based on the criteria listed in the Miro design sprint, from the materials needed, rules to play the games, the challenges created in the games, the reward of the winner, and conditions for the preschool while playing the games. At this stage, all the materials needed to make the puzzle were prepared, and the puzzle process started after all the materials were ready. Since the puzzle only needs paper and a marker to create it, it is a straightforward process.

5) Organize HMWs - How Might We?? (Question yourself what can you do for the students, game, teacher and school based on your choice)

Students	Game	Teacher	Schools
1) How might we keep the students engaged in the classroom?	1) How might we create the games that attract students interest and and the same time focus?	1) How might we helps teachers to create fun learning environment?	1) How might we possibly create games that can ensure collaboration among students?
2) How might we motivate the students to enjoy their learning?	2) How might we create meaningful game that can help students learning?	2) How might we help teacher to design meaningful fun learning?	2) How might we involve schools in designing the learning environment?
3) How might we get the students attention during the lesson?	3) How might we design game that not only fun but also meaningful?	3) How might we guide teacher to create lesson that can involve students actively?	3) How might we help schools to create a meaningful learning experience for their students?
4) How might we help the students to understand better things they are learning?	4) How might we create game that can involve students actively in the lesson?	4) How might we help teacher to understand their students' need?	4) How might we introduce learning games to school?
5) How might we make the students pay attention, focus and not bored during the lesson?	5) How might we design game that involve collaboration?	5) How might we help teachers to design learning environment that can improve their lesson?	5) How might we help schools to design meaningful learning environment?

Figure 4. How Might We question as a guideline to create the game (Source: https://miro.com/app/board/uXjVPD6-CmY=?share_link_id=491293191434).

3.4 Instruments

As part of the lesson presentation, the team selected a few available collaboration tools to encourage participation and present meaningful-making opportunities.

3.4.1 ClassDojo

Families, teachers, and students can communicate via ClassDojo. Teachers build "classes" with the preschool children on ClassDojo using their free accounts, which they register for. Preschool children might receive feedback from them for a variety of classroom abilities. The school story or the story for their class is where teachers can add images and videos. These are adaptable, and teachers can alter their abilities to meet the requirements of the class or the institution.

Preschool children do not need to download or register with ClassDojo. The teacher can provide them with an access code, which they can use to create an account and design their avatar, add images, and more. Additionally, they can message family members and know when it has been read through "read receipts." During the playday, ClassDojo was used to show the children's group accumulative points, boosting their motivation to get the correct answer with less time consumed. In ClassDojo, the teacher divided the class into two groups according to the blue and red colours. ClassDojo views each of the children's names in each group, and every time the children get the

correct answer, they will be given a point in their name, and accumulated points will be counted as group points. ClassDojo will have a sound of winning every time points are given. Sound stimulates children's excitement toward the game and encourages them to think fast and accurately. Nonetheless, they need to comprehend the blending concept.

3.4.2 Google Meet

Google Meet is a video-communication service developed by Google™. It promotes a new learning method that leads to communication skills and collaboration between two geographies. To make the gamification more interesting, teachers use Google Meet to communicate with preschool children between two different preschools located in Serian and Padawan. During the playday, the teacher provided each group with two laptops in front of the table. The same setting was executed in School B. Blue team members from School A will collaborate with the other blue team members from School B. Team members will show the syllable to be blended, and the other team member from the school will help to get the answer as both schools have the same game setting.

3.4.3 Frugal Education Action Card

The Frugal Education Action Cards (Master, 2021) are an easy-to-use tool for rethinking education design in frugal and sustainable ways. The cards comprise 27 frugal education considerations, organised by their associated aspects and overarching principles. Each card is designed to act as a prompt to inspire your creativity when considering how to apply it within your design best. The step requires creative thinking as you leverage available materials and resources to craft innovative education design. In creating the game, the researcher uses a frugal card as a guideline to achieve the game's goals and objectives. Below are guidelines on using frugal education action cards to decide what game and how it will solve the reading problems among preschool children.

Table 1. Guidelines on how to use frugal education action cards on game design.

Design with an open mind	Collaboration	<p><u>Co-create</u></p> <p>Use the power of co-creation to support the design process. Work in partnership with your target audience to co-create designs that are tailored to their specific needs. By taking part, they will develop valuable creative and problem-solving skills</p>	<p>Each researcher throws up ideas of what kind of gamification can contribute to solving the reading problem among preschool pupils.</p>
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Creative	<u>Problem Solve</u> Creative problem-solving thrives on design constraints. They provide an opportunity to try out new ideas and approaches to solve problems in creative ways. Identify the constraints your design is faced with and use them to your advantage.	Time constraints are the central issue in creating the game. The creativity comes when we use simple materials such as colour paper and cut them like a puzzle that will look like a house. Pupils will be eager to make sure that end of the game; they will surely build a house (Complete puzzle)
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Leverage Available resources	Practical <u>Fit for purpose</u> There is nothing wrong with creating a beautiful product as long as it is not at the expense of practicality and functionality. Make sure you are achieving your learning objectives before investing resources into the aesthetics of your design	For gamification, we have chosen the Word Puzzle game to solve the reading issue among preschool children. It is simple, colourful and easy to understand as the teacher creates the game by explaining the role of a girl named Mukan in completing the puzzle (Blending syllables) in order to build a house (Puzzle)
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Build at the speed of need	Iterative <u>Test & Refine</u> The most effective way to validate your design is by testing it in the real world. Build only what you need, then test it on your target audience. The sooner you do this, the sooner you can gain valuable insights and begin iterating on your design	Once we had built the game prototype, the teacher tested the game before the actual day. It seems smooth, and the children understand how to play the game and what are the objectives of the game. Teachers observe during the test day and improve the gamification aspect before the actual playday.
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Minimal	<u>Keep it simple.</u> The simpler your design, the easier it will be to build, deliver and manage. This lean approach will free up valuable resources, such as time, money and people, to be applied more effectively and better serve those you are designing for	The design of the word puzzle is straightforward as it suits the level of understanding of preschool children. Syllables are written using a big size font that can be seen clearly and readable by the pupils. We used different colours on the puzzle to make it more interesting.
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Understanding how to use the Frugal Education Action Card makes it easier to come out with games that are objectives oriented. It guides from the early process of creating the game. Guided by the Design Thinking approach and blend with the elements needed in Frugal Education Action Card make, designing the game more systematically. It led to the creation of the plan for this puzzle game (see Appendix A). The ideas gathered have turned into remarkable output, and it works and is adaptable (flexible) by any preschool teacher to teach their preschool children. One of the constraints when a teacher teaches in a rural area is getting material to build or create a game. The materials are costly and hard to find. One of the elements that we can find in Frugal is Leverage Available resources. It nurtures teachers to be creative by using available sources to be turned into teaching materials. The most critical matter in teaching is delivering with the help of our tools to make the learning meaningful. In this gamification, we only use colourful paper cut into pieces with syllables to solve every piece.

3.5 Findings and Discussion

Preschool children are observed looking around and whispering to each other about what is happening. Based on the observation during the playday, at first, the preschool children seemed to be wondering what was going to happen as the teacher had not explained anything regarding the game. A group of preschool children showed interest in knowing, and few that can be considered more outspoken asked the teacher if they would be allowed to play any games.



Figure 5. The puzzles.



Figure 6. Children communicate via google meet.



Figure 7. Red team.



Figure 8. Blue team.

3.5.1 Collaboration

Each group was given a laptop in front of the table to communicate and collaborate with the other group from the other school. It was their first time meeting new friends from other schools, and they used the Malay Language to communicate with the other group members. Communication skills were implemented here, and collaboration seemed to be smooth without any breakdown in terms of language. Through games, pupils are more motivated to learn more. Tisza and Markopoulos (2021) stated that fun has a beneficial effect on attitude, it serves as an enhancer for the willingness to study, and students who were observed having fun were found to learn more.



Figure 9. Red team Communicating via Google Meet.



Figure 10. Blue team Communicating via Google Meet.



Figure 11. Children are discussing the task.



Figure 12. Children collaborate to complete the task.

3.5.2 Readiness

Teachers start to divide the preschool children into two groups, and each group member will get their hat based on the group colours, which are blue and red. The excitement starts to show on their faces, and they jump around to be gathered in a group. Once the teacher finished dividing the group, the teacher explained how to play the game. From the body language and the facial expression, preschool children show they understand the instruction and are ready to play the game. Human movement's cognitive and physiological impacts make it possible to enhance learning in cognitive learning tasks (Mavilidi et al., 2015).



Figure 13. Children were ready to do the task.

3.5.3 Understanding

Throughout the game, each of the preschool children contributes towards getting the syllable correct. They will get the first syllable from the table in front of the class and bring them to their group table, and together they will solve the problem. At the table, they brought their body nearer to each other and got the second syllable blended to get the correct one. From this observation, each pupil understands the concept of blending syllables and reads them out loud to get the teacher's attention before getting a new task. Sevimli and Johnson (2013) stated that physical activity should be introduced into the regular school curriculum to promote children's thinking physically and joyfully. Thus, this puzzle game is one activity that promotes children's thinking physically and collaboratively.



Figure 14. Children discuss the task. **Figure 15.** Children rearrange the puzzles.

3.5.4 Shared mental model

A shared mental model refers to a common understanding among individuals about how a system, process, or situation works. It is essential in many settings, such as teamwork, because it enables team members to anticipate and adapt to each other's actions, leading to improved performance and outcomes. When two schools collaborate in a team to achieve their ultimate goal, they need to understand the exact instruction given, which is the process, and adapt to a new online collaborative environment that successfully contributes to completing the given task. In this game, the shared mental model was achieved through collaboration among the team members. Each blue and red team member will get their hat according to the group colour. Pupils from preschool in Serian district will collaborate with their teammates from preschool in Padawan district according to hat's colour and this creates a sense of ownership that they belong to the same team. They have a mutual understanding which can be seen in the need to collaborate with the other team member virtually once they see the other teammate wearing the same colour hat. The children share a mental model when they collaborate to get the correct answer for each syllable that appears during their turn in answering the puzzle. They foster open communication by communicating openly among team members and ensuring everyone can express their ideas and concerns. This situation helps build trust and facilitate information sharing, which is critical for developing a shared mental model.

3.6 Challenges

Since this is the first time the teacher implemented collaboration via the internet using Google Meet, it is a challenge to maintain the collaboration due to a bad internet connection. Geographical issues contribute to this problem even though wifi was provided in each school. Since the internet connection was not strong enough to support heavy internet usage for the activity, the teachers used their wifi to get a stable internet connection by using their cell phones. It caused the collaboration was only smoothly done in the first round of puzzle games.

In addition, based on the observation during the playday, the group size of six to seven children in each group was considered too big. It will affect the learning engagement of each child because they need to wait for some time for their turn. Besides, the teacher has difficulty controlling some situations during the games, such as internet connectivity, children's turns, and monitoring the scores in ClassDojo. However, this problem can be overcome by properly preparing before the playday and having reasonable class control with the teacher during the game. It also suggested that the group size should be reduced from six to seven children to three to four children in each group. It ensures that the children can actively and effectively participate in the activity.

4 CONCLUSION

The study shows that blending through puzzle games in improving reading skills has more significant learning benefits and is effective in collaboration, readiness, understanding, and shared mental models. The games were successfully carried out when the collaboration between each member was actively involved during the playday. All of them were highly motivated, contributing

to their readiness to play the game, understand the instructions, and reach the targeted learning goals, considered a shared mental model. It illustrates that the play-based/gamification approach as an intervention by adopting puzzle games to teach blending effectively improved Malay Language reading skills among preschool children. Nevertheless, there are issues regarding the high number of preschool children who still cannot read, and a large percentage of school-age children, including children from all socioeconomic backgrounds, struggle to learn to read (National Research Council, 1998). Children who struggle with reading develop a negative attitude toward reading, which causes them to fall academically behind their peers (Akyol et al., 2017). Thus, it leads to prolonged reading difficulties among children until they reach secondary school (Jeffes, 2016). Therefore, blending through puzzle games is one of the effective strategies to help children between the age of five and six years old to be able to blend the syllables from an early age in order to help them improve their reading skills in the Malay Language and also avoid them having reading difficulties when they enter the primary school in Year One. Since the study focuses on preschool children, future research on the effectiveness of blending through puzzle games in improving reading skills can be conducted on children at other levels of learning, such as in primary school, and on other languages that use phonics, such as English.

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APPENDIX A

Word puzzle game

The story: Mukan wants to build a house, but some of her bricks (puzzle) are missing. You can only complete the puzzle if you are able to make words based on the syllable that you have picked (Example of words: baju, batu, duri, duku, kolam, kotak). So, can you help Mukan to find her missing bricks by completing the puzzle?

ABOUT THE GAME

D) Game description		
1	Subject	Bahasa Melayu
2	Topic	<p>Content standard:</p> <p>BM 2.3 Membina dan membaca suku kata dan perkataan</p> <p>Learning Standard:</p> <p>BM 2.3.4 Membaca perkataan dengan suku kata terbuka dan tertutup:</p> <p>(i) KV+KV</p> <p>(ii) KV+KVK</p>
3	Learning goal	I. Pupils can blend the syllables into words and relate the words to their daily life.

4	Players/Target learner	Preschool pupils from two different schools (Serian and Padawan)
5	List of materials/items	<ul style="list-style-type: none"> - Puzzle - made of paper (containing the syllables) - Puzzle counter - Table (to organise the puzzle) - Virtual Dice - (https://www.teacherled.com/iresources/tools/dice/)
6	Mission	<ul style="list-style-type: none"> - Find the missing syllable to complete the words.
7	Challenge	<ul style="list-style-type: none"> - Pupils need to complete their syllables by creating words based on the syllables they have picked. For example, if the pupils have picked 'ba', they must create words based on the syllable. The words can be 'batu, baju, bata'.
8	Frugal Education	<p>I. Combine</p> <p>Pupils will experience a combined environment involving the physical and virtual. Collaboration in the combined environment gives a different experience to the students and creates excitement.</p> <p>II. Problem-Solve</p> <p>Word Puzzle encourages students to solve the puzzle by searching for the missing syllable, and at the end of the game, students will have a mission to be achieved that the puzzle / complete syllable will build a house (Puzzle)</p> <p>III. Experiment</p>

		<p>Pupils experiment with new learning methods by using the gamification of puzzles and getting new learning experiences.</p> <p>IV. Explore</p> <p>Pupils exploring each of the gamification processes (knowing each syllable and recognise which other syllable can be combined to make a word)</p> <p>V. Gather feedback</p> <p>Pupils from two groups from School A (Serian) will collaborate with School B (Padawan). Each group member from each school will gather feedback from each other to get the correct answer.</p> <p>VI. Fit for the purpose</p> <p>Puzzles have been created for the student to fit the purpose and suit the learning objective, mainly to make the learning meaningful.</p>
9	How to play the game	<p>I. Pupils are divided into two groups. Each group will consist of 8-9 team members.</p> <p>II. Each group will sit in one big circle, and the lost puzzle will be in the middle.</p> <p>III. Each team will choose their representative to read the word on the Word Counter. (Give a role)</p> <p>IV. Each representative will run towards the Word Counter, read the syllable they picked, and tell the syllable to their team member. (Take turns)</p>

		<p>V. The team will start to create words based on the puzzle and find the missing syllable based on the words that they have created.</p> <p>VI. Once they find the missing syllable, they will bring it to the word count and stick the missing puzzle in order.</p> <p>VII. The first group to complete the word puzzle correctly will be the winner.</p>
10	How do you encourage collaboration?	<ul style="list-style-type: none"> ● Consider giving each group a different task - delegating different tasks. Each team member will be given a role so they feel individually accountable for their work. ● Take turns, and encourage the teammates to share information and opinion. ● The teammates need to know that they need each other to complete the task. (The teacher/instructor must explain precisely how to play the game.) ● By discussing, each team member agrees with their decision (answer).
11	How do they help their teammates	<ul style="list-style-type: none"> ● The pupils must tell and discuss the answer in their group before bringing the missing syllable to the word count. ● Teachers need to encourage pupils to support their teammates throughout the game. ● Pupils with higher ability may be able to come out with the word faster, and other teammates may help to allocate the missing syllable based on the word created.

12	How do you make them depend on each other?	<ul style="list-style-type: none"> ● The teammates will rely on the representative to read the word on the word count. ● To win the game, all the teammates must work together to complete the word puzzle as fast as possible.
13	Winning condition	<ul style="list-style-type: none"> - Complete all the words puzzle correctly - The first group to complete the word puzzle correctly will be the winner.
10	Learning outcomes	The learning outcome of this game is that pupils can relate the words they have created to their daily life and read independently.
11	Resources (The source of guidance in creating the game)	This game was created based on the latest KSPK and the hierarchy of game elements. The hierarchy of game elements has three elements: components, mechanics, and dynamics. These elements are our guide when creating this game.

II) Description of an item used in the game

Challenge	Players must create words to get the correct puzzles to build the house.
Rules	<ul style="list-style-type: none">- No discussion with other team members. Players can only discuss the question within their group.- Representatives cannot be the same person; pupils must take turns to be the representative.- You must give the correct answer to proceed with the game.
Time	1 hour
Reward and penalties	<p>Reward:</p> <ul style="list-style-type: none">- The team who wins the game will get 'Good job' applause and be given points using the ClassDojo online tools.- Both groups will be given rewards (mystery gifts) for their participation, and the most active pupils will be given an extra reward. <p>Penalties:</p> <ul style="list-style-type: none">- The player who is caught cheating will lose their chance to play