Development of Digital Puzzle Game-Based Learning Media to Improve Linguistic Intelligence in Early Childhood

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ABSTRACT

Linguistic intelligence is crucial for children's early communication skills, enabling them to effectively understand and express thoughts, feelings, and needs. Digital games, accessible via Android and web platforms, offer an engaging way for children to enhance their linguistic abilities. This study aims to develop and evaluate digital puzzle game-based learning media to improve linguistic intelligence in young children. This research follows a Research and Development (R&D) approach using the ADDIE model, which includes Analysis, Design, Development, Implementation, and Evaluation. The study involved 15 children as experiment participants, two lecturers as validators, one teacher as an effectiveness tester, and the researcher. Instruments used include expert validation sheets, questionnaires, and practicality test sheets. The developed digital puzzle game-based learning media was validated by experts, achieving 100% validity from material experts and 97.92% from media experts, indicating a "very valid" rating. In terms of practicality, the teacher's response yielded a score of 92.59%, categorizing it as "very practical." Effectiveness testing resulted in a score of 4.2 on a scale of 3.6–4.5, demonstrating its effectiveness in improving linguistic intelligence. The findings suggest that the digital puzzle game is a valid, practical, and effective learning tool for enhancing linguistic intelligence in young children. Future research could explore broader sample sizes and long-term impacts on language development.

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1. INTRODUCTION

Linguistic intelligence is widely involved in reading, writing, speaking and listening. Linguistic activity is located in certain parts of the brain (Gardner, 2013). Linguistic understanding plays a key role in language development and communication. Verbal linguistic learning is based on understanding language structure, including grammar, vocabulary, and syntax. It helps individuals articulate thoughts and ideas clearly and effectively. By understanding linguistic principles, one can gain better communication skills and be able to adapt to various language contexts.

Basically, verbal linguistics is an activity that occurs naturally, just like when humans don't think when breathing. However, if we think that we do not use language, as a result our identity as the

"human genus" will disappear because linguistics represents "humanity" which differentiates us from other creatures on this earth. Through verbal linguistics we can become creatures created by God who are social and organized. That's why language has a big role in community development, creation and development (Yaumi, 2012).

The development of digital puzzle game-based learning media that can improve linguistic intelligence in early childhood has several significant novel aspects. Following are several main points that are the advantages and novelty of this approach: The first is that digital puzzle game-based learning media offers higher interactivity than conventional methods. Children can actively participate in the learning process, which encourages their involvement and increases their interest and motivation to learn. Next, there is the integration of technology in the form of digital games, allowing the use of animation, sound and interesting visual effects. This not only increases the attractiveness of the learning medium but also helps in improving linguistic and cognitive skills, including language comprehension, memory, and problem-solving abilities. Digital games usually have a reward system that can motivate children to continue learning and completing challenges. Such as point systems, levels, or virtual prizes can increase children's intrinsic and extrinsic motivation in the learning process. In addition to linguistic intelligence, puzzle games can also be designed to support the development of social and emotional skills. For example, through collaborative games or puzzles that involve narrative and joint problem solving. Digital game-based learning media can be accessed anytime and anywhere as long as there is an adequate device and internet connection. This provides flexibility in learning and allows children to learn outside the classroom environment.

Observations from a preliminary study conducted at PAUD AL PADILAH, Bengkulu City, on November 24, 2023, revealed that children's verbal linguistic intelligence remains underdeveloped. A common issue identified was language development delays, where children experience difficulties in pronouncing words and forming sentences. These challenges can stem from various factors, such as limited verbal interaction with parents or an environment that does not sufficiently support language development. Over time, children gradually become familiar with letters, develop reading skills, and gain confidence in expressing their thoughts. However, teachers at PAUD AL PADILAH have not yet implemented digital game-based learning methods, which could provide an engaging and effective approach to improving linguistic intelligence.

To address this gap, this study aims to develop a digital puzzle game designed to enhance children's linguistic abilities. This game will train children to differentiate between letters and images, recognize words, and develop critical thinking skills. The gameplay involves guessing pictures by arranging letters in the correct order within designated columns. Successful completion of puzzles rewards children with coins, which can be used to unlock higher levels, making the learning process interactive and motivating. By integrating this game into early childhood education, this study seeks to support linguistic development through an engaging, technology-based approach.

A survey of PAUD teachers indicated a strong interest in incorporating digital learning media into early education. Teachers believe that technology can make learning more interactive and engaging, while also helping children develop essential digital literacy skills. However, many educators face challenges due to inadequate infrastructure and limited access to digital devices, particularly in remote areas. The lack of computers, tablets, or stable internet connections forces teachers to rely on traditional learning tools (APE) rather than digital advancements. This study aims to bridge this gap by developing accessible, technology-driven learning media to enhance children's linguistic intelligence in early childhood education.

Using digital games, learning media developers can create a learning environment that is interactive, interesting and appropriate to children's characteristics. By including game elements, such as challenges, rewards and interactions, this learning media is able to generate children's intrinsic motivation to learn language. In addition, digital games can be designed to stimulate linguistic abilities through various activities, such as composing words, understanding stories, and verbal interaction. Developing student potential is very necessary, especially in the current era of digitalization which

requires students to be more active in the learning process while keeping abreast of current developments, students must also be equipped with sufficient monotheistic beliefs, in order to protect themselves from ignorant things. Without students having a solid understanding of the creed of monotheism, they will easily fall into bad company.

Children aged 5-6 years gain learning experience by using Android-based game learning media to improve early literacy skills in aspects of phonological awareness, writing knowledge and writing concepts, letters and words. Apart from that, children aged 5-6 years receive new learning methods as an alternative to facilitate early literacy skills. Children can also learn independently and have the motivation to complete games containing material on recognizing letters and writing through games recognizing colors, matching words, arranging words. And also teachers can use Android-based game learning media as an alternative media in learning to welcome education (Nirwana, 2021).

Utilizing educational game technology in the teaching and learning process is one of the right ways, because educational games as a visual media have advantages compared to other visual media. Apart from that, educational games invite players to participate and take part in determining the final outcome of the game. Forms of educational games for students need to know that playing activities do not always require "toys". However, not all toys played by students today have educational elements, where the games are specifically designed for educational purposes (Latif et al., 2021).

Basically, every child has different characteristics and different abilities, some like to cry and there are also those who immediately blend into the environment, therefore educators must understand the characteristics of children. Even though early childhood education is not the main requirement for entering basic education, early childhood education must be understood and comprehended by teachers and parents. However, not all parents and teachers pay attention to children's early characteristics and abilities, this is due to low parental awareness, lack of parental insight, and special education parents' lack of understanding about early childhood (Winda et al., 2023). In fact, some teachers pay too much attention to children's academic abilities, namely being able to read and write, so they pay less attention to students' initial abilities. To uncover or explore the uniqueness of each child and his abilities requires patience and a sustained personal approach. In fact, some teachers pay too much attention to children's academic abilities, namely being able to read and write, so they pay less attention to students' initial abilities. To uncover or explore the uniqueness of each child and his abilities requires patience and a sustained personal approach.

According to the Ministry of Education and Culture Number 146 of 2014 concerning the early childhood education curriculum, it stipulates "Regulation of the Minister of Education and Culture concerning the 2013 Early Childhood Education Curriculum Article 5 paragraphs 1 and 5, namely that the structure of the early childhood education curriculum contains a development program that includes: religious and moral values, physical- motoric, cognitive, language, social emotional and arts. "The language development program as intended in paragraph (1) includes the creation of an atmosphere for the development of emotional maturity in the context of play" (Rachman, 2018).

In the results of previous research journals, it was found that educational games can make children interested and are not easily forgotten by children. Through educational English games that take into account the specifics, language development and theories of early childhood language acquisition, it can certainly be an effective way to develop English vocabulary in early childhood (Firdaus et al., 2020).

Based on other research journals, there is a design and implementation process that has been carried out, so it can be concluded that this educational game can be used as an interesting and fun learning media, which can be used anywhere but does not completely replace conventional learning media and can help children in learning. English word recognition learning (Savitri, 2023).

Digital puzzle games have a number of advantages in improving linguistic intelligence in early childhood. First, this game provides an interactive and interesting environment, which can motivate children to participate actively. With features such as colorful images, sounds, and animations, children become more interested and involved in learning activities. Second, digital puzzle games are often designed with varying levels of difficulty that can be adjusted to suit a child's abilities and

development. This process not only improves their language skills but also teaches critical thinking and problem solving skills. Third, digital puzzle games often allow for social interaction, whether with peers directly. These interactions can help children improve their communication skills and learn from each other. Overall, digital puzzle games offer a fun and effective learning method to improve linguistic intelligence in young children, combining educational elements with technology and entertainment.

The importance of this approach lies in its ability to combine educational and entertainment aspects, creating a positive learning experience and generating children's interest in language learning. Along with technological developments, digital game-based learning media is increasingly developing as an effective tool for improving linguistic intelligence in early childhood, utilizing children's potential to learn while playing to achieve educational goals.

2.   METHODS

This study adopts a Research and Development (R&D) approach, a methodology designed to create and evaluate specific products for effectiveness (Sugiyono, 2011). R&D consists of two main components: research, which involves gathering initial data and analyzing product potential, and development, which focuses on refining and testing the product (Winaryati, 2021). The research phase includes data collection through literature reviews, observations, interviews, and documentation, while the development phase emphasizes systematic product testing and improvement.

For this study, the ADDIE development model was employed, consisting of five sequential stages: Analysis, Design, Development, Implementation, and Evaluation (Jaya, 2019). These stages are interrelated and must be followed systematically to ensure an effective and structured development process. Compared to other instructional design models, ADDIE is considered simpler and easier to implement, making it a practical choice for educational research.

The research was conducted in Group B at PAUD Al Padilah, Bengkulu City, during the first semester of the 2024/2025 academic year. The thematic focus was Plants, with a sub-theme of Fruits. The study involved 15 children as participants, two lecturers as validators, one teacher as an effectiveness tester, and the researcher. The research object was the digital puzzle game learning media.

Data collection instruments included expert validation sheets, questionnaires, and practicality test sheets. Quantitative data were obtained through assessment questionnaires, measuring validity, practicality, and effectiveness. Qualitative data were collected from expert validation tests, including comments, suggestions, and revisions. These inputs were analyzed and used to refine the digital puzzle game to enhance children's linguistic intelligence.

Data Analysis Validity and practicality

$$P = \frac{R}{SM} \times 100\%$$

Information:

P = Percentage of Questionnaire Data

R = Number of Scores obtained

SM= Maximum Total Score

The following are the validity criteria assessment categories:

Table 1. Validity Criteria

Presentation	Mark	Category
0% - 25%	1	Invalid
26% - 50%	2	Less Valid
51% - 75%	3	Valid
76% - 100%	4	Very Valid

The following categories assess the practicality of the teacher's response:

Table 2. Criteria for the Practicality of Teacher Responses

Presentation	Category
75.01% - 100%	Very Practical
50.01% - 75%	Practical
25.01% - 50%	Less Practical
00.00% - 25%	Impractical

The table above relates to media eligibility criteria and is a guide for researchers to categorize the results of expert validation and teacher response questionnaires.

3.   FINDINGS AND DISCUSSION

Learning media is something that is used in learning activities in order to stimulate students' thoughts, feelings, interests and attention so that the process of educational communication interaction between teachers (or media makers) and students can take place in an effective and efficient manner (Faizah, 2020).

In the digital era, learning media is often integrated with information and communication technology. The use of software, online platforms and mobile applications has provided flexibility in presenting learning material. With a wide choice of learning media, teachers can adapt their teaching methods to suit students' learning styles and create a more diverse and effective learning experience. Therefore, developing, selecting and utilizing appropriate learning media is an important aspect in designing meaningful learning experiences for students.

According to Gayne and Briggs, as cited in Sugihartono et al. (Wiyani, 2013), the concept of meaningful learning emphasizes how students are able to derive personal significance from the material they study. This occurs when learners can connect what they have learned to real-life experiences, allowing knowledge to become more relevant, retained, and applicable.

The study identifies various types of learning media that can support meaningful learning, each catering to different learning styles and sensory engagement. First, visual media involves image-based tools such as pictures, diagrams, and charts. These visual aids serve as effective teaching tools, especially when customized to align with the subject matter (Hildayah, 2019).

Next, auditory media focuses on learning through hearing. It includes resources such as audio recordings, videos with sound, and storytelling that uses rhythm, tone, and voice modulation to enhance understanding and engagement (Ramilda, 2021).

Audio-visual media integrates both visual and auditory elements, aligning with advancements in technology. This category includes instructional videos, educational television programs, and multimedia presentations that stimulate multiple senses simultaneously, making learning more dynamic and immersive (Gabriela, 2021).

Manipulative media refers to tangible objects that learners can physically interact with. These materials—such as blocks, puzzles, and mathematical manipulatives—not only support fine motor

development but also encourage hands-on, experiential learning, enhancing both cognitive and physical engagement (Susilowati, 2014).

The development of digital media has further expanded the possibilities of interactive learning. Digital tools such as educational games, memory challenges, and learning apps on smartphones or tablets combine educational content with entertainment. These platforms offer personalized learning experiences and are particularly effective for early childhood education, covering basic skills like letters, numbers, and logical reasoning (Winaryati, 2021).

Lastly, print media includes traditional formats such as textbooks, workbooks, and printed visual aids. Though more conventional, printed materials remain a valuable component of instructional media, serving as tangible references that support independent learning and reinforce concepts through reading and visual exposure (Suyasa & Sedana, 2020).

Each type of media plays a significant role in enhancing meaningful learning by catering to diverse learning preferences. Integrating a variety of these media types into instructional practices can enrich the learning experience and better support students in connecting academic content with real-world applications.

Educational games are a form of learning media designed in the format of games to provide players with engaging and meaningful educational experiences (Septiawati et al., 2021). These games are crafted to be both enjoyable and instructional, enhancing the learning process in a fun and interactive way.

The rapid development of digital technology—marked by the emergence of computers, the internet, smartphones, and social media—has significantly transformed daily life, especially among the younger generation (Rahayu, 2019). This digital era is reshaping patterns of learning and information dissemination, gradually replacing traditional paper-based resources. For instance, the availability of digital dictionaries on mobile devices has led to a decline in the use of printed dictionaries.

According to the Big Indonesian Dictionary, a riddle refers to an act of guessing or surmising (Anwar, 2003). Puzzles, often presented as ambiguous questions in the form of images or stories, serve as games designed to sharpen the mind (Sugiarto, 2021). While each type of puzzle has its own rules and levels of difficulty, they all provide mental stimulation and entertainment.

This study focuses on a hidden word puzzle game, where players complete a grid filled with random letters by identifying specific hidden words. Puzzle games like these offer numerous benefits, including enhancing children's cognitive abilities, stimulating curiosity, and fostering independence (Sugiarto, 2021). As a form of language-based gameplay, puzzles can be an effective tool in language learning, helping improve vocabulary acquisition and reading skills.

Children are naturally drawn to play activities involving engaging objects, particularly digital devices that offer various features. However, screen time must be managed carefully to ensure healthy development. Hasbi and Adiarti (2020) suggest specific guidelines: (1) children aged 0–2 years should avoid device use altogether due to potential harm from screen light and radiation; (2) those aged 2–4 may engage in simple games for up to one hour daily; and (3) children aged 4–7 can explore digital content under adult supervision, with a recommended maximum usage of two hours per day. These guidelines are essential in balancing the benefits of digital interaction with the importance of child health and development.

Linguistic Intelligence is the ability to use words effectively, both to influence and manipulate. In everyday life, linguistic intelligence is useful for: speaking, listening, reading and writing (Syarifah, 2019). The following are aspects of linguistic intelligence according to Gardner, namely: (Armstrong, 2018).

a. Rhetoric, rhetorical skills can make someone able to speak language with good persuasive techniques.
b. Mnemonics, someone with Mnemonic skills can use language to help remember and provide information.

c. Explanation, explanatory skills which are an important role for someone in explaining something well.

d. Metalanguage, the ability to describe language, whether in the form of terms or whatever language is used.

The concept of linguistic intelligence or "Word Smart" is one of the eight types of intelligence in the theory of multiple intelligences developed by Howard Gardner (Armstrong, 2018). Armstrong adapted this theory to be applied in education, including early childhood. Linguistic intelligence in early childhood involves sensitivity and the ability to use language effectively.

The main components of linguistic intelligence or "Word Smart" according to Armstrong include: (Armstrong, 2018).

a. Sensitivity to Sound (Phonological Awareness): Children with high linguistic intelligence have the ability to differentiate and identify various sounds in language. They can recognize rhyme, alliteration, and various sound patterns in words.

b. Sensitivity to Structure (Grammatical Sensitivity): These children tend to be sensitive to grammar and syntax. They understand how words can be combined to form meaningful sentences and can recognize grammatical structures in language.

c. Sensitivity to Meaning (Semantic Sensitivity): Children who have high linguistic intelligence have good abilities in understanding and using vocabulary. They can understand the meaning of words and how that meaning can change depending on the context.

d. Sensitivity to Language Functions (Pragmatic Awareness): This involves understanding how language is used in various social situations. Children with high linguistic intelligence can understand the nuances of communication and are able to use language appropriately according to the social context.

Based on the explanation above, it can be concluded that the integration of digital technology in children's education is essential in the modern era. Utilizing digital learning media enables teachers to create more interactive and engaging learning experiences, helping children become familiar with technology from an early age. As digital advancements continue to shape education, teachers must adapt by incorporating digital tools to enhance learning outcomes. In response to this need, this study develops a digital puzzle game-based learning medium to improve linguistic intelligence in children. Additionally, the controlled use of digital learning tools allows children to gain exposure to technology while ensuring appropriate screen time management.

This study employs a Research and Development (R&D) approach, a methodology designed to develop and evaluate specific educational products (Sugiyono, 2011). The research follows the ADDIE development model, which consists of five systematic stages: Analysis, Design, Development, Implementation, and Evaluation (Jaya, 2019). This structured model ensures that the digital puzzle game is effectively developed, tested, and refined to optimize its impact on linguistic intelligence in early childhood education.

3.1. *Stages of the ADDIE model*

In accordance with the ADDIE development model for educational game-based learning media to improve the linguistic intelligence used, the procedure for developing educational game learning media consists of five stages, namely:

3.1.1 Analysis stage

A needs analysis was conducted at Al Padilah PAUD in Bengkulu City through a series of observations focused on daily learning implementation plans, the use of learning media, and the overall learning process. The analysis also examined the available early childhood learning media, which had not been specifically developed to enhance children's linguistic intelligence. The existing media primarily included thematic books, posters, pictures, educational play equipment (APE), and other

printed learning materials. However, there was a noticeable absence of technology-based media in the classroom.

To address this gap, the researchers explored the use of floor puzzle learning media and further developed it into a digital format—specifically, a digital puzzle game. The aim was to create a more accessible and engaging learning tool that could both support early language development and introduce digital literacy skills at an early age. The digital puzzle game was designed not only to strengthen children's linguistic intelligence but also to align with modern educational trends that incorporate interactive technology into early childhood education.

Through the observation process, it was found that while educational games and picture books were commonly used by teachers, these tools had limited capacity in enhancing linguistic intelligence through digital means. This finding highlighted the need for the development and integration of digital-based learning media that could complement traditional methods. Digital learning tools—such as interactive puzzle games, educational videos, and e-learning platforms—offer dynamic and engaging experiences that can support deeper learning and sustained attention in young children.

Additionally, digital media can assist teachers in delivering more detailed content and provide a variety of teaching methods to maintain children's interest and reduce boredom during lessons (Kurniasih, 2019). As such, the integration of digital learning tools represents a valuable innovation in early childhood education, offering both cognitive and motivational benefits that support children's overall development.

3.1.2 Design stage

The design stage begins with designing learning media based on digital puzzle games for children aged 5-6 years. This stage is the stage of creating a product evaluation tool to determine whether the product the researcher is developing is valid or invalid, practical or impractical, and effective or ineffective. The product evaluation instrument in this research is a questionnaire containing statements to material experts and language experts.

The following are the stages of creating a digital puzzle game via the web:
a. Do a search on Google with the keyword quickapp.ninja
b. Register now if you don't have an account, then log in if you are already registered
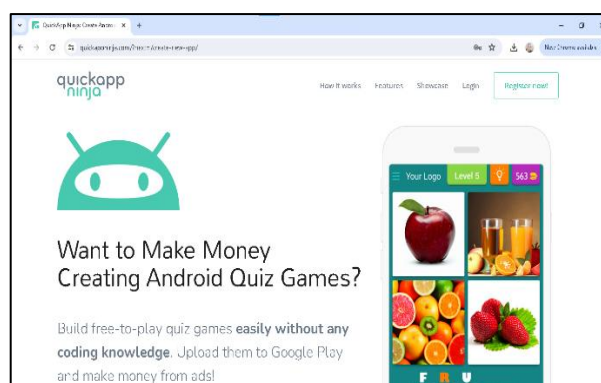
Figure 1. Register
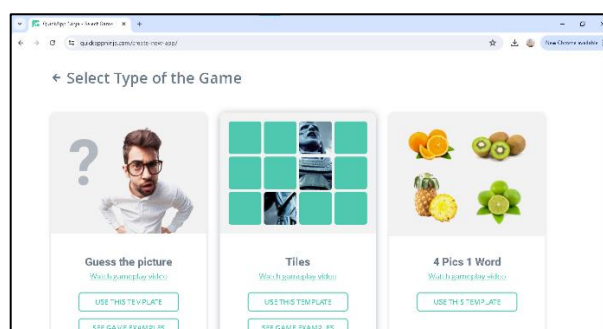
c. Select one of the templates provided

Figure 2. Select Template

d. Make questions and answers according to the template as attractive as possible
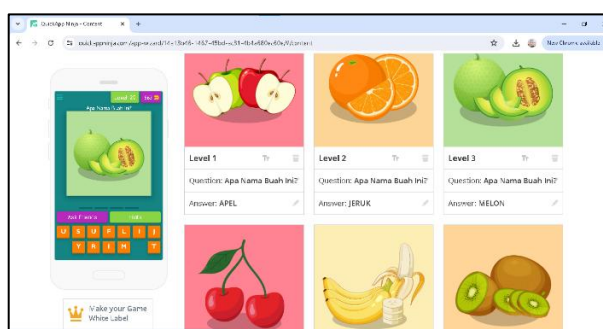

Figure 3. Question and Answer

e. Design the appearance of the game starting from the initial application appearance, logo, icon, color, sound, image, background, game title, etc.
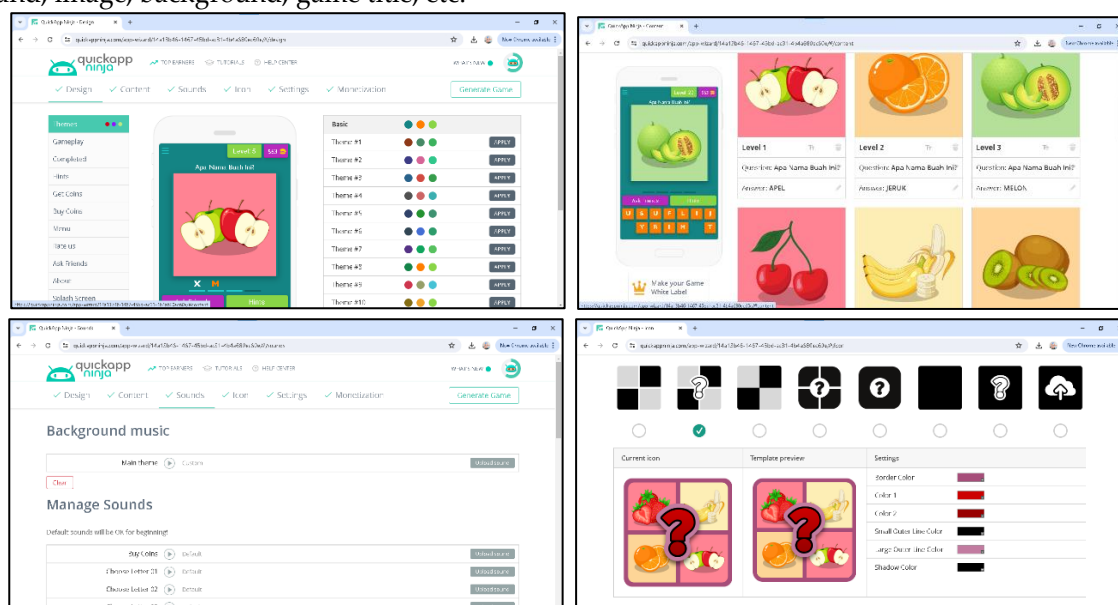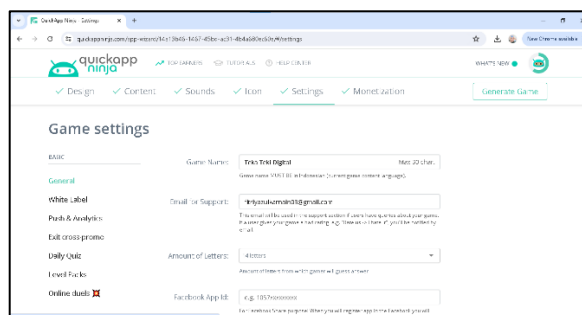

Figure 4. **Menu**

Figure 5. Game Setting

This design stage includes adapting learning media to learning achievement indicators in the independent curriculum and selecting interesting and fun learning media designs. This digital puzzle game-based learning media is a development of floor puzzle media to improve the ability to recognize letters in group B children at GMIM Eben Haezer Kapataran Kindergarten. Researchers developed learning media in the form of digital media, adapting to current developments, while utilizing digital developments as a learning medium for young children. The previous media used a floor puzzle mat that could be removed and had a safety level that was quite safe for children. This removable floor puzzle can also cause loss of puzzle pieces or cause damage so that the usage period does not last long. The following are learning media before being developed:

Figure 6. Learning Media Before Developing

In the previous media development, namely floor puzzles, there were several features for children to play with, in this study, researchers only focused on one feature to improve children's linguistic intelligence, namely writing random letters. The digital puzzle game-based learning media that has been developed will be attached in full in the attachment, here are several pictures of the appearance of the digital puzzle game that has been developed:
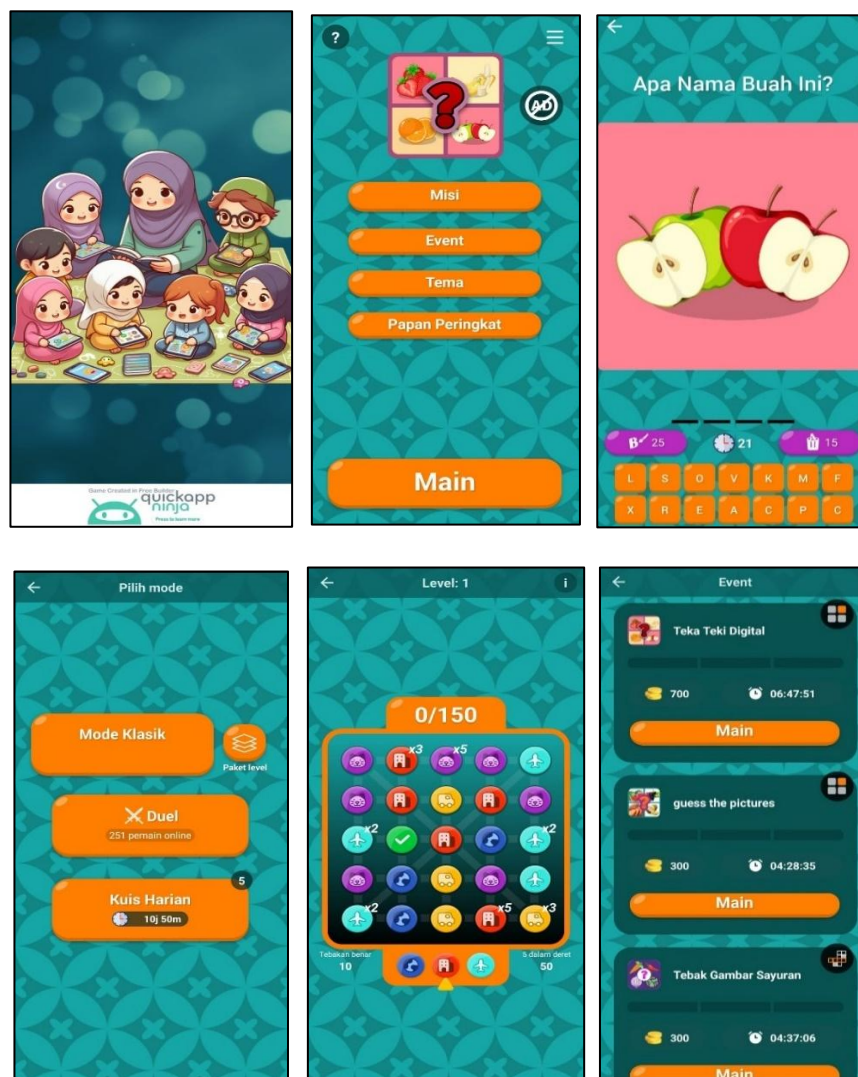
Figure 7. Learning Media That Have Been Developed

3.1.3 Development stage

The development stage in this research aims to see the validity of the media based on expert opinions to assess the validity, practicality, and effectiveness of the learning media and materials that have been designed in the previous stage. Improvements are made in accordance with the assessment results and suggestions provided by the validator. The validity of the development of digital puzzle game-based learning media to improve the linguistic intelligence of early childhood, after being validated by validators from 3 expert teams, namely material experts and media experts. The following are the results of the validation test for learning media based on digital puzzle games: material experts obtained a percentage of $\frac{48}{48}$ x 100% = 100%, media experts obtained a percentage of $\frac{47}{48}$ x 100% = 97,92%. The learning media was declared very valid and worthy of being tested with revisions according to suggestions or input from a team of experts.

3.1.4 Implementation Stage

Data from the assessment of the practicality of teachers' responses to the learning media that has been developed has a score of 92.59% in the very practical category. Statement 1, with the interest assessment aspect received a score of 100%. Statement 2, with the material assessment aspect received a score of 88.89% and statement 3 with the media appearance assessment aspect, received a score of

88.89% with very practical criteria. The final total score for the practicality of learning media is $\frac{P1+P2+P3}{3}$ so, $\frac{P1 (100\%) + P2 (88,89\%) + P3 (88,89\%)}{3} = \frac{277,78\%}{3} = 92,59\%$ (Very Practical).

The ability test was carried out 2 times, namely the first test before using digital puzzle game-based learning media (pretest) and the second test after using digital puzzle game-based learning media (posttest). Here are the pretest results:

Table 3. Pretest Score Results

No	Student's Name	Assessment Indicators												$\overline{X}$	Criteria
		Number													
		1	2	3	4	5	6	7	8	9	10	11	12		
1.	Rahim	2	1	2	3	2	2	2	2	3	1	2	1	1.9	Not enough
2.	Rahan	2	1	2	3	2	2	2	2	2	1	2	2	1.9	Not enough
3.	Rafael	3	2	3	4	3	3	3	3	2	3	2	2	2.7	Not enough
4.	Aulia	2	2	2	2	2	2	2	2	2	2	3	1	2.0	Not enough
5.	Angel	2	1	1	3	2	2	2	3	3	1	2	2	2.0	Not enough
6.	Attalah	2	1	1	2	3	3	1	2	3	2	1	2	1.9	Not enough
7.	Cindy	2	1	1	2	2	2	2	2	3	2	1	2	1.8	Not enough
8.	Erva	2	1	2	1	2	2	2	2	2	1	2	3	1.8	Not enough
9.	Khaira	2	3	2	2	2	3	2	3	3	2	3	1	2.3	Not enough
10.	Kirana	2	1	1	2	2	2	3	2	3	1	2	1	1.8	Not enough
11.	Adbit	3	1	2	2	2	2	2	2	2	1	2	2	1.9	Not enough
12.	Syabil	2	1	2	3	2	2	1	2	2	1	1	3	1.8	Not enough
13.	Intan	2	1	2	3	3	2	2	2	3	1	2	1	2.0	Not enough
14.	Dwi	3	1	1	2	2	2	2	2	2	2	1	2	1.8	Not enough
15	Qowi	2	2	1	2	2	2	3	1	2	2	1	2	1.8	Not enough
	Amount	33	20	25	36	33	33	31	32	37	23	27	27	29.7	
	Average	2.2	1.3	1.6	2.4	2.2	2.2	2.0	2.1	2.4	1.5	1.8	1.8	1.98	Not enough
	Category	K	K	K	K	K	K	K	K	K	K	K	K		Not enough

Based on the results of the pretest scores, it is known that 15 children got average scores with fewer criteria. The average obtained from the pretest score of 15 children was 1.98, within a score of 1.8 – 2.7, with poor assessment criteria.

Table 4. Posttest Score Results

No.	Student's Name	Assessment Indicators Number												$\overline{X}$	Criteria
		1	2	3	4	5	6	7	8	9	10	11	12		
1.	Rahim	5	4	4	5	4	4	5	5	4	4	5	4	4.4	Good
2.	Rahan	3	4	3	5	3	3	3	4	3	3	4	3	3.4	Enough
3.	Rafael	5	5	5	4	5	5	5	5	4	5	4	5	4.7	very well
4.	Aulia	3	4	3	4	4	3	3	3	3	4	5	3	3.5	Enough
5.	Angel	4	4	4	5	4	4	4	5	5	4	4	4	4.2	Good
6.	Attalah	5	4	4	4	5	5	4	4	5	4	4	4	4.3	Good
7.	Cindy	4	4	3	4	3	3	4	3	3	4	4	3	4.1	Enough
8.	Erva	4	4	5	4	5	4	4	4	4	4	5	4	4.2	Good
9.	Khaira	5	5	4	4	4	4	4	5	5	4	5	4	4.4	Good
10.	Kirana	5	5	4	4	5	5	5	4	5	4	4	4	4.5	Good
11.	Adbit	5	5	5	4	4	5	5	5	4	5	5	4	4.6	very well
12.	Syabil	4	4	4	5	4	5	4	4	5	4	4	5	4.3	Good
13.	Intan	5	4	4	5	5	4	5	4	5	4	4	4	4.4	Good
14.	Dwi	5	4	4	4	5	5	4	4	4	4	5	4	4.3	Good
15	Qowi	5	5	4	5	4	4	5	4	5	5	4	4	4.5	Good
	Amount	67	65	60	66	64	63	64	63	64	62	66	59	63.5	
	Average	4.4	4.4	4.0	4.4	4.2	4.2	4.2	4.2	4.2	4.1	4.4	3.9	4.2	Good
	Category	B	B	B	B	B	B	B	B	B	B	B	B		Good

The use of digital puzzle game-based learning media in the learning process has increased, although there are some children who still meet the sufficient criteria. Based on the results of the posttest scores, it is known that there are still 3 children with sufficient criteria, 10 children with good criteria and 2 children with very good categories. The average obtained from the posttest score of 15 children was 4.2, within a score of 3.6 – 4.5 with good criteria. Overall, from the posttest, the increase in children's linguistic intelligence has been good and has increased.

Based on the results obtained, it can be concluded that the development of digital puzzle game-based learning media in improving children's linguistic intelligence is declared effective and has fulfilled 3 requirements, namely the posttest score with a score of 4.2 with good criteria, the average posttest score is above the pretest score. and the average posttest score is above the completion score.

3.1.5 Evaluation Stage

Learning media based on digital puzzle games needs to be evaluated, this is seen based on the implementation stages that have been carried out. The product that has been developed has shortcomings because there are several things that are less efficient in implementing the learning media. The results of the teacher's responses showed that in the digital puzzle game-based learning media, at the game stage, children were asked to play puzzle games alternately with their friends, but in practice this was less efficient if there were 5 (five) children on one device simultaneously. alternate. Therefore, the teacher uses another alternative, namely by providing 1 (one) device for only 2 (two) children to avoid commotion with the children and at the same time teach children to cooperate with their playmates.

Based on the results of validity, practicality, and effectiveness at the development and implementation stages, digital puzzle game-based learning media is feasible.

3.2 Discussion

Previous research on floor puzzle learning media has shown that children's ability to recognize letters goes beyond simply naming them. The implementation of learning using floor puzzles begins with letter identification, followed by understanding the relationship between letter shapes and corresponding objects, and eventually progressing to sequencing letters correctly. The use of floor puzzle media has proven to be an engaging and enjoyable method for children, as it transforms learning into a playful experience within the classroom (Lotulung, 2016).

Building on these findings, the development of digital puzzle game learning media presents a more advanced and engaging alternative. Unlike traditional learning tools, digital puzzle games integrate interactive features and modern technology, offering a more immersive educational experience. One of the key advantages of digital puzzle game-based learning is its ability to provide realistic visualizations and interactive problem-solving scenarios. The structure of the game encourages players to actively engage with challenges, follow game instructions, and utilize the available tools to explore solutions and develop strategies. This dynamic learning process helps children enhance their problem-solving skills, cognitive abilities, and knowledge retention.

Furthermore, digital puzzle games serve as an effective alternative learning tool for Early Childhood Education (PAUD) teachers, allowing them to transition from traditional teaching methods to game-based simulation learning. By incorporating elements of challenge, precision, reasoning, and ethical decision-making, digital puzzle games not only stimulate creativity in young learners but also make learning more enjoyable and interactive. These features align with the principles of educational game-based learning, which fosters both engagement and cognitive development in early childhood education (Vitianingsih, 2016).

4. CONCLUSION

Based on the findings of this study, it can be concluded that the development of digital puzzle game-based learning media is a valid, practical, and effective tool for improving linguistic intelligence in early childhood. The validity of the learning media, as assessed by three expert validators, was confirmed with a 100% validation score from material experts and 97.92% from media experts, categorizing it as "valid" and ready for implementation. In terms of practicality, teachers' responses to the developed learning media resulted in an average score of 92.59%, placing it in the "very practical" category. The effectiveness of the digital puzzle game-based learning media was determined through pretest and posttest evaluations, where the pretest average score was 1.98 (low competency), while the posttest score increased to 4.2 (good competency), indicating significant improvement. Despite these promising results, this study has certain limitations, including a limited sample size and the need for further long-term evaluation to assess the sustained impact of digital puzzle games on children's linguistic development. Additionally, infrastructure and digital access challenges in some schools may affect the widespread adoption of digital learning media. Future research should consider expanding the sample size, conducting longitudinal studies to measure long-term effectiveness, and exploring adaptive digital learning models that cater to diverse early childhood learning needs and different levels of linguistic intelligence. Integrating AI-driven personalization and multiplayer collaborative features in digital puzzle games could also be explored to enhance engagement and interaction in early childhood education.

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