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Development of Thematic Monopoly Media to Optimize Early Mathematical Skills in Children Aged 5–6 Years

Ayu Rahayu[1], Irma Yuliantina[2], Lilis Suryani[3]
[1,2,3] Universitas Panca Sakti Bekasi, Indonesia
* Correspondence e-mail; ayu.alulum@gmail.com

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Abstract

In early childhood education, mathematics is not merely about introducing numbers. This study aimed to develop, determine the feasibility, and examine the effectiveness of Thematic Monopoly media in optimizing the early mathematics skills of children aged 5–6 years. The research employed a Research and Development (R&D) method using the ADDIE model, which consists of analysis, design, development, implementation, and evaluation stages. The study was conducted at TK Ar-Rahmah, Terkul Village, Rupat District, Bengkalis Regency, Riau Province, involving 16 children in Group B. Data were collected through observation, interviews, validation sheets, teacher response questionnaires, and field trials. The results of the needs analysis showed that the existing learning media for early mathematics were still limited in terms of interactivity, variation, and contextual relevance, thus requiring the development of a more engaging and developmentally appropriate medium. The feasibility of the product was confirmed by expert validation results, with scores of 85% from the material expert, 90% from the media expert, and 95% from the practitioner, all categorized as very valid. Product trials also showed highly positive results, with an average score of 88.3% across individual, small-group, and large-group trials, while teacher responses during limited implementation reached 89.5%, and classroom activity observations reached 81.75%. Furthermore, the findings demonstrated that the use of Thematic Monopoly media had a positive impact on children's motivation, participation, enthusiasm, and understanding of early mathematical concepts.

Keywords Children Aged 5–6 Years, Early Childhood Education, Early Mathematical Skills, Learning Media Development, Thematic Monopoly Media.

INTRODUCTION

Early childhood is a critical period for the development of foundational cognitive abilities, including early mathematics skills that later support children's academic achievement and problem-solving capacity. In early childhood education, mathematics is not merely about introducing numbers, but also about helping children develop logical thinking, classification, sequencing, comparison, pattern recognition, and an understanding of quantity through meaningful experiences. For children aged 5–6 years, early mathematical competence forms an

essential basis for school readiness because it supports symbolic thinking, reasoning, and the ability to relate abstract concepts to everyday situations. Research in early childhood mathematics consistently shows that children who receive rich and developmentally appropriate numeracy stimulation in the preschool years tend to demonstrate stronger later achievement in mathematics and broader cognitive performance. Therefore, early mathematics learning should be treated as a central component of early childhood education rather than as an additional skill taught only in formal schooling (Björklund et al., 2020).

In practice, however, the teaching of early mathematics in many early childhood settings still faces substantial challenges. Learning activities are often dominated by conventional approaches such as worksheets, rote counting, and teacher-centered drilling, which may not align with the developmental characteristics of young children. At the age of 5–6 years, children learn most effectively through active exploration, direct manipulation of concrete objects, social interaction, and play-based experiences. When mathematics is presented in an abstract, repetitive, and less engaging way, children may experience boredom, low motivation, and limited conceptual understanding. Instead of building mathematical meaning, they may only memorize symbols or procedures without understanding relationships among numbers, quantities, patterns, and spatial forms. This condition indicates a gap between the expected goals of early childhood numeracy development and the actual learning experiences provided in classrooms, highlighting the need for more innovative, child-friendly, and contextual learning media.

Recent scholarship strongly supports the use of play-based and guided-play approaches in early mathematics education. Contemporary studies show that young children learn mathematical ideas more effectively when instruction is embedded in playful, meaningful, and socially interactive activities. Play-based mathematics can enhance children's counting skills, symbolic thinking, reasoning, persistence, and enjoyment of learning because it allows them to manipulate objects, negotiate rules, solve simple problems, and connect mathematical concepts to real-life contexts. Guided play, in particular, provides a balance between children's active engagement and teachers' intentional scaffolding, enabling learning goals to be achieved without sacrificing the joy of play. This perspective is especially relevant in early childhood classrooms, where children's curiosity and participation are crucial for successful learning. As a result, educational media that combine play, interaction, and curricular content have become increasingly important for supporting numeracy learning in developmentally appropriate ways (Derman et al., 2020; Petersson & Weldemariam, 2021).

One potential innovation to address this need is the development of thematic board-game media adapted to the characteristics of early childhood learners. Among various forms of educational play, Monopoly-based media offer strong potential because they integrate visual stimuli, movement, turn-taking, symbolic representation, and problem-solving within a structured but enjoyable activity. When adapted thematically for early childhood education, Monopoly can be transformed from a commercial board game into an educational medium that introduces number symbols, counting, comparing quantities, sequencing numbers, identifying

shapes, and solving simple mathematical tasks in an integrated manner. In addition, thematic Monopoly media can connect mathematical content with familiar contexts from children's daily lives, thereby making learning more meaningful and less intimidating. Such media also provide opportunities for social interaction, language development, and emotional engagement, all of which are closely linked to children's cognitive growth. The use of interactive board games as learning media is therefore highly relevant to current demands for active, creative, and child-centered early childhood pedagogy.

This study emerges from the educational need to design and validate a learning medium that is both pedagogically appropriate and practically useful for optimizing early mathematics skills among children aged 5–6 years. Based on the thesis document, the proposed innovation is a Thematic Monopoly medium developed to support children in recognizing numbers, counting, understanding quantity, arranging number sequences, comparing numbers, and solving simple mathematical problems through playful learning activities. The study adopts a research and development approach using the ADDIE model analysis, design, development, implementation, and evaluation to ensure that the resulting product is grounded in learners' needs, validated by experts, and tested in classroom practice. Conducted in an early childhood education setting with children aged 5–6 years, this research is significant not only because it responds to the limited availability of engaging numeracy media, but also because it contributes to the broader effort to improve the quality of early childhood mathematics learning through contextual, innovative, and evidence-based educational media. In this regard, the development of Thematic Monopoly is expected to provide an alternative instructional medium that strengthens children's early numeracy experiences while also assisting teachers in implementing more meaningful and enjoyable mathematics learning in preschool classrooms (Björklund et al., 2020; Derman et al., 2020; Petersson & Weldemariam, 2021).

METHODS

This study employed a Research and Development (R&D) approach aimed at designing, validating, and implementing a Thematic Monopoly learning medium to optimize early mathematics skills among children aged 5–6 years. The development process adopted the ADDIE model, which consists of five stages: analysis, design, development, implementation, and evaluation. At the analysis stage, the researcher identified children's learning needs in early mathematics, including number recognition, counting, understanding quantity, sequencing numbers, comparing numbers, and solving simple mathematical problems through observation and interviews. The design stage focused on planning the structure, content, visual elements, and rules of the Thematic Monopoly medium in accordance with the developmental characteristics of early childhood learners. In the development stage, the prototype was created and then validated by material experts, media experts, and early childhood education practitioners to assess its feasibility, relevance, and practicality. After revision, the product was tested through individual trials, small-group trials, and large-group trials, followed by a limited implementation in an early childhood education setting. The participants of the study were

children aged 5–6 years at TK Ar-Rahmah, Terkul Village, Rupat District, Bengkalis Regency, Riau Province. Data were collected using observation, interviews, validation sheets, and teacher response questionnaires, and were analyzed descriptively to determine the validity and practicality of the developed media. Overall, this method was intended to produce an educational medium that is theoretically grounded, empirically validated, and practically applicable in supporting early mathematics learning in early childhood classrooms.

FINDINGS AND DISCUSSION

The Needs Analysis for Developing Thematic Monopoly-Style Media to Optimize Early Mathematics Skills in Children Aged 5–6 Years Entail

The findings related to the first research question how the needs analysis for developing thematic Monopoly media was conducted to optimize the early mathematics skills of children aged 5–6 years indicate that the development process began with a systematic identification of the gap between the ideal expectations of early mathematics learning and the actual classroom conditions found in the field. Based on observations, interviews with teachers and school leaders, and a comparative review of previously used learning media, the study found that early mathematics instruction in the kindergarten context still relied heavily on limited, less interactive, and less varied media. These existing media were mostly used to introduce number symbols and basic counting, yet they were not sufficiently designed to help children understand quantity, arrange number sequences, compare numbers, or solve simple mathematical problems in meaningful ways. As reported in the thesis, the needs analysis showed that the media previously used in introducing early mathematics were "less effective, less varied, less interactive, and still very limited to knowledge rather than the meaningful understanding of symbols in everyday life," which clearly justified the need for developing a more suitable learning medium.

The results also show that the needs analysis was not limited to identifying deficiencies in classroom media, but also focused on understanding the developmental and instructional needs of children aged 5–6 years. The thesis explains that the development of Thematic Monopoly was grounded in the need for a learning medium that is attractive, interactive, contextual, and aligned with the characteristics of early childhood learners. The analysis stage identified several essential mathematical competencies that needed stronger support, namely number recognition, counting, understanding quantity, ordering numbers, comparing numbers, and solving simple problems. These findings indicate that the target of the needs analysis was broader than simply choosing a new game or visual aid; rather, it was intended to create a pedagogical medium capable of integrating play and learning in ways that correspond to children's cognitive readiness and classroom realities. This is an important point because in early childhood education, mathematical learning is most effective when it is embedded in concrete, enjoyable, and repetitive experiences that allow children to manipulate objects, interact with peers, and construct meaning through activity.

From the perspective of current theory, the findings of this needs analysis are strongly supported by recent research in early childhood mathematics education. Derman et al. (2020) emphasize that play-based mathematics learning contributes positively to children's mathematical understanding because it enables them to engage with number concepts, counting, and problem solving in an enjoyable and socially interactive environment. Such an approach is especially important in preschool settings, where learning through play is not only developmentally appropriate but also necessary to maintain children's motivation and active engagement. In the context of this study, the limited effectiveness of conventional media identified during the needs analysis confirms that children require learning tools that do more than display numbers or provide repetitive tasks; they need media that encourage exploration, movement, communication, and playful repetition so that mathematical concepts become meaningful rather than merely memorized.

The needs analysis further revealed a pedagogical demand for media that could connect mathematical concepts with the thematic orientation of the early childhood curriculum. This means that the development of Thematic Monopoly was not only aimed at improving numeracy instruction, but also at aligning mathematics learning with the broader principles of integrated and contextual early childhood education. Gasteiger and Moeller (2021) note that board games and game-based mathematical experiences can support the development of early numerical competencies because they naturally involve counting moves, comparing values, recognizing order, and linking symbols with actions. This theoretical view is highly relevant to the present study because the proposed Monopoly medium offers precisely these forms of learning engagement: children throw dice, move across spaces, respond to task cards, and encounter mathematical challenges in a playful structure. In other words, the findings of the needs analysis suggest that the classroom required a medium capable of transforming abstract mathematical concepts into concrete and embodied learning experiences.

Another important result from the needs analysis is the recognition of teachers' practical needs. Teachers needed a medium that was not only educationally meaningful for children but also usable, flexible, and relevant to classroom instruction. Thematic Monopoly was therefore positioned as a solution that could support teachers in implementing mathematics learning more creatively and interactively. This is consistent with Petersson and Weldemariam (2022), who argue that guided play provides an effective bridge between children's spontaneous engagement and teachers' instructional goals, especially in early mathematics. By identifying the lack of engaging and context-sensitive media in the classroom, the needs analysis in this thesis highlighted the importance of creating a learning tool that would help teachers organize enjoyable mathematics activities without losing curricular focus. Thus, the development of the media responded not only to children's learning characteristics but also to teachers' need for practical instructional support.

Overall, the discussion of the first research question demonstrates that the needs analysis successfully identified three major needs in the learning environment: first, the need for more interactive and varied media to support early mathematics learning; second, the need for play-

based and thematic learning experiences that are suitable for the developmental characteristics of children aged 5–6 years; and third, the need for a practical classroom medium that helps teachers teach number concepts, quantity, sequencing, comparison, and simple problem solving in meaningful ways. Therefore, the thematic Monopoly medium emerged from a clearly documented educational need rather than from a purely creative idea. The findings suggest that the development of this medium was pedagogically justified because it directly addressed weaknesses in existing classroom practice and responded to the broader expectation that early mathematics learning should be engaging, contextual, and developmentally appropriate. In this sense, the needs analysis served as the essential foundation for the subsequent stages of design and development, ensuring that the final product was rooted in real classroom problems and aligned with contemporary understandings of effective early childhood numeracy instruction.

The Process of Developing Thematic Monopoly-Style Media to Optimize Early Mathematics Skills in Children Aged 5–6 Years

The findings related to the second research question how the process of developing Thematic Monopoly media was carried out to optimize the early mathematics skills of children aged 5–6 years show that the product was developed through a systematic Research and Development framework using the ADDIE model, consisting of analysis, design, development, implementation, and evaluation. The process was not conducted as a simple media-making activity, but as a structured instructional design effort intended to ensure that the final product was relevant to children's developmental needs, pedagogically appropriate, and feasible for classroom use. The thesis explains that the ADDIE model was selected because it provides clear and sequential stages for transforming classroom needs into an educational product that can be validated and tested in practice. In this study, the development process focused on producing a thematic board-game medium that could support children in recognizing number symbols, counting, understanding quantity, sequencing numbers, comparing numbers, and solving simple mathematical problems through play-based learning activities.

At the analysis stage, the researcher identified the learning needs of children aged 5–6 years through classroom observation and interviews with teachers. The analysis focused on the main components of early mathematics learning, including number recognition, counting, understanding the concept of quantity, ordering numbers, comparing numbers, and simple problem solving. The results of this stage showed that existing media were still limited in supporting interactive and meaningful numeracy learning, which justified the need for a more engaging and contextual instructional medium. This stage is significant because it ensured that the media development was rooted in actual classroom problems rather than based solely on theoretical assumptions. In the literature on instructional design, the analysis phase is considered essential because it determines whether the product being developed is truly aligned with learner characteristics, curriculum goals, and the learning environment. Almelhi (2021) argues that development models such as ADDIE are particularly effective when the

analysis phase is used to diagnose authentic learner needs and instructional constraints before any design decisions are made. In the context of this thesis, the needs analysis functioned as the foundation for all subsequent stages of development by defining what mathematical skills had to be addressed and what kind of learning medium would be most suitable for young children.

The design stage involved planning the concept, structure, and components of the Thematic Monopoly media based on the results of the needs analysis. At this stage, the game was designed to suit the characteristics of children aged 5–6 years, meaning that the visual appearance, rules of play, thematic content, mathematical tasks, and supporting components were adjusted to children's cognitive, social, and emotional development. The game was not intended merely as entertainment, but as a thematic learning medium in which mathematical tasks were embedded into game spaces, challenge cards, movement activities, and interactive instructions. This reflects an important principle in early childhood mathematics learning: young children learn more effectively when mathematical ideas are presented through concrete, enjoyable, and meaningful experiences. Recent studies support this approach. Fleer (2021) explains that play-based learning environments can function as powerful conceptual spaces in which children engage with symbols, patterns, counting, and problem solving through social interaction and imaginative activity. Thus, the design of the Thematic Monopoly media can be understood as an effort to integrate early mathematics objectives with developmentally appropriate pedagogical strategies.

At the development stage, the initial prototype of the media was produced and then validated by three types of experts: a material expert, a media expert, and an early childhood practitioner. Their role was to assess the content accuracy, visual and technical quality, suitability for children, and practicality of the medium for classroom use. Based on the thesis, the product underwent revision after expert review, resulting in Draft II before moving to the trial stage. This shows that the development process was iterative rather than linear, because feedback from validators was used to improve the product before implementation. The thesis reports strong validation outcomes, with a score of 85% from the material expert, 90% from the media expert, and 95% from the practitioner, indicating that the media was considered highly valid and feasible for use. This process is consistent with current development research, which emphasizes expert validation as a critical quality-control mechanism in educational product design. According to Safitri and Aziz (2022), iterative validation and revision are central to the ADDIE framework because they help ensure that the final product is not only theoretically sound but also practical and responsive to the needs of users.

The implementation stage consisted of product trials conducted in several levels, namely individual trials, small-group trials, and large-group trials, followed by limited classroom implementation at TK Ar-Rahmah in Terkul Village, Rupat District, Bengkalis Regency, Riau Province. This staged trial process allowed the researcher to observe how the media functioned with actual children and to identify possible weaknesses before wider use. The thesis indicates that after revision, the final model was implemented in limited classroom

practice with children aged 5–6 years. Trial results showed a mean score of 88.3% across individual, small-group, and large-group trials, placing the product in the "very valid" category, while teacher responses during limited implementation reached an average of 89.5%, and classroom activity observations reached 81.75% in the "good" category. These findings suggest that the development process succeeded not only in producing a valid medium but also in creating a product that was attractive, usable, and capable of supporting active learning. In addition, children's interview responses indicated that the media increased motivation, attracted their interest, and made number learning more enjoyable, showing that the development process had practical relevance for real classroom interaction.

Overall, the findings demonstrate that the development process of Thematic Monopoly media was carried out systematically through the ADDIE stages and resulted in a product that was pedagogically grounded, empirically validated, and practically applicable. The process began with identifying real learning needs, continued with the design of a thematic and child-friendly game structure, proceeded through expert validation and revision, and culminated in multi-stage trials and limited classroom implementation. From a theoretical perspective, this process reflects current views in instructional design and early childhood pedagogy that emphasize user-centered development, iterative revision, and play-based learning as essential principles for producing effective educational media. Therefore, the development of Thematic Monopoly in this study can be understood not only as the creation of a learning tool, but also as a carefully structured educational innovation designed to bridge curriculum goals, child development, and classroom practice.

The Use of Thematic Monopoly-Style Media for Early Mathematics Instruction for Children Aged 5–6 Years

The findings related to the third research question—how feasible the use of Thematic Monopoly media is in early mathematics learning for children aged 5–6 years—indicate that the developed media reached a high level of feasibility based on expert validation, product trials, teacher responses, and classroom implementation. In this study, feasibility was not defined narrowly as technical usability, but as a broader construct encompassing content suitability, visual and material quality, safety, practicality, attractiveness, and relevance to the learning characteristics of young children. The thesis explains that feasibility was assessed through a structured validation process involving three validators—material expert, media expert, and early childhood practitioner—followed by individual, small-group, and large-group trials, as well as limited implementation in classroom practice. This multi-layered evaluation design is important because educational media for early childhood must not only be correct in content but also safe, engaging, and manageable within real teaching situations. The results show that Thematic Monopoly met these expectations and was judged appropriate for use in early mathematics instruction for children aged 5–6 years.

The first indicator of feasibility comes from the expert validation results, which show consistently high scores across all validator categories. The material expert awarded the media a score of 85%, the media expert gave 90%, and the early childhood practitioner gave 95%, all

of which were categorized as "very valid" or highly feasible for classroom use. These findings suggest that the media was considered appropriate both in terms of mathematical content and in terms of design, child suitability, and implementation potential. The material validation confirmed that the tasks embedded in the game aligned with key early numeracy indicators such as number recognition, counting, quantity understanding, number-symbol matching, comparison, and simple problem solving. At the same time, the media validation indicated that the board layout, visual clarity, game components, and attractiveness of the product supported children's active engagement. The practitioner's particularly high rating is also significant because it reflects the perspective of an educator who understands classroom realities, children's behavior, and the practical demands of teaching. In development research, such triangulated validation is often regarded as a strong indicator of feasibility because it combines theoretical, technical, and pedagogical judgments in one evaluative framework.

A second important indicator of feasibility appears in the product trial results, which demonstrate that the media remained highly acceptable when tested directly with users. The thesis reports that the product obtained 86% in the individual trial, 84% in the small-group trial, and 92% in the large-group trial, with an overall mean of 88.3%, placing it in the very valid category. These findings are particularly meaningful because feasibility in early childhood media cannot be established solely through expert opinion; it must also be demonstrated through children's actual interaction with the product. The trial results indicate that the media was understandable, attractive, and usable in different instructional settings, even after being exposed to varying numbers of participants. The slightly lower result in the small-group trial does not weaken the conclusion of feasibility; rather, it shows the normal iterative nature of product refinement in research and development studies, where media are tested, revised, and strengthened before final implementation. What is important is that the overall trial pattern confirms that the media functioned effectively across stages and maintained a high level of acceptability after revision.

The feasibility of the media is further reinforced by teacher responses and classroom activity observations during limited implementation. The thesis states that teacher responses across four meetings reached an average of 89.5%, categorized as very good, while observations of learning activities reached an average of 81.75%, categorized as good. These results show that the media was not only valid as a product, but also practical and beneficial when used in the actual learning process. Teachers perceived the media as feasible from the perspectives of appearance, content, ease of use, and learning usefulness, indicating that it could support instruction rather than create additional classroom difficulty. This is a crucial dimension of feasibility because early childhood teachers need media that are manageable, flexible, and capable of sustaining children's attention without disrupting lesson flow. The classroom observation results also suggest that the media encouraged active participation and engagement, which is particularly important in early mathematics learning where children benefit from movement, repetition, and interaction with concrete materials.

From a broader theoretical perspective, the strong feasibility of Thematic Monopoly is consistent with recent scholarship on play-based numeracy media in early childhood education. Studies published in the last few years emphasize that educational media for young children are considered feasible not merely when they are visually attractive, but when they integrate content accuracy, child safety, interactivity, and practical classroom applicability. For example, Dewi and Zaini (2021) argue that early childhood learning media should be ergonomic, safe, and capable of encouraging active movement, which aligns closely with the thesis finding that the size of the floor board, cloth dice, and game materials were considered proportionate and safe for children. Likewise, Ananda and Putri (2022) emphasize that numeracy media for young learners should embed mathematical concepts in meaningful and playful tasks rather than isolate them as abstract exercises, a principle that is reflected in the challenge cards and game procedures of the Thematic Monopoly model. In addition, recent work by Hsiao and Shih (2023) shows that game-based learning media in early childhood are more likely to be judged feasible and sustainable when they simultaneously increase children's motivation, support concept acquisition, and remain manageable for teachers in classroom settings. This theoretical alignment strengthens the interpretation that the high feasibility scores obtained in this study are not incidental, but stem from the fact that the media was designed according to contemporary principles of early childhood pedagogy.

Overall, the findings clearly demonstrate that Thematic Monopoly is a feasible medium for use in early mathematics learning for children aged 5–6 years. Its feasibility is supported by strong expert validation, positive results across three levels of product trials, favorable teacher responses, and good classroom activity outcomes during limited implementation. More importantly, the evidence suggests that feasibility in this study should be understood holistically: the media is feasible because it is valid in content, attractive in design, safe for children, practical for teachers, and engaging in classroom use. Therefore, the developed Thematic Monopoly media can be considered a pedagogically appropriate and implementable learning tool for introducing early mathematical concepts in kindergarten settings.

Thematic Monopoly-Style Media, and What Positive Impact Does it Have on the Early Mathematics Skills of Children Aged 5–6 Years

The findings related to the fourth research question—how effective the Thematic Monopoly media was and whether it produced a positive impact on the early mathematics skills of children aged 5–6 years show that the developed media functioned effectively as a learning tool for early numeracy and contributed positively to children's participation, motivation, and understanding of basic mathematical concepts. In this study, effectiveness was not measured only by the technical completion of the game or by expert judgment, but by the extent to which the media supported children's engagement in learning activities and facilitated the development of early mathematical competencies such as number recognition, counting, understanding quantity, sequencing numbers, comparing values, and solving simple mathematical problems. The thesis reports that the effectiveness test demonstrated a positive impact on children's early mathematics skills: children became more active,

enthusiastic, and motivated during learning activities, and the media helped them understand basic mathematical concepts more easily through enjoyable play experiences. These results indicate that the Thematic Monopoly media was not merely feasible to use, but also functionally effective in promoting meaningful mathematical learning among children aged 5–6 years.

The empirical basis for this conclusion can be seen in the product trial and implementation data presented in the thesis. During the empirical testing phase, the media was tried out in three stages individual trials, small-group trials, and large-group trials—with children as the direct users of the product. Across these stages, the researcher observed, recorded, and analyzed children's responses while they interacted with the game. The findings show that children consistently demonstrated positive responses and high interest when using the Thematic Monopoly media. In the individual trial the media obtained a score of 86%, in the small-group trial 84%, and in the large-group trial 92%, indicating a generally high level of acceptability and usability across different classroom settings. Although these percentages are primarily reported in the thesis as indicators of validity and practicality, they also support the interpretation of effectiveness because the product was able to sustain engagement, remain understandable to children, and function successfully in increasingly complex group conditions. In early childhood contexts, effectiveness is closely linked to whether a medium can maintain children's attention and participation while simultaneously embedding learning goals in an accessible form. The fact that children responded positively across trial stages suggests that the game successfully transformed mathematical content into an activity they could meaningfully engage with.

The limited implementation stage further strengthens the evidence of effectiveness. The thesis explains that the final model was implemented in a real classroom setting at TK Ar-Rahmah with 16 children aged 5–6 years in Group B, across four meetings of approximately 2 x 30 minutes each. During implementation, children were divided into smaller groups so that every child could participate actively in the game, while the teacher and researcher observed children's activities, responses, and mathematical performance during play. The results of this limited implementation indicate that the Thematic Monopoly media was practical, easy to apply, and able to generate positive classroom dynamics. Teacher response scores averaged 89.5%, while observations of learning activities averaged 81.75%, categorized as good to very good in the thesis abstract. These findings are important for interpreting effectiveness because they show that the medium worked not only under controlled trial conditions but also in actual classroom use, where children needed to follow rules, respond to challenge cards, count spaces, recognize numbers, and engage with peers during play. In other words, the effectiveness of the medium emerged through the integration of cognitive learning, behavioral engagement, and social participation.

From the perspective of learning theory, these findings are consistent with recent research on play-based mathematics instruction in early childhood. Young children generally understand mathematical concepts more effectively when learning is embedded in concrete,

enjoyable, and socially interactive activities rather than isolated verbal explanation or repetitive worksheets. Research by Ramani, Zippert, Schweitzer, and Pan (2021) shows that structured numerical board games can improve preschool children's counting, number recognition, and numerical magnitude understanding because game-based movement and repetition make abstract concepts more accessible in developmentally appropriate ways. Likewise, Nunes, Bryant, and Watson (2022) emphasize that early mathematics interventions are more likely to be effective when children can manipulate representations, receive immediate feedback, and engage in guided interaction during learning tasks. The Thematic Monopoly media reflects these principles because children do not passively receive mathematical information; instead, they roll dice, move on the board, interpret task cards, count objects, and compare numerical quantities in a playful and collaborative context. These forms of interaction likely explain why the children in the thesis became more active and enthusiastic while also showing improved ease in understanding basic mathematical concepts.

The positive impact of the media can also be interpreted through the lens of motivation and emotional engagement, both of which are central to effective early learning. The thesis reports that interviews with children indicated that the Thematic Monopoly game attracted their interest, increased their motivation to learn, and helped them recognize number symbols in enjoyable ways. This is significant because effectiveness in early childhood education is not only about immediate task performance but also about creating positive dispositions toward learning. When children enjoy a learning experience, they are more likely to remain attentive, persist in problem solving, and revisit mathematical ideas without feeling pressured. Recent scholarship supports this interpretation. Hasanah and Nurhayati (2023) found that game-based numeracy media in kindergarten can improve not only concept mastery but also confidence, communication, and willingness to participate in mathematical activities, especially when children are given opportunities to move, collaborate, and respond to challenges in playful settings. Similarly, Widodo and Sari (2022) argue that the effectiveness of early childhood mathematics media should be judged holistically by examining cognitive outcomes together with engagement, classroom interaction, and emotional response. In the present study, all of these indicators point in the same direction: the media was effective because it made mathematics more understandable, more motivating, and more accessible for young children.

Overall, the findings demonstrate that the Thematic Monopoly media was effective and had a positive impact on the early mathematics skills of children aged 5–6 years. Its effectiveness is evidenced by positive child responses during individual, small-group, and large-group trials, by successful limited classroom implementation, by high teacher evaluations, and by the observed increase in children's activity, enthusiasm, motivation, and ease in understanding mathematical concepts. More broadly, the study suggests that the effectiveness of this media lies in its ability to convert abstract mathematical content into a concrete, thematic, and play-based learning experience that matches the developmental needs of young children. Therefore, Thematic Monopoly can be regarded not only as a feasible

educational medium, but also as an effective pedagogical tool for strengthening early numeracy learning in kindergarten settings.

CONCLUSION

In conclusion, this study demonstrates that the development of Thematic Monopoly media is a relevant, feasible, and effective innovation for optimizing the early mathematics skills of children aged 5–6 years. The needs analysis revealed that existing mathematics learning media in the classroom were still limited in terms of interactivity, variation, and contextual relevance, thereby creating the need for a more engaging and developmentally appropriate learning tool. Through the ADDIE development model, the Thematic Monopoly media was systematically designed, validated, revised, and implemented to support children's abilities in number recognition, counting, understanding quantity, sequencing numbers, comparing numbers, and solving simple mathematical problems. The validation results from material experts, media experts, and practitioners, as well as the outcomes of individual, small-group, and large-group trials, confirmed that the media was highly feasible for classroom use. Furthermore, limited classroom implementation showed that the media had a positive impact on children's enthusiasm, participation, motivation, and understanding of early mathematical concepts. Therefore, Thematic Monopoly can be regarded as a pedagogically appropriate and practically applicable learning medium that not only makes mathematics learning more enjoyable for young children but also contributes meaningfully to the improvement of early numeracy instruction in kindergarten settings.

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