

DEVELOPMENT OF ISLAMIC-BASED VITRUVIUS DESIGN LEARNING MEDIA TO IMPROVE EARLY CHILDHOOD DEVELOPMENT IN KINDERGARTEN

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Abstract

This study aims to improve all aspects of early childhood development. The study employs a modified Research and Development (R&D) model based on Borg and Gall's framework, comprising six stages: identifying potential and problems, collecting initial data, designing media, validating media, revising the design, and conducting product trials. Media developed using Adobe Illustrator software that can create custom letters, gradient effects, and textures. Was tested on 56 children at TK ABA Medan Helvetia District. Data collection involved two types of questionnaires: media validation and children's comprehension assessment. Validators and teachers evaluated each questionnaire using a checklist scale. Data analysis employed qualitative and quantitative methods to assess the effectiveness of educational media. Data analysis employed qualitative and quantitative methods to assess the effectiveness of educational media. Results demonstrated a significant improvement in children's development with pre-test scores averaging 25,6 and post-test scores at 33,6. This shows that the Islamic-based Vitruvius design learning media can improve child development. This research can also be a reference for early childhood education teachers to use interesting learning media according to the child's developmental stage.

Keywords

Learning Media, Vitruvius Design, Islamic-Based, Early Childhood Development.



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INTRODUCTION

Early childhood is a golden age and a crucial foundation for a child's physical, cognitive, socio-emotional, and moral development. Early childhood is a period of critical development that shapes children's long-term social, emotional, and physical health (Sun et al., 2024). Children who grow and develop well in early childhood will be better prepared physically, mentally, and emotionally to face more complex learning challenges (Khaironi, 2020). Early childhood is a critical period in the formation of character, personality, and values in children. Appropriate parenting, environment, and stimulation during this time will help children develop positive character traits that will last into adulthood (Masitah & Sitepu, 2021). Early childhood education plays a crucial role in preparing children for the next stage of development. In reality, there are still many early childhood children who experience obstacles in their development, such as problems with delays in language development (Hasanah, AM, 2018), behavioral disorders (Purwati, 2022), cognitive development problems (Novitasari, 2018), and social-emotional development issues (Nur'zahra & Wulandari, 2023), and other developmental problems.

The teacher's role in schools is to provide appropriate stimulation to enhance children's development during their time at school. Stimulation can be achieved through play activities and engaging learning media tailored to their developmental characteristics. One engaging learning medium for early childhood is the Islamic-based Vitruvius Design. The Vitruvius Design learning media is designed to be very attractive by integrating Islamic values, which are still limited in other learning media. The Vitruvius Design, proposed by the architect Vitruvius, includes three main principles: *firmitas* (strength), *fungsi* (usefulness), and *venustas* (beauty) (Yulistya & Roosandriantini, 2022). Vitruvius' design principles are adapted to develop engaging, functional, and Islamic learning media. Through these learning media, Islamic values such as greetings, prayers, and Islamic character, which are essential for character development in early childhood, are taught (Wijayati & Khafidhoh, 2023). Learning media is a form of equipment, method, or technique used to convey messages, help emphasize learning materials, so that it can arouse the interest and motivation of students or pupils in participating in the teaching and learning process (Kurnia, 2018). The Vitruvius design concept is one of the principles used in architectural design, put forward by the ancient Roman architect Vitruvius (Nurfadhillah et al., 2023). This concept is known as the Vitruvius trilogy, which contains three essential aspects, namely utility (function), *firmitas* (durability), and *venustas* (beauty) (Soedarwanto, 2018). The Vitruvius design concept can be used

not only in the field of architecture but also in designing learning media. Theoretically, the Vitruvius concept requires that a design product must fulfill three aspects: the utility aspect, which discusses the function of an object (how it is used), the firmness aspect, which discusses the system and materials of an object (how it works – how it produces), and the utility aspect, which discusses the appearance of an object (how it looks) (McEwen, 2005).

A game will contain several elements that are the same as the Vitruvius design concept, namely the functional aspect which in Vitruvius' Theory is known as the term utility, which discusses the function of the basic needs of a toy function, namely safety and comfort that cause pleasure, Venustas can be interpreted as beauty or aesthetics, which means a design must meet the rules of beauty, and firmness where a toy should be designed to last a long time (Soedarwanto, 2021), (Johnson & Smith, 2020). Early childhood development includes several aspects, including physical-motor aspects, cognitive aspects, language aspects, social-emotional aspects, and moral-religious aspects.

(Santrok, 2015). Information management, communication, collaboration, critical thinking, and problem-solving skills must also be well stimulated (Hollenstein et al., 2022). The 2024 BSKAP Decree on learning outcomes for children of this age identifies several important domains to develop. These elements are formulated based on considerations of child development, including religious and moral values, Pancasila values, physical motor skills, cognitive skills, language skills, and social and emotional skills (Kementerian pendidikan, kebudayaan, riset, 2024).

In early childhood education, these developmental and learning achievements can be achieved through play activities. Many types of games and game media can be used to stimulate children's development, such as through cube learning media. Children's cognitive development can be developed, because this media provides an attraction for children to play and learn, so that children's cognitive development is stimulated and well developed (Koderi et al., 2021). Children's fine motor development can also be developed well through digital media video tutorials provided by teachers, such as cutting, sticking, and coloring (Hendraningrat & Fauziah, 2021). Through digital media, children's cognitive abilities can also be improved by providing emergency drill learning videos to help them understand emergency situations (Sitepu et al., 2024).

All aspects of child development can be stimulated to develop optimally through various activities and using various types of media, both conventional and digital media. Research on Vitruvius' design has previously been conducted, such as research conducted by (Pisei & Ikaputra,

2020) which found that the design and construction of Javanese houses carried out by indigenous communities is very much in line with Vitruvius' three basic principles, namely *firmitas*, *fungsiiatas*, and *venustas*.

Based on interviews with teachers, many children at ABA Kindergarten in Medan Helvetia District are still experiencing suboptimal development in several areas, including cognitive development, language development, and social skills. Furthermore, the learning process, which is still dominated by conventional methods, also impacts children's low creativity and active participation in learning activities. This is due to the low use of methods appropriate to children's developmental needs, such as more creative and innovative media-based approaches. Education at ABA Kindergarten in Helvetia District relies more on verbal methods and pays less attention to children's social and emotional development. Furthermore, the lack of supporting learning media is also a barrier to improving the quality of interactive learning. Research that discusses Vitruvius' design has been carried out, including:

Research conducted by (Paio et al., 2012) with the results of the Vitruvius FabLab at ISCTE-IUL serve as a relevant example in efforts to implement digital fabrication at the academic and research level. By facilitating collaboration between academia and industry, this lab supports the development of prototypes, customizable construction systems, and research in the field of biomimicry to create more environmentally friendly and energy-efficient building materials. In the long term, the contributions of these experiments are expected to enrich architecture.

Research conducted by (Roosandriantini, 2019) revealed that although the construction and materials used in Nusantara architecture may be different from Western architecture, these buildings still have a level of sturdiness, utility, and beauty that is appropriate to the functional and cultural needs of the local community. Research conducted by (Izzario et al., 2024) examines the application of three main aspects of Vitruvius' theory: firmness (*firmitas*), function (*utilitas*), and aesthetics (*venustas*) in modern building architectural design. This research emphasizes the importance of these three aspects as fundamental pillars in creating quality buildings. Research by (Manenti, 2019) discusses that the design process according to Vitruvius is not just about determining dimensions, but rather creating a harmonious and orderly relationship between all building elements, which provides aesthetics, function, and strength simultaneously in classical architectural works. However, research on Vitruvius-based learning media has never been conducted, thus attracting the attention of researchers to develop Islamic-based Vitruvius-based

learning media to enhance early childhood development.

METHOD

This study uses a modified Research and Development (R&D) model based on the Borg and Gall framework, which includes ten stages (Gall et al., 2015). However, this research is limited to the first six stages due to time and budget constraints, with the main focus on testing the effectiveness of Vitruvius design learning media in the context of early childhood development. The development stages include: (1) identifying potential and problems, (2) collecting initial data, (3) designing media, (4) validating media by media validators, (5) revising the design based on input, and (6) product trials. The data sources in this study were children at ABA Kindergarten in Medan Helvetia District, as the main subjects of the study, to measure development through Islamic-based Vitruvius design learning media, and teachers to provide insight into the implementation of learning media and its impact on child development. The sampling technique used was purposive sampling, and data collection was conducted using observation, interviews, and documentation.

The media design was developed using Adobe Illustrator software. This technology was chosen because it has the advantage of being able to create custom letters, gradient effects, and textures. The product trial was given to 56 students at TKA ABA, Medan Helvetia District, consisting of TK ABA 03 and TK ABA 13 Helvetia Medan. Data were collected using two questionnaires: media validation and child development assessment covering motoric, cognitive-language, and social-emotional aspects. The questionnaire used a checklist response format by placing a checklist in the appropriate column, assessed by the media validator and teacher.

Reliability and validity are ensured through a systematic and iterative validation process. Educational and media experts validate media and content to ensure accuracy and pedagogical relevance (Dory et al., 2012). The media is evaluated based on Vitruvius' design principles, namely *firmitas* (strength), *fungsion* (usefulness), and *venustas* (beauty), as well as the presence of Islamic values, suitability for child development, and the innovation and originality of the media.

Data analysis techniques included quantitative and qualitative data. Qualitative data were collected using interviews and feedback from media validators. Quantitative data described the results of the Vitruvius media development. Descriptive data were converted into quantitative data using a five-point scale, tabulated, and analyzed to determine the media's suitability as an educational product (Brannen, 2017). The media eligibility criteria are based on the percentage

assessment guidelines provided by (Arikunto, 2017) as shown in Table 1:

Table 1. Media Suitability Assessment Criteria

Score Presentation (%)	Interpretation
81 – 100 %	Very Eligible
61 – 80 %	Eligible
41 – 60 %	Quite Eligible
21 – 40 %	Less Eligible
<20 %	Not Eligible

These criteria guide the evaluation process, ensuring that the media developed meets educational standards and contributes effectively to children's development.

FINDINGS AND DISCUSSION

Findings

This research develops Islamic-based Vitruvius design learning media made in the form of hijaiyah letters. This media is used as a learning medium that can help teachers in the learning process in the classroom. This Islamic-based Vitruvius design learning media product is developed in the form of Hijaiyah letter puzzles made of sturdy wood, embossed according to the elements of the Vitruvius design, and can be lured because there is a magnet above each letter, so that it adds to the uniqueness of this media and differentiates it from existing media. The design of the Hijaiyah letters was first designed in soft copy form before being made of wood.

The Vitruvius design learning media was first designed as a digital version of the Hijaiyah letters, without color. The validator's assessment suggested adding attractive colors to the media. Subsequently, the design was recreated as a digital version of the Hijaiyah letters, complete with color.

اَبْتَثْجَحْدَرْزِسْش
صَضْطَظْعَغْفَقْكَلْمَنْوَهِي

Figure 1. Initial Design of Islamic-Based Vitruvius Design Learning Media

اَبْتَثْجَحْدَرْزِسْش
صَضْطَظْعَغْفَقْكَلْمَنْوَهِي

Figure 2. Final Design of Islamic-Based Vitruvius Design Learning Media

After the letter design has received approval from the validator, the media is then made from sturdy wood in accordance with the elements of Vitruvius' design in the form of a raised hijaiyah

letter puzzle and has a magnet so it can be fished.



Figure 3. Vitruvius Design Learning Media in the form of a Hijaiyah Letter Fishing Puzzle

The validator, as a material expert to validate the Islamic-based Vitruvius design learning media in this development research, is Mr. Irwansyah, ST. He is a contractor in the construction sector who is accustomed to using Vitruvius design in building construction. In this case, he was asked to assess the Vitruvius design-based media to determine whether it is in accordance with the aspects of Vitruvius' design or not. The researcher chose him because he has a deep understanding of the principles of structure, proportion, balance, and aesthetics of buildings, which are in line with the values of Vitruvius design (firmitas, fungsi, venustas), in addition, he also often works with various construction materials and building techniques, so he is able to assess the materials, shapes, and physical durability of the media so that it is safe for use by children and durable for learning activities. The media validator gave an average score of 4.4, which falls within the very appropriate criteria. The media expert's assessment criteria were based on a 5-point scale, as listed in Table 2.

Table 2. Assessment Criteria

Mark	Criteria	Scor	
		Formulas	Calculation
A	Very Eligible	$X > X_i + 1,8 Sbi$	$X > 4,21$
B	Eligible	$X_i + 0,6 Sbi < X \leq X_i + 1,8 Sbi$	$3,40 < X \leq 4,21$
C	Quite Eligible	$X_i - 0,6 Sbi < X \leq X_i + 0,6 Sbi$	$2,60 < X \leq 3,40$
D	Less Eligible	$X_i - 1,8 Sbi < X \leq X_i - 0,6 Sbi$	$1,79 < X \leq 2,60$
E	Not Eligible	$X \leq X_i - 1,8 Sbi$	$X \leq 1,79$

Provision:

Mean Ideal Score (X_i) : $\frac{1}{2} (\text{Maximum ideal score} + \text{Minimum ideal score})$ Ideal Score Standard Deviation : $\frac{1}{6} (\text{maximum ideal score} - \text{minimum ideal score}) X$ Ideal : Empirical Scores

After the Islamic-based Vitruvius design learning media was assessed by media experts, the researchers and media experts then discussed the quality of the developed product. The media experts assessed and provided input or suggestions, both written and verbal. Suggestions for improvement and input from the media validator can be seen in table 3.

Table 3. Suggestions for Improvement and Input from Media Experts

The existing media is good, but some of the magnets placed are not in accordance with the bait (which should be positive and negative so they can attract each other), but there are still some that are positive and negative (so they repel each other). The attached magnets should also be smaller so they look neater and more aesthetic.

SUGGESTION:

Add sound elements or QR codes to hear the letter sounds if possible, or include pronunciations (phonetics) or brief instructions as a guide for teachers or parents. And if possible, make a portable or foldable version like chess for easy transport to various learning locations.

Test Data

After the Islamic-based Vitruvius design learning media developed was validated by media experts, this product was then tested on students at ABA Kindergarten, Medan Helvetia District, and ABA 03 Kindergarten, Helvetia Medan. This trial was conducted to assess children's development. Data collection was conducted by assessing aspects of child development, including cognitive and language, physical-motor, and social-emotional aspects, conducted by class teachers. The trial involved 56 students from two schools: ABA 13 Helvetia Kindergarten, Medan, and ABA 03 Helvetia Kindergarten, Medan.

Product Trial Results

After validating the media and declaring it suitable for use, the researcher then administered a child development assessment instrument. The assessment was conducted by each class teacher in two stages: a pre-test, where the teacher still used the Iqro' book to introduce the Hijaiyah letters and assess the children's development. In the second stage, the teacher conducted a post-test using Islamic-based Vitruvius design media in the form of a Hijaiyah letter puzzle, and then the teacher assessed the children's development.



Figure 3. Trial at ABA 03 Kindergarten



Figure 4. Trial at ABA 13 Kindergarten

The results of a limited trial conducted on 56 children at ABA Kindergarten in Medan Helvetia District showed a significant improvement in child development after using Islamic-based Vitruvius-designed learning media. The pre-test score obtained by the children before using this learning media was 25.6, while the post-test score increased to 33.6, representing an 86% increase. This significant increase can be interpreted as evidence of the effectiveness of the developed learning media in supporting early childhood development.

Discussion

The Islamic Vitruvius design-based learning media developed in this study demonstrates significant potential to support early childhood development. Based on the results of the media validator's assessment, this media obtained an average score of 4.4 with a percentage of 87%, indicating that this media has met the eligibility criteria for use in the learning process in kindergarten. This is in line with the Vitruvius design principle, which emphasizes the balance between *firmitas* (strength), *fungsion* (usefulness), and *venustas* (beauty) in creating a space that supports early childhood development (Bianco, 2023). The development of learning media based on Vitruvius' design focuses on simple but effective architectural principles, combined with Islamic values that can help children not only in cognitive aspects, but also in social, spiritual, and spatial aspects (E. Rossi, 2020). This aligns with research findings by (Fitamaya & Zulfahmi, 2024) found that learning media based on religious values has a positive impact on children's moral and social development, increasing their social awareness and strengthening their character in everyday life. Appropriate learning media will provide effective and optimal learning results (Rustan et al., 2023) and improve children's motor skills and creativity (S. Al-Fatih et al, 2021).

Research by (Evi Rahayu, 2023) shows that the use of media based on local values , such as in traditional games, can facilitate the development of imagination and creativity, improve spatial reasoning and visualization skills, promote social interaction and collaborative engagement, improve the development of fine motor skills and hand-eye coordination, and provide a sense of achievement and self-confidence.

The improved post-test scores indicate that children can more easily understand material presented through learning media that is attractively designed and relevant to their lives. These research findings also align with findings from (Sitepu et al., 2021) which states that the use of engaging and educational media, such as Islamic-based media, can help children develop their language, social, cognitive, and motor skills simultaneously. The use of learning media makes the

learning process more interactive, visual, and flexible, which can attract students' attention and encourage them to be more actively involved in learning (Wiliyanarti et al., 2021).

The significant increase in post-test scores also indicates that the learning media used in this study were effective in stimulating children's learning motivation. This supports the results of research by (Wahid et al., 2022) which states that children's learning motivation can be enhanced through approaches relevant to their cultural and religious values. Fun learning media can increase children's motivation and involvement in the learning process (Yuris & Raniyah, 2025). Therefore, Islamic-based learning media is not merely a teaching tool, but also a means of developing children's character and personality.

Overall, the results of this study provide evidence that the use of learning media based on Vitruvius' design and Islamic values can have a significant impact on early childhood development at ABA Kindergarten, Medan Helvetia District, including cognitive, social, and moral aspects. The improvements recorded in the post-test suggest that this approach is worthy of wider implementation in early childhood education in Indonesia.

The use of learning media to stimulate child development is highly effective. This is evidenced by the use of pop-up books and big books, which can improve children's language skills (Rahimah & Zahriani, 2022), (Sitepu et al., 2021). In addition to using media, stimulation for early childhood can be done through play activities. Through effective play-based programs that involve various educational games and storytelling activities designed to improve children's auditory discrimination, visual recognition, pronunciation accuracy, and verbal fluency and coherence in developing linguistic skills, especially listening and speaking skills, can improve language skills in kindergarten children (Ali Suleiman & Mohammad, 2025).

The use of geometric game media has a significant influence on the counting skills of early childhood children, such as geometric puzzles and other media, which are effective in improving children's ability to recognize numbers, shapes, and sizes (Husniati, 2023). In addition to using engaging learning media, teachers' teaching methods also impact children's development at school. This teaching method involves associating objects and images with specific letters, which are repeated to reinforce understanding. Through geometric shape-based toy designs, children can learn about the association of shapes and colors related to letters, as well as improve their spatial skills, such as the ability to understand the orientation and relative position of elements within the toy. Furthermore, group play involving collaboration among children also provides benefits in

developing social and interaction skills (Vaidya, 2021).

The application of learning media in a limited trial on 56 children at ABA Kindergarten in Medan Helvetia District resulted in significant improvements in child development. Before using the media, the children's average pre-test score was 25.6, while after using the media, the post-test score increased to 33.6, indicating an 86% improvement. One important aspect of this media development is the integration of Islamic-based Vitruvius designs, which provide added value in shaping children's character from an early age. This media focuses not only on academic aspects but also instills moral and spiritual values in children, in line with the concept of character education emphasized in Islamic education (Nasution & Hidayat, 2021). The use of Vitruvius' principles of design, which emphasize balance, harmony, and proportion, can also provide an educational and enjoyable visual basis for children in their learning process.

In the context of early childhood development, various studies have demonstrated the importance of using media based on a comprehensive and holistic approach. Learning media facilitates teachers' delivery of material to students and can increase students' enthusiasm and motivation during the learning process (Rhamdani & Ramadan, 2025). Just as architectural education must transcend the separation between theory and practice, early childhood education also requires an approach that not only relies on theories of child education but also integrates practices relevant to children's cognitive and visual development. In the context of learning media for early childhood, we can learn that teaching based on cognitive and visual development is very important. The fun aspect is the main function of toy and media design, so that media as toys for children, as learning that supports child development, such as educational games, images, and interactive videos, can enrich the child's learning process, in line with efforts to develop their cognitive skills (Soedarwanto, 2021). With this approach, children can better understand basic concepts, such as colors, shapes, and numbers, through media that stimulate their imagination and thinking.

For example, using design-based learning media aligned with the principles of architectural education, such as using visualization and representation to help children understand abstract concepts, can be implemented. This visual media not only captures children's attention but also engages them in a deeper learning process, with an approach that emphasizes creativity and practical problem-solving, similar to how Vitruvius approached architectural design and learning in his time. Vitruvius' design integrates aesthetic and functional principles, combined with Islamic

values, providing a holistic approach to educating children, focusing on physical, mental, and moral development.

CONCLUSION

This study shows that the development of Islamic-based Vitruvius design learning media can improve early childhood development, as reflected in the results of a limited trial at ABA Kindergarten, Medan Helvetia District, involving 56 children. A significant increase was seen in the difference in pre-test (25.6) and post-test (33.6) scores, indicating an increase of 86%. This confirms that Vitruvius' design-based learning media that integrates Islamic values is effective in improving children's cognitive, social, and moral aspects. The use of media that is appropriate to the child's cultural and religious context has a positive impact on children's engagement in the learning process and improves their understanding of the material presented. Overall, the results of this study provide evidence supporting the effectiveness of Islamic-based Vitruvius-designed learning media in supporting early childhood development. The significant improvement in grades indicates that this approach not only helps academically but also strengthens children's character and morals. Therefore, this learning media can be an effective alternative in early childhood education, which not only pays attention to cognitive aspects but also to children's social and emotional development, in line with the values applied in Islamic-based education.

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