

Implementation of Multimedia Center Learning in an Integrated Islamic Kindergarten – Nur Hikmah

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ABSTRACT

This study aims to describe the implementation of multimedia center learning at Nur Hikmah Integrated Islamic Kindergarten (TKIT Nur Hikmah) and to analyze its relationship with the cognitive and psychomotor development of children aged 5–6 years. The multimedia center is one of the learning centers that utilizes simple technological tools as exploratory media, including child-friendly computers, educational tablets, audio-visual devices, and interactive learning applications. Using a qualitative approach with a case study design, data were collected through observations, in-depth interviews, and document analysis. The findings reveal that multimedia center learning is implemented systematically through three learning stages: pre-play scaffolding, during-play activities, and post-play reflection. Teachers play an active role as facilitators, instructors, and companions while children explore multimedia devices. Multimedia-based activities were found to support children's cognitive development, particularly in symbol recognition, simple problem-solving, and logical thinking skills. In addition, children's psychomotor abilities showed improvement through activities such as using touch-screen devices, creating digital drawings, and coordinating hand-eye movements while interacting with multimedia tools. This study confirms that the multimedia center can serve as an effective medium for integrating technology into early childhood education while promoting Islamic values and supporting holistic child development.

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INTRODUCTION

The rapid development of digital technology has brought significant changes to the field of education, including Early Childhood Education (ECE). Children aged 4–6 years are in a critical developmental stage during which cognitive, language, socio-emotional, creative, and psychomotor abilities grow rapidly. Therefore, providing a stimulating learning environment through structured, concrete, and meaningful activities is essential.

Digital technology has become an integral part of early childhood education (ECE) worldwide. This is come from Hui Li (2026), that interactive multimedia, educational applications, digital storytelling, and audiovisual resources are increasingly incorporated into classroom activities to enrich children's learning experiences. Recent studies indicate that technology can promote language development, creativity, problem-solving, and engagement when implemented through developmentally appropriate and play-based pedagogical approaches. However, researchers also emphasize that technology should complement rather

than replace direct interaction, exploration, and play, as excessive or inappropriate use may negatively affect children's social and emotional development.

Ramadani (2025) says that although many studies report positive effects of digital technology on children's learning outcomes, the findings remain inconsistent. Some studies demonstrate that digital media enhances children's motivation, communication, and cognitive development when teachers intentionally integrate technology into play-based learning. In contrast, other studies reveal persistent barriers, including limited teacher competence, insufficient infrastructure, and concerns regarding children's screen time and developmental appropriateness. These contrasting findings suggest that educational outcomes depend less on the technology itself than on how teachers design meaningful learning experiences.

Within Islamic early childhood education, the integration of digital technology presents additional pedagogical considerations because learning is expected not only to support cognitive development but also to cultivate Islamic values and character formation. Ramadani (2025) said again that recent evidence indicates that Islamic kindergartens increasingly recognize the importance of digital media, yet many institutions continue to experience difficulties in integrating technology into classroom practices while maintaining developmentally appropriate and value-based learning.

Fathri (2024) describes among various learning centers implemented in center-based early childhood education, the multimedia center offers unique opportunities because it combines audiovisual media, interactive technology, digital storytelling, animation, and children's active exploration within a structured play environment. Rather than functioning merely as a technology corner, the multimedia center provides opportunities for integrating language, cognitive, creativity, communication, and religious learning into meaningful activities. Despite its growing importance, empirical studies focusing specifically on multimedia center learning remain limited.

Existing international studies have primarily examined digital technology integration in early childhood education from the perspectives of digital literacy, teacher competence, technology acceptance, or children's developmental outcomes. Meanwhile, Ramadani (2025) gives studies within Islamic early childhood education generally discuss digital media integration at a broader institutional level. Very limited research has specifically investigated how multimedia center learning is planned, implemented, and evaluated in Integrated Islamic Kindergartens using an in-depth qualitative case study approach.

Therefore, Firdaus (2026) says that this study aims to analyze the implementation of multimedia center learning at Nur Hikmah Integrated Islamic Kindergarten. This study contributes to the literature by providing an in-depth description of multimedia center implementation within an Islamic educational context, illustrating how digital technology is integrated with center-based pedagogy and Islamic values to support holistic child development.

One of the learning innovations widely implemented in early childhood education institutions is the center-based learning approach, in which each learning center is designed to provide specific educational experiences. TKIT Nur Hikmah implements several learning centers, including a multimedia center that utilizes technological devices such as computers, mice, projectors, and audio-visual media as tools for learning through play.

Learning activities in the multimedia center provide opportunities for children to become familiar with technology, interact with images and sounds, watch educational videos, and use developmentally appropriate learning applications. Activities such as digital drawing using a mouse, selecting objects, moving icons, and following audio-visual instructions can enhance cognitive abilities, including symbol recognition, simple problem-solving, classification, and early logical thinking. Furthermore, the use of computer-based devices supports psychomotor development, particularly hand-eye coordination, movement accuracy, visual focus, and fine motor control.

Despite its growing implementation, scientific studies concerning the application of multimedia centers within integrated Islamic early childhood education settings remain limited. In particular, there is a lack of research examining how learning is planned,

implemented, and evaluated, as well as how multimedia activities contribute to children's cognitive and psychomotor development. Therefore, this study is important to provide a comprehensive understanding and serve as a practical reference for teachers and educational institutions.

This study is guided by the following research questions: (1) How is learning planned in the multimedia center at TKIT Nur Hikmah? (2) How is learning implemented in the multimedia center? (3) How is learning evaluated in the multimedia center? (4) How are multimedia center activities related to children's cognitive development? and (5) How are multimedia center activities related to children's psychomotor development?

Accordingly, the objectives of this study are to describe the planning of learning activities in the multimedia center, analyze the implementation of multimedia center learning, explain the forms of learning evaluation conducted by teachers, identify children's cognitive development through multimedia-based activities, and identify children's psychomotor development through multimedia-based activities.

This study is expected to contribute theoretically to the development of center-based learning approaches in the context of early childhood education and to enrich the literature regarding the relationship between multimedia use and the cognitive and psychomotor development of young children. Practically, the findings may serve as a reference for teachers in designing effective, safe, and developmentally appropriate multimedia activities; provide educational institutions with a basis for strengthening the management and development of multimedia centers; help parents better understand the appropriate use of technology for young children; and offer future researchers a valuable reference for further studies on multimedia learning and digital literacy in early childhood education.

THEORETICAL FRAMEWORK

A. Learning Media and Multimedia Theory

Learning media are tools utilized to facilitate the delivery of instructional messages, making learning more effective and easier for learners to understand. In the context of Early Childhood Education (ECE), learning media play a crucial role because young children learn through concrete experiences, visual and auditory stimulation, and play-based activities.

According to Arsyad (2009), learning media encompass anything that can be used to convey educational messages and stimulate learners' attention, interest, thoughts, and feelings during the learning process. Opan Arifudin argues that technological advancement requires teachers to integrate technology-based media into instructional practices in order to create active, creative, innovative, and enjoyable learning experiences. Android-based applications and interactive multimedia are among the most relevant forms of media for contemporary early childhood learning.

Similarly, Dewi Chasanah emphasizes that technology-based learning media hold a strategic position in facilitating and enhancing educational processes. Educational technology enables children to gain broader and more engaging learning experiences through electronic media and interactive multimedia. Novita Maulidya Jalal further explains that the use of instructional media improves the quality of learning and learning outcomes in early childhood education by helping children understand concepts in concrete and engaging ways.

Within multimedia center learning, media function not only as instructional tools but also as instruments that encourage children's exploration, enabling the development of thinking skills, creativity, language abilities, and social interaction through technology-based learning experiences.

Imron Fauzi and Srikantono (2013) emphasize that advancements in science and technology require teachers to possess competencies in utilizing contemporary learning media to ensure that educational activities remain engaging and effective. Heinich, Molenda, Russell, and Smaldino (2002) define instructional media as communication tools that convey educational messages from the source to learners, thereby facilitating more effective learning processes.

Ratno Abidin and Asy'ari (2023) argue that early childhood learning cannot be separated from the use of developmentally appropriate media because such media enable children to acquire direct and concrete learning experiences. They further explain that edutainment-based learning should be conducted in a safe, comfortable, enjoyable environment capable of fostering learners' enthusiasm for learning.

Renti Oktaria (2022) describes the learning center model as an appropriate approach for providing stimulation that accommodates children's interests and talents. She further explains that center-based learning emphasizes play activities as a means of stimulating child development through various educational media and learning materials.

According to Upik Elok Endang Rasmani et al. (2022), interactive multimedia may include instructional videos, animations, illustrated and audio-supported storybooks, digital educational games, learning websites, and Augmented Reality (AR)-based media. Ida Umami et al. (2021) emphasize that instructional media play a significant role in teaching and learning activities because appropriate media selection directly influences the quality of educational processes and outcomes.

Aguswan Kh. Umam et al. (2021) explain that media designed to support cognitive development in early childhood should facilitate the growth of auditory, visual, tactile, and kinesthetic abilities through concrete and interactive learning experiences. Likewise, Icam Sutisna and Sri Wahyuningsi Laiya (2020) state that children's cognitive development is strongly influenced by environmental stimulation and learning experiences. Consequently, multimedia-based learning can serve as an effective form of stimulation that promotes thinking skills and creativity among young children.

Ariyanti (2016) argues that early childhood learning should be implemented according to children's developmental needs and conducted through play-based activities. Teachers are therefore required to create conducive learning environments using attractive media and activities that sustain children's attention. Tisna Syafnita et al. (2023) further assert that children's cognitive abilities can be enhanced through verbal interaction and visual comprehension, indicating the substantial contribution of visual media and multimedia to early childhood learning.

Briggs, as cited in the PG-PAUD IKIP Siliwangi Lecturer Team (2019), defines media as any physical tool capable of presenting messages and stimulating learners to learn, including books, films, recordings, and pictures. Heinich, Molenda, and Russell, as cited in the same source, describe media as communication channels such as films, television, diagrams, printed materials, computers, and instructors.

Aguswan Kh. Umam et al. (2021) explain that visual development in early childhood is associated with the abilities of seeing, observing, focusing attention, and perceiving the surrounding environment. Through visual media, children can recognize shapes, colors, sizes, letters, numbers, and construct images. Similarly, Khikmah Novitasari (2023) states that children's visual abilities encompass observation, attention, perception, and responses to environmental stimuli, which can be developed through exposure to pictures, colors, shapes, letters, numbers, and visual puzzles.

Umi Rohmah (2025) explains that cognitive development in early childhood requires learning approaches that are enjoyable, effective, and aligned with developmental stages. Asih Puji Hastuti, Farida Khusniawati, and Sigit Tri Utomo (2021) emphasize that ECE teachers must be creative and innovative in selecting instructional methods and media capable of attracting children's attention and supporting optimal development. Referring to Gagné, they further explain that media constitute components within children's environment that motivate them to learn, understand, and participate actively in educational activities.

Purwani et al., as cited by Rupnidah and Dadan Suryana (2022), argue that media as instructional tools and facilitators are inseparable from the learning process. Yusuf, as cited by Syarip Hidayat and Lutfi Nur (2018), explains that early childhood represents a developmental stage characterized by the most rapid growth compared to other life stages. Therefore, appropriate media and stimulation are essential to support optimal development.

Geldard and Geldard, as cited by Syarip Hidayat and Lutfi Nur (2018), emphasize that the environment is a major factor influencing behavioral change and child development. Consequently, an engaging multimedia learning environment can positively affect young children's development. Andre Maulana Sutrisno and Boy Man (2022) similarly note that children's development is significantly influenced by family and educational environments that provide stimulation across multiple developmental domains, including language, physical-motor, and emotional development.

Montessori, as cited by Nurkamelia (2019), argues that young children experience sensitive periods during which they are highly receptive to environmental stimuli. Therefore, learning environments rich in media and stimulation are essential for optimal development. Steve Stork and Stephen W. Sanders, as cited by Choiriyah Widiyari et al. (2019), further highlight the importance of physical activity and active learning in supporting children's cognitive, social, physiological, and neurological development.

Ardhana Reswari et al. (2022) describe early childhood as a golden period during which stimulation is crucial for the development of physical-motor, cognitive, language, socio-emotional, and moral-religious competencies. Moreover, Escolano-Pérez, as cited by Anik Lestarinigrum (2022), explains that motor development is inseparable from cognitive development, implying that intellectual growth also requires bodily movement and direct learning experiences.

In summary, theories of learning media and multimedia emphasize that media are essential components of early childhood education because they enable children to understand information concretely, attractively, and in accordance with their developmental characteristics. Since young children learn through direct experiences, visual and auditory stimuli, and play-based activities, interactive multimedia has become highly relevant in contemporary educational practice. Multimedia may include educational videos, animations, audiovisual content, digital games, interactive displays, and various technological devices that provide multisensory learning experiences through vision, hearing, and direct interaction.

The use of multimedia not only enhances children's attention, interest, and motivation to learn but also facilitates symbol recognition, concrete experiences, and the development of thinking skills through enjoyable exploration. Digital media support the creation of active, creative, interactive, and meaningful learning environments while simultaneously fostering cognitive, social, linguistic, and motor development. Teachers play a pivotal role in utilizing technology appropriately to ensure that learning processes remain effective and developmentally appropriate. Therefore, the multimedia center at TKIT Nur Hikmah can be understood as a technology-based learning environment that integrates visual, auditory, and interactive media to create engaging and enjoyable learning experiences while supporting the holistic development of young children.

B. Cognitive Development Theory

Cognitive development in early childhood refers to children's ability to think, understand, remember, solve problems, and process information obtained from their surrounding environment.

According to Yenni (2021), young children learn through play and direct experiences. Therefore, learning activities should be designed in an enjoyable manner to facilitate the optimal development of children's thinking skills. Dewi Puspitasari explains that science learning in early childhood education aims to stimulate curiosity, observation skills, thinking abilities, and problem-solving through exploratory activities.

Salomon (2009) argues that media are closely related to cognitive processes and learning because they assist children in constructing understanding through visualization and direct interaction. Furthermore, Piaget's theory of cognitive development states that children aged 4–6 years are in the preoperational stage, during which they begin to use symbols, images, and language to represent objects, although their thinking remains largely concrete. Therefore, multimedia resources such as animated images, educational videos, animations, and interactive games are highly appropriate for supporting children's cognitive development.

Brewer (2007) emphasizes that early childhood learning should provide direct experiences so that concepts can be more easily understood by children. Similarly, Imron Fauzi and Srikantono (2013) explain that cognitive ability is a fundamental aspect of early childhood development because it serves as the foundation for intellectual growth at subsequent educational levels.

Yenni (2021) further states that play is the natural world of children, through which they learn various aspects of everyday life. Likewise, Dewi Puspitasari (2021) explains that science learning aims to stimulate curiosity, observation, thinking skills, and problem-solving abilities. According to Piaget, as cited by Ratno Abidin and Asy'ari (2023), children in the preoperational stage actively ask questions and explore concepts of numbers, space, and symbols through play and imagination.

Renti Oktaria (2022) explains that the learning center model is designed to stimulate child development through play activities that are appropriate to children's developmental stages. Upik Elok Endang Rasmani et al. (2022) argue that interactive multimedia helps children understand new information through engaging images, sounds, and movements, making it easier for them to comprehend instructional content.

Ida Umami et al. (2021) explain that young children think differently from adults because their thinking is based on concrete experiences they encounter directly. Referring to Jean Piaget, they further state that children aged 2–6 years are in the preoperational stage, during which they begin to use symbols to represent their environment. Similarly, Aguswan Kh. Umam et al. (2021) describe children aged 2–7 years as being in the preoperational stage, characterized by the emergence of symbolic thinking and the ability to represent experiences through images and words.

Beyond Piaget's theory, Aguswan Kh. Umam et al. (2021) discuss Vygotsky's theory, which emphasizes that children's cognitive development is influenced by social interaction and assistance from adults or more capable peers. The concept of the Zone of Proximal Development (ZPD) suggests that children can achieve higher levels of cognitive development when guided by teachers or more knowledgeable individuals.

Jean Piaget, as explained by Icam Sutisna and Sri Wahyuningsi Laiya (2020), argues that children actively construct knowledge through interaction with their environment. In Piaget's constructivist theory, children are not passive recipients of information; rather, they actively explore their surroundings to develop new mental structures. Piaget identifies three key processes in cognitive development: assimilation, accommodation, and equilibrium. He further explains that kindergarten-aged children are in the preoperational stage, characterized by the ability to represent their environment through words, images, symbols, and drawing activities.

Tisna Syafnita et al. (2023) explain that early childhood development encompasses physical, cognitive, emotional, social, language, creativity, and communication development, all of which progress according to developmental stages. Mukhlisin (2023) defines development as qualitative and quantitative changes involving psychophysical transformation resulting from maturation and learning processes. Likewise, Piaget, as discussed by Muhamad Akip (2023), explains that children's intellectual development progresses from reflexive responses to abstract thinking and problem-solving abilities.

In addition to Piaget's theory, cognitive development can also be understood through Bloom's Taxonomy. According to Gunawan and Paluti, as cited by Muhamad Akip (2023), cognitive abilities include knowledge, comprehension, application, analysis, synthesis, and evaluation.

Mayke Sugianto, as cited by the PG-PAUD IKIP Siliwangi Lecturer Team (2019), explains that educational play equipment consists of play materials specifically designed to support educational objectives and children's developmental needs.

Piaget, as explained by Aguswan Kh. Umam et al. (2021), states that children aged 2–7 years are in the preoperational stage, during which they use symbols, images, language, and imagination to understand their environment. Consequently, multimedia learning is particularly suitable for early childhood education because digital media extensively utilize visual symbols, colors, images, sounds, and animations.

Furthermore, Vygotsky, as cited by Aguswan Kh. Umam et al. (2021), explains that cognitive development is influenced by social interaction and support from adults or more capable peers. This perspective highlights the important role of teachers in guiding children during multimedia learning activities. The concept of the Zone of Proximal Development (ZPD) refers to the gap between what children can accomplish independently and what they can achieve with assistance from a teacher or another competent individual. In multimedia center learning, teachers assist children in operating digital media, understanding instructions, and completing interactive tasks.

According to Khikmah Novitasari (2023), Lev Vygotsky emphasizes that children's cognitive development is strongly influenced by social interaction. Children acquire knowledge through support from teachers, adults, and more capable peers. She further explains the concept of scaffolding, which refers to the gradual provision of assistance during learning activities. Such support is progressively reduced as children become capable of completing tasks independently.

Umi Rohmah (2025) explains that cognitive development consists of four stages: the sensorimotor stage, preoperational stage, concrete operational stage, and formal operational stage. She also highlights Vygotsky's perspective that cognitive development does not occur individually but develops through social and cultural interaction. Thinking, remembering, and problem-solving abilities evolve through children's interactions with parents, teachers, and their social environment.

According to the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 137 of 2014, as cited by Asih Puji Hastuti et al. (2021), the cognitive development domain in early childhood includes learning and problem-solving, logical thinking, and symbolic thinking.

Sari et al., as cited by Rupnidah and Dadan Suryana (2022), explain that children achieve up to 80% of their developmental potential during the ages of 0–6 years, making appropriate developmental stimulation essential. Likewise, Santrock, Hurlock, and Yusuf, as cited by Syarip Hidayat and Lutfi Nur (2018), emphasize that early childhood is the most effective period for receiving and processing information, making educational stimulation during this stage highly influential for future development.

According to Bloom, as discussed by Andre Maulana Sutrisno and Boy Man (2022), child development involves interconnected cognitive, affective, and psychomotor domains that collectively shape behavior. Montessori, as cited by Nurkamelia (2019), explains that early childhood development includes language development, eye–muscle coordination, attention to small objects, and sensory abilities. Steve Stork and Stephen W. Sanders, as cited by Choiriyah Wideasari et al. (2019), further argue that learning activities involving movement and direct experiences effectively facilitate cognitive and social development in young children.

Syamsu Yusuf, as cited by Ardhana Reswari et al. (2022), defines development as a progressive and continuous process of change occurring throughout an individual's life. Meanwhile, Fitts and Posner, as cited by Anik Lestarinigrum (2022), explain that the acquisition of motor and thinking skills progresses through three stages: the cognitive phase, associative phase, and autonomous phase.

In summary, cognitive development in early childhood involves the ability to understand information, remember, think logically, use symbols, solve problems, and make simple decisions. At this developmental stage, children learn most effectively through play, exploration, and direct experiences. Therefore, learning environments should be designed according to children's developmental characteristics by providing rich stimulation and opportunities for active participation.

Within the context of the multimedia center, the use of digital media such as educational videos, animations, interactive images, educational games, and audio-visual resources provides children with concrete and engaging learning experiences. Through these activities, children can recognize colors, shapes, symbols, and images; understand visual and auditory instructions; connect new information with prior experiences; and develop thinking and problem-solving skills. Multimedia also contributes to the development of memory,

concentration, creativity, and exploratory abilities through direct interaction with an interactive learning environment.

Teachers play a crucial role as facilitators who provide guidance and support while children engage with digital media. Consequently, multimedia-based learning serves as an effective means of stimulating children's cognitive development through concrete, active, enjoyable, and developmentally appropriate learning experiences.

C. Psychomotor Development Theory

Psychomotor development refers to the development of bodily movement, muscle coordination, balance, and children's physical skills.

According to Reni Suwenti (2021), physical and motor development in early childhood is a crucial aspect that must be stimulated from an early age because early childhood represents the golden age of development. She further explains that sensorimotor development deserves serious attention in early childhood education since motor activities help children develop body coordination and learning readiness.

Hasanah (2016) argues that physical and motor skills can be developed through educational games involving movement activities, hand coordination, and object manipulation. Likewise, Azwar Rahmat explains that movement and dance activities support both gross and fine motor development through simple bodily movements such as swinging the arms, turning the head, jumping, and moving rhythmically.

Within the context of the multimedia center, children's psychomotor development can be enhanced through activities such as using touchscreens, operating a mouse and keyboard, arranging digital objects, playing educational games, creating digital drawings, and coordinating eye and hand movements while interacting with multimedia devices. These activities help develop fine motor skills, visual-motor coordination, and manipulative abilities.

Imron Fauzi and Srikantono (2013) state that physical and motor development constitutes one of the primary functions of the early childhood curriculum because children's physical and motor abilities develop rapidly during the early years. Ratno Abidin and Asy'ari (2023) explain that play supports motor, cognitive, psychomotor, language, social, and life-skill development. Similarly, Renti Oktaria (2022) argues that play activities within the learning center model contribute to children's physical-motor development through activities involving bodily movement and coordination.

Upik Elok Endang Rasmani et al. (2022) explain that interactive multimedia makes learning more effective, enjoyable, and meaningful for young children. Furthermore, interactive game-based multimedia and Augmented Reality (AR) technologies can train children's movement coordination through exploratory and interactive technology-based activities. Ida Umami et al. (2021) emphasize that play is a natural learning tool because it simultaneously develops children's intellectual, physical, moral, and spiritual capacities.

Aguswan Kh. Umam et al. (2021) explain that tactile development relates to the sense of touch through activities such as playing with sand, clay, and squeezing objects. In multimedia center learning, psychomotor development can be stimulated through touchscreen use, operating a mouse and keyboard, digital drawing, arranging visual objects, interactive educational games, and hand-eye coordination during interaction with multimedia devices.

According to Piaget, as explained by Icam Sutisna and Sri Wahyuningsi Laiya (2020), children's motor development progresses from simple reflexive movements to increasingly coordinated and complex actions. Catron and Allen, as cited by Tisna Syafnita et al. (2023), consider motor skills one of the most important aspects of early childhood development that must be optimally nurtured. Muhamad Akip (2023) further explains that physical development includes biological growth, brain development, gross motor skills, and fine motor skills.

Kartini Kartono, as cited by Mukhlisin (2023), states that between the ages of six and eight years, children's psychomotor coordination improves significantly and they become increasingly active in group play. In multimedia learning, psychomotor abilities may develop through touchscreen use, operating a mouse and keyboard, arranging digital images, playing

interactive educational games, manipulating multimedia objects, and coordinating eye and hand movements while using technological media.

Khikmah Novitasari (2023) explains that kinesthetic development is associated with fine motor skills and body movement coordination. She further argues that brain development is closely related to motor development, and that hand-eye coordination improves when children receive appropriate stimulation through active and enjoyable learning environments.

According to Umi Rohmah (2025), early childhood education should not only focus on cognitive development but also on physical and motor development. She explains that play-based approaches help children strengthen muscles, stimulate the senses, explore their environment, and develop self-awareness. Play also provides opportunities for children to acquire skills that are difficult to obtain through other methods, including movement coordination and motor skills. Activities involving exploration, movement, and active interaction simultaneously support both cognitive and motor development.

Asih Puji Hastuti et al. (2021) describe early childhood as both a golden age and a critical period because children rapidly absorb information from their environment. They explain that early childhood development encompasses vision, emotion, language, movement abilities, and musical abilities. Furthermore, play activities strengthen muscles, stimulate the senses, and help children explore their surroundings. Their study found that the “Pansitung” learning media improved children's ability to arrange number symbols, count using fingers, write numbers, and coordinate hand and eye movements. These findings are relevant to multimedia center learning because multimedia activities similarly involve touchscreen use, mouse and keyboard operation, digital object manipulation, digital drawing, and interactive educational games.

Rupnidah and Dadan Suryana (2022) explain that early childhood education aims to provide stimulation for children's physical and psychological development so that they can develop optimally. Gandana et al., as cited by Rupnidah and Dadan Suryana (2022), argue that early childhood is a period of simultaneous physical growth and psychological development, requiring adult guidance to support learning processes. They further emphasize that physical-motor development is one of the most important developmental domains that should be stimulated through appropriate learning media.

Fitriyah et al., as cited by Rupnidah and Dadan Suryana (2022), found that busy book media can improve children's physical-motor abilities because children are directly involved in opening, attaching, and moving learning objects. Similarly, Hendayani et al. explain that illustrated block media can stimulate multiple aspects of child development, including physical-motor abilities and movement coordination. Attractive and varied learning media also encourage active participation and prevent boredom among young learners.

Bloom, as cited by Syarip Hidayat and Lutfi Nur (2018), explains that the psychomotor domain represents a developmental aspect associated with physical movement resulting from the integration of cognitive and affective processes. They further emphasize that psychomotor development is essential because it enables children to adapt to their environment and social activities. Hurlock, as cited in the same work, argues that psychomotor development plays a crucial role in the formation of children's self-concept and personality.

Ardiyansyah, as cited by Syarip Hidayat and Lutfi Nur (2018), explains that motor development helps children experience enjoyment, become more independent, adapt to school environments, interact with peers, and strengthen personality development. They also identify the environment as the most influential factor affecting psychomotor development in early childhood.

Andre Maulana Sutrisno and Boy Man (2022) define psychomotor development as the process of acquiring progressive skills involving the brain, muscles, nervous system, and children's ability to adapt to their environment. Psychomotor development progresses gradually according to the experiences and stimulation received by children. Environmental factors play a crucial role because they provide both physical and psychological stimulation.

Based on Bloom's psychomotor taxonomy, psychomotor development consists of five levels: imitation, manipulation, precision, articulation, and naturalization. The imitation stage

refers to the ability to copy observed movements, while manipulation involves following instructions and performing specific actions through practice. Precision refers to performing movements accurately and correctly, articulation involves combining multiple movements into coordinated sequences, and naturalization represents the ability to perform movements naturally, efficiently, and automatically through repeated practice.

Nurkamelia (2019) explains that physical-motor development is a continuous process involving bone formation, muscle growth, and nervous system development according to children's developmental stages. Syamsu Yusuf LN, as cited by Nurkamelia, argues that motor development occurs systematically, progressively, and continuously. Motor skills involve intentional and controlled bodily movements such as walking, grasping objects, and moving various body parts. Beaty further distinguishes gross motor skills, including walking, running, jumping, climbing, and maintaining balance, from fine motor skills, which include hand and finger coordination used for drawing, cutting, pasting, and using tools.

Choiriyah Widiyari et al. (2019) emphasize that psychomotor development is a vital component of early childhood development because it strengthens both fine and gross motor abilities. They argue that motor intelligence should be maximized through play and active learning. According to John W. Santrock, gross motor abilities involve large-muscle activities such as walking and arm movements. Active learning activities, including educational games and outdoor learning experiences, contribute significantly to the development of children's motor skills, independence, cooperation, quick thinking, and movement coordination.

In summary, psychomotor development involves the growth of bodily movement abilities that require coordination among muscles, nerves, and physical skills. In the multimedia center context, psychomotor skills can be stimulated through touchscreen interaction, operating a mouse and keyboard, digital drawing, arranging multimedia objects, playing interactive educational games, and practicing hand-eye coordination while using digital devices. Therefore, learning activities in the Multimedia Center of TKIT Nur Hikmah not only support children's cognitive development but also contribute significantly to psychomotor development through interactive, engaging, and enjoyable multimedia experiences.

D. Synthesis

The study entitled *"Implementation of Learning in the Multimedia Center at Nur Hikmah Integrated Islamic Kindergarten"* is grounded in the understanding that early childhood represents a golden age of development, requiring learning stimulation that is concrete, engaging, interactive, and appropriate to children's developmental stages. Within this context, multimedia center learning is considered a relevant educational approach because it utilizes digital media, audio-visual materials, animations, educational games, and interactive technologies as learning tools for young children.

From a theoretical perspective, learning media are understood as instruments for delivering educational messages that can stimulate learners' attention, interest, thoughts, and emotions, thereby enhancing the effectiveness of the learning process. Arsyad, Heinich, Molenda, Russell, and Smaldino emphasize that media function as instructional communication tools that help learners understand concepts more concretely. In early childhood education, interactive multimedia occupies an important position because children learn through visual, auditory, and hands-on experiences.

Multimedia center learning at TKIT Nur Hikmah utilizes audio-visual media, educational videos, animations, digital games, and multimedia devices to create an active and enjoyable learning environment. The use of multimedia provides multisensory learning experiences that enable children to learn through sight, hearing, movement, and direct exploration. This is consistent with the center-based learning approach, which emphasizes play activities as a means of stimulating child development through various learning media and educational play materials.

From the perspective of cognitive development, Jean Piaget's theory explains that children aged 4–6 years are in the preoperational stage, during which they begin to use symbols, images, language, and imagination to understand their surrounding environment. Therefore, the use of

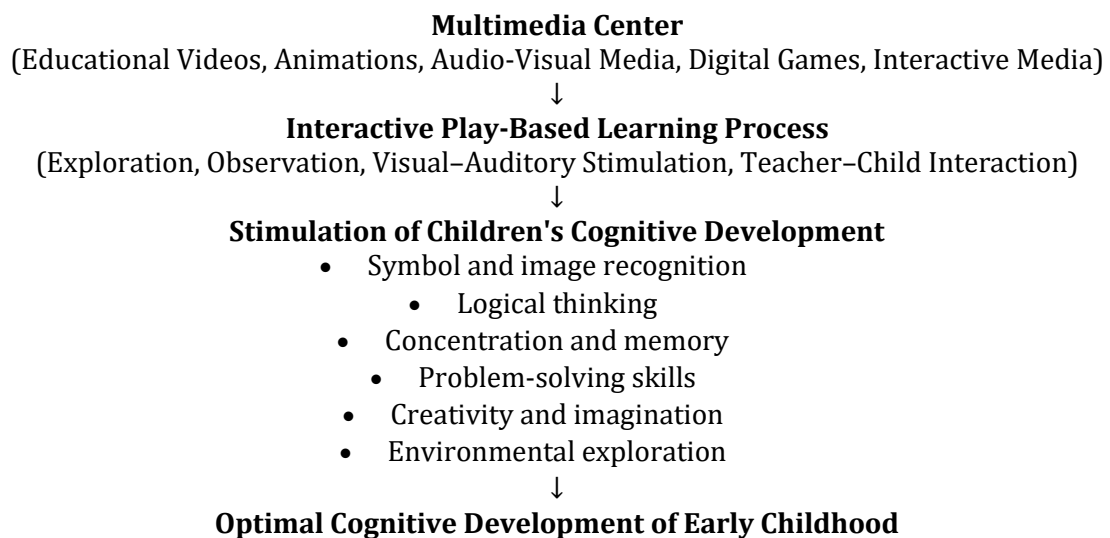
interactive multimedia is highly appropriate because digital media present visual symbols, colors, moving images, and sounds that help children transform abstract concepts into more concrete forms of understanding.

In addition to Piaget's theory, Lev Vygotsky's sociocultural theory emphasizes that children's cognitive development is influenced by social interaction and assistance from teachers or peers through the concepts of the Zone of Proximal Development (ZPD) and scaffolding. In multimedia center learning, teachers act as facilitators who provide guidance while children use digital media, understand instructions, and complete interactive activities, thereby supporting the optimal development of children's thinking skills.

Through the use of interactive multimedia, children receive visual, auditory, and kinesthetic stimulation that contributes to the development of thinking skills, memory, concentration, creativity, problem-solving abilities, symbol recognition, language skills, and environmental exploration. Thus, learning activities in the multimedia center function not only as technology-based play activities but also as a comprehensive process for stimulating young children's cognitive development.

Based on the synthesis of these theories, it can be understood that learning activities in the Multimedia Center of TKIT Nur Hikmah constitute a play-based learning process that utilizes interactive multimedia as a medium for stimulating young children's cognitive development. The implementation of this learning process is influenced by the use of digital media, the teacher's role as a facilitator, interactive play activities, and an enjoyable learning environment, all of which support children in developing their ability to think, understand information, solve problems, and actively explore learning experiences.

Conceptual Framework



RESEARCH METHODOLOGY

A. Research Design and Approach

This study employed a descriptive qualitative approach. This approach was selected to obtain an in-depth understanding of the implementation of learning activities, the role of teachers, and the impact of multimedia center activities on children's development. Through qualitative inquiry, the researcher sought to explore learning processes, teacher involvement, and the influence of multimedia-based activities on children's developmental outcomes within their natural educational setting.

B. Research Participants and Location

The participants of this study consisted of teachers and children enrolled in an Islamic-based early childhood education institution. The research site was selected purposively,

namely KB-TK Islam Nur Hikmah, which has implemented a center-based learning system, particularly the multimedia center.

C. Data Collection Techniques

Data were collected using three techniques: observation, interviews, and documentation. The use of these methods was intended to obtain comprehensive data and allow for the triangulation of information, thereby enhancing the credibility and validity of the findings.

D. Observation

Observation was conducted to directly examine the learning process in the multimedia center, including interactions between teachers and children, as well as children's participation in multimedia-based learning activities. According to Miles and Huberman (1994), observation is one of the primary methods for obtaining rich contextual qualitative data because it enables researchers to understand behavior within its natural setting. "Observation is a fundamental method in qualitative research, providing data on behavior and context that are difficult to capture by other means." (Miles & Huberman, 1994, p. 10). Through observation, the researcher documented children's engagement with multimedia devices, their responses to educational activities, and the instructional strategies employed by teachers during the learning process.

E. Interviews

Interviews were conducted with teachers to gather information regarding learning strategies, the role of teachers in the multimedia center, and their perspectives on children's learning activities. Miles and Huberman (1994) explain that interviews enable researchers to uncover the meanings behind participants' actions, experiences, and viewpoints. "Interview data help researchers understand participants' perspectives, experiences, and the meanings they assign to events." (Miles & Huberman, 1994, p. 7). The interviews provided valuable insights into the planning, implementation, and evaluation of multimedia-based learning activities, as well as teachers' observations of children's cognitive and psychomotor development.

F. Documentation

Documentation was carried out by collecting secondary data such as photographs of learning activities, Daily Learning Implementation Plans (RPPH), and children's developmental records. This technique was used to support and strengthen the findings obtained through observation and interviews. Miles and Huberman (1994) state that documents constitute stable and rich sources of data that can be utilized for verification and triangulation purposes. "Documents and records are stable sources of data that can be re-examined and used to triangulate other findings." (Miles & Huberman, 1994, p. 12). The documentation data provided additional evidence regarding the implementation of learning activities in the multimedia center and children's developmental progress throughout the learning process.

RESULTS AND DISCUSSION

A. Planning of Learning Activities in the Multimedia Center at TKIT Nur Hikmah

Based on interviews conducted with the principal, Luckyana Siswati, S.Pd.I.Gr., and the multimedia center teacher, Popon Fatimah, S.Pd., it was found that learning activities in the Multimedia Center at TKIT Nur Hikmah are systematically planned before the learning process begins. Teachers design learning activities based on themes, sub-themes, learning outcomes,

and developmental indicators established by the school. These plans are documented in daily and weekly lesson plans that serve as guidelines for instructional implementation.

The multimedia center teacher explained that before learning activities commence, various media and digital devices are prepared, including televisions, tablets, headsets, speakers, educational videos, educational game applications, and other digital learning materials. This preparation is intended to ensure the effectiveness of the learning process and to prevent technical disruptions during instructional activities.

In designing learning activities, teachers consider children's age, needs, and developmental characteristics. Multimedia resources are selected carefully by considering content safety, thematic relevance, visual attractiveness, and children's ability to operate digital devices. The teacher further explained that not all applications can be used in learning activities because the school applies strict content screening to ensure appropriateness for young children.

The principal explained that the school has specific policies regarding the use of multimedia in early childhood education. Technology use must remain under teacher supervision and should not replace children's social interactions or direct play activities. Therefore, the duration of digital device use is limited and combined with motor activities, communication, and real-world exploration.

In addition, the multimedia teacher coordinates with classroom teachers regarding current learning themes to ensure that multimedia center activities remain integrated with other learning centers. This demonstrates that multimedia learning is not implemented independently but forms part of the integrated learning system at TKIT Nur Hikmah.

Learning planning also includes the preparation of evaluation procedures and assessment instruments. Teachers develop observation indicators related to children's ability to recognize symbols, follow instructions, operate devices, maintain attention, and demonstrate fine motor skills while using digital media.

Based on these interview findings, it can be concluded that learning planning in the Multimedia Center at TKIT Nur Hikmah involves the preparation of themes, media, digital devices, instructional strategies, technology-use regulations, and developmental assessment instruments.

B. Implementation of Learning Activities in the Multimedia Center at TKIT Nur Hikmah

The implementation of learning activities in the Multimedia Center consists of three stages: introductory activities, core activities, and closing activities. Teachers explained that before activities begin, children are guided to enter the multimedia room in an orderly manner, followed by collective prayers, *muroja'ah* (Qur'anic review), and an introductory discussion related to the day's learning theme.

During the introductory stage, teachers introduce the theme, sub-theme, date, and explain the activities that children will engage in while in the multimedia center. Teachers also remind children about the rules for using digital devices, such as not competing for tablets, using headsets properly, taking care of equipment, and following teacher instructions throughout the learning process.

The core activities utilize various multimedia resources, including educational videos, learning animations, educational games, interactive quizzes, digital puzzles, letter and number recognition games, and other interactive visual activities. Children appeared enthusiastic when watching videos and engaging with educational games available on tablets.

Teachers explained that during the activities, children are not merely passive viewers; they are actively encouraged to answer questions, identify images, recognize colors and letters, match shapes, and complete simple challenges within digital games. Consequently, learning takes place in an interactive rather than passive manner.

Throughout the implementation process, teachers function as facilitators and learning companions. When children encounter difficulties using digital devices, teachers provide direct assistance. They help children operate touchscreens, select game menus, and understand educational game instructions according to each child's developmental abilities.

The principal explained that multimedia is used to help children learn through engaging visualizations, making learning concepts easier to understand. Multimedia is considered capable of increasing children's focus and learning interest compared to verbal instruction alone.

Beyond academic development, multimedia learning activities also foster children's discipline and social skills. Children learn to wait for their turn to use devices, cooperate with peers, assist classmates experiencing difficulties, and comply with multimedia equipment regulations.

The multimedia teacher further explained that digital learning activities are combined with real-world activities such as drawing, collage work, bead-stringing, and motor-skill games to avoid excessive screen exposure. This approach is intended to maintain balanced child development.

Based on the interview findings, it can be concluded that learning implementation in the Multimedia Center at TKIT Nur Hikmah is interactive, enjoyable, structured, and aligned with the developmental characteristics of young children.

C. Evaluation of Learning Activities in the Multimedia Center at TKIT Nur Hikmah

Evaluation in the Multimedia Center is conducted through direct observation during learning activities. Teachers observe children's behavior, abilities, responses, and developmental progress while using multimedia resources.

Teachers explained that assessment is based not only on the final outcomes of activities but also on children's learning processes. Children who can follow instructions, remain focused, recognize symbols, complete activities successfully, and collaborate with peers receive positive developmental records.

Assessment instruments are aligned with early childhood developmental achievement indicators, particularly in cognitive development, fine motor skills, language, socio-emotional development, and basic technological competencies. Teachers also maintain anecdotal records to document specific behaviors that emerge during multimedia learning activities.

In addition to observation, teachers conduct evaluations through question-and-answer sessions after learning activities. Children are asked to retell videos they have watched, identify colors or images they have learned about, and answer simple questions related to the games they played.

The principal explained that multimedia learning evaluation considers not only children's academic abilities but also their capacity to use technology appropriately and responsibly. The school aims to ensure that technology serves as a positive learning tool for children's development.

The results of developmental evaluations are communicated to parents through developmental reports and semester report cards. Teachers also maintain communication with parents regarding children's use of digital devices at home to ensure that multimedia learning stimulation remains well-managed.

Therefore, learning evaluation in the Multimedia Center is conducted authentically, continuously, and comprehensively across all aspects of children's development throughout the learning process.

D. The Relationship Between Multimedia Center Activities and Children's Cognitive Development

Based on interview findings, multimedia activities have a strong relationship with early childhood cognitive development. Teachers explained that multimedia helps children understand learning content more easily because information is presented through moving images, sounds, colors, animations, and interactive games that effectively capture children's attention.

Children appeared more focused and enthusiastic when learning through digital media compared to conventional lecture-based methods. Teachers explained that educational videos

and interactive games help children recognize letters, numbers, colors, shapes, animals, professions, and other basic concepts.

Digital puzzles, spot-the-difference activities, shape-matching tasks, and simple logic games help children develop thinking skills, concentration, memory, and problem-solving abilities. Children also learn to make simple decisions when selecting answers in digital games.

Teachers reported that some children demonstrated faster cognitive development after regularly participating in multimedia activities, particularly in recognizing visual symbols and understanding instructions. Children tended to comprehend visualized concepts more quickly than concepts explained solely through verbal instruction.

The principal explained that multimedia functions as a visualization tool that transforms abstract concepts into more concrete experiences for young children. This is particularly beneficial because early childhood learners tend to acquire knowledge through concrete and visual experiences.

These findings are consistent with Jean Piaget's theory, which states that young children are in the preoperational stage, during which they understand the world through symbols, images, language, and visual representations. Interactive multimedia therefore aligns closely with the cognitive developmental characteristics of children at this stage.

Furthermore, the guidance provided by teachers while children use digital media reflects the concept of scaffolding proposed by Vygotsky. Teachers assist children in completing tasks that they cannot yet perform independently, thereby supporting the gradual development of their cognitive abilities.

Thus, activities in the Multimedia Center contribute significantly to the development of children's thinking skills, concentration, symbol recognition, memory, and problem-solving abilities.

E. The Relationship Between Multimedia Center Activities and Children's Psychomotor Development

In addition to cognitive development, multimedia activities are also associated with children's psychomotor development, particularly fine motor skills and hand-eye coordination. Teachers explained that the use of tablet touchscreens helps children practice finger movements through tapping, dragging, selecting images, and arranging digital objects.

Activities such as drag-and-drop games, digital tracing, digital puzzles, and target-selection games help children develop visual-motor coordination. Children learn to synchronize hand movements with objects displayed on the screen.

Teachers also explained that some multimedia activities are combined with real-world motor activities, such as drawing after watching videos, creating collages from printed digital images, or imitating movements presented in educational videos. These activities help connect digital stimulation with direct physical experiences.

According to the multimedia teacher, children who regularly engage with certain educational games demonstrate improved finger coordination and greater proficiency in using writing tools. Nevertheless, teachers continue to limit digital device use to prevent gadget dependency and reduced physical activity.

The principal emphasized that multimedia use in early childhood education must be balanced with direct motor play activities to ensure optimal development. Multimedia is positioned as a supportive learning tool rather than a substitute for direct play experiences.

Therefore, activities in the Multimedia Center contribute to children's psychomotor development, particularly in hand-eye coordination, finger dexterity, movement accuracy, and fine motor skills.

Picture 1
Multimedia Centre



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