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Integrating LEGO-Based Constructive Media to Foster Patience Character Development in Early Childhood: A Study at TK Miftahul Ulum 27 Pamekasan

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Abstract: *This study examines the effectiveness of LEGO-based constructive media in fostering patience as a core dimension of self-regulation among early childhood learners at TK Miftahul Ulum 27 Pamekasan. Grounded in constructivist and socio-cultural learning theories, the research employs a qualitative case study approach to explore how experiential, play-based learning environments facilitate character development. Data were collected through observations, in-depth interviews, and documentation, involving teachers, school leaders, parents, and children aged 5–6 years. The findings reveal that LEGO-based learning significantly enhances children's ability to regulate emotions, delay gratification, persist in tasks, and engage in cooperative social interactions. The implementation process, when systematically designed and supported by effective teacher facilitation, enables children to internalize patience through meaningful and repeated learning experiences. However, the effectiveness of the approach is influenced by multidimensional factors, including individual developmental differences, institutional support, and family involvement. The study further proposes a LEGO-based constructive learning model comprising instructional design, implementation processes, and character outcomes. This model highlights the importance of integrating play-based strategies with character education to achieve holistic development. The findings contribute to the advancement of early childhood pedagogy by emphasizing that character formation is most effective when embedded in authentic, experiential learning contexts.*

Keywords *: LEGO-based learning, patience character, early childhood education, self-regulation, play-based learning*

Introduction

Early Childhood Education (ECE) constitutes a foundational stage in human development, as it significantly shapes children's cognitive, socio-emotional, moral, and behavioral capacities. During this critical period, children undergo rapid developmental changes that require structured, meaningful, and contextually appropriate stimulation.

Contemporary educational discourse positions ECE not merely as preparation for formal schooling but as a strategic phase for cultivating character, self-regulation, and socio-emotional competencies.[1] Global policy frameworks increasingly emphasize non-cognitive skills, including emotional resilience, cooperation, and patience, as essential determinants of long-term academic and life success. Consequently, pedagogical approaches in ECE must integrate character education within experiential and developmentally appropriate learning environments.[2]

From a developmental neuroscience perspective, early childhood represents a period of heightened brain plasticity, during which more than 80% of neural connections are formed. These connections are highly sensitive to environmental inputs, particularly those involving social interaction, play, and guided learning experiences.[3] Executive functions such as inhibitory control, working memory, and cognitive flexibility develop rapidly during this stage and are closely associated with children's capacity for self-regulation. Empirical studies indicate that early experiences significantly influence these functions, which in turn predict children's academic readiness and social competence. Therefore, educational interventions that strengthen executive function through structured play and interaction are essential for optimizing developmental outcomes.[4]

Patience, as a core dimension of self-regulation, plays a crucial role in early childhood development. It encompasses the ability to delay gratification, regulate emotional responses, persist in challenging tasks, and adapt to situational demands without impulsive reactions. In early childhood contexts, patience manifests through behaviors such as waiting for turns, tolerating frustration, completing tasks progressively, and maintaining emotional stability.[5] Recent research highlights that children with higher levels of patience demonstrate better academic performance, enhanced social relationships, and greater emotional resilience. These findings underscore the importance of cultivating patience as a foundational socio-emotional skill within early educational settings.[6]

Despite its importance, character education in many early childhood settings remains largely normative and instruction-based, relying heavily on verbal directives rather than experiential learning. Teachers often encourage patience through verbal reminders without providing structured opportunities for children to practice it in authentic contexts.[7] However, early childhood learners acquire knowledge and values most effectively through direct engagement and meaningful experiences. As such, pedagogical approaches that embed character development within play-based activities are more aligned with developmental

1 Palanikumar Balasundaram and Indirapriya Darshini Avulakunta, "Human Growth and Development," in StatPearls (StatPearls Publishing, 2026), http://www.ncbi.nlm.nih.gov/books/NBK567767/.
2 Akanksha Likhar et al., "Early Childhood Development and Social Determinants," Cureus 14, no. 9 (2022): e29500, https://doi.org/10.7759/cureus.29500.
3 Raed Mualem et al., "Econeurobiology and Brain Development in Children: Key Factors Affecting Development, Behavioral Outcomes, and School Interventions," Frontiers in Public Health 12 (September 2024): 1376075, https://doi.org/10.3389/fpubh.2024.1376075.
4 Patrícia Marzola et al., "Exploring the Role of Neuroplasticity in Development, Aging, and Neurodegeneration," Brain Sciences 13, no. 12 (2023): 1610, https://doi.org/10.3390/brainsci13121610.
5 Sigit Handoko and Syahria Anggita Sakti, "Optimizing Classroom and Activity-Based Character Education: A Comprehensive Guide to Best Practices and Implementation Strategies in Early Childhood Education," Golden Age: Jurnal Ilmiah Tumbuh Kembang Anak Usia Dini 8, no. 2 (2023): 79–88, https://doi.org/10.14421/jga.2023.82-03.
6 Nancy Eisenberg et al., "Emotion-Related Self-Regulation and Its Relation to Children's Maladjustment," Annual Review of Clinical Psychology 6 (April 2010): 495–525, https://doi.org/10.1146/annurev.clinpsy.121208.131208.
7 Handoko and Sakti, "Optimizing Classroom and Activity-Based Character Education."

principles. Research demonstrates that play-based learning significantly enhances children's self-regulation, social interaction, and emotional competence, making it a powerful vehicle for character formation.[8]

Constructive play materials, particularly LEGO, offer substantial pedagogical potential in fostering patience among young learners. LEGO, as a manipulative learning tool, enables children to engage in designing, building, testing, and reconstructing structures through iterative processes. These activities inherently require sustained attention, persistence, and emotional regulation, as children must navigate trial-and-error experiences and cope with structural failures.[9] Moreover, LEGO-based activities promote active learning, problem-solving, and creativity while simultaneously encouraging patience and perseverance. Empirical studies indicate that constructive block play contributes significantly to the development of executive functions and socio-emotional skills in early childhood.[10]

The integration of LEGO within play-based learning frameworks further enhances its effectiveness in promoting socio-emotional development. In collaborative play scenarios, children are required to share resources, negotiate roles, and coordinate actions with peers. Such interactions create authentic contexts for practicing patience, particularly when children must wait for their turn, resolve conflicts, or adapt to group decisions.[11] A recent meta-analysis on game-based learning demonstrates its significant impact on children's emotional regulation, engagement, and social competence. These findings reinforce the argument that structured play environments can serve as effective platforms for character education, including the cultivation of patience.[12]

However, existing research on LEGO in early childhood education predominantly focuses on cognitive and creative outcomes, with limited attention to its role in character development, particularly patience. While studies acknowledge improvements in social-emotional skills, they rarely conceptualize patience as a distinct construct with measurable behavioral indicators. Furthermore, key aspects such as waiting behavior, emotional control during failure, and task persistence remain underexplored in LEGO-based learning contexts.[13] This gap highlights the need for a more focused investigation into how constructive play can be systematically utilized to foster patience as a core developmental competency.[14]

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8 Ika Anggraheni and Devi Wahyu Ertanti, "Multisensory Character Education: Enhancing Social–Emotional Development in Early Childhood through Experiential Learning," AL-ISHLAH: Jurnal Pendidikan 17, no. 4 (2025): 7909–19, https://doi.org/10.35445/alishlah.v17i4.8497.

9 Reneta Utami Putri and Abdul Muhid, "Permainan Lego Dan Kreativitas Anak: A Scoping Review: Lego Play and Children's Creativity: A Scoping Review," Indonesian Journal of Early Childhood: Jurnal Dunia Anak Usia Dini 8, no. 1 (2026): 46–59, https://doi.org/10.35473/ijec.v8i1.4803.

10 Jauharil Maknuni and Rizayanti, "Peran Mainan Lego Dalam Meningkatkan Kreativitas Dan Tumbuh Kembang Anak," Journal Children Education Research 1, no. 1 (2025): 6–11, https://doi.org/10.58477/cer.v1i1.271.

11 Dianhui Peng et al., "The Effects of Interactive Video Games Combined with LEGO Game Therapy on Social Anxiety in Rural Left-behind Children," Frontiers in Psychology 15 (December 2024): 1423755, https://doi.org/10.3389/fpsyg.2024.1423755.

12 Ida Rohaendah et al., "Lego Sebagai Aktivitas Permainan Dalam Meningkatkan Perkembangan Sosial Emosional Anak Usia Dini," CERIA (Cerdas Energik Responsif Inovatif Adaptif) 7, no. 3 (2024): 266–72, https://journal.ikipsiliwangi.ac.id/ceria/article/view/22657.

13 Id'ha Tutfi Ulkhatiata and Sigit Purnama, "The Effect of Lego Games on Improving Children's Creativity Development," Golden Age: Jurnal Ilmiah Tumbuh Kembang Anak Usia Dini 7, no. 4 (2022): 177–86, https://doi.org/10.14421/jga.2022.74-03.

14 Rikuya Hosokawa et al., "Enhancing Social-Emotional Skills in Early Childhood: Intervention Study on the Effectiveness of Social and Emotional Learning," BMC Psychology 12 (December 2024): 761, https://doi.org/10.1186/s40359-024-02280-w.

Another limitation in the literature lies in the contextual scope of previous studies, which are predominantly conducted in urban or semi-urban settings. Rural educational contexts, characterized by distinct socio-cultural dynamics, remain underrepresented in research. These contexts often emphasize communal values, religious practices, and moral upbringing, which can influence children's behavioral development. Understanding how educational interventions function within such environments is crucial for developing context-sensitive pedagogical models. Ecological systems theory suggests that children's development is shaped by their immediate and broader social environments, underscoring the importance of contextualized research in early childhood education.[15]

Preliminary observations at TK Miftahul Ulum 27 Pamekasan indicate that many children exhibit challenges in demonstrating patience during classroom activities. Behaviors such as frustration when tasks fail, competition over learning materials, and incomplete task engagement suggest limitations in self-regulation. These observations highlight the need for structured pedagogical interventions that provide opportunities for children to practice patience in meaningful contexts. Research suggests that constructive play interventions can effectively enhance self-regulation and emotional control in early childhood, particularly when integrated into collaborative learning environments.

At the policy level, Indonesia's Merdeka Curriculum emphasizes character development through the Pancasila Student Profile, which includes values such as independence, cooperation, and moral integrity. These values are intrinsically linked to patience and self-regulation.[16] However, implementing these values requires pedagogical strategies that translate abstract principles into concrete learning experiences. Play-based learning, particularly using constructive media, offers a viable approach to operationalizing character education within classroom practices. Therefore, integrating LEGO into early childhood learning aligns with national educational priorities while addressing developmental needs.[17]

This study introduces a novel perspective by positioning LEGO-based constructive media as a deliberate pedagogical strategy for fostering patience in early childhood education, particularly within rural contexts. Unlike previous studies, this research emphasizes the process of character internalization through interactive play experiences rather than focusing solely on developmental outcomes. By examining children's behavioral responses, teacher strategies, and contextual factors, this study contributes to both theoretical and practical advancements in character education and play-based pedagogy.

Methodologically, this study adopts a qualitative approach with a case study design to explore the implementation of LEGO-based learning in a natural educational setting.[18] Qualitative research is particularly suitable for understanding complex social phenomena, as it allows for in-depth exploration of participants' experiences, meanings, and interactions. The

15 Mingwei Yuan and Jin-Oh Kim, "Unveiling Participation Dynamics: A Comparative Study of Green Infrastructure Practices," Land 14, no. 11 (2025): 2267, https://doi.org/10.3390/land14112267.
16 Suwarni Suwarni, "Fostering Character Development in Elementary School Students: Implementing the Independent Curriculum Through the Pancasila Student Profile Program," AL-ISHLAH: Jurnal Pendidikan 16, no. 4 (2024): 4802–10, https://doi.org/10.35445/alishlah.v16i4.5708.
17 Zainul Luthfi et al., "STRENGTHENING CHARACTER WITH INTEGRATION OF PANCASILA STUDENT PROFILE STRENGTHENING PROJECT (P5) IN LESSONS AT MAN MATARAM CITY," Edukasi Islami: Jurnal Pendidikan Islam 13, no. 04 (2024): 1001–18, https://doi.org/10.30868/ei.v14i001.9970.
18 John W. Creswell and Cheryl N. Poth, Qualitative Inquiry and Research Design: Choosing Among Five Approaches (SAGE Publications, 2016).

case study approach enables the researcher to investigate a bounded system in this case, TK Miftahul Ulum 27 Pamekasan within its real-life context, providing rich and detailed insights into pedagogical practices and their impact on children's behavior.[19]

The research site was purposively selected based on its implementation of LEGO-based learning activities. Participants include teachers, school administrators, parents, and children aged 5–6 years who are directly involved in the learning process.[20] This multi-informant approach ensures a comprehensive understanding of the phenomenon from various perspectives. Teachers play a critical role as facilitators and role models, while children serve as primary subjects whose behaviors reflect the effectiveness of the intervention. Such a design aligns with qualitative research principles that emphasize contextual depth and participant diversity.[21]

Data collection techniques include observation, in-depth interviews, and documentation. Observations focus on children's behaviors during LEGO activities, particularly indicators of patience such as turn-taking, emotional regulation, and task persistence. Interviews are conducted with teachers and school leaders to explore instructional strategies, challenges, and perceived outcomes.[22] Documentation, including lesson plans and activity records, provides additional contextual data. This triangulated approach enhances the credibility and validity of the findings by integrating multiple data sources.[23]

Data analysis follows an iterative process involving data reduction, data display, and conclusion drawing.[24] Thematic analysis is used to identify patterns and relationships within the data, focusing on key aspects such as implementation strategies, behavioral indicators of patience, and contextual influences. To ensure trustworthiness, triangulation of sources and methods is employed, along with continuous verification of findings. Through this methodological framework, the study aims to provide a comprehensive understanding of how LEGO-based constructive play can effectively foster patience in early childhood education settings.

Results

Implementation of LEGO-Based Constructive Media in Stimulating Patience Character

The findings indicate that the implementation of LEGO-based constructive media at TK Miftahul Ulum 27 Pamekasan was systematically structured through detailed daily lesson planning aligned with thematic learning objectives. Teachers deliberately integrated LEGO activities into the RPPH to ensure that learning outcomes addressed both cognitive and socio-emotional development. This approach reflects a pedagogical orientation that prioritizes experiential learning processes rather than mere product outcomes. Children were guided

19 Robert R. Sherman and Rodman B. Webb, Qualitative Research in Education: Focus and Methods (Psychology Press, 1988).
20 Imaniyatul Fithriyah, "Installation of Religious Moderation Values in Multi Ethnic And Religious Communities in Polagan Galis Pamekasan Village," FIKROTUNA: Jurnal Pendidikan Dan Manajemen Islam 12, no. 2 (2023): 198–217, https://doi.org/10.32806/jf.v12i02.7350.
21 Marilyn Lichtman, Qualitative Research in Education: A User's Guide (Taylor & Francis, 2023).
22 Michael Quinn Patton, Qualitative Research & Evaluation Methods: Integrating Theory and Practice (SAGE Publications, 2014).
23 Matthew B. Miles et al., Qualitative Data Analysis (SAGE, 2014).
24 Ach Sayyi et al., "Child-Friendly Education Model for Violence Prevention in Islamic Boarding Schools," Al-Hayat: Journal of Islamic Education 9, no. 4 (2025): 800–820, https://doi.org/10.35723/ajie.v9i4.187.

through sequential building stages, allowing them to experience gradual task completion. Such structured implementation demonstrates that LEGO was not used randomly, but functioned as an intentional instructional medium designed to foster patience through repeated, process-oriented engagement within meaningful classroom activities.

Further findings reveal that teachers shared a consistent pedagogical understanding regarding the role of LEGO in cultivating patience among early childhood learners. Both teachers emphasized the importance of allowing sufficient time for children to complete tasks without pressure, as time flexibility enabled deeper engagement and reduced impulsive behaviors. This strategy created a supportive learning environment where children were encouraged to explore, experiment, and persist. By minimizing time constraints, teachers facilitated opportunities for children to regulate their emotions naturally. This pedagogical practice aligns with constructivist principles, where learning occurs through active participation and reflection, reinforcing the integration of cognitive processes with emotional development in early childhood educational settings.

At the institutional level, school leadership played a significant role in supporting the integration of LEGO-based learning into classroom practices. The principal highlighted that play-based learning is a fundamental component of the school's educational philosophy, emphasizing experiential engagement over traditional instruction. The adoption of LEGO activities was not incidental but formed part of a broader institutional strategy aimed at strengthening child-centered pedagogy. This alignment between school policy and classroom practice indicates organizational coherence, which is essential for sustaining innovative teaching methods. Institutional support ensured that teachers were provided with adequate resources and autonomy, enabling them to implement LEGO-based learning effectively within a structured pedagogical framework.

Parental perspectives further reinforce the significance of LEGO-based learning experiences in shaping children's behavior. Parents reported that children frequently recounted their classroom activities involving LEGO, demonstrating high levels of engagement and emotional attachment to the learning process. This indicates that the learning experiences were not only cognitively stimulating but also psychologically meaningful. The ability of children to recall and narrate these experiences suggests deep internalization of the activities. Moreover, this engagement extended beyond the classroom into the home environment, where children continued to practice behaviors learned at school. Such continuity highlights the role of meaningful learning experiences in fostering character development beyond formal educational settings.

From a theoretical perspective, the implementation of LEGO-based activities reflects core principles of constructivist learning theory. Children actively constructed knowledge through direct manipulation of objects, engaging in trial-and-error processes that required persistence and patience. When structures failed, children were encouraged to rebuild, fostering resilience and tolerance for failure. This iterative process provided opportunities for experiential learning, where patience emerged as a natural behavioral response rather than an imposed value. The learning environment encouraged autonomy and exploration, allowing children to regulate their actions independently. Thus, LEGO-based learning functioned as both a cognitive and socio-emotional development tool within a holistic educational framework.

However, critical findings indicate that the implementation was not uniformly effective across all learners. Variations in children's responses suggest that individual differences significantly influenced the internalization of patience. While some children demonstrated notable improvements in emotional regulation and task persistence, others continued to exhibit impulsive behaviors. These disparities highlight the limitations of a uniform instructional approach and underscore the need for differentiated learning strategies. Factors such as temperament, prior experiences, and developmental readiness contributed to these variations. Therefore, while the implementation was structurally sound, it requires further refinement to accommodate diverse learner needs and ensure equitable developmental outcomes.

Overall, the implementation of LEGO-based constructive media at TK Miftahul Ulum 27 reflects a well-structured and theoretically grounded pedagogical approach. The integration of play-based learning with character development aligns with contemporary educational paradigms that emphasize holistic child development. The findings demonstrate that LEGO can serve as an effective medium for fostering patience when implemented systematically. However, the effectiveness of this approach depends on continuous pedagogical adaptation, particularly in addressing individual differences among learners. Thus, while promising, the implementation requires ongoing evaluation and refinement to maximize its impact on children's socio-emotional development and character formation.

Supporting and Inhibiting Factors in LEGO-Based Learning Implementation

The findings reveal that one of the primary supporting factors in the implementation of LEGO-based learning is the availability of appropriate learning materials. The presence of sufficient LEGO sets enabled children to engage actively in construction activities without excessive limitations. Teachers noted that access to tangible and visually appealing materials significantly enhanced children's participation and enthusiasm. The tactile nature of LEGO stimulated sensory engagement, which is crucial in early childhood learning. This accessibility allowed children to explore freely, fostering creativity and persistence. Therefore, the availability of resources played a fundamental role in ensuring that learning activities were both engaging and conducive to developing patience as a behavioral outcome.

Children's intrinsic motivation also emerged as a critical supporting factor in the effectiveness of LEGO-based learning. Teachers observed that children displayed high levels of interest and excitement when participating in LEGO activities. This intrinsic engagement facilitated sustained attention and reduced resistance to learning tasks. When children perceived learning as play, they were more willing to invest effort and remain focused. This natural motivation created an optimal learning environment where patience could develop organically. The alignment between children's interests and instructional strategies underscores the importance of using developmentally appropriate media in early childhood education to support both engagement and character development simultaneously.

Institutional support further strengthened the implementation process by providing a conducive learning environment. The school administration demonstrated commitment to innovative pedagogy by endorsing play-based learning approaches and allocating resources accordingly. Teachers were encouraged to integrate creative instructional strategies into their lessons, including the use of LEGO as a core learning tool. This supportive environment

fostered a culture of pedagogical experimentation and professional growth. Institutional backing ensured that teachers had the flexibility and confidence to implement non-traditional teaching methods, thereby enhancing the overall effectiveness of LEGO-based learning in promoting patience among children.

Parental involvement was identified as another significant supporting factor that contributed to the success of the intervention. Parents reported reinforcing learning experiences at home by encouraging constructive play and modeling patient behavior. This continuity between school and home environments strengthened the internalization of patience among children. When children encountered consistent expectations across different contexts, they were more likely to adopt stable behavioral patterns. The synergy between school practices and parental support highlights the importance of collaborative efforts in early childhood education. Such partnerships are essential for ensuring that character development extends beyond the classroom and becomes embedded in children's daily lives.

Despite these strengths, several inhibiting factors were identified during the implementation process. Teachers noted that some children exhibited low levels of patience and were easily distracted during activities. These internal challenges, including limited attention span and difficulty regulating emotions, hindered the effectiveness of LEGO-based learning. Children who struggled with self-control often found it difficult to engage in structured activities, leading to inconsistent behavioral outcomes. This finding underscores the complexity of character development in early childhood, where individual differences play a significant role in shaping learning experiences and outcomes.

Structural limitations within the school environment also posed challenges to effective implementation. Limited quantities of LEGO sets occasionally led to competition among children, resulting in conflicts over resource allocation. While such situations could serve as opportunities for practicing patience, insufficient facilitation sometimes exacerbated negative behaviors. Teachers had to manage these dynamics carefully to prevent frustration and maintain a positive learning environment. These findings highlight the importance of adequate resource provision and effective classroom management in supporting character development through play-based learning activities.

Additionally, inconsistencies between school and home environments were identified as significant barriers to the sustained development of patience. Some parents did not consistently reinforce patient behaviors at home, leading to discrepancies in children's experiences. This lack of alignment weakened the overall impact of the intervention, as character development requires consistent reinforcement across contexts. The findings suggest that stronger collaboration between educators and families is necessary to ensure continuity in behavioral expectations. Therefore, the effectiveness of LEGO-based learning is influenced by a complex interplay of individual, institutional, and environmental factors that must be addressed holistically.

Impact of LEGO-Based Learning on Children's Patience Development

The findings demonstrate that LEGO-based constructive learning has a significant positive impact on children's patience development. Teachers observed notable improvements in children's ability to regulate their emotions during learning activities. Children who initially displayed frustration when encountering difficulties gradually developed the capacity

to persist and continue working on tasks. This behavioral transformation indicates that repeated exposure to structured play activities can effectively enhance emotional resilience. The ability to manage frustration and remain engaged in challenging tasks is a key indicator of developing patience in early childhood contexts.

Further observations revealed improvements in children's ability to wait for their turn during group-based activities. Initially, many children struggled with sharing materials and adhering to turn-taking rules. However, over time, children began to demonstrate greater awareness of social norms and respect for peers. This shift reflects the gradual internalization of patience as a social behavior rather than a forced compliance. The structured nature of LEGO activities provided consistent opportunities for practicing these behaviors, allowing children to develop patience through repeated social interactions within a supportive learning environment.

School-level evaluations also indicated consistent improvements in behavioral indicators related to patience. Teachers documented changes in daily assessments, noting increased levels of persistence, focus, and cooperative behavior among children. These observations suggest that LEGO-based learning not only influences immediate behavior but also contributes to sustained developmental progress. The consistency of findings across multiple data sources strengthens the credibility of the results and highlights the effectiveness of integrating constructive play into early childhood education as a strategy for character development.

Parental feedback further supports the observed impact of the intervention. Parents reported noticeable changes in children's behavior at home, including increased willingness to wait, complete tasks independently, and manage emotions more effectively. This transfer of behavior from school to home indicates that the learning experiences were internalized rather than situational. The ability of children to apply learned behaviors across different contexts is a strong indicator of successful character development. It suggests that LEGO-based learning facilitated not only behavioral change but also deeper cognitive and emotional transformation.

From a developmental perspective, the findings indicate that LEGO-based activities contribute to the enhancement of executive functions, including attention control, working memory, and inhibitory control. These cognitive processes are closely linked to patience and self-regulation. By engaging in activities that require sustained focus and problem-solving, children develop the cognitive foundation necessary for regulating their behavior. Thus, the impact of LEGO-based learning extends beyond observable behaviors to underlying neurological and cognitive processes that support long-term development.

However, the findings also reveal variability in the extent of improvement among children. Some children demonstrated rapid progress, while others required more time and support to develop patience. Teachers emphasized that individual differences, including personality traits and prior experiences, significantly influenced outcomes. This variability highlights the importance of adopting differentiated instructional approaches that accommodate diverse learner needs. Without such adaptations, the benefits of LEGO-based learning may not be equally distributed among all children.

In conclusion, the use of LEGO-based constructive media has a significant and multifaceted impact on the development of patience in early childhood learners. The findings demonstrate that structured play activities can effectively enhance both behavioral and

cognitive aspects of self-regulation. However, the effectiveness of this approach is influenced by individual and environmental factors. Therefore, while LEGO-based learning represents a promising pedagogical strategy, its implementation must be continuously refined to ensure equitable and sustainable outcomes in character development.

Discussion

Pedagogical Effectiveness of LEGO-Based Constructive Media in Fostering Patience

The findings of this study indicate that the implementation of LEGO-based constructive media significantly contributes to the development of patience as a core component of children's self-regulation through experiential learning mechanisms. This aligns with constructivist theory, which posits that children actively construct knowledge through interactions with their physical and social environments.[25] LEGO construction activities expose children to iterative trial-and-error processes that inherently require persistence, self-control, and tolerance for failure.[26] Consequently, patience is not transmitted through normative instruction but is internalized through meaningful and concrete learning experiences. This approach reinforces the integration of cognitive and affective domains, highlighting the importance of experience-based learning in early childhood education.[27]

Furthermore, these findings reinforce the pedagogical relevance of play-based learning in fostering children's socio-emotional competencies.[28] In this context, play extends beyond recreational activity and serves as a primary medium through which children interpret social interactions and emotional dynamics. Through LEGO-based play, children learn to regulate their emotions, delay gratification, and engage in cooperative interactions with peers. Empirical evidence suggests that play-based learning significantly enhances self-regulation and social competence in early childhood contexts.[29] Therefore, the integration of LEGO into classroom practices strengthens the positioning of play as an essential pedagogical strategy in promoting holistic child development.

Moreover, the study demonstrates that patience develops through sustained engagement in activities requiring focused attention and cognitive persistence. LEGO construction tasks provide opportunities for children to exercise executive functions, particularly inhibitory control and sustained attention.[30] The precision required in assembling LEGO structures encourages children to remain attentive over extended periods, thereby strengthening their capacity for self-regulation. Empirical studies have shown that constructive play positively correlates with the development of executive functions, which underpin behavioral regulation

25 Catherine Twomey Fosnot, Constructivism: Theory, Perspectives, and Practice (Teachers College Press, 2013).
26 Katie Biggs et al., "Lessons Learnt about Implementing LEGO Based Therapy (Play Brick Therapy) Based on Fidelity Data and Experience from a Large School-Based Randomised Controlled Trial," PLOS One 21, no. 2 (2026): e0336952, https://doi.org/10.1371/journal.pone.0336952.
27 Ulkhatiata and Purnama, "The Effect of Lego Games on Improving Children's Creativity Development."
28 Qiming Liu and Helen Demetriou, "Integrating Play-Based Pedagogy into a Knowledge-Based Curriculum: Supporting Children's Understanding of Anger in a Chinese Kindergarten," Frontiers in Psychology 16 (October 2025): 1673016, https://doi.org/10.3389/fpsyg.2025.1673016.
29 Alexandra Harper et al., "Nature Play in Primary School: Supporting Holistic Development Through Outdoor Learning," Education Sciences 15, no. 11 (2025): 1487, https://doi.org/10.3390/educsci15111487.
30 Courtney L. Gallen et al., "Contribution of Sustained Attention Abilities to Real-World Academic Skills in Children," Scientific Reports 13 (February 2023): 2673, https://doi.org/10.1038/s41598-023-29427-w.

in early childhood.[31] Thus, LEGO-based learning influences not only observable behavior but also the underlying cognitive mechanisms that support patience.

However, the effectiveness of LEGO-based learning is contingent upon the strategic role of teachers as facilitators of the learning process. From a socio-cultural perspective, the interaction between teachers and children is central to cognitive and socio-emotional development.[32] Teachers provide scaffolding that enables children to operate within their zone of proximal development, thereby achieving higher levels of competence.[33] Without appropriate facilitation, the potential of LEGO-based learning cannot be fully realized. This underscores the importance of pedagogical expertise in designing and implementing developmentally appropriate learning experiences.[34]

Additionally, LEGO-based learning reflects the principles of experiential learning, which emphasize the importance of direct experience in knowledge construction.[35] Children learn through reflecting on their experiences, including the challenges and failures encountered during LEGO construction. These experiences enable children to understand the consequences of their actions and develop emotional resilience. Research indicates that experiential learning has a significant impact on character development and socio-emotional skills.[36] Thus, LEGO serves as a pedagogical bridge connecting theoretical constructs with practical learning experiences in early childhood education.

Overall, the pedagogical effectiveness of LEGO-based constructive media lies in its capacity to integrate play experiences with character formation in a natural and meaningful manner. This approach affirms that patience can be cultivated through experiential engagement rather than verbal instruction alone. Consequently, LEGO-based learning contributes significantly to the advancement of character education models in early childhood settings, particularly in fostering self-regulation and socio-emotional competence through developmentally appropriate pedagogical strategies.

Multidimensional Factors Influencing LEGO-Based Learning Implementation

The findings reveal that the effectiveness of LEGO-based learning implementation is influenced by multidimensional factors involving complex interactions between individual, institutional, and family contexts. At the individual level, children's temperament, developmental readiness, and self-regulation capacities serve as critical determinants of their ability to internalize patience. Children with higher levels of inhibitory control and sustained attention tend to respond more adaptively to constructive learning activities. This suggests

31 Harper et al., "Nature Play in Primary School."
32 Ismail Ismail et al., "THE SYNTHESIS OF TURATH AND MODERN INSTRUCTIONAL DESIGN: ENHANCING FIQH AL-MAWARITH MASTERY AT MAKTAB NUBDZAT AL-BAYAN," EDURELIGIA: Jurnal Pendidikan Agama Islam 9, no. 3 (2025): 243–57, https://ejournal.unuja.ac.id/index.php/edureligia/article/view/11625.
33 Imraatul Hasanah et al., "Konsep Scaffolding Dalam Perspektif Pendidikan Islam: Analisis Pemikiran Ibnu Khaldun Dan Vygotsky," Akademika 19, no. 1 (2025), https://doi.org/10.30736/adk.v19i1.2488.
34 Holly Henderson and Richard Shipway, "For the Love of Lego®: Exploring the Perceptions and Use by Academics in Higher Education," Journal of Further and Higher Education 50, no. 4 (2026): 688–707, https://doi.org/10.1080/0309877X.2026.2623003.
35 Ach Sahrowi et al., "Implementasi Pembelajaran Berbasis Humanistik Dalam Meningkatkan Spiritualitas Santri Di Pesantren Darul Ulum Banyuanyar Pamekasan," Jurnal Studi Pendidikan Agama Islam 1, no. 1 (2025): 14–24, https://doi.org/10.32806/jspai.v1i1.912.
36 Henderson and Shipway, "For the Love of Lego®."

that pedagogical interventions do not produce uniform outcomes but are mediated by children's psychological readiness and developmental profiles.[37]

Furthermore, variations in children's executive functioning highlight that patience development is closely linked to individual cognitive capacities. Children with stronger working memory, cognitive flexibility, and impulse control demonstrate greater persistence in activities requiring delayed gratification, such as LEGO construction tasks. Conversely, children with limited executive function skills are more prone to impulsive behaviors and frustration. These findings underscore the importance of differentiated instructional approaches that account for individual variability, ensuring that each child receives appropriate support aligned with their developmental needs.[38]

From an institutional perspective, school support plays a pivotal role in facilitating effective implementation. Schools that embrace play-based learning philosophies are better positioned to create environments conducive to character development. Institutional support encompasses not only the provision of learning materials but also policies that encourage pedagogical innovation and teacher professional development.[39] Research indicates that supportive school environments significantly enhance teaching quality and student outcomes.[40] Therefore, institutional commitment is essential for sustaining the integration of LEGO-based learning within early childhood education frameworks.[41]

In addition to institutional factors, the family environment significantly influences the internalization of patience. Consistency between school practices and parenting approaches is crucial in reinforcing learned behaviors. Children who receive consistent behavioral reinforcement at home exhibit more stable and sustained development of patience. Conversely, discrepancies between school and home environments can hinder character formation. This aligns with ecological systems theory, which posits that child development is shaped by interactions across multiple environmental systems.[42]

However, the study also identifies several inhibiting factors, including limited learning resources and inconsistent behavioral reinforcement. Insufficient LEGO materials can lead to competition among children, potentially triggering impatience if not properly managed. Additionally, low intrinsic motivation among some children may reduce engagement in learning activities. Given that intrinsic motivation is a key driver of active learning, its absence can impede the effectiveness of pedagogical interventions. Therefore, instructional

37 Daashwinni Vijaendren and Anne Noor Sri Juwaneeta Jamaludin, "The Effectiveness of Peer-Mediated Lego-Based Intervention to Improve the Social Skills of Primary School Students with ASD," Jurnal Pendidikan Bitara UPSI 18, no. Special Issue (2025): 78–100, https://doi.org/10.37134/bitara.vol18.sp.8.2025.

38 Amanda Grenell and Stephanie M. Carlson, "Individual Differences in Executive Function and Learning: The Role of Knowledge Type and Conflict with Prior Knowledge," Journal of Experimental Child Psychology 206 (June 2021): 105079, https://doi.org/10.1016/j.jecp.2020.105079.

39 Ach Sayyi et al., "MODERATE ISLAMIC EDUCATION CURRICULUM DESIGN: REALIZING TOLERANCE AMIDST SOCIAL DIVERSITY IN THE ERA OF SOCIETY 5.0," Jurnal Konseling Pendidikan Islam 6, no. 3 (2025): 261–77, https://doi.org/10.32806/jkpi.v6i3.1184.

40 Rofiqi et al., "Islamic Feminism in Global Context: Negotiating Gender Justice and Religious Authority in Indonesian Higher Education Institutions," Journal of Gender Studies 0, no. 0 (2026): 1–20, https://doi.org/10.1080/09589236.2026.2655827.

41 Muhamah Furqon, "Family Support and Learning Environment as Key Determinants of Early Childhood Learning Motivation," IC-ESTEH: International Conference on Education, Social Studies, Technology and Health 1, no. 1 (2026): 34–40, https://ejournal.unuja.ac.id/index.php/ic-esteh/article/view/14327.

42 Grenell and Carlson, "Individual Differences in Executive Function and Learning."

strategies must not only be visually engaging but also emotionally meaningful to sustain children's involvement.

Overall, the implementation of LEGO-based learning reflects a complex interplay of individual, institutional, and environmental factors. The success of such interventions depends on the system's ability to integrate these elements cohesively. A comprehensive, adaptive, and collaborative approach is therefore necessary to optimize learning outcomes. By addressing these multidimensional factors, LEGO-based learning can serve as a sustainable strategy for fostering patience and socio-emotional development in early childhood education.

Impact of LEGO-Based Learning on Self-Regulation and Character Development

The findings demonstrate that LEGO-based learning significantly enhances children's self-regulation, particularly in developing patience as a fundamental socio-emotional competence. Children engaged in constructive LEGO activities exhibit improved emotional control, reduced impulsivity, and increased persistence in completing tasks. This suggests that experiential learning through constructive play provides effective stimuli for developing self-regulation. In developmental terms, self-regulation is a strong predictor of academic achievement and social adjustment, as it enables children to adapt to structured learning environments.[43]

Moreover, LEGO activities contribute substantially to the development of executive functions, including attention control, working memory, and inhibitory control. The structured nature of LEGO construction requires children to plan, focus, and regulate their actions systematically. These cognitive processes support the development of patience by enabling children to delay immediate responses and maintain goal-directed behavior. Research indicates that early development of executive functions has long-term implications for cognitive and academic success.[44]

The positive impact of LEGO-based learning is also evident in children's social development. Through collaborative play, children learn to share resources, respect turn-taking, and engage in cooperative problem-solving. These social interactions provide authentic contexts for practicing patience and understanding others' perspectives. High-quality social interactions have been shown to play a crucial role in socio-emotional development, enhancing empathy and interpersonal competence.[45]

Nevertheless, the study reveals variability in children's developmental outcomes, indicating that responses to LEGO-based learning are not uniform. Individual differences in temperament, prior experiences, and environmental influences affect the degree of improvement in patience.[46] This variability underscores the need for differentiated instruction

[43] Biggs et al., "Lessons Learnt about Implementing LEGO Based Therapy (Play Brick Therapy) Based on Fidelity Data and Experience from a Large School-Based Randomised Controlled Trial."

44 Luciana Oliveira Angelis et al., "LEGO®-Based Therapy in School Settings for Social Behavior Stimulation in Children with Autism Spectrum Disorder: Comparing Peer-Mediated and Expert Intervention," Brain Sciences 14, no. 11 (2024): 1114, https://doi.org/10.3390/brainsci14111114.

45 Ulkhatiata and Purnama, "The Effect of Lego Games on Improving Children's Creativity Development."

46 Ach Sayyi et al., Bridging Tradition and Multiculturalism in Islamic Jurisprudence Education, 2025, https://ejournal.insuriponorogo.ac.id/index.php/scaffolding/article/view/8002.

tailored to individual learning needs. Differentiation ensures that all children receive appropriate levels of support, maximizing the effectiveness of pedagogical interventions.[47]

From a longitudinal perspective, LEGO-based learning holds strong potential for sustained character development. The repeated engagement in meaningful learning experiences facilitates the internalization of patience as a stable personality trait. Experiential character education is more effective than normative approaches because it embeds values within lived experiences. Research supports that character education grounded in experiential learning has a lasting impact on behavioral development.[48]

Overall, LEGO-based constructive learning contributes significantly to the development of patience by integrating cognitive and socio-emotional processes. The approach enables children to experience patience as a lived behavior rather than an abstract concept. Consequently, LEGO serves as an effective pedagogical tool for fostering holistic child development, particularly in strengthening self-regulation and character formation in early childhood education.

A Constructive LEGO-Based Learning Model for Developing Patience

The findings of this study propose a structured LEGO-based constructive learning model comprising three core components: instructional design, implementation processes, and learning outcomes. The model emphasizes the importance of systematic pedagogical planning in integrating constructive media into early childhood learning activities. Instructional design focuses not only on cognitive outcomes but also on character development through experiential engagement. This approach aligns with constructivist theory, which positions experience as the foundation for knowledge and behavioral formation.[49]

The second component of the model is the implementation process, characterized by dynamic interactions between teachers, children, and learning media. Teachers function as facilitators who provide appropriate scaffolding to support children's developmental needs.[50] Through guided interaction, children learn to navigate tasks, regulate emotions, and complete activities progressively. This reflects socio-cultural learning principles, where development occurs through meaningful social interaction and guided participation.[51]

The third component is learning outcomes, particularly the development of patience as a central character trait. Children demonstrate behavioral changes such as improved emotional regulation, delayed gratification, and increased task persistence. These outcomes indicate that LEGO-based learning effectively integrates cognitive and socio-emotional development. Patience, in this context, is internalized through repeated and meaningful experiences, making it more sustainable in children's daily behavior.

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47 Angelis et al., "LEGO®-Based Therapy in School Settings for Social Behavior Stimulation in Children with Autism Spectrum Disorder."

48 Roro Kurnia Nofita Rahmawati and Imaniyatul Fithriyah, "PERAN BIMBINGAN DAN KONSELING DALAM MENINGKATKAN KESEJAHTERAAN PSIKOLOGIS SISWA DI SDN 1 BUJUR TENGAH, PAMEKASAN," *Pendas : Jurnal Ilmiah Pendidikan Dasar* 11, no. 01 (2026): 20–35, https://doi.org/10.23969/jp.v11i01.41166.

49 Ashraf Alam and Atasi Mohanty, "Integrated Constructive Robotics in Education (ICRE) Model: A Paradigmatic Framework for Transformative Learning in Educational Ecosystem," *Cogent Education* 11, no. 1 (2024): 2324487, https://doi.org/10.1080/2331186X.2024.2324487.

50 Sayyi et al., "MODERATE ISLAMIC EDUCATION CURRICULUM DESIGN."

51 Alam and Mohanty, "Integrated Constructive Robotics in Education (ICRE) Model."

The model also incorporates moderating factors, including family environment and institutional support. Family involvement strengthens behavioral reinforcement, while institutional support ensures the availability of resources and conducive learning environments.[52] These factors align with ecological development theory, which emphasizes the interconnectedness of multiple environmental systems in shaping child development.[53]

From a practical perspective, this model provides a valuable framework for early childhood educators in designing character-based learning activities. The integration of LEGO as a pedagogical tool offers an innovative and contextually relevant approach to teaching patience. Educators can adapt this model to different educational settings, ensuring flexibility and applicability across diverse contexts.

Overall, the LEGO-based constructive learning model contributes both theoretically and practically to early childhood education. It enriches existing literature on constructivist pedagogy and character education while offering a scalable approach for classroom implementation. This model demonstrates strong potential for broader application in promoting patience and self-regulation among young learners.

Conclusion

This study concludes that the integration of LEGO-based constructive media represents a pedagogically robust and theoretically grounded approach to fostering patience as a core dimension of self-regulation in early childhood education. The findings demonstrate that patience is most effectively cultivated through experiential, play-based learning environments that engage children in iterative, goal-oriented activities requiring persistence, emotional control, and delayed gratification. By situating learning within a constructivist and socio-cultural framework, LEGO-based activities enable children to internalize character values through meaningful interaction with materials, peers, and teachers. Moreover, the effectiveness of this approach is mediated by multidimensional factors, including individual developmental readiness, institutional support, and family involvement, underscoring the necessity of a holistic and collaborative educational ecosystem. The proposed LEGO-based learning model further contributes to the field by offering a structured yet adaptable framework that integrates instructional design, implementation processes, and character outcomes. Importantly, the study affirms that character education in early childhood is most impactful when embedded in authentic learning experiences rather than transmitted through normative instruction. Therefore, this research provides both theoretical enrichment and practical implications for advancing play-based, character-oriented pedagogy, particularly in resource-constrained and culturally contextualized early childhood settings.

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