



Playful Learning at Home: Developing SISEMO Flashcards to Enrich Parent-Child Sensory-Motor Activities

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Abstract

This study aims to develop a flashcard-based, play-oriented learning medium to stimulate children's sensory-motor development through parental guidance at home. The study employed a Research and Development (R&D) methodology using the ADDIE development model, comprising analysis, design, development, limited implementation, and evaluation stages. The analysis stage involved interviews and observations to identify parents' needs in facilitating children's play activities at home. In contrast, the design and development stages focused on conceptualizing and producing the flashcard product. The research participants were parents of children aged 4–5 years at PAUD Al-Hidayah, North Jakarta, who were directly involved in accompanying their children's play activities and sensory-motor stimulation at home. Product validation was conducted by content experts, media experts, and early childhood education practitioners using feasibility questionnaires, followed by three stages of product trials: individual, small-group, and large-group. The results indicate that the developed flashcard, named SISEMO, was classified as highly feasible, achieving validation scores of 95% from content experts, 98% from media experts, and 98% from practitioners, while the limited implementation stage yielded a positive response rate of 87.80%. The study focuses on the development of sensory-motor flashcards that include structured, practical play-based activity ideas for collaborative parent-child use at home, thereby bridging early childhood developmental stimulation between school and family environments. This study concludes that the SISEMO Flashcard is both practical and feasible as a supportive medium for parents' sensory-motor play activities. Future research is recommended to examine the effectiveness of this product using experimental designs with control groups and to extend its implementation across diverse social and cultural contexts to strengthen the generalizability of the findings.

Keywords: Flashcard; Learning at Home; Parent-Child; Sensory-Motor



A. INTRODUCTION

Sensory and motor domains occupy a fundamentally essential position in early childhood development (Williams & Monsma, 2017; Alves & Bravo, 2024; Nasution et al., 2023). Sensory development refers to children's capacity to receive, process, and respond to environmental stimuli through the five senses. In contrast, motor development involves the acquisition of physical skills, including gross motor competence, which engages large muscle groups, and fine motor competence, which requires coordinated use of smaller muscles (Nasution et al., 2023). Early motor experiences play a pivotal role in shaping children's perception, cognition, and social interaction (Adolph & Franchak, 2017; Amir et al., 2025). Accordingly, sensorimotor development in early childhood is not limited to physical skill acquisition but also contributes to the formation of self-concept and understanding of the surrounding world. Through sensory exploration and motor activities, children develop an understanding of causal relationships, spatial concepts, and problem-solving abilities.

Parents constitute a crucial actor in fostering children's development through interactive play activities (Rantina et al., 2021). Sensorimotor skills, which integrate physical movement and sensory perception, are central to children's overall development, including cognitive, social, and emotional well-being (Rosianah et al., 2020). However, research by Lisa et al. (2020) indicates that approximately 60% of mothers provide play activities that are not aligned with educational play principles, suggesting that more than half of parents lack adequate knowledge regarding play activities appropriate to children's developmental stages. This challenge is further exacerbated in the current technological era, where parents experience difficulty limiting children's excessive use of digital devices (Basrah et al., 2025). Consequently, children require alternative activities that are engaging enough to redirect their attention away from gadgets.

A needs analysis further reveals that many parents lack structured guidance for implementing developmental stimulation at home. Instead, parents often encourage children to engage in early academic tasks, such as writing exercises or completing worksheets purchased from bookstores (Sulistiyowati, 2019). Although parents recognize that developmental stimulation should occur consistently both at school and at home, and that collaboration between parents and teachers is essential (Lilawati, 2021), limited access to practical references leads parents to engage in play activities based solely on children's preferences, such as building with blocks or role-playing, without clear objectives or structured guidance (Haryanti et al., 2018). These conditions underscore the need for a practical guide that supports parents in conducting developmentally appropriate stimulation activities at home.

Therefore, an educational play medium is required that not only attracts children's interest but also functions as a supportive tool for parents in providing stimulation aligned with children's developmental stages, particularly in the sensorimotor domain. One potential alternative is the use of sensorimotor stimulation flashcards designed to promote active interaction between parents and children in the home environment. This study focuses on the design and development of sensorimotor stimulation flashcards that correspond to the needs of both parents and children, as well as an examination of their role and use in enriching shared play activities at home. Through the use of this medium, it is expected that

more meaningful, interactive, and educational play experiences can be created, thereby reducing children's dependence on digital devices while simultaneously optimizing their sensorimotor development.

Previous studies have demonstrated that flashcards are an effective and flexible medium for supporting children's stimulation and learning processes. For instance, Yuliati et al. (2024) found that flashcard media exerted a positive influence on the development of speaking skills in early childhood education, with a significant effect on expressive language abilities among children aged 4-5 years. Nevertheless, the development of flashcards in existing studies remains limited in terms of developmental scope and context of use, as the sensorimotor domain of preschool children has not been a primary focus (Wati, 2021; Hidayah & Pertiwi, 2025). Furthermore, most flashcard developments position children as the primary users, while the role of parents as facilitators of play activities at home has not been adequately accommodated. It indicates a research gap in the development of flashcards that function not merely as visual learning aids but also as structured, practical, and contextual guides for sensorimotor play activities involving parents and children aged 4-5 years.

Several studies further illustrate the predominant academic orientation of flashcard development. Wibowo et al. (2024) developed flashcards as an intervention medium to stimulate speaking abilities in children with speech delay, focusing specifically on language development through word and picture cards. Similarly, Sholeh (2023) developed QR-code-based flashcards to improve science learning outcomes among third-grade Islamic elementary students, while Lailusmi (2022) designed double-sided flashcards to enhance science learning interest among fifth-grade students. These studies confirm the advantages of flashcards as practical and adaptive learning media; however, they predominantly situate flashcards within structured, academically oriented learning contexts. Additional evidence from Ramlah et al. (2023) demonstrates the influence of flashcard media on symbolic thinking skills and linguistic intelligence among children, while Tirtayani et al. (2017) developed teacher-friendly bilingual e-flashcards for early childhood education with positive outcomes. In contrast to these approaches, the present study offers a novel contribution by developing flashcards as a play-based guide grounded in sensorimotor stimulation, specifically designed for use by parents together with children aged 4-5 years in the home environment. This approach extends the function of flashcards beyond visual learning tools, positioning them as interactive play media that support holistic child development.

B. METHOD

1. Research design

This study employed the ADDIE research and development model with the objective of producing an educational medium designed to enrich joint play activities between children and parents in the home environment. The ADDIE model, formulated by Dick and Carey, constitutes a conceptual framework for the systematic design of instructional systems. Beyond serving as a technical guideline, the model functions as a strategic approach for constructing adaptive learning product architectures that emphasize instructional effectiveness. Broadly, the ADDIE model consists of five

sequential stages: (1) Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation (Slamet, 2022). The selection of the ADDIE model in this study was based on its capacity to provide comprehensive guidance throughout the entire development process.

2. Research Subject and Setting

The research and development of the SISEMO Flashcard were conducted at PAUD Al-Hidayah Penjaringan, North Jakarta, DKI Jakarta Province, from August 2024 to March 2025. The sampling technique employed purposive sampling, a non-probability method in which participants are deliberately selected based on characteristics relevant to the research objectives (Sulistiyowati, 2017). The research participants consisted of parents or guardians of children aged 4-5 years (Class A) at PAUD Al-Hidayah, involving 12 parents and 12 children with diverse motor abilities and daily habits. Among the participating parents, some rarely engaged in structured play activities with their children, while others regularly spent time playing together. This variation provided an appropriate context for examining the use of sensorimotor stimulation flashcards as a means of enriching home-based play activities.

3. Research Procedures

The first stage of the ADDIE model, analysis, involved a comparative review of previous studies relevant to the research topic, followed by a needs analysis conducted through parent and teacher interviews and child observations. The second stage, design, focused on developing the conceptual and physical design of the sensorimotor stimulation flashcards, taking into account parental needs, children's developmental characteristics, the use of safe materials, and appropriate card dimensions. The third stage, development, represented a critical phase in which the initial prototype underwent durability and feasibility testing through a validation process involving expert triangulation. This process included evaluations by a content expert, a media expert, and a field practitioner. Following expert validation, the product was tested through three successive trial phases: individual trials, small-group trials, and large-group trials. During these trials, the researcher systematically observed, documented, and analyzed participants' reactions and responses to the sensorimotor stimulation flashcards. The individual trial involved three children, the small-group trial included four to eight children, and the large-group trial involved ten children. The fourth stage, implementation, entailed applying the finalized product on a limited scale at PAUD Al-Hidayah Penjaringan to examine patterns of use and parental responses to the flashcard product.

4. Data Collection Technique

Data were collected using multiple methods. First, observation was conducted through direct monitoring of play activities using field note instruments. Observations focused on children's responses during play with their parents, parents' ability to implement activities presented on the flashcards, and the overall dynamics of the play sessions. Second, interviews were conducted during the preliminary phase to analyze parental needs and to gather parents' and teachers' perspectives regarding the proposed

product development. Third, questionnaires were administered to parents or guardians of Class A students to assess their responses to the application of sensorimotor stimulation flashcards at home. Fourth, documentation served as a visual tracking instrument, capturing play activities and research processes through photographic records.

5. Data Analysis Technique

This study utilized both qualitative and quantitative data. Qualitative data consisted of critical reflections, conceptual feedback, and technical recommendations provided by two subject-matter experts and one field practitioner, namely one media expert, one content expert, and one practitioner. These data were further enriched through the three-tiered trial process involving individual, small-group, and large-group testing, which collectively informed product refinement. Quantitative data were derived from parental questionnaire responses and subsequently transformed into qualitative interpretations for analytical purposes. Quantitative data analysis employed a four-point Likert scale as proposed by Suryani (2016), where 1 = very poor, 2 = poor, 3 = good, and 4 = very good, serving as a systematic measure of perceived product quality.

The percentage of expert validation results was calculated using the following formula (Sudjana, 2013):

$$\text{Percentage (\%)} = \frac{\text{Obtained Score}}{\text{Maximum Score}} \times 100\%$$

After all respondent data were collected and analyzed, conclusions were drawn regarding the validity and feasibility of the developed sensorimotor stimulation flashcards for parental use in enriching home-based play activities. The level of product feasibility was determined based on expert validation scores as an academic benchmark. These evaluative results are presented systematically in the following table as a reflection of the conceptual and technical legitimacy of the developed product.

Table 1. Stimulation Flashcard feasibility criteria

No	Percentage Range	Criteria
1	<25%	Not Feasible
2	26%-50%	Less Feasible
3	51%-75%	Feasible
4	76%-100%	Highly Feasible

Source : (Suryani, 2016)

Respondent results derived from parent questionnaires administered during the limited implementation phase were aggregated using a mean score formula based on the predefined assessment criteria:

Table 2. Parent Response Results

No	Scala	Criteria
1	81-100%	Very Good
2	61-80%	Good
3	41-60%	Poor
4	21-40%	Very Poor

Source : (Sudjana, 2013)

C. RESULT AND DISCUSSION

1. Result

The feasibility testing of the developed model was mapped across two epistemological dimensions: theoretical appraisal and empirical verification. At the conceptual level, the design of the flashcards, named SISEMO, was grounded in an integrative synthesis of motor development, sensory processing, and play theory, which were systematically organized into a pedagogical construct aligned with the developmental characteristics of early childhood. The initial draft, which embodied this theoretical synthesis, could not be directly implemented without undergoing an academic filtration process through expert-based material feasibility testing. This step was essential to ensure that the constructed conceptual framework remained faithful to the core principles of early childhood development. Theoretical validation in this study involved three expert validators who functioned as academic gatekeepers of scientific rigor. Each expert employed a meticulously designed and validated evaluation instrument to ensure that the resulting assessments were not merely descriptive, but analytically grounded and scientifically defensible. An evaluative summary of expert judgments regarding the feasibility of the SISEMO flashcard learning media is presented as an academic benchmark for determining the validity of the developed design.

Table 3. Feasibility Percentage

No	Expert	Media Feasibility Score	Remarks
1	Content Expert	95 %	Highly Feasible
2	Media Expert	98%	Highly Feasible
3	Field Practitioner	98%	Highly Feasible

Revisions to the SISEMO flashcard design from the initial stage to the final version encompassed three primary aspects: (1) background design refinement, (2) sentence and instruction clarity, and (3) image sharpness and visual comprehensibility. The final flashcard product was produced after undergoing expert validation as well as Draft I and Draft II trials, during which revisions were implemented based on critical feedback, suggestions, and directives from the validators. These iterative improvements culminated in the finalized model presented in this study:





Figure 1. Final Draft

The final product utilizes a two-sided card format. One side displays an illustrative image depicting the activity, while the reverse side provides detailed information regarding required tools and materials, step-by-step play instructions, and the developmental benefits of each activity. The activities incorporated include walking along a straight line while carrying objects, hopping on one foot, tracing on basil seeds, threading beads, zigzag cutting, buttoning and unbuttoning clothes, making playdough, walking backward, standing on one foot, pouring water, jumping while throwing a ball, creating and coloring shapes, scribbling within shapes, walking barefoot on grass and watering plants, hanging and lifting laundry, navigating obstacles, and turning over and wearing socks. These activities employ flexible and readily available household materials such as balls, pillows, flour, water, beads, straws, and similar items. The inclusion of play instructions and activity benefits on the reverse side of each card is intended to facilitate parents' guidance of stimulation activities at home.

In addition to theoretical validation, media feasibility testing incorporated an empirical approach through a sequence of field trials. These experience-based evaluations encompassed three levels: individual trials, small-group trials, and large-group trials. Across all stages, children aged 4-5 years were actively involved as the primary participants, enabling direct observation of engagement, usability, and developmental responsiveness to the flashcard activities.

In addition to interviews, parents completed questionnaires after implementing the flashcards at home. Based on the questionnaire data:

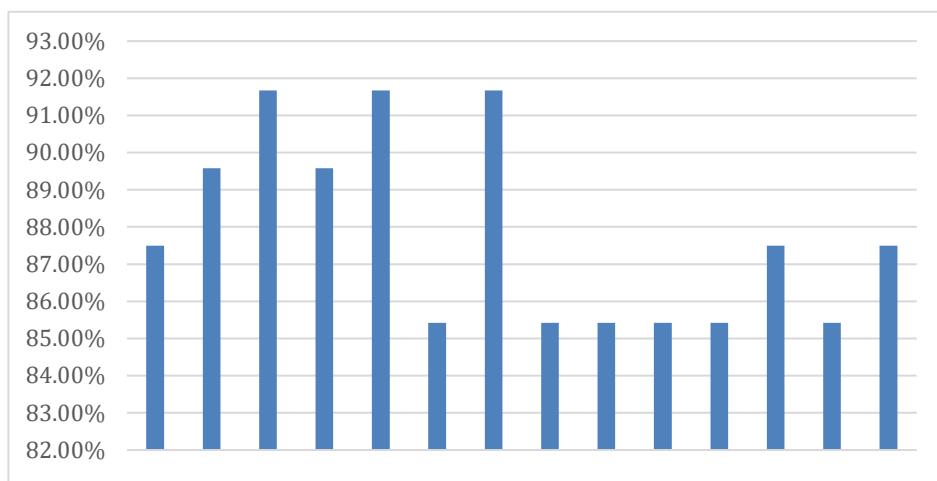


Figure 2. Parents' Questionnaire Results

The average feasibility score provided by parents was 87.80%, indicating that the sensorimotor stimulation flashcards fall within the very good category. This result confirms that the SISEMO flashcards are feasible and appropriate for use as a medium to enrich joint play activities between children and parents in the home environment.

2. Discussion

The high level of parental acceptance of the SISEMO Flashcard indicates that the product effectively addresses the primary issue identified during the needs analysis stage: parents' limited access to structured and meaningful play activity references. This finding reinforces previous research suggesting that active parental involvement, particularly when grounded in responsive practices, positively influences children's independence (Sapan & Musrini, 2024). As revealed during the preliminary phase of this study, play activities conducted at home were often unstructured, lacked clear developmental objectives, and tended to follow children's spontaneous preferences. This condition aligns with the findings of Mulyati and Suryani (2023), who reported that the use of appropriate and creative learning media enhances children's engagement and enthusiasm in play-based learning activities.

Parents play a critical role in fostering children's growth through interactive play. Black et al. (2017) emphasize that parental involvement in early stimulation contributes significantly to various aspects of child development, including sensory and motor development. Stimulation should be consistently provided across both school and home environments. Nurhayati et al. (2021) further assert that parents and teachers must collaboratively facilitate children's activities by preparing play experiences that support optimal development. Such activities can be implemented using simple, readily available household materials that children can directly see, touch, and manipulate. This approach aligns with Edgar Dale's Cone of Experience, which posits that learning is most effectively acquired through direct, concrete experiences before progressing toward more abstract representations (Arsyad, 2017).

From a developmental theory perspective, the findings of this study are consistent with Vygotsky's view of play as a primary medium for children's cognitive and social development (Edita et al., 2023). Play enables children to construct knowledge through social interaction and adult scaffolding. Within the context of the SISEMO Flashcard, parental involvement becomes more structured and intentional, as the flashcards provide clear activity guidance. Consequently, parent-child interactions are not merely spontaneous but are purposefully directed toward sensorimotor developmental goals. In this sense, the SISEMO Flashcard functions as a mediational tool that bridges play theory and practical home-based stimulation.

Sensorimotor development is a fundamental aspect of early childhood growth. Appropriate stimulation enhances children's gross and fine motor skills, coordination, and sensory integration. Accordingly, sensorimotor stimulation activities must be aligned with the developmental characteristics of children aged 4-5 years, as outlined in the Early Childhood Education (ECE) curriculum framework issued by the Ministry of Education, Culture, Research, and Technology of Indonesia (Kemendikbudristek, 2024). This framework emphasizes imagination, creativity, direct experiential learning, and the integration of cognitive, affective, artistic, and motor competencies. The activities embedded in the SISEMO Flashcard are designed in accordance with these principles, enabling children to explore, express ideas, and solve problems through concrete and meaningful experiences.

Positive child responses observed during individual, small-group, and large-group trials indicate that the activities presented in the SISEMO Flashcard successfully attract interest and sustain engagement during play. This finding supports the view that play constitutes the most appropriate learning approach for early childhood, as it facilitates the optimal development of multiple developmental domains (Fauziddin & Mufarizuddin, 2018). Children's enthusiasm during the activities corroborates the perspectives of Soepyanto (2018) and Petrovska et al. (2013), who assert that effective play activities involve bodily movement, provide novel experiences, and foster positive emotional states. Similarly, Etri and Pransiska (2021) emphasize that varied and engaging learning media enhance children's motivation and enthusiasm. The SISEMO Flashcard activities fulfill these criteria by integrating gross motor, fine motor, and sensory exploration within a structured play framework.

From a motor development standpoint, Solahuddin et al. (2023) describe motor development as a process through which children gradually acquire skilled control over bodily movements, with early childhood representing a critical period for motor learning opportunities. The findings of this study support Hurlock's (2014) theory that both internal and external factors, including environmental stimulation, influence motor development. The SISEMO Flashcard provides a rich stimulation environment through diverse, easily implemented activities using simple household materials. Frequent exposure to developmentally appropriate stimulation increases children's opportunities to enhance motor coordination, functional independence, and readiness for daily activities.

Furthermore, the findings align with the concept of sensory processing proposed by Benson et al. (2019), which emphasizes that children's ability to receive, process, and

respond to sensory stimuli is shaped by the quality of environmental experiences. The SISEMO Flashcard activities are intentionally designed to provide varied yet controlled sensory stimuli, supporting the development of adaptive responses. This approach is consistent with the multisensory nature of flashcard media, as noted by Sari et al. (2023), who state that flash cards provide a multisensory learning experience, combining visual stimulation with verbal reinforcement. Through the integration of visual cues from the cards and verbal guidance from parents, children engage in more meaningful and contextualized play experiences.

Multisensory experiences are particularly relevant in early childhood, as learning occurs through active engagement of the senses. Appropriate sensory stimulation enables children to understand their environment better and supports natural learning processes. Kurniawan et al. (2023) emphasize that sensory stimulation is essential in early childhood because children learn through what they see, hear, and feel during direct experiences. Accordingly, the sensorimotor activities presented in the SISEMO Flashcard function not only as play activities but also as developmental stimulation that prepares children for active participation in daily life and early childhood learning environments.

From an educational media perspective, the concise, practical, and visually engaging characteristics of flashcards contributed to the successful implementation of the product. According to Echols and Shadily (as cited in Akbar, 2022), flashcards function as memory aids that present information in a brief and accessible format. This view is supported by Rodiyana et al. (2022), who highlight flashcards' flexibility, ease of use, and visual appeal. Moreover, Hasanuddin and Prayoga (2025) demonstrate that flashcard media are effective in early childhood education because they promote active, interactive, and enjoyable learning experiences compared to conventional methods.

Despite these strengths, the present study differs fundamentally from previous research that predominantly employed flashcards for academic instruction or language stimulation. The SISEMO Flashcard is specifically developed as a sensorimotor play activity guide that positions parents as the primary users, rather than children alone. In doing so, this study expands the function of flashcards beyond visual learning tools into interactive media that support emotional and physical engagement between parents and children in the home environment.

Nevertheless, several limitations must be acknowledged. The implementation scope was limited, and the study did not quantitatively measure long-term improvements in children's sensorimotor developmental outcomes. Future research should therefore focus on evaluating the effectiveness of the SISEMO Flashcard through experimental designs, longitudinal assessments of child development, and broader implementation across diverse family contexts and early childhood education settings to strengthen the generalizability of the findings.

D. CONCLUSION

This study employed a research and development (R&D) approach to produce an educational product in the form of SISEMO Flashcards, designed to provide sensorimotor stimulation activities for parent-child play in the home environment. The flashcards were

developed using durable and child-safe 260 gsm art carton material and feature a two-sided format. One side presents an illustrative image and activity title, while the reverse side includes the required tools and materials, step-by-step activity instructions, and information on the developmental benefits. The flashcards are packaged in a zip-lock pouch to ensure durability and facilitate repeated use. The results of the development process indicate that the SISEMO Flashcards are highly feasible as a medium for enriching sensorimotor play activities for children aged 4–5 years at home. This conclusion is supported by expert validation results and the field practitioner, which fall within the highly feasible category and positive parental responses.

These findings suggest that the SISEMO Flashcards function effectively as a structured guide for sensorimotor play activities, promoting sustained parental involvement and supporting children's sensorimotor stimulation in the home setting. Future research is recommended to examine the effectiveness of the SISEMO Flashcards in improving children's sensorimotor developmental outcomes over extended periods and across more diverse family contexts, thereby strengthening empirical evidence and expanding the applicability of the product.

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