





Enhancing early childhood's fine motor development through educational games

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Abstract

This study investigates the effectiveness of educational game tools in developing fine motor skills among early childhood students at Kemala Bhayangkari 80 Sampang Kindergarten. Using a descriptive qualitative approach, it involved 15 children (ages 4-6), five teachers, and three parents over a six-month period through observations, interviews, and document analysis. Findings show that tools like plasticine, building blocks, puzzles, finger painting, picture books, and beading each uniquely support fine motor skills such as finger strength, coordination, and creative control. An average improvement of 40-45 points per tool type was observed. This study highlights the importance of a structured educational game-based curriculum, ongoing teacher training, and school-family collaboration to maximize tool efficacy. Future research is recommended to explore the long-term impact of educational game tools on children's academic performance and to assess the potential of technology-enhanced tools for fine motor skill development.

Keywords: educational game tools; early childhood; fine motor skills.

INTRODUCTION

Fine motor development in early childhood is a fundamental aspect in children's overall growth and development (Escolano-Pérez et al., 2020). Fine motor skills include the ability to perform small, precise movements, such as holding a pencil, tying shoelaces, or cutting with scissors (Kreutzer et al., 2011). These skills are essential because they affect a child's ability to carry out daily activities and prepare them for future academic tasks. According to various studies, children with good fine motor development tend to be more prepared to learn to write, draw, and do various activities requiring good eye-hand coordination (Jumiyati et al., 2023; Hafidz & Puspawati, 2022). Therefore, focusing on fine motor development in early childhood is an important investment in their early education.

Educational game tools (EGT) have a big role in early childhood learning, especially in developing fine motor skills (Isnaini & Katoningsih, 2022). Educational games are designed to provide appropriate stimulation for children through structured and fun play activities. Such as puzzle games, building blocks, and construction toys not only help children understand basic concepts such as shapes, colors, and sizes, but also train hand-eye coordination and small muscle strength. In educational settings, Educational games are effective tools to

combine learning and play elements to attract children's interest and keep them engaged in the learning process. The use of educational games in the Childhood Education curriculum is a relevant strategy to support children's holistic development.

Various literature shows that the use of educational game tools has a significant positive impact on the development of fine motor skills in early childhood. The results of studies conducted by Nijhof et al., (2018) and (Yogman et al., 2018) emphasize the importance of play in children's cognitive and physical development. Several recent studies have also revealed that children who are often involved in educational game activities show an increase in fine motor skills (Lisa et al., 2020; Arisanti et al., 2022; Tauriana & Retno, 2023). These facts emphasize the importance of integrating educational game tools in early childhood education.

Although various studies have shown the effectiveness of educational game tools in developing fine motor skills, there is still a gap in understanding the implementation of educational game tools in the context of local education, especially in the Madura region. Kemala Bhayangkari 80 Sampang Kindergarten, as one of the early childhood education institutions in Madura, has never been the subject of similar research. This study aims to fill this gap by identifying the use of educational game tools in developing fine motor skills of early childhood in the kindergarten. Particular focus is given to understanding how educational game tools are integrated into daily activities and their impact on children's fine motor development.

This research aims to identify the use of educational game tools in developing fine motor skills of young children at Kindergarten Kemala Bhayangkari 80 Sampang. This research focuses on the local educational context seeking to understand the extent to which educational game tools is used in daily activities in the kindergarten and how it affects children's fine motor development. This research also aims to identify the most effective educational game tools to use in stimulating children's fine motor skills as well as the obstacles and challenges faced by educators when implementing educational game tools in the learning process. The results of this research can be valuable recommendations for curriculum development and better educational practices at early childhood education institutions, especially at Kemala Bhayangkari 80 Sampang Kindergarten.

The main argument to be proven in this research is that the use of educational game tools can significantly develop fine motor skills in young children, but not all educational game tools can develop fine motor skills to the maximum. This research will also explore the factors

that influence the effectiveness of educational game tools in the educational context at Kindergarten Kemala Bhayangkari 80 Sampang, including support from teachers, availability of resources, and parental involvement. The novelty of this research lies in its specific focus on Kindergarten Kemala Bhayangkari 80 Sampang, which has not been studied much before, as well as its comprehensive approach in evaluating the use of educational game tools in the local educational context.

METHOD

This study uses a descriptive qualitative approach to identify the use of educational play tools in developing fine motor skills of early childhood at Kemala Bhayangkari 80 Sampang Kindergarten. The research subjects were selected using a purposive sampling technique with a total of 15 children aged 4-6 years (8 girls and 7 boys), 5 teachers with at least 3 years of teaching experience, and 3 parents who were actively involved in school programs. Data collection was carried out for 2 months using three main techniques. First, participatory observation was conducted 3 times a week with a duration of 2 hours per session, where researchers directly observed learning activities involving educational play tools and children's interactions with these tools using structured observation sheets. Second, semi-structured interviews were conducted with teachers (2 times per teacher, duration 60-90 minutes) and parents (3 times during the study, duration 45-60 minutes) regarding the effectiveness of educational play tools. Third, document analysis included a review of the school curriculum, daily lesson plans, child development records, portfolios of children's work, and photo documentation of learning activities.

The data analysis process was conducted descriptively through four systematic stages: data collection, data reduction, data presentation, and drawing conclusions. Data from observations and interviews were transcribed and analyzed to identify key themes related to the use of educational game tools. To ensure the validity of the data, this study used three triangulation techniques, namely source triangulation which was carried out by comparing data from teachers, parents, and direct observation. Method triangulation was applied by matching observation data with interview results and existing documents, and time triangulation through observations at different times to compare the consistency of information. Data validity was also strengthened through discussions with colleagues and re-checking with research participants (member checking).

RESULTS AND DISCUSSION

The implementation of educational game tools at Kemala Bhayangkari 80 Sampang Kindergarten shows a systematic and integrated approach in the learning curriculum. Teachers use various types of Educational Games strategically, where plasticine is the most intensively used tool to facilitate fine motor development through manipulative activities involving precision movements and finger strength control. The use of building blocks complements this program with a focus on the development of visual-motor coordination and understanding of spatial concepts that help children develop planning skills and understanding of the concept of balance. Puzzles play an important role in developing eye-hand coordination and visual problem-solving skills, while finger painting offers a comprehensive sensory experience in fine motor development through artistic exploration and motor control.

Picture books and beading activities enrich the fine motor development program with a different approach. The use of picture books integrates fine motor development with emergent literacy through page-opening and picture-pointing activities, while building social-emotional interactions and conceptual understanding. Beading activities are implemented to improve motor precision and sequential understanding, with complexity that can be adjusted according to the child's developmental level. These two activities not only support fine motor development but also facilitate children's cognitive and social-emotional development.

Educational game-based learning planning is carried out systematically with specific learning objectives for each session. Teachers design and integrate various types of games in formal and informal learning supported by a scaffolding system that ensures children understand the objectives and procedures for using the game. Observations show a high level of involvement and enthusiasm from children, with significant improvements in attention and concentration, especially in activities that require precision. A comprehensive monitoring system allows teachers to conduct continuous evaluation and adjustment of learning strategies according to individual needs. This program is strengthened by active collaboration between schools and parents through workshops and structured educational sessions, thus creating continuity in the use of educational games between the school and home environments. Data shows an increase in children's involvement in fine motor development activities in both environments that are positively correlated with the development of children's overall skills. Despite facing challenges in terms of resource management and professional development, schools overcome this through ongoing professional development

programs and structured resource management systems to ensure the sustainability and effectiveness of the Educational Game-based fine motor development program.

Development of Children's Fine Motor Skills After Using Educational Game Tools

This study revealed that the use of educational play tools in Kemala Bhayangkari 80 Kindergarten Sampang contributed to the development of children's fine motor skills. After a period of using educational game tools integrated into learning activities, there was a significant increase in children's fine motor skills. Observations and evaluations conducted by teachers showed that children who were actively involved in using educational game tools such as plasticine, building blocks, puzzles, finger painting, picture books, and stringing experienced significant progress in their ability to control hand and finger movements.

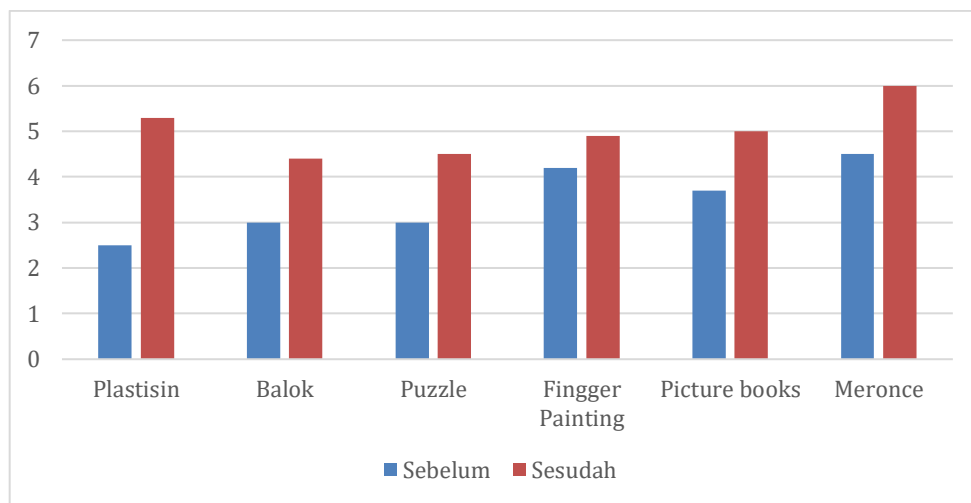


Fig 1: Comparison of fine motor skills before and after using educational game tools

Based on **Fig 1**, a comparison of children's fine motor skills before and after the use of APE at Kemala Bhayangkari 80 Sampang Kindergarten is shown. The data shows a significant increase in all types of educational game tools used. The highest increase was seen in the use of stringing (from 4.5 to 6.0) and plasticine (from 2.5 to 5.2). Meanwhile, finger painting showed an increase from 4.2 to 4.8, picture books increased from 3.8 to 5.0, puzzles from 3.0 to 4.5, and blocks from 3.0 to 4.4. These results indicate that stringing and plasticine activities that involve material manipulation and require high precision have the greatest impact on the development of children's fine motor skills. Overall, all types of educational game tools showed effectiveness in improving fine motor skills, with an average increase of 1.5 points from the initial condition.

Children who use plasticine regularly show increased strength and flexibility in their fingers. They become more skilled at forming plasticine into various objects, indicating increased manipulative abilities and fine motor control. This activity has been confirmed by the results of research by Safari et al., (2023) and Nuareni et al., (2023) which revealed that playing with manipulable materials such as plasticine is very effective in developing fine motor skills. They noted that this activity not only strengthens the small muscles in the hands but also improves the coordination needed for academic tasks such as writing.

The use of building blocks also has a significant positive impact. Researchers observed progress in children's ability to arrange blocks into complex and stable structures. These skills reflect improvements in planning, problem solving, and eye-hand coordination. Building blocks help children understand the concepts of balance and proportion, which are important foundations for future understanding of mathematics and science. Research conducted by Hudson et al., (2021) also shows that participating in cognitively challenging motor skills activities improves motor skills, executive function, and early numeracy skills in preschool-aged children.

Puzzles are also one of the educational games used at Kemala Bhayangkari 80 Sampang Kindergarten. Based on the researcher's findings, children who are often involved in puzzle-making activities show better abilities in recognizing shapes, colors, and images. They also become more adept at solving problems and thinking logically. This improvement can be seen from the child's ability to complete puzzles with a higher level of difficulty in a shorter time, indicating an increase in concentration and accuracy. This finding is in line with cognitive theory which states that puzzle-assembling activities not only train eye-hand coordination but also develop critical and analytical thinking skills (Ramesh et al., 2022).

Apart from providing an opportunity to express creativity for children, researchers have found a positive impact on fine motor development. Children become more skilled at controlling their finger movements to create patterns and images. It also strengthens sensory abilities, as they learn to recognize and control different textures and colors. This activity involves intense sensory exploration, which contributes to children's understanding of the physical differences between materials, as well as improving hand-eye coordination and manipulative skills. This finding is in line with research conducted by The Korean Society of Cognitive Therapeutic Exercise et al., (2022), which found that activities involving sensory exploration can improve eye-hand coordination and manipulative skills in children.

Picture books help children improve finger dexterity through page-opening activities and pointing to pictures. In addition, interaction with picture books also stimulates language development and early literacy skills. Children who frequently engage in picture book reading activities show improvements in vocabulary and storytelling abilities, which contribute to their cognitive and social development. Several previous studies revealed that children who are frequently involved in picture book reading activities show significant increases in vocabulary and storytelling abilities, which contribute to cognitive and social development (Mesmer, 2016; Ratnasari, 2020; Chen & Huang, 2023).

The latest researcher's findings at Kemala Bhayangkari 80 Sampang Kindergarten are educational game tools in the form of *Meronce*, which is an activity involving arranging and tying small objects that play a role in the development of precision motor control and basic cognitive skills. This activity strengthens children's fine motor skills and teaches basic mathematical concepts such as sequences and patterns. Vygotsky's theory of the Zone of Proximal Development (ZPD) supports the idea that children can achieve more complex skills with guidance, and *meronce* is a concrete example where children learn to organize and follow patterns with help or guidance. Pires et al., (2019) also found that activities such as *meronce*, which involves manipulating small objects, can improve children's ability to organize and organize, which are important skills in understanding basic mathematical concepts.

Table 1. Descriptive analysis of the development of children's fine motor aspects through the use of APE at Kemala Bhayangkari 80 Kindergarten, Sampang

<i>Types of Educational Game Tools</i>	<i>Before using educational game tools</i>	<i>After using educational game tools</i>
Plasticine	Low manipulative skills, weak hand-eye coordination	Increased finger strength and flexibility, better fine motor control
Stacking Blocks	Difficulty in assembling structures, lack of understanding of balance	Improved ability to assemble complex structures, better understanding of concepts like balance and proportion
Puzzle	Difficulty recognizing shapes, colors, and images; poor problem solving	Ability to recognize shapes, colors, and images improves; problem solving improves
Finger Painting	Poor finger movement control, limited creative expression	Better finger movement control, increased creative expression
Picture Book	Weak hand-eye coordination, low interest in reading	Improved hand-eye coordination, increased interest in reading, better storytelling skills
Beading	Low precision motor control, difficulty following patterns	Improved precision motor control, better ability to follow patterns and sequences

Plasticine (Duplicate)	Low manipulative skills, weak hand-eye coordination	Increased finger strength and flexibility, better fine motor control
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Supporting and Inhibiting Factors in The Use of Educational Game Tools

Analysis of the implementation of educational game tools at Kemala Bhayangkari 80 Kindergarten, Sampang identified several factors that influenced the effectiveness of their use. High teacher commitment is the main supporting factor, reflected in their dedication to designing educational game-based learning and developing competencies through ongoing training. Support from school leadership in providing quality educational game resources and facilities strengthens the implementation of this program. This is in line with the input-process-output model by Nyirenda, (2021). which emphasizes that the availability of adequate resources affects the learning process and outcomes. Parental involvement in school programs and the continuity of the use of educational game tools at home also contribute to optimizing child development.

However, several obstacles were found in the implementation of educational game tools. Budget constraints are the main challenge that affects the variety and quality of educational game tools, including aspects of maintenance and periodic replacement. Given the density of academic and administrative activities, the complexity of time management in integrating educational games into learning activities is also an obstacle. The disproportionate teacher-student ratio also affects the effectiveness of individual assistance in the use of educational game tools.

This study reveals the urgency of continuous professional development for teachers in optimizing the use of Educational Game Tools. Although training programs have been implemented, improving teacher competency is still needed to ensure effective implementation of Games. This is relevant to the constructivist learning theory that emphasizes the role of teachers as facilitators in creating a learning environment that supports children's active exploration with Educational Game Tools. Based on these findings, several strategic solutions are recommended. Diversifying funding sources through sponsorship programs, donations, or grants can overcome budget constraints. Innovation in the development of Educational Games using local materials is a potential alternative. Curriculum restructuring that systematically integrates Educational Games and continuous teacher competency development through stakeholder collaboration will support program effectiveness. These recommendations support various research results that emphasize the

importance of structural and professional support in the implementation of Educational Game Tools in early childhood education.

The Effectiveness of Using Educational Game Tools in Developing Children's Fine Motor Skills

The use of EGT in efforts to develop children's fine motor skills at Kindergarten Kemala Bhayangkari 80 Sampang was identified as effective in developing fine motor skills in early childhood. Based on the observations and evaluations, children actively involved in various types of educational game tools such as plasticine, building blocks, puzzles, finger painting, picture books, and *meronce* showed significant improvements in their fine motor skills. This finding is in line with several research results which state that play is an important means for children's physical and cognitive development (Boni et al., 2023; Yogman et al., 2018; Nijhof et al., 2018). The interpretation of these findings is that consistent use of educational game tools can create a learning environment that simultaneously supports children's motor and cognitive development.

Plasticine, for example, has been proven to be effective in increasing the strength and flexibility of children's fingers through the activity of forming and manipulating the flexible material. This activity not only strengthens the small muscles in the hands but also improves hand-eye coordination, which is essential for academic tasks such as writing and drawing. These findings support research by Kusuma, et al., (2018) which shows that manipulative activities with flexible materials can develop fine motor skills effectively. This shows that plasticine is a play medium and a significant learning tool for developing essential skills that support future academic success.

Apart from plasticine, building blocks also make a big contribution to the development of fine motor skills. Children who engage in block-building activities show improvements in their ability to plan, solve problems, and build stable structures. These skills reflect an increased understanding of the concepts of balance and proportion, supporting cognitive development. According to Vygotsky's theory, interaction with physical objects through constructive games, such as building blocks, can enable children to internalize basic mathematical concepts, thereby strengthening their logical and critical thinking abilities (Luong, 2022). This indicates that building blocks not only aid motor development but also provide a strong foundation for the development of more complex cognitive skills.

Puzzles are also an effective play tool in honing children's ability to recognize shapes, colors, and images and improving problem-solving and logical thinking skills. Children who

often play puzzles show better abilities in completing puzzles with higher levels of difficulty in a shorter time. This is in line with research Sari et al., (2018) which shows that puzzle games can improve cognitive and fine motor skills because they involve intense processes of critical thinking and problem-solving. These findings provide confirmation that puzzles can serve as an effective pedagogical tool for developing analytical and problem-solving skills in children from an early age.

Finger painting offers the added benefit of practicing controlled finger movements and creative expression. This activity not only develops fine motor skills but also strengthens children's sensory abilities through the exploration of texture and color. Children who engage in finger painting show improvements in visual-spatial abilities and creativity. Cristiana Normalita De Lima et al., (2023) and Binsa & Diyanah, (2022) state that visual arts can improve children's spatial and kinesthetic intelligence. This shows that finger painting stimulates creativity and develops spatial skills that are important in many aspects of daily life.

Picture books also have an important role in developing fine motor skills by opening pages and pointing to pictures, stimulating interest in reading and storytelling abilities. Children who frequently interact with picture books show improvements in vocabulary and communication skills. This is in line with research by Sun, (2022) which found that exposure to picture books at an early age can improve children's literacy and language skills. Picture books can serve as a bridge between fine motor development and literacy skills, both of which are essential for future academic and social success.

Meronce, which involves the activity of arranging and tying small objects, has also proven to be very effective in developing precision motor control. Children who frequently engage in *meronce* activities show increased abilities in arranging and organizing small objects and following patterns and sequences. This activity also teaches basic math concepts, such as sequences and patterns, which are important for their cognitive development. Bruner's theory supports these findings by stating that manipulation of small objects can strengthen children's understanding of abstract concepts through direct experience (Jeung & Kellogg, 2019). The interpretation of these findings is that they develop fine motor skills and integrate mathematics learning in play activities, creating a holistic learning approach.

CONCLUSION

This study proves that the use of educational game tools in Kemala Bhayangkari 80 Sampang Kindergarten is effective in developing fine motor skills in early childhood. Various

types of Educational Game Tools such as plasticine, building blocks, puzzles, finger painting, picture books, and beading provide unique contributions to children's fine motor skills development. The implementation of Educational Game Tools carried out systematically and integrated into the daily curriculum, supported by teacher commitment and parental involvement, showed a significant increase in children's fine motor skills, with an average increase of 40-45 points for each type of Educational Play Tools.

The findings of this study have practical implications for the development of early childhood education programs. First, there is a need for the development of a structured and systematic Educational game Tools curriculum. Second, the importance of improving teacher competence in the use of Educational game Tools through ongoing professional development programs. Third, there is a need to strengthen collaboration between schools and parents in optimizing the use of Educational Games. For further research, it is recommended to conduct a longitudinal study on the long-term impact of the use of Educational Play Tools on children's academic achievement, as well as explore the effectiveness of technology integration in the development of fine motor skills in early childhood.

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REFERENCES

- Binsa, U. H. B., & Diyanah, S. D. (2022). Upaya Meningkatkan Kecerdasan Visual Spasial Melalui Kegiatan Melukis Pada Media Talenan Kelompok B Tk Pgri 3 Ngawi Desa Mangunharjo Kecamatan Ngawi Kabupaten Ngawi Tahun Pelajaran 2021/2022. *Kurikula : Jurnal Pendidikan*, 6(2), 67–88. <https://doi.org/10.56997/kurikula.v6i2.701>
- Boni, C., Zancan, S., Piccoli Diehl, R., Larissa Da Silva Flores, J., Raque Faccin, T., Possa Moreschi, M., & Scalcon Dos Santos De Lima, M. (2023). The importance of playing in childhood education. *Revista Gênero e Interdisciplinaridade*, 4(04), 412–418. <https://doi.org/10.51249/gei.v4i04.1510>

- Chen, M., & Huang, Y.-C. (2023). Analysis on the Role of Picture Books in Children's Cognitive Development Education. *Educational Administration: Theory and Practice*, 30(1), 125–140. <https://doi.org/10.52152/kuey.v30i1.767>
- Cristiana Normalita De Lima, Dharma Gyta Sari Harahap, Muh. Rafi'y, Ferry Irawan, & Rivaldo Paul Telussa. (2023). Improving Spatial Visual Intelligence in Merauke Kindergarten Group B Children Using Finger Painting Techniques. *Technium Social Sciences Journal*, 49(1), 434–441. <https://doi.org/10.47577/tssj.v49i1.9838>
- Escolano-Pérez, E., Herrero-Nivela, M. L., & Losada, J. L. (2020). Association Between Preschoolers' Specific Fine (But Not Gross) Motor Skills and Later Academic Competencies: Educational Implications. *Frontiers in Psychology*, 11, 1044. <https://doi.org/10.3389/fpsyg.2020.01044>
- Hafidz, N., & Puspawati, D. (2022). The Influence of Drawing Activities on the Performance of Fine Motoric in Children aged 5-6 Years. *Jurnal Educative: Journal of Educational Studies*, 7(2), 185. <https://doi.org/10.30983/educative.v7i2.4295>
- Hudson, K. N., Ballou, H. M., & Willoughby, M. T. (2021). Short report: Improving motor competence skills in early childhood has corollary benefits for executive function and numeracy skills. *Developmental Science*, 24(4), e13071. <https://doi.org/10.1111/desc.13071>
- Isnaini, R., & Katoningsih, S. (2022). Problematics of Improving Fine Motor Abilities of Children Age 5-6 Years. *Early Childhood Research Journal (ECRJ)*, 4(1), 58–64. <https://doi.org/10.23917/ecrj.v4i1.11857>
- Jeung, H. H., & Kellogg, D. (2019). A story without SELF: Vygotsky's pedagogy, Bruner's constructivism and Halliday's construalism in understanding narratives by Korean children. *Language and Education*, 33(6), 506–520. <https://doi.org/10.1080/09500782.2019.1582663>
- Jumiyati, Dian Eka Priyantoro, & Uswatun Hasanah. (2023). Implementation of Coloring Activities Early Childhood in Developing Fine Motor Skills. *Journal of Childhood Development*, 3(1), 1–12. <https://doi.org/10.25217/jcd.v3i1.3139>
- Kreutzer, J. S., DeLuca, J., & Caplan, B. (Eds.). (2011). Fine Motor Skills. In *Encyclopedia of Clinical Neuropsychology* (pp. 1048–1048). Springer New York. https://doi.org/10.1007/978-0-387-79948-3_4660

- Lisa, M., Mustika, A., & Lathifah, N. S. (2020). Alat Permainan Edukasi (APE) Meningkatkan Perkembangan Motorik Halus pada Anak Usia 4-6 Tahun. *Jurnal Kesehatan*, 11(1), 125. <https://doi.org/10.26630/jk.v11i1.1584>
- Luong, P. A. (2022). Applying the Concepts of “Community” and “Social Interaction” from Vygotsky’s Sociocultural Theory of Cognitive Development in Math Teaching to Develop Learner’s Math Communication Competencies. *Vietnam Journal of Education*, 6(3), 209–215. <https://doi.org/10.52296/vje.2022.243>
- Mesmer, H. A. E. (2016). Text matters: Exploring the lexical reservoirs of books in preschool rooms. *Early Childhood Research Quarterly*, 34, 67–77. <https://doi.org/10.1016/j.ecresq.2015.09.001>
- Ni Kadek Dian Arisanti, Anak Ayu Nyoman Trisna Narta Dewi, & Agung Wiwiek Indrayani. (2022). The Effect of Puzzle-playing on Fine Motor Development in Preschool Children. *Physical Therapy Journal of Indonesia*, 3(2), 54–57. <https://doi.org/10.51559/ptji.v3i2.55>
- Nijhof, S. L., Vinkers, C. H., Van Geelen, S. M., Duijff, S. N., Achterberg, E. J. M., Van Der Net, J., Veltkamp, R. C., Grootenhuis, M. A., Van De Putte, E. M., Hillegers, M. H. J., Van Der Brug, A. W., Wierenga, C. J., Benders, M. J. N. L., Engels, R. C. M. E., Van Der Ent, C. K., Vanderschuren, L. J. M. J., & Lesscher, H. M. B. (2018). Healthy play, better coping: The importance of play for the development of children in health and disease. *Neuroscience & Biobehavioral Reviews*, 95, 421–429. <https://doi.org/10.1016/j.neubiorev.2018.09.024>
- Nuareni, I., Nuriska, S., & Fitrunnisa, S. (2023). Permainan Lilin Plastisin Sebagai Stimulasi Motorik Halus Anak dalam Persiapan Menulis. *Indonesian Journal of Society Engagement*, 3(3). <https://doi.org/10.33753/ijse.v3i3.111>
- Nyirenda, M. K. (2021). Impact of Resource Distribution and Availability on Primary Schools Pupil Learning Outcomes: Case Study of Chintheche Education Zone, Nkhata Bay, Malawi. *Journal of Development and Communication Studies*, 8(1), 239–260. <https://doi.org/10.4314/jdcs.v8i1.12>
- Pires, A. C., González Perilli, F., Bakala, E., Fleisher, B., Sansone, G., & Marichal, S. (2019). Building Blocks of Mathematical Learning: Virtual and Tangible Manipulatives Lead to Different Strategies in Number Composition. *Frontiers in Education*, 4, 81. <https://doi.org/10.3389/educ.2019.00081>
- Ramesh, P., Devadas, A., Joshua, T., Ray, P., Ramesh, S., Ramesh, M., & Rajasekaran, R. (2022). 3D printing ophthalmology related models for enhancing learning through the concept

- of puzzle assembly—A comprehensive self-learning tactile tool kit. *Indian Journal of Ophthalmology*, 70(4), 1384. https://doi.org/10.4103/ijo.IJO_2593_21
- Ratnasari, E. M. (2020). The Influence of Picture Book to the Storytelling skill of Preschool Children. *Indonesian Journal of Early Childhood Education Studies*, 9(1), 8–12. <https://doi.org/10.15294/ijeces.v9i1.37805>
- Safari, G., Al Syurfah, Z., Yusfar, K., & Pujiastuti, L. (2023). The Effect of Playing Plasticine on the Fine Motor Development of Children Aged 4-6 Years in Kindergarten. *KESANS: International Journal of Health and Science*, 2(12), 973–986. <https://doi.org/10.54543/kesans.v2i12.223>
- Sari, Y. K., Sukartiningsih, W., & Jannah, M. (2018). The Effect of Geometric Puzzle Game Towards Children's Recognition of Geometric Shapes and Fine Motor. *Proceedings of the 2nd International Conference on Education Innovation (ICEI 2018)*. Proceedings of the 2nd International Conference on Education Innovation (ICEI 2018), Surabaya, Indonesia. <https://doi.org/10.2991/icei-18.2018.75>
- Stkip Kusuma Negara Jakarta., Maharani, N., Jannah, M., & Stkip Kusuma Negara Jakarta. (2018). THE EFFECT OF CONSTRUCTIVE PLAY WITH CLAY MEDIA TOWARDS FINE MOTOR SKILL OF CHILDREN. *International Journal of Advanced Research*, 6(3), 87–94. <https://doi.org/10.21474/IJAR01/6653>
- Sun, C. (2022). Enhancing Picture Book Reading for Young EFL Learners. *Education Reform and Development*, 4(2), 1–7. <https://doi.org/10.26689/erd.v4i2.4527>
- Tauriana & Retno Palupi Yonni Siwi. (2023). The Influence of Playdough on Increasing Fine Motoric Movement in the Fingers of 5 Year Old Children at Ar-Ruhama' Kindergarten and Independent Pkk Kindergarten, Patokan Village, Bantaran District, Probolinggo Regency. *Journal of Global Research in Public Health*, 8(1), 26–32. <https://doi.org/10.30994/jgrph.v8i1.426>
- The Korean Society of Cognitive Therapeutic Exercise, Oh, J.-H., & Ahn, S.-N. (2022). Effects of Sensory Integration and Manipulation Activities on Postural Control and Eye-Hand Coordination in Children With Down Syndrome. *The Korean Society of Cognitive Therapeutic Exercise*, 14(2), 77–86. <https://doi.org/10.29144/KSCTE.2022.14.2.77>
- Yogman, M., Garner, A., Hutchinson, J., Hirsh-Pasek, K., Golinkoff, R. M., committee on psychosocial aspects of child and family health, council on communications and media, Baum, R., Gambon, T., Lavin, A., Mattson, G., Wissow, L., Hill, D. L., Ameenuddin, N., Chassiakos, Y. (Linda) R., Cross, C., Boyd, R., Mendelson, R., Moreno, M. A., ... Smith, J.

(2018). The Power of Play: A Pediatric Role in Enhancing Development in Young Children. *Pediatrics*, 142(3), e20182058. <https://doi.org/10.1542/peds.2018-2058>