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STEAM Broidery Kit Developing a Traditional Embroidery Kit as a STEAM Based Teaching and Learning Tool for Early Childhood Visual Arts Education

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Abstract

This study creates the STEAMbroidery Kit, an innovative teaching resource that integrates traditional Malaysian embroidery with STEAM education principles to promote preschool learning. Guided by Vygotsky's Constructivist Theory, the Project-Based Learning (PBL) method, and the ADDIE instructional design model, this qualitative case study engaged ten preschool instructors and domain specialists. Data acquired through semi-structured and unstructured interviews were analyzed thematically using the Miles and Huberman framework. Findings suggest that the kit efficiently supports holistic child development by fostering creativity, fine motor coordination, problem-solving, and cultural understanding. Activities such as Thread Lab and Stitch & Count correspond with the National Preschool Curriculum Standard (KSPK, 2017) and Sustainable Development Goal 4 (Quality Education). Expert evaluations affirmed its teaching relevance, usability, and safety. Overall, the STEAMbroidery Kit demonstrates a culturally grounded, multidisciplinary approach that promotes early childhood education while conserving Malaysia's creative and cultural history.

Keywords: Early Childhood Education, STEAM Learning, Constructivist Theory, Project-Based Learning, Traditional Crafts, Cultural Heritage, Malaysia

Introduction

In early childhood education, excellent resources for teaching and learning are very important for building a strong foundation. UNESCO (2024) says in their study Transforming Education Towards SDG 4 that it is important to use curricula and teaching methods that encourage creativity, critical thinking, and problem-solving. Adding environmental sustainability, socio-emotional skills, and digital resources to education can help kids today grow and learn in a more well-rounded way. Additionally, assessment methods must go beyond just learning to include evaluations based on skills.

From birth to age 8, a child's cognitive development begins. During this time, children are more aware of their surroundings. At this stage, children experience significant development and require structured education. Their growth encompasses systematic behavioral modifications that promote maturation in physical, mental, social, and emotional domains (Azizi, 2022). The changes are qualitative and influenced by biological factors, nutrition, and environmental conditions, promoting psychomotor, cognitive, and emotional development. Piaget's theory posits that during the preoperational stage (ages 2-7), children transition from motor activities to cognitive processes, beginning to utilise symbols to represent objects, while still contending with egocentrism and the understanding of others' perspectives. This stage is good for creative play that helps kids learn how to express themselves (Levine & Munsch, 2018).

Additionally, sensory integration, which includes touch, hearing, and vision, is necessary for the development of complex skills, such as motor and cognitive abilities. These sensory traits boost creativity, school performance, social interaction, and self-confidence (Ticktin, 2022). High-quality early childhood education helps kids learn, feel good about themselves, and fit in with others by focusing on developing their sensory and functional skills. Education helps kids grow by developing a wide range of skills.

High-quality instructional materials are essential for fostering holistic development. These materials augment learning efficacy and professional advancement by enabling educators to produce resources customized to classroom requirements. This corresponds with the SDG 4 objective of fostering lifelong learning, ensuring that education provides individuals with the necessary tools and skills to succeed in life and work (Tham, 2023). Effective education fosters human development and enhances national progress.

This study focuses on the obstacles experienced in incorporating traditional crafts into preschool education through a STEAM approach in Malaysia. Although national regulations such as the National Preschool Curriculum Standard (KSPK 2017) encourage holistic and culturally based learning, classroom implementation is restricted and inconsistent. Activities like paper weaving are infrequently done since many youngsters' struggle with fine motor skills and teachers lack adequate expertise and confidence in traditional crafts. This environment lowers opportunities for meaningful learning experiences that encourage creativity, problem solving, and cultural appreciation. According to Vygotsky's Constructivist Theory, effective scaffolding by teachers is crucial for young learners to master new abilities, although the absence of training and resources inhibits this process (Vygotsky, 1978; OECD, 2025).

Research indicates that art and craft activities boost cognitive, emotional, social, and motor development in early children (Zosh et al., 2022; Roseli et al., 2024). However, the incorporation of traditional crafts such as embroidery in preschool settings remains low compared to newer STEM-based kits like robotics or augmented reality (Hanafi et al., 2021; Tee, 2022). Studies by Ghazali et al. (2023) and Zahiroh et al. (2022) reveal that preschool STEAM initiatives generally depend on teachers' inventiveness, with minimal professional assistance or systematic guidance. As a result, many teachers are unclear about how to apply STEAM concepts successfully and lack relevant teaching resources.

A key contributing reason is the limited development of culturally grounded instructional tools that bridge traditional craft techniques with current STEAM education. While regulations like as the National Cultural Policy (DKN 2021) and worldwide frameworks like SDG4 support creativity and heritage preservation, these aims are not fully achieved in early education. Therefore, this project intends to build a STEAM-based embroidery kit to increase fine motor abilities, creativity, and cultural awareness while boosting preschool teachers' pedagogical practices in Malaysia.

Therefore, this study aims to develop a STEAMbroidery Kit, a teaching and learning resource that integrates traditional embroidery with STEAM principles, to support preschool educators in delivering creative, culturally meaningful, and developmentally appropriate learning experiences.

The objectives of this study are:

1. To identify essential components in designing a STEAM-based embroidery kit aligned with the National Preschool Curriculum (KSPK).
2. To develop the embroidery kit as a teaching tool that incorporates interdisciplinary STEAM elements.
3. To validate the usability and relevance of the kit through expert evaluations in early childhood education, visual arts, and traditional craft fields.

Literature Review

The effectiveness of early childhood education relies greatly on preschool teachers' expertise of curriculum design, pedagogy, and professional skills. However, many constraints such as poor training, restricted access to resources, and minimal administrative support sometimes inhibit quality teaching and learning methods. Kozak et al. (2024) noted that preschool teachers must continuously adapt to pedagogical innovations and technology to increase their instructional competency. Similarly, Roslin et al. (2023) observed that many Malaysian preschool instructors struggle to effectively follow the National Preschool Curriculum Standard (KSPK) due to lack specialized training. Sharim et al. (2023) further observed that professional development programs often fail to fit with current educational demands, underlining the necessity of structured and appropriate training frameworks to improve teaching quality.

Learner-centered pedagogies, particularly Project-Based Learning (PBL) and play-based learning, have emerged as successful techniques for boosting holistic child development. Wai Leng et al. (2021) demonstrated that PBL promotes autonomy, teamwork, and problem-solving skills, coinciding with Piaget's constructivist learning theory and Vygotsky's scaffolding technique. Annet (2024) similarly stated that play-based learning develops children's creativity and emotional intelligence while anchoring cultural and social learning experiences. Nonetheless, few research in Malaysia have explored how traditional crafts might be integrated into these active learning methods to improve engagement and creativity in preschool contexts.

Integrating the arts with STEM forming STEAM has shown to be a transformative teaching technique that promotes creativity and interdisciplinary learning. Spieler and Krnjic (2021) shown through the Code'n'Stitch curriculum that integrating coding and embroidery stimulates computational thinking and innovation among learners. Likewise, Grace et al.

(2021) discovered that integrating visual arts and science promotes conceptual understanding and imagination. Despite these encouraging findings, present research mostly focuses on digital and visual art forms, leaving a void in studying how traditional crafts such as embroidery could serve as an effective medium for STEAM learning in early school.

The use of interactive learning kits has also been found to increase children's cognitive, motor, and problem-solving skills. Jaafar et al. (2022) found that the My Fimoki kit boosted handwriting through fine-motor exercises, while Chung-Oi (2023) and Chaldi and Mantzanidou (2021) highlighted the benefits of robotics kits in fostering scientific inquiry and algorithmic thinking. However, contemporary literature remains scant about learning kits that combine cultural heritage or traditional crafts, particularly within Malaysian preschools.

In summary, previous research underscores the significance of teacher competence, innovative pedagogies, and the incorporation of the arts within STEAM education; however, there exists a substantial deficiency in the combination of traditional crafts with early childhood education. The safeguarding of Malaysian cultural heritage via craft-based learning remains inadequately explored. This study addresses the identified gap by developing a culturally responsive STEAM-based embroidered learning kit aimed at enhancing teachers' pedagogical practices while fostering creativity, fine motor skills, and an appreciation for traditional heritage in preschool children.

Methodology

This research utilized a qualitative methodology to investigate the creation and execution of a STEAM-oriented embroidery kit within real preschool settings. An instrumental case study was selected to clarify the issue instead of concentrating on a singular unique instance, thereby enhancing depth and practical knowledge for the development and assessment of the kit (Stake, 1995; Yin, 2017). In phase one, a purposive sample of 10 preschool teachers from the state of Perak, Malaysia, with diverse training, tenure, school types, and ethnic backgrounds, was utilized to identify critical kit characteristics and classroom challenges. Phase two utilized snowball sampling to recruit domain experts for usability validation until information redundancy was attained, thereby improving credibility through varied perspectives (Creswell and Poth, 2018). The only tools used were semi-structured and unstructured interviews, which were reviewed by academic experts. Permissions were obtained from the appropriate authorities, and protocols conformed to the principles of informed consent, confidentiality, and voluntary participation.

The data were examined utilizing the Miles and Huberman interactive cycle of data condensation, display, and conclusion verification, enhanced with thematic coding in Atlas.ti and a focus on contextual keywords to reveal patterns associated with the research objectives (Miles, Huberman, and Saldana, 2014). Methodological and theoretical triangulation informed the interpretation, utilizing constructivist, problem-based learning, and ADDIE frameworks to connect the findings with the kit's design and its intended pedagogical use (Yin, 2014; Creswell and Poth, 2018).

This research utilized a qualitative methodology informed by Vygotsky's Constructivist Theory, the Project-Based Learning (PBL) framework, and the ADDIE instructional design model. Vygotsky's theory highlights the significance of social contact and scaffolding within

the Zone of Proximal Development (ZPD) as crucial for children's cognitive and creative development (Carranza-Pinedo & Diprossimo, 2025; Bodrova & Leong, 2024). These concepts guided the creation of a STEAM-oriented stitching kit that incorporates authentic materials and collaborative tasks to improve problem-solving and cultural comprehension. The PBL technique, consistent with constructivist ideas, encourages inquiry-based and experiential learning that enhances creativity, communication, and scientific literacy in young learners (Jermstad, 2025; Eliza et al., 2025).

The ADDIE model functioned as the methodical framework for kit development (Schimizzi, 2022; Elizabeth et al., 2024). Data were collected via semi-structured interviews with preschool teachers to identify relevant content and supplies. Prototypes were developed, assessed, and improved before the production and evaluation of the final edition by professionals in early childhood education and visual arts. The conceptual framework linked these theories and methodologies, guaranteeing that each stage of design and validation facilitated the comprehensive development of children through significant and culturally relevant learning experiences. The conceptual framework, depicted in Figure 1, integrates Vygotsky's Constructivist Theory, the Project-Based Learning strategy, and the ADDIE model, illustrating the relationship between theoretical concepts and the methodical development of the STEAM-based embroidery kit.

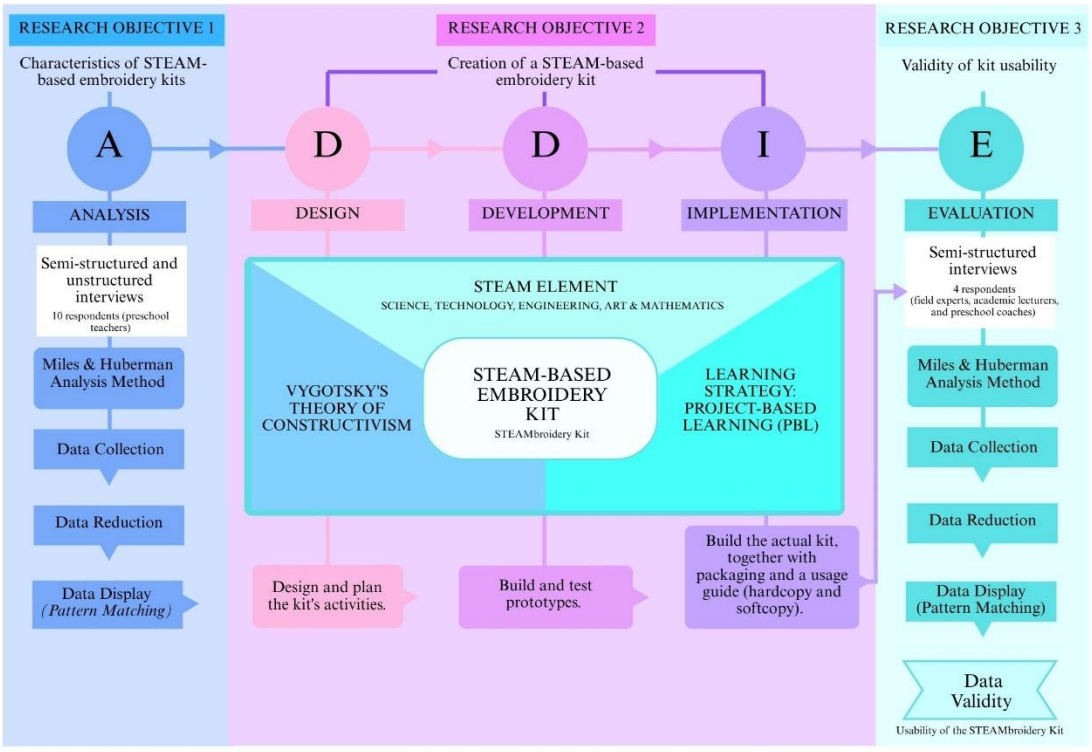

Figure 1: *Conceptual Framework for Building an Embroidery Kit Based on STEAM Elements*

Findings

The research findings indicate that the STEAMbroidery Kit was designed as an innovative educational tool that integrates traditional Malaysian embroidery with STEAM education principles (Science, Technology, Engineering, Arts, and Mathematics) for preschoolers aged 4 to 6. The analysis, conducted through thematic coding using Atlas.ti and adhering to Miles and Huberman's data reduction framework, identified five primary themes: comprehensive

child development, STEAM-focused learning aligned with the National Preschool Curriculum Standard (KSPK), craftsmanship and cultural heritage, kit management and design, and pedagogical guidance. The kit makes learning through experience and questions easier with new activities like Thread Lab (Science), Colour Coding (Technology), Build & Dress (Engineering), Stitch & Count (Mathematics), and Stitch the Patterns (Arts). These activities help kids develop their fine motor skills, critical and creative thinking, and respect for their cultural heritage. The results are consistent with Vygotsky's constructivist theory, emphasizing the importance of collaborative learning and social interaction in knowledge construction. The STEAMbroidery Kit improves preschool education by combining traditional crafts with modern cross-disciplinary learning. This protects cultural identity while giving kids important skills for the 21st century.

Figure 2: *STEAMbroidery Kit*

The STEAMbroidery Kit is a new way to learn that combines traditional Malaysian embroidery with STEAM education for kids ages four to six. It encourages creativity, critical thinking, and problem-solving through fun, hands-on activities. The package comes with a full 104-page guidebook in both print and digital formats. It also comes with supplies like cotton threads, batik dyes, LEGO blocks, velvet wire, Stitch and Count boards, embroidered cards, ribbons, felt fabric, buttons, and themed worksheets. The STEAMbroidery Kit's management and design focus on making it easy to use, safe, and visually appealing, which makes it a great way for kids to learn and teach. Teachers can use a full guidebook and video tutorials linked by QR codes to help them carry out activities. The picture below shows the kit's contents and activities that show how cultural arts and STEAM can work together.

Figure 3: *STEAMbroidery Kit Science Activity, Thread Lab:* The activity featured students discovering natural dyes through dipping and painting experiments, monitoring color changes, comparing textures and fragrances, recording discoveries, and showing their creative threads.

Figure 4: *STEAMbroidery Kit Technology Activity, Color Coding:* The activity used the free Pixilart software to educate children digital coloring by making coded motifs like butterflies and sharing their colorful pixel artworks online to inspire creativity and exploration of embroidery patterns.

Figure 5: *STEAMbroidery Kit Engineering Activity, Build & Dress:* The activity engaged students in creating a tiny wardrobe with LEGO blocks, designing and decorating a kebaya with colors and beads, and crafting a velvet wire hanger to integrate engineering, creativity, and creative expression.

Figure 6: *STEAMbroidery Kit Mathematics Activity Stitch & Count:* The activity linked math and art by using stitching to construct simple shapes and lines, enabling students recognize geometric forms, count stitches, and express creativity through hands-on learning.

Figure 7: *STEAMbroidery Kit Art Activity Stitch the Patterns:* The activity guided students to apply basic stitches on cardboard incorporating Nyonya kebaya motifs, exploring colors, textures, and traditional designs while improving creativity and cultural appreciation through simple stitching techniques.

Figure 8: *STEAMbroidery Kit Cultural & Heritage Activity, Decorate the Nyonya World and Let's Make Onde-Onde:* The activity introduced students to Baba Nyonya culture through art and traditional cooking, allowing them to explore clothing, food, and heritage while developing fine motor and creative skills.

The study results indicated that the STEAMbroidery kit effectively increased preschoolers holistic learning through the integration of Science, Technology, Engineering, Arts, and Mathematics. Expert validation confirmed that the kit stimulated creativity, problem solving, and psychomotor development through hands on and collaborative activities, aligned with the KSPK 2017 and Vygotsky's Constructivist Theory. It also assisted cultural preservation by introducing traditional embroidery motifs, developing early appreciation of Malaysian heritage in keeping with the National Cultural Policy. The materials and design were judged to be child friendly, safe, and entertaining, with clear visual and instructional guidance based on the VAK learning model. Moreover, the kit includes 21st century learning features such as critical thinking, communication, and entrepreneurship characteristics, contributing to Sustainable Development Goal 4 (Quality Education) and OECD lifelong learning principles. Experts proposed refining the learning outcomes descriptions, rubric based assessments, and incorporating more traditional themes and larger tools for easier handling. Overall, the STEAMbroidery kit proven to be an innovative and practical teaching resource that facilitates engaging, safe, and culturally relevant preschool learning experiences

The discussion of the first study aims to highlight the key components derived from the Phase One findings, which concentrate on the developmental attributes of the STEAMbroidery kit. The kit is designed to support all-around preschool development and follows the National Preschool Curriculum Standard (KSPK) and Project-Based Learning (PBL) methods. Kids learn about science, math, and fine motor skills through hands-on, themed activities like Thread Lab and Stitch & Count. Digital apps and LEGO-based building include elements of technology and engineering, while ethnic crafts like Nyonya kebaya embroidery and *onde-onde* making introduce traditional art and historical values. The kit comes with easy-to-use materials like guidebooks, tutorial videos, and teaching aids that teachers can use to make lessons fit the needs of their students. Scaffolding and the Zone of Proximal Development (ZPD) principles allow for self-directed and peer-supported learning, which is in line with Vygotsky's Constructivist Theory. Experts confirmed that the kit was useful in five areas: holistic education, psychomotor development, cultural preservation, active learning, and user-centered design. The STEAMbroidery kit is a complete teaching tool that combines science, technology, engineering, arts, and math. It encourages creativity, cultural appreciation, and 21st-century skills through interactive and contextual learning.

The study indicates an excellent fit between the created STEAMbroidery Kit and Malaysia's current preschool curriculum revisions. The Ministry of Education (KPM) prioritizes curriculum transformation by 2027 to enable lifelong, relevant, and adaptable learning that incorporates national policies, global trends, and Sustainable Development Goals (SDG) (KPM, 2025). Both the National Preschool Curriculum Standard (KSPK, 2017) and the future School Curriculum 2027 (KP2027) share the objective of cultivating holistic learners with strong character, creativity, and digital literacy. The STEAMbroidery Kit unifies these goals by infusing creativity, critical thinking, and local historical appreciation through STEAM-based projects such as Thread Lab, Stitch & Count, and Cultural Heritage & Me. These activities strengthen core competencies stated in KP2027, including communication, responsibility, digital fluency, and lifelong learning. The kit's framework encourages authentic and experiential learning that strengthens cultural identity while developing innovation and problem-solving abilities. Thus, the STEAMbroidery Kit not only aligns with Malaysia's curricular change but also contributes to developing globally competent and culturally

grounded preschool learners prepared for 21st-century challenges (UNESCO, 2024; KPM, 2025).

The significance of this study lies in the comprehensive contributions of the STEAMbroidery kit, which aligns with key educational frameworks such as the National Preschool Curriculum Standard (KSPK), Sustainable Development Goal 4 (SDG4), and the OECD Future of Education and Skills 2030 framework. First, the kit boosts the quality of teaching among preschool educators by providing creative and culturally relevant learning materials. This tackles the absence of creative and contextualized teaching tools that often hinder teachers' ability to use 21st-century educational approaches. The kit also works as informal training that enhances teachers' confidence and pedagogical ability, confirming findings by Ng (2024) and Ghani and Nor (2020), who stress the need of continual professional support and training in early childhood education.

Second, the kit helps to children's fine motor development through hands-on stitching activities that increase hand-eye coordination and muscular control, compatible with Vygotsky's Constructivist theory and the concept of scaffolding within the Zone of Proximal Development (Ticktin, 2022). These exercises enhance holistic learning that integrates physical, cognitive, and emotional growth, in line with KSPK's emphasis on physical and psychomotor development (MacBlain, 2020). Third, the inclusion of art in STEAM activities encourages creativity and critical thinking. Guided by Resnick's (2018) Creative Learning Spiral and the Project-Based Learning (PBL) approach, children are encouraged to explore, imagine, and problem-solve creatively while learning digital literacy in line with Malaysia's Digital Education Policy. Such an approach encourages active, collaborative learning that develops 21st-century competencies (Eliza et al., 2025; Jermstad, 2025).

Furthermore, the kit encourages interdisciplinary learning by mixing parts of science, mathematics, and art, boosting students' capacity to apply information across domains (Leavy et al., 2023; Ghazali et al., 2023). It also plays a significant role in conserving Malaysia's traditional crafts by promoting embroidery as a cultural learning medium that coincides with the National Cultural Policy (DKK) and National Creative Industry Policy (DIKN). Studies by Wy Leow (2023) and Ariffin et al. (2023) confirm that integrating cultural crafts in early education strengthens national identity and supports the creative economy. Finally, the systematic use of the ADDIE model provides high-quality kit design and relevance to learners' developmental needs. Overall, the STEAMbroidery kit exhibits a unique combination of education, culture, and technology, presenting a comprehensive paradigm for nurturing creative, culturally aware, and future-ready preschool learners.

Conclusion

This study finds that the STEAMbroidery Kit has made an important contribution to preschool education by supporting holistic child development through the combination of STEAM (Science, Technology, Engineering, Arts, and Mathematics) elements with cultural heritage values. The activities embedded in the kit, such as Thread Lab, Stitch and Count, and Cultural Heritage and Me, effectively support the competencies outlined in the National Preschool Standard Curriculum (KSPK, 2017) and the 2027 School Curriculum (KP, 2027), which emphasize cognitive, social, emotional, and physical growth. This approach coincides with Vygotsky's Constructivist Theory and the concept of the Zone of Proximal Development (ZPD),

highlighting guided learning and scaffolding. The utilization of Project-Based Learning (PBL) inside the kit encourages creativity, fine motor abilities, and critical thinking. Furthermore, the STEAMbroidery Kit develops communication and reading abilities, encourages collaboration among children, and maintains national cultural heritage through traditional embroidered craft, supporting the National Cultural Policy (DKN) and the National Creative Industry Policy (DIKN). Developed utilizing the ADDIE methodology, the kit enables systematic and high-quality instructional design aligned with national and global priorities such as the Digital Education Policy (DPD) and SDG4. Overall, the STEAMbroidery Kit demonstrates an innovative instructional tool that increases teaching quality, protects cultural identity, and fosters sustainable national development.

References

Annet, K. A. (2024). The role of play in early Childhood Education: Balancing fun and learning. *Eurasian Experiment Journal of Arts and Management*, *5*(3).

Azizi, Y. (2022). *Psikologi Pendidikan*. Penerbit UTM Press. (Original work published 2019)

Bahagian Dasar Kebudayaan. (2021). Dasar Kebudayaan Negara 2021. In *Kementerian Pelancongan, Seni Dan Budaya*. Perpustakaan Negara Malaysia.

Bahagian Sumber dan Teknologi Pendidikan KPM. (2023). Dasar Pendidikan Digital. Bahagian Sumber dan Teknologi Pendidikan KPM. Kementerian Pendidikan Malaysia.

Bodrova, E., & Leong, D. (2024). *Tools of the mind: The Vygotskian Approach to Early Childhood Education*. Taylor & Francis.

Carranza-Pinedo, V., & Diprossimo, L. (2025). Scaffolding and individuality in early childhood development. *Topoi*. https://doi.org/10.1007/s11245-024-10155-3

Chaldi, D., & Mantzanidou, G. (2021). Educational robotics and STEAM in early childhood education. *Advances in Mobile Learning Educational Research*, *1*(2), 72–81. https://doi.org/10.25082/amler.2021.02.003

Chung-Oi, K. (2023). Learning science through the Artec robotics program for preschools in Singapore. *the Journal of Educational Research/Journal of Educational Research*, *116*(2), 113–123. https://doi.org/10.1080/00220671.2023.2207185

Creswell, J. W., & Poth, C. N. (2018). Qualitative Inquiry and Research Design: Choosing Among Five Approaches (ed. ke-4). Thousand Oaks, CA: SAGE Publications.

Eliza, D., Mulyeni, T., Yulsyofriend, Y., Mahyuddin, N., Erita, Y., & Dhanil, M. (2025). IMPLEMENTATION OF PROJECT-BASED LEARNING IN IMPROVING SCIENTIFIC LITERACY IN EARLY CHILDHOOD EDUCATION: SYSTEMATIC LITERATURE REVIEW. *Journal of Baltic Science Education*, *24*(1), 71–91. https://doi.org/10.33225/jbse/25.24.71

Elizabeth, A. K., Ahmad, A., & Pairan, M. R. (2024). Development of Effective Instructional Teaching Module in TVET: A Comparative Review of Addie and Nedham's 5Phases Instructional Design Model. *INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION AND DEVELOPMENT*, *13*(4).

Ghani, R. B. A., & Nor, M. M. (2020). Faktor yang mempengaruhi peranan guru dalam pelaksanaan Kurikulum Standard Prasekolah Kebangsaan (KSPK) di Malaysia. *JuKu: Jurnal Kurikulum & Pengajaran Asia Pasifik*, *8*(4), 35–49. https://jice.um.edu.my/index.php/JUKU/article/view/26841

Ghazali, A., Ashari, Z. M., Hardman, J., Omar, R., & Handayani, S. W. (2023). Best practices in STEM education for preschool children: a case study in Malaysia. *Sains Humanika*, *16*(1), 87–99. https://doi.org/10.11113/sh.v16n1.2102

Grace, E., Kelton, M. L., Owen, J. P., Martinez, A. D., White, A., Danielson, R. W., Butterfield, P., Fallon, M., & Medina, G. S. (2021). Integrating Arts with STEM to Foster Systems Thinking. *PubMed*, *34*, 11–19. https://pubmed.ncbi.nlm.nih.gov/35386308

Hanafi, H. F. B., Wong, K., Adnan, M. H. B. M., Selamat, A. Z. B., Zainuddin, N. a. B., & Abdullah, M. F. N. L. B. (2021). Utilizing animal characters of a mobile augmented reality (AR) reading kit to improve preschoolers' reading skills, motivation, and Self-Learning: an Initial study. *International Journal of Interactive Mobile Technologies*, *15*(24), 94–107. https://doi.org/10.3991/ijim.v15i24.26673

Jaafar, A. N. M., Prabhakaran, S., Hosshan, H., Zalli, M. M. M., & Setambah, M. a. B. (2022). Penggunaan Kit 'My Fimoki' dalam Meningkatkan Kemahiran Menulis Kanak-Kanak Prasekolah. *Malaysian Journal of Social Sciences and Humanities*, *7*(8), e001689. https://doi.org/10.47405/mjssh.v7i8.1689

Jermstad, L. K. (2025). Building History: Project-Based Pedagogy for Cultural Heritage in Early Childhood Education. *Early Childhood Education Association Finland*, *14*(2).

Kementerian Pendidikan Malaysia [KPM]. (2025a). Bidang Pembelajaran Kurikulum Prasekolah 2026. In *Bahagian Pembangunan Kurikulum*. Kementerian Pendidikan Malaysia.

Kementerian Pendidikan Malaysia [KPM]. (2025b). Kurikulum Persekolahan 2027. In *Portal KPM*. Kementerian Pendidikan Malaysia.

Kozak, L., Popovych, O., Ivanova, V., Harashchenko, L. H., & Teslenko, S. (2024). Teaching professional competence in preschool education. *Amazonia Investiga*, *13*, 114–127. https://doi.org/10.34069/AI/2024.73.01.9

Levine, L. E., & Munsch, J. (2018). *Child development from infancy to adolescence: An Active Learning Approach*. SAGE Publications.

MacBlain, S. (2020). *Child development for teachers*. Learning Matters.

Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative data analysis*. SAGE.

Ng, A. (2024). Empowering Malaysian early childhood practitioners' sustainable inclusive practices through the 'integrating and navigating Science, Technology, Engineering, Arts, and Mathematics' (inSTEAM) framework. *Eurasia Journal of Mathematics Science and Technology Education*, *20*(11), em2531. https://doi.org/10.29333/ejmste/15579

Organization for Economic Co-operation and Development. (2025). Unlocking High-Quality teaching. In *OECD*. OECD Publishing.

Resnick, M. (2018). *Lifelong Kindergarten: Cultivating Creativity through Projects, Passion, Peers, and Play*. MIT Press.

Roseli, N. E. N., Yasin, S. F. B. M., Sharim, M. a. B., & Vijayaragavan, K. (2024). Case Study on fine motor skills Development in Early Childhood Education. *International Journal of Academic Research in Business and Social Sciences*, *14*(9). https://doi.org/10.6007/ijarbss/v14-i9/22749

Roslin, R., Bakar, K. A., & Madar, M. A. (2023). Teacher competence in the implementation of national preschool curriculum. *International Journal of Academic Research in Progressive Education and Development*, *12*(1). https://doi.org/10.6007/ijarped/v12-i1/16387

Schimizzi, B. (2022, March 17). *The History of ADDIE - Discover Learning Designs*. Discover Learning Designs. https://discoverlearning.com.au/2019/09/the-history-of-addie/

Sharim, M. a. B., Ani, S. B. C., Roseli, N. E. B. N., Ghazali, N. H. B. M., & Lim, S. Y. (2023). Challenges of professional development for preschool teachers in Selangor.

International Journal of Academic Research in Business and Social Sciences, *13*(8). https://doi.org/10.6007/ijarbss/v13-i8/17510

Spieler, B., & Krnjic, V. (2021). Creative, Engaging, and Playful Making-Activities with Smartphones and Embroidery Machines. *An International Conference on Computing, Design and Making in Education*. https://doi.org/10.1145/3466725.3466745

Stake, R. E. (1995). *The art of case study research*. SAGE.

Tee, Y. Q. (2022). Enhancing Preschoolers' Creativity through Creative Play-STEAM Activities in Malaysia. *Pacific Early Childhood Education Research Association*, *16*(3), 151–177. https://doi.org/10.17206/apjrece.2022.16.3.151

Tham, A. (2023). *The 5 Foundations of Education for the Future*. Kanyin Publication Sdn. Bhd.

Ticktin, A. (2022). *Play to progress: Lead Your Child to Success Using the Power of Sensory Play*. Penguin.

UNESCO. (2024). Transforming Education Towards SDG 4: Report of a global survey on country actions to transform education. In *UNESCO eBooks*. https://doi.org/10.54675/obbc3458

Wai Leng, A. P., Hui-Shen, C. L., Dhamotharan, M., & Che Mustafa, M. (2021). Preschool teachers' beliefs and classroom Practices of Child-Centred Learning at private preschools in central Region, Malaysia. *Southeast Asia Early Childhood Journal*, *10*.

Yin, K. (2017). *Case study research and applications design and methods*. SAGE Publications.

Zahiroh, A., Norhaizian, S., Normasura, J., Alimah, H. A., & Haslinda, Md. A. (2022, June 28). *Pelaksanaan Banana Circle berasaskan Pendekatan Steam Projek dalam meningkatkan Perkembangan Sosioemosi Murid Prasekolah*. https://ojs.upsi.edu.my/index.php/JPB/article/view/7172/3695

Zosh, J. M., Brenna Hassinger-Das, B. H., Laurie, M., & The LEGO Foundation. (2022). Learning through play and the development of holistic skills across childhood. *White Paper*.