

LITTLE STEPS, BIG COUNTS: THE LITERATURE REVIEW OF PARENTAL PLAY ON EARLY MATH LEARNING

ROZI, N. A. K.¹ – ELMHEY, M. S. N. N.¹ – BACOTANG, J.² – HARUN, N. H.¹ – JOHARI, N.¹ –
BACHO, A. N. S.¹ – JUMATI, N. F.¹ – IDRIS, R.^{3*}

¹ *Department of Early Childhood, Universiti Selangor, Selangor, Malaysia.*

² *Faculty of Education and Sport Studies, Universiti Malaysia Sabah, Sabah, Malaysia.*

³ *Department of Social Science, Universiti Selangor, Selangor, Malaysia.*

**Corresponding author
e-mail: crashidin7[at]unisel.edu.my*

(Received 16th April 2025; revised 20th June 2025; accepted 28th June 2025)

Abstract. This article examines the role of play-based learning in the development of early mathematics skills, drawing on data from current international research covering 2016 to 2024. Drawing on research from Asia, Europe, Africa, and Australia, the review finds major influences on early math learning, including the significance of interactive and nature-based play, instructor knowledge, parental beliefs, and home-school collaboration. A thematic analysis demonstrates that play-based tactics regularly improve children's mathematical engagement, motivation, and accomplishment. Educators show a high degree of understanding and support for such approaches, whereas parents generally have good beliefs but encounter practical limitations in fully participating. Despite the established benefits, structural challenges such as inadequate basic skills, misconceptions about mathematics, and fragmented implementation continue to impede development. The research finds that fostering solid early numeracy foundations requires a comprehensive, collaborative strategy that includes well-trained educators, informed parental involvement, and contextually appropriate play approaches. Recommendations are made to inform future educational practices and policy development.

Keywords: *play-based learning, early mathematics, parental involvement, preschool education*

Introduction

Early childhood is a formative time in which basic mathematics skills, attitudes, and motivation emerge. During this time, play is not only a natural way of learning, but also an effective instructional instrument. An increasing body of global research supports the use of play-based learning in early mathematics, indicating that it improves children's engagement, comprehension, and general development (Noraina et al., 2024; Connie and Alley, 2021; Rahimah, 2020). Young learners can better understand abstract concepts like number recognition, counting, and fundamental operations through interactive play, games, and real-world applications (Nur and Norly, 2023; Nurdiyana et al., 2021). Educators have an important role in defining the learning environment. Studies have demonstrated that preschool instructors frequently have a high level of expertise and confidence in adopting play-based tactics (Tan and Norly, 2024), and products like the "Math Addition Bag" are widely supported for their impact on learning outcomes (Nur and Norly, 2023). Furthermore, techniques that include nature and hands-on experiences, such as nature-based math play, have shown significant gains in student performance, with post-test scores rising from 70.8% to 94% (Noraina et al., 2024). These findings demonstrate that well-designed, experience-based training is not only effective, but also necessary for early numeracy development.

In addition, the home environment, particularly parental participation, has a significant impact on children's mathematical development. Positive parental attitudes and active support are associated with increased motivation and accomplishment (Peixoto et al., 2024; Fekumo and Omeka, 2022). However, the efficacy of this support varies according to parental understanding, values, and resources. While some parents strongly support and participate in math play (Alim and Zaini, 2021; Masyetah and Syaza, 2021), others confront cultural or economic impediments to participation (Khowaja and Kang, 2021). In addition, misconceptions about mathematics and inadequate exposure to play-based methods can impair parental confidence and collaboration with educators (Radišić and Baucal, 2024; Ng et al., 2020). Although acceptance of the benefits of play-based learning, there are still hurdles. Weak arithmetic foundations, a lack of engaging education, and fractured school-home partnerships continue to stifle early STEM engagement (Saputra, 2024; Norwaheda and Siti, 2022). Furthermore, the requirement for culturally sensitive, accessible, and practical techniques, particularly in underserved or diverse populations, necessitates greater collaboration. This article presents findings from recent international research conducted between 2016 and 2024 across Europe, Asia, Africa, and Australia. It investigates how play-based learning, educator skill, and family engagement interact to influence early mathematical outcomes, and provides thematic insights to guide future research, policy, and classroom practice.

Literature review

Play-based learning and early math achievement

Play-based learning is increasingly recognized as a powerful approach to fostering mathematical understanding in early childhood. Research indicates that integrating math instruction with play enhances not only engagement but also conceptual grasp and performance. Demonstrated significant improvement in student performance, with post-test scores rising from 70.8% to 94% after the use of nature-based play (Noraina et al. (2024). Similarly, interactive teaching tools such as the “Math Addition Bag” received strong support from teachers, all of whom agreed on its effectiveness in enhancing students’ addition skills (Nur and Norly, 2023). Hands-on activities and meaningful play have been linked to improved numeracy skills (Rahimah, 2020). Game based learning, which is based on Vygotsky’s constructivism theory, can help young learners understand abstract mathematical topics in a more practical and engaging way. Interactive games significantly improved number recognition and pronunciation (Nurdiyana et al., 2021). These findings consistently support the idea that meaningful, play-based activities can successfully introduce and reinforce core math concepts in early learners.

Experience-based and holistic approaches to numeracy

Real life experiences and context rich learning are important in addition to structured games. Arithmetic instruction to be focused on meaningful, experiential contexts (Farah and Suziyani, 2023). Similarly, underlined that early numeracy abilities like counting, grouping and measuring are critical foundations that should be taught through active, real world involvement (Naldo et al., 2023). These approaches are consistent with holistic development goals, addressing cognitive, physical and socio-emotional growth at the same time (Masyetah and Syaza, 2021). Furthermore, from an Islamic perspective

where play has long been acknowledged as an essential component of a child's natural growth with early traditions promoting playful learning since the time of Prophet Muhammad SAW. This lends more support to the use of culturally relevant, developmentally sound techniques in early childhood education.

Educator knowledge and instructional approaches

Teachers' comprehension and belief in play-based tactics have a substantial impact on their implementation. Preschool teachers had a very high level of understanding on play-based early math learning with no significant differences based on their teaching experience (Tan and Norly, 2024). This shows that training and exposure to good tactics may have a greater impact than years of service. Nonetheless, systemic acceptance is patchy; positive results when play-based math exercises were implemented but noted limited general application among instructors (Cohrsen et al., 2016).

Parental beliefs, involvement and constraints

Parental involvement is a repeating factor in early math success. Research regularly shows that parental attitudes, support and involvement at home have a significant impact on children's motivation and performance. Ingrained parental beliefs can either favorably or negatively influence math learning outcomes (Peixoto et al., 2024). Arithmetic motivation is influenced by the home context, instructional strategies and learner characteristics (Radišić and Baucal, 2024). High parental involvement and belief in play-based math with mean scores of 4.45 and 4.31 respectively despite moderate limitations ($M=3.21$) (Alim and Zaini, 2021). Discovered similar strong beliefs but variable levels of participation (Masyetah and Syaza, 2021). Identified belief ($M=4.20$), moderate involvement ($M=3.66$) and low constraint ($M=2.76$) (Maisarah and Syaza, 2021). These findings indicate a positive attitude towards arithmetic learning through play but practical implementation may be hampered by logistical, cultural or economic constraints (Khowaja and Kang, 2021). Notably, studies conducted in diverse locations demonstrate continuous parental support for early education but variable participation in structured, play-based learning. While parents value holistic education, math play is not successfully incorporated at home (Ng et al., 2020). Parents of children aged 0 to 3 years old look for practical, sometimes digital, instruments to facilitate home-based math play (Panaoura and Nitsiou, 2023).

Collaboration between home and school

Effective communication and collaboration between school and families improves children's learning. Shared accountability and discussion between educators and parents boost motivation and academic performance in early math (Saputra, 2024). Meanwhile, teacher credentials and parental knowledge are critical elements in the success of STEAM-based learning in early childhood, implying that both institutional and family support are required for its implementation. In environments where arithmetic misunderstandings remain such as in portions of Nigeria, Fekumo and Omeka (2022) discovered that parental support is associated with higher accomplishment but wrong assumptions frequently diminish the quality of participation. This emphasizes the necessity of providing parents with the knowledge and resources they need to effectively support their children.

Barriers and challenges in early math implementation

Despite the abundance of research supporting play-based learning, various obstacles continue to impede implementation. Identified inadequate math foundation and unengaging instruction as primary factors limiting STEM interest in early childhood and suggested play as a remedial strategy (Norwaheda and Siti, 2022). Cultural expectations, limited resources and a lack of formal advice were noted as limitations in several research (Ng et al., 2020; Cohrsen et al., 2016). Even in areas with a good attitude toward play and holistic learning, practical restrictions hinder its widespread implementation. Addressing these systemic and contextual obstacles is critical for creating effective, inclusive early math learning environments.

Materials and Methods

Define research topic, search strategy and data source, inclusion and exclusion criteria

This study employed a qualitative literature review approach to evaluate scholarly perspectives and research trends related to a defined issue such as "parental role in mathematics". The process involved a thorough search, selection, and thematic analysis of scholarly literature. A comprehensive search was conducted using academic databases including Scopus, Web of Science, Google Scholar, and ScienceDirect. Keywords such as "mathematics education," "play-based mathematics learning," "early mathematics," and "parental role in mathematics learning" were used to find relevant material. Additionally, this research focuses on Malaysia and is an international research element. Only peer-reviewed journal publications, conference proceedings, and research reports published between 2020 and 2025 were included. Articles selected based on their relevance to the research objectives, methodological clarity, and the credibility of publication sources. Non-academic publications, editorials, and opinion papers were removed to ensure data quality.

Data collection and analysis, validity and reliability

After an initial screening, 34 papers (15 Malaysian and 8 international) were selected and thoroughly examined. A thematic analysis technique was utilized to identify shared themes, conceptual frameworks, findings, and research needs. The selected literature was reviewed using open coding, and the data was categorized into key categories such as academic achievement, professional routes, and instructional implications. To ensure the validity and reliability of the literature evaluation, a systematic review matrix was utilized, which allows for uniform data extraction and comparison. Triangulation was performed by cross-referencing multiple sources and perspectives on the same subject (*Figure 1*).



Figure 1. Method using by researcher to analyze research article.

Results and Discussion

Play-based learning has long been recognized as an effective educational strategy, especially in early childhood education. In mathematics, this strategy provides young students with an interesting, relevant, and developmentally appropriate entry point into abstract subjects. Recent research has emphasized the significance of incorporating play into mathematics education to promote children’s cognitive, social, and emotional development. The table below summarizes recent research from 2020 to 2024 on several aspects of play-based learning in early childhood mathematics across contexts and viewpoints. The *Table 1* is followed by a thematic analysis that summarizes the findings.

Table 1. Summary of Malaysian research findings on parental role in early Math learning through play.

Researcher	Factor	Explanation
Noraina et al. (2024)	Nature-based math learning	Post test scores improved from 70.8% to 94% after using nature-based play, it shows a strong impact on early math achievement.
Tan and Norly (2024)	Preschool teachers’ knowledge of play-based learning in early math	A very high level of knowledge among teachers (M = 4.40, SD = 0.388), with no significant difference based on teaching experience.
Nur and Norly (2023)	Math Addition Bag teaching tool	100% of teachers agreed it helps students learn addition where high mean score (M = 4.75) is widely supported.
Farah and Suziyani (2023)	Experience based learning	Mathematics learning for childrens should be grounded in meaningful and real-life experiences.
Masyetah and	Play and holistic	Very high parental perception in cognitive (M + 4.50), physical (M = 3.80)

Syaza (2021)	development	and socioemotional (M = 4.64) aspects.
Alim and Zaini (2021)	Parental involvement math play	Very high belief (M = 4.45), high involvement (M = 4.31), moderate constraints (M = 3.21) were conducted in Kudat, Sabah.
Naldo et al. (2023)	Basic numeracy skills (counting, grouping and measuring)	Early childhood numeracy development focuses on foundational skills such as counting, grouping and measuring.
Norwaheda and Siti (2022)	Barriers to early math & STEM interest	Weak math foundations and lack of engaging instruction hinder STEM interest: play is suggested as solution
Ngien et al. (2021)	Parental involvement and academic success	Systematic review: home based support is key for achievement, school collaboration less addressed.
Connie and Alley (2021)	Games based learning	Games make abstract math engaging and meaningful: supported by Vygitsky's theory of constructivism.
Nurdiyana et al. (2021)	Interactive play for number recognition	Children improved number identification and pronunciation using interactive games, based on case study.
Masyetah and Syaza (2021)	Parental perception of learning through play	Parents believe play is effective for learning: high involvement using adapted PPBS scale.
Maisarah and Syaza (2021)	Belief and involvement in math play	High belief (M = 4.20), moderate involvement (M = 3.66), low constraint (M = 2.76): positive but not fully practiced.
Nor et al. (2021)	Islamic perspective in play therapy	Islam has long emphasized play as part of a child's natural development as practiced since the time of Prophet Muhammad SAW.
Rahimah (2020)	Hands-on and meaningful play in numeracy	Numeracy skills in early childhood can be developed effectively through hands-on activities and meaningful play.

The role of play-based learning in early childhood Mathematics: A synthesis of recent research

Play-based learning has received a lot of attention in recent years as a developmentally appropriate and successful way to introduce math to young students. Play, which is based on constructivist ideas such as Vygotsky's, allows children to explore abstract concepts in tangible, hands-on ways. Recent research from 2020 to 2024 repeatedly highlights the usefulness of this method in boosting cognitive growth, improving engagement, and strengthening core numeracy abilities. One of the most striking findings from several researchers is the efficacy of play-based and hands-on techniques in enhancing mathematics achievements. For example, Noraina et al. (2024) found a significant rise in post-test score from 70.8% to 94% after adding nature-based math play into a preschool setting. Similarly, Nur and Norly (2023) discovered complete instructor agreement on the usefulness of the Math Addition Bag Tool in helping children improve their additional abilities, with a high mean score (M=4.75). Rahimah (2020) emphasized the importance of hands-on activities in developing early numeracy skills, while demonstrating that game-based and interactive play can significantly improve number recognition and understanding, making abstract concepts more enjoyable (Connie and Alley, 2021; Nurdiyana et. al, 2021). Another important trend emerging from the research is the value of real-life, meaningful experience in promoting early math learning. Farah and Suziyani (2023) emphasized that children learn best when mathematical ideas are integrated into ordinary circumstances. Naldo et al. (2023) corroborated this by identifying fundamental numeracy abilities like counting, grouping, and measuring as essential for early math development, especially when taught through experience-based learning. These techniques not only help with comprehension, but they also foster a long-term interest in mathematics.

The research also demonstrates the critical responsibilities of educators and parents in the success of play-based learning. Tan and Norly (2024) discovered that preschool instructors had a high degree of understanding of play-based learning practices, independent of their teaching experience. Numerous studies (Alim and Zaini, 2021; Masyetah and Syaza, 2021) have found that parents place a high value on maths play. Alim and Zaini (2021) reported high levels of belief (M=4.45) and participation (M=4.31), although modest restrictions (M=3.21) were also acknowledged. Maisarah

and Syaza (2021) found a similar trend, with strong belief in math’s play but only limited practical participation due to different restrictions. Ngien et al. (2021) found from a comprehensive study that home based parental support greatly contributes to children’s academic achievement, while partnership with schools was not emphasized. Despite widespread support for play-based learning, several impediments exist. Norwaheda and Siti (2022) identified inadequate math foundations and a lack of engaging training as factors limiting children’s enthusiasm in STEM fields. They suggested play-based learning as a possible solution to these challenges. However, time, resource, and parental awareness limits may impede complete implementation (Alim and Zaini, 2021; Maisarah and Syaza, 2021). Cultural and religious viewpoints can influence attitudes towards play in school. Nor et al. (2021) offered an Islamic perspective, emphasizing that play is not only a normal element of a child’s growth, but was also promoted throughout the Prophet Muhammad SAW’s lifetime. The incorporation of religious beliefs into educational practices indicates that play-based learning may be both culturally sensitive and pedagogically competent.

International empirical findings on parental perception and implementation of play-based learning in early Mathematics

In recent years, several global studies have examined the importance of parental involvement in early childhood education, with a focus on play-based learning. *Table 2* presents the key findings from the selected international literature, emphasizing the researchers, the primary factor explored, and the corresponding conclusion.

Table 2. Summary of international research findings on parental role in early Math learning through play.

Researcher	Factor	Explanation
Peixoto et al. (2024)	Parental Values, Inspiration, and Success	Researchers discovered that entrenched parental mindsets can have a negative impact on children’s maths motivation and achievement. Positive attitudes improve performance and engagement.
Radišić and Baucal (2024)	Home and Classroom Influences on Motivation	The mix of learner characteristics, instructional tactics, and family environment has a substantial impact on math motivation.
Rutkieni and Narusaitiene (2024)	STEAM and Early Math Education	Parental awareness and teacher qualifications are critical in promoting math through integrated STEAM approaches.
Saputra (2024)	Motivation, Knowledge, and Overcoming Barriers	Effective communication and collaboration between home and school significantly improve math learning and motivation.
Panaoura and Nitsiou (2023)	Math Thinking in Ages 0–3	Parents seek guidance for play-based support, such as digital training, which is useful if focused on everyday non-school tasks.
Fekumo and Omeka (2022)	Student Perception & Parental Support	Strong correlation exists between parental support and achievement, but misconceptions about math hinder involvement.
Khowaja and Kang (2021)	Parental Perception of Early Childhood Education	Parents place a high priority on early education, but do not participate in formal play-based learning
Konca and İlhan (2021)	Parental Opinions on Preschool Education	Parents promote pre-schooling to prepare children academically, but cultural and budget constraints affect play-based implementation.
Ng et al. (2020)	Holistic Early Childhood Education	Parents support holistic learning, but play-based math is not well integrated by parents led at home
Cohrsen et al. (2016)	Play-Based Math Activities	Positive responses are seen where play-based math is used, but its adoption is not widespread among educators.

Parental roles and influences in early childhood Mathematics: A global perspective

Parental influence has a significant impact on early children's attitudes, motivation and mathematical achievement. Recent research from throughout the world have highlighted both the helpful and restricting features of parental involvement in early math education, particularly within play-based and holistic learning frameworks.

Multiple studies consistently show that parental beliefs, views and support systems have a major impact on children's math learning outcomes. Established negative parental mindsets might have a negative impact on children's motivation and performance in mathematics, whereas positive attitudes lead to increased engagement and outcomes (Peixoto et al., 2024). A child's math motivation is significantly influenced by their learner features, teaching tactics and family environment (Radišić and Baucal, 2024). Similarly, a substantial link Nigeria, however prevalent misconceptions about mathematics frequently impede more effective family participation (Fekumo and Omeke, 2022). Several studies have shown that communication and collaboration between family and school are important in promoting math learning. Good home school partnerships improve learning and motivation, especially when families and educators communicate well (Saputra, 2024). This is supported by Rutkiene and Narusaitiene (2024) who contend that the effectiveness of integrated STEAM (Science, Technology, Engineering, Arts and Mathematics) approaches is dependent on both parental awareness and teacher expertise.

The studies also show various levels of parental readiness and involvement in play-based or informal math education. Parents of very young children (ages 0-3) frequently seek support and guidance, particularly digital resources for delivering math related play at home even though they prefer to focus on everyday tasks rather than formal academic skills (Panaoura and Nitsiou, 2023). In contrast, while Pakistani parents place a high importance on early children's education, they frequently avoid structured, play-based learning opportunities (Khowaja and Kang, 2021). Similarly, Hong Kong and Turkey found that, while parents support early education and holistic development, financial and cultural constraints limit their involvement in play-based math learning at home (Konca and İlhan, 2021; Ng et al., 2020). Educators' opinions emphasize the significance of parental involvement. Favorable effects in math learning when play-based tactics are used, however these practices are not generally impl, potentially due to a lack of parental or institutional support (Cohrssen et al., 2016). As summary, the examined literature demonstrates a complex but crucial link between parents and early math learning. While parental attitudes. Support and collaboration with educators are critical for children's arithmetic motivation and achievement, cultural beliefs, misconceptions and restricted access to resources can all impede effective participation. Future interventions should try to close this gap by providing parent friendly guidance, culturally relevant play activities, and strong relationships between families and schools to improve arithmetic learning from an early age.

Conclusion

The collection of evidence confirms that play-based learning is not a supplemental method, but rather a necessary basis for effective early childhood mathematics teaching. Across multiple cultural and geographic settings, studies consistently show that including play, whether through nature-based exploration, interactive games, or hands-on equipment, improves children's engagement, knowledge, and accomplishment in math's. Educators and parents play equally significant roles. Teachers who have excellent pedagogical understanding and use developmentally appropriate approaches contribute considerably to meaningful math's learning, while supportive, informed family participation boosts motivation and learning results. However, structural, cultural, and logistical constraints frequently impede the practical application of these

positive views. While many parents and teachers respect early math and play, problems such as inadequate resources, misunderstandings about mathematics, a lack of training, and poor communication between the home and school contexts and consistent implementation across areas highlight the need for more comprehensive, inclusive solutions. Finally, a comprehensive and collaborative strategy based on experience-based learning, supported by skilled educators, and actively involving families is required to develop confident, capable, and interested young mathematicians. Future initiatives must prioritize bridging the research practice divide to guarantee that all children, regardless of circumstance, have access to quality early math instruction via play.

Acknowledgement

This research is self-funded.

Conflict of interest

The authors confirm that there is no conflict of interest with any parties in this research study.

REFERENCES

- [1] Alim, M.M., Zaini, S.H. (2021): Persepsi ibu bapa terhadap kaedah bermain dalam pembelajaran matematik awal kanak-kanak di rumah: Parent's perception on playing method in early childhood mathematics at home. – *Jurnal Pendidikan Awal Kanak-kanak Kebangsaan* 10(2): 1-15.
- [2] Cohrsen, C., Church, A., Tayler, C. (2016): Play-Based Mathematics activities as a resource for changing educator attitudes and practice. – *SAGE Open* 6(2): 14p.
- [3] Connie, C.O., Alley, E. (2021): Permainan matematik untuk kanak-kanak prasekolah. – *Malaysian Journal of Social Sciences and Humanities (MJSSH)* 6(11): 181-189.
- [4] Farah, N.O., Suziyani, M. (2023): Pelaksanaan pendekatan bermain dalam pengajaran dan pembelajaran matematik awal. – *Malaysian Journal of Social Sciences and Humanities (MJSSH)* 8(3): 9p.
- [5] Fekumo, B., Omeke, F.O. (2022): Influence of students' perception on mathematics on junior secondary school students' academic performance in yala local government area of cross river state, nigeria. – *An International/Multidisciplinary Journal of Network for Grassroots Science and Mathematics Education (The VillageMath Network)* 3(1): 53-71.
- [6] Khowaja, H.A., Kang, M.A. (2021): A study of parents' perceptions about early childhood education and development in the Pakistani context. – *Journal of Early Childhood Care and Education (JECCE)* 5(2): 63-76.
- [7] Konca, A.S., İlhan, S.D. (2021): Learning activities in preschool classrooms: preferences of preschool teachers and views of parents. – *Participatory Educational Research* 8(4): 186-197.
- [8] Maisarah, M.A., Syaza, H.Z. (2021): Persepsi ibu bapa terhadap kaedah bermain dalam pembelajaran matematik awal kanak-kanak di rumah. – *Jurnal Pendidikan Awal Kanak-Kanak Kebangsaan* 10(2): 1-15.
- [9] Masyetah, M.A.B.S., Syaza, H.S. (2021): Persepsi ibu bapa terhadap aktiviti belajar melalui bermain bagi kanak-kanak prasekolah. – *Jurnal Pendidikan Awal Kanak-Kanak Kebangsaan* 10(2): 35-46.

- [10] Naldo, J., Mohamad, I.M.I., Yusni, Y., Pamella, B., Rizah, S., Grace, W. (2023): Belajar sambil bermain di dalam kelas pada peringkat pendidikan awal kanak-kanak. – *Malaysian Journal of Social Sciences and Humanities (MJSSH)* 8(4): 15p.
- [11] Ng, D., Fisher, J., Au, M., Lo, S. (2020): Parental perceptions of holistic early childhood education in Hong Kong. – *Educational Planning* 27(1): 49-60.
- [12] Ngien, H.W., Murugan, R., Nor, A.S@S. (2021): Analisis literatur bersistematik terhadap hubungan antara keterlibatan ibu bapa dengan prestasi akademik. – *Jurnal Dunia Pendidikan* 3(4): 344-363.
- [13] Nor, H.R., Siti, N.M.Y., Nurhafizah, M.S. (2021): Terapi bermain menurut pendekatan Islam: Play therapy in Islamic approaches. – *Jurnal Pendidikan Awal Kanak-kanak Kebangsaan* 10(2): 61-70.
- [14] Noraina, N., Connie, S., Jusiah, I., Nur, S. S. (2024): Keberkesanan pembelajaran berasaskan alam semula jadi terhadap pencapaian matematik awal kanak-kanak prasekolah. – *Malaysian Journal of Social Sciences and Humanities (MJSSH)* 9(10): 14p.
- [15] Norwaheda, H., Siti, M.B.M. (2022): Kebimbangan dan kepercayaan matematik serta hubungan dengan pembelajaran matematik. – *Malaysian Journal of Social Sciences and Humanities (MJSSH)* 7(4): 15p.
- [16] Nur, A.N.B., Norly, J. (2023): Analisis keperluan pembangunan Math Addition Bag untuk meningkatkan kemahiran operasi tambah dua digit kanak-kanak prasekolah. – *Jurnal Pendidikan Awal Kanak-kanak Kebangsaan* 12(2): 114-127.
- [17] Nurdiyana, T., Ahmad, M.M.H., Nur, H.A.W. (2021): Permainan interaktif membantu pembelajaran matematik awal kanak-kanak empat tahun. – *Jurnal Kesidang* 6(1): 62-68.
- [18] Panaoura, R., Nitsiou, C. (2023): Children’s Informal Learning in Mathematics through Parental Involvement with Play-Based Activities: A Nonformal Training Program. – *Education Sciences* 13(9): 14p.
- [19] Peixoto, F., Mata, L., Campos, M., Caetano, T., Radišić, J., Niemivirta, M. (2024): ‘Am I to blame because my child is not motivated to do math?’: Relationships between parents’ attitudes, beliefs and practices towards mathematics and students’ mathematics motivation and achievement. – *European Journal of Psychology of Education* 39(2): 1561-1586.
- [20] Radišić, J., Baucal, A. (2024): Mathematics motivation in primary education: building blocks that matter. – *European Journal of Psychology of Education* 39(2): 1505-1512.
- [21] Rahimah, W. (2020): Keberkesanan pembelajaran berasaskan permainan dalam kalangan pelajar institusi pengajian tinggi. – *Journal of Education and Social Sciences* 16(1): 9-13.
- [22] Rutkiene, A., Narusaitiene, G. (2024): Attitudes of parents and teachers towards mathematics education in the context of STEAM education. – *Proceedings of the International Scientific Conference* 2: 48-58.
- [23] Saputra, N.H. (2024): Peran orang tua dalam mendukung pembelajaran matematika di rumah bagi siswa sekolah dasar. – *Jurnal Arjuna Publikasi Ilmu Pendidikan Bahasa Dan Matematika* 2(5): 313-329.
- [24] Tan, X.X., Norly, N. (2024): Tahap pengetahuan guru prasekolah melaksanakan pendekatan belajar melalui bermain dalam pembelajaran matematik awal. – *Jurnal Pendidikan Awal Kanak-kanak Kebangsaan* 13(1): 66-79.