Teachers' Perceptions of Play-Based Learning (PBL) in the Teaching and Learning (Pdp) of Early Mathematics in Government Preschools in Selangor

BY

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ABSTRACT

Appropriate teaching and learning strategies must be used to reveal students' potential and interests in order to generate good results from students. One of the most effective methodologies is the play method. Therefore, the purpose of this study was to identify the implementation of the play-based learning (PBL) approach in the teaching and learning (Pdp) of Early Mathematics for preschool students, as well as to investigate the relationship between teachers' attitude and motivation and the implementation of the PBL approach in the teaching and learning of Early Mathematics for preschool students. This study used purposive sampling and involved 30 government preschool teachers from the state of Selangor. The research highlights the positive aspects of implementing the PBL approach in the of Early Mathematics in government preschools**,** and the role of teachers in implementing this approach in government preschools**.** According to the findings, there is a significant relationship between teachers' attitude and motivation and the implementation of the Play-Based Learning (PBL) approach in the teaching of Early Mathematics for preschool students.

Keywords: play-based learning, teaching and learning (Pdp) of Early Mathematics, teachers' attitude, teachers' motivation

1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

The National Preschool Standard Curriculum (Kurikulum Standard Prasekolah Kebangsaan, KSPK) of Malaysia, first implemented in 2010, was revised in alignment with the Malaysian Education Development Plan (Pelan Pembangunan Pendidikan Malaysia, PPPM) 2013–2025. The revision aims to align Malaysia's early childhood education standards with global benchmarks, ensuring that children aged four to six years receive holistic and integrated development. This curriculum recognizes the importance of early educational experiences and seeks to prepare children adequately for the formal education system.

The National Association for the Education of Young Children (NAEYC) advocates for the use of Developmentally Appropriate Practices (DAP), highlighting that early childhood curricula should not solely emphasize academics but must integrate cognitive, emotional, social, physical, and creative development. Such a comprehensive approach ensures that children grow in a well-rounded manner, acquiring both academic and life skills essential for future success (Whitebread & Bingham, 2013; Ho & Funk, 2018).

1.2 Background of the Study

Mathematics, historically referred to as "accounting" in the Malaysian context, is a science concerned with quantity, structure, space, and change. Young children first encounter mathematical concepts through tangible experiences such as recognizing shapes, sizes, and colours. This stage lays the foundation for symbolic and abstract mathematical understanding. According to NAEYC & NCTM (2010), children naturally engage with mathematical ideas by comparing objects, recognizing patterns, and solving everyday problems.

Recognizing the challenges students face in early mathematics, the Ministry of Education Malaysia (KPM) introduced the "Didik Hibur" concept; a playful and enjoyable teaching strategy. It emphasizes learning through engaging and entertaining activities, which lowers classroom anxiety and improves cognitive engagement. Play-Based Learning (PBL) is one of the primary methods used to implement this concept, especially in mathematics instruction.

The present study aims to assess the effectiveness of the PBL approach in teaching early mathematics in government preschools in Selangor. The study also seeks to analyze the relationship between teachers' attitudes and motivations and the successful implementation of PBL strategies.

Prior research, such as that by Abdul Gafoor and Kurukkan (2015), emphasized that negative student perceptions toward mathematics and viewing it as complex or intimidating can cause significant barriers to learning. Similarly, Acharya (2017) noted that both learner and teacher factors, such as interest, prior knowledge, and teacher optimism, affect mathematics learning outcomes. Hence, addressing these challenges through effective pedagogical methods such as PBL is critical.

1.3 Purpose of the Study

The key objective of this study is to evaluate how effectively the Play-Based Learning (PBL) approach improves early mathematics skills in government preschools in Selangor. This includes examining teachers' attitudes and motivations toward implementing PBL, which can impact the quality and effectiveness of the teaching process.

Furthermore, findings from this research can inform curriculum developers and policy makers by providing insights into how PBL strategies could be further refined and supported to enhance student learning. The "Didik Hibur" approach, with its emphasis on engagement and entertainment, may also serve as a blueprint for broader instructional reforms across early childhood education in Malaysia.

1.4 Research Questions

This study is guided by the following research questions:

1. What is the level of teacher's attitude towards the implementation of the Play-Based Learning (PBL) approach in teaching Early Mathematics in government preschools in Selangor?
2. What is the level of teacher motivation to implement the PBL approach?
3. What is the level of implementation of the PBL approach in teaching Early Mathematics?
4. Is there a relationship between teacher attitudes and motivation and the implementation of PBL in Early Mathematics?

2.0 LITERATURE REVIEW

2.1 Introduction

This section reviews existing literature on play-based learning approaches in early mathematics education. It outlines the differences between PBL and traditional pedagogies, the role of interactive games, and the acceptance of PBL in Malaysian educational settings.

2.2 Play-Based Learning vs. Traditional Learning in Early Mathematics

Play-Based Learning (PBL) differs significantly from traditional teaching methods. Traditional learning focuses on rote memorization and structured lessons delivered through teacher-led instruction. In contrast, PBL emphasizes experiential, hands-on activities that foster curiosity and engagement. According to Hirsh-Pasek et al. (2015), PBL enables children to develop critical thinking, problem-solving skills, and creativity in a natural and engaging way.

Research by Brown and Miller (2023) supports the notion that learning through play enhances cognitive and social development. PBL offers children the chance to explore mathematical ideas through play, manipulation of physical objects, and peer interaction, which helps build a solid understanding of fundamental concepts.

2.3 Mastery of Early Mathematics Skills in Preschool

Preschool years are foundational for academic and cognitive development, particularly in mathematics. Ojose (2008) stated that early math skills, such as number recognition, counting, and spatial reasoning, are strong indicators of future academic performance.

Interactive teaching practices, including PBL, provide engaging contexts where children learn by doing. A study by Braak et al. (2022) found that children who had strong early math skills performed better in later schooling, demonstrating the long-term value of foundational instruction.

2.4 Game-Based Learning (GBL) and Its Impact on Mathematics Achievement

Game-Based Learning (GBL) is closely related to PBL and emphasizes the use of games to teach core mathematical concepts. Balasubramaniam and Maat (2022) noted that GBL motivates students, enhances engagement, and allows abstract concepts to be visualized and applied in meaningful ways.

Adipat et al. (2021) found that incorporating interactive games in math instruction improves retention and understanding. GBL also shifts the traditional teacher-student dynamic, making students more active participants in their learning journey (Kotob & Ibrahim, 2019).

2.5 Interactive Games and Prenumeracy Development

Interactive games help develop pre-mathematical skills such as counting, shape identification, and pattern recognition. Siraj-Blatchford (2009) emphasized that learning through play fosters independent thinking and responsibility.

Games that simulate real-life problem solving encourage children to make decisions and engage with mathematical concepts in dynamic ways. Tasripin and Bakar (2018) concluded that such learning environments support deeper understanding and sustained interest in math.

2.6 Student Acceptance of Play-Based Learning

Students are more likely to accept and enjoy learning mathematics when the process is fun, interactive, and collaborative. According to Ahmad et al. (2019), adopting 21st-century teaching strategies such as PBL increases student motivation and learning efficacy.

Khairuddin and Mailok (2020) highlighted that play-based learning supports Malaysia's education policy goal of developing creative, critical thinkers. PBL encourages students to apply their skills in real-life scenarios, thus enhancing problem-solving and reasoning abilities.

2.7 Theoretical Perspectives: Piaget and Vygotsky

Piaget's cognitive development theory underpins much of the research on PBL. He argued that children learn actively through experiences and play. His stages of cognitive development highlight how children move from concrete to abstract reasoning over time (Mcleod, 2023).

Vygotsky's sociocultural theory complements Piaget's views by emphasizing the importance of social interactions in learning. Vygotsky's concept of the Zone of Proximal Development (ZPD) illustrates how children learn best with assistance from more knowledgeable others during play (Mendo-Lázaro et al., 2018). According to Bodrova and Leong (2015), play creates opportunities for guided learning within the child's ZPD.

2.8 Conceptual Framework

The conceptual framework of this study centres around the interplay between teacher attitude, teacher motivation, and the implementation of PBL in Early Mathematics instruction. Intrinsic motivation—stemming from a teacher's belief in the value of play- drives enthusiastic and innovative teaching practices. Meanwhile, extrinsic motivation such as institutional support further reinforces the teacher's commitment. Positive teacher attitudes and strong motivation levels are therefore critical determinants of successful PBL integration.

3.0 METHODOLOGY AND DATA SOURCES

3.1 Introduction

This study adopts a descriptive quantitative research design aimed at capturing teachers' perceptions of the PBL approach in Early Mathematics instruction in government preschools in Selangor. This method enables the exploration of variables such as attitude, motivation, and actual classroom implementation.

3.2 Study Setting

Selangor, located on the west coast of Peninsular Malaysia, is one of the most developed states and offers a range of early childhood education programs. Government preschools in this state are selected as the setting for this study due to their accessibility, standardized curriculum, and diversity of student demographics.

3.3 Population and Sample

The population includes all government preschool teachers in Selangor. The sample consists of 30 teachers from randomly selected government preschools. Due to the limited number of preschool teachers in each school (typically one per school), this sample is representative of the broader teaching population.

The study uses a closed-ended questionnaire to gather data on teacher perceptions regarding PBL in Early Mathematics. These include questions measuring teacher attitude, motivation, implementation practices, and the correlation between these variables.

3.4 Data Collection

Following the guidelines by Taherdoost (2021), data collection **involved** reaching out to preschool teachers through personal networks and digital platforms such as Facebook and Instagram. Permission from school principals **was sought** to ensure ethical standards. Teachers **were invited** to participate voluntarily, and anonymity **was preserved**.
The questionnaire **used** Likert scales and **was distributed** online or in person, depending on logistical feasibility.

3.5 Ethical Considerations

Research ethics considerations are critical to ensuring the safety, rights, and well-being of participants as well as the integrity of the research process. Informed consent, confidentiality, and the minimization of potential harm to participants are all principles covered by ethical guidelines. Researchers must obtain participants' voluntary and informed consent by outlining the study's objectives, procedures, and potential risks (Siegle, D., 2023). Participants' identities and sensitive information should be protected by maintaining confidentiality and anonymity.

4.0 DATA ANALYSIS

4.1 Introduction

The data collected were analyzed using SPSS statistical software. Descriptive statistics **were used** to determine means and frequencies for variables such as teacher attitude and motivation. The key inferential analysis **involved** Pearson's Correlation, which **tested** the strength of the relationship between teacher attitudes/motivation and the implementation of PBL. Pearson's r-values were interpreted to determine whether relationships were weak, moderate, or strong, and whether they were statistically significant. This analysis **addressed** the fourth research question regarding correlations between key variables.

This section presents the findings and data analysis from the 30 questionnaires completed by preschool teachers who teach in government preschools in Selangor state**.** The study **sought** to answer the following research questions:

1. What is the level of teacher's attitude towards the implementation of the Play Based Learning (PBL)approach in teaching and learning (PdP) Early Mathematics for government preschool students in Selangor?

2. What is the level of teacher motivation to implement the Play Based Learning (PBL) approach in the teaching and learning (PdP) of Early Mathematics for government preschool students in Selangor?

3. What is the level of implementation of the Play Based Learning (PBL) approach in the teaching and learning(PdP) of Early Mathematics for preschool students?

4. Is there a relationship between the teacher's attitude and motivation towards the implementation of the Play Based Learning (PBL) approach in the teaching and learning (PdP) of Early Mathematics for preschool students?

A questionnaire was given to a total of 20 preschool teachers from government preschools in **Selangor state**. The quantitative data were statistically analyzed using SPSS Version 27. The questionnaires **were** analyzed as follows:

1. The demographic profile of respondents.

2. The level of teacher's attitude towards the implementation of the Play Based Learning (PBL)approach in teaching and learning (PdP) Early Mathematics learning for government preschool students in Selangor.

3. The level of teacher motivation to implement the Play Based Learning (PBL) approach in the teaching and learning (PdP) Early Mathematics for government preschool students in Selangor.

4. The level of implementation of the Play Based Learning (PBL) approach in the teaching and learning (PdP) of Early Mathematics for preschool students.

5. The relationship between the teacher's attitude and motivation towards the implementation of the Play Based Learning (PBL) approach in the teaching and learning(PdP) of Early Mathematics for preschool students.

4.2 Demographic Profile of Respondents

A total of 30 respondents answered the demographic items in the questionnaire, which included gender, age, level of education, and teaching experience. The demographic data were tabulated and are shown in Table 4.1.

As shown in Table 4.1, the majority of respondents were female (80.0%), while males constituted only 20.0%. As for age, most of the respondents were between 51 and 60 years old (36.7%). Respondents aged 21–30 and 41–50 represented the same proportion (26.7%), whereas those aged 31–40 made up 10.0% of the sample. In addition, most of the respondents' level of education was a bachelor's degree (96.7%), while the remaining 3.3% held a Master's degree**.** Next, in terms of teaching experience, the teachers were grouped into four categories: 1–10 years, 11–20 years, 21–30 years, and 31 years and above. The largest group of respondents had 21–30 years of teaching experience (36.7%), while those with 11–20 years and 31 years and above each accounted for 16.7%. The remaining respondents—those with 1–10 years of teaching experience—numbered nine**,** representing 30.0%.

Table 4.1

Demographic profile of respondents

Items	Number	Percentage
Gender		
Female	24	80.0
Male	6	20.0
Total	30	100
Age		
21 – 30	8	26.7
31 – 40	3	10.0
41 – 50	8	26.7
51 – 60	11	36.7
Total	30	100
Level of education		
Diploma		
Degree	29	96.7
Master	1	3.3
PhD		
Total	30	100
Experience of teaching		
1 – 10 years	9	30.0
11 – 20 years	5	16.7
21 – 30 years	11	36.7
31 years above	5	16.7
Total	30	100

4.3 Teachers' attitudes towards the implementation of Play Based Learning (PBL) in Teaching and Learning (PdP) Early Mathematics for preschool students.

Teachers were required to respond to the items based on a 4-point Likert scale. The first research question in this study examined teachers' attitudes toward the implementation of Play-Based Learning (PBL) in the Teaching and Learning (PdP) of Early Mathematics for preschool students.

Table 4.2

Teachers' attitudes towards the implementation of Play Based Learning (PBL) in Teaching and Learning (PdP) Early Mathematics for preschool students.

No	Item	Mean	SD
1	I do not easily give up on guiding students by using the Play Based Learning (PBL) approach Early Mathematics teaching.	3.533	0.507
2	I feel confident to apply the Play Based Learning (PBL) approach in teaching Early Mathematics.	3.533	0.507
3	I am optimistic that my students can improve mastery of Early Mathematics through Play Based Learning (PBL) approach.	3.633	0.490
4	I am diligent in preparing before beginning the lesson process that uses the Play Based Learning (PBL) Approach.	3.500	0.508
5	I always give students the opportunity to be creative during play activities.	3.633	0.556
6	I am diligent in preparing materials for Early Mathematics lesson.	3.500	0.508
7	I feel comfortable applying the Play Based Learning (PBL) approach for teaching Early Mathematics.	3.433	0.504
8	I like to use the Play Based Learning (PBL) approach in teaching Early Mathematics.	3.666	0.479
9	I like to share the method of teaching for Play Based Learning (PBL) approach with colleagues.	3.600	0.498
	Total	**3.559**	**0.506**

Scale: 1= Strongly Disagree, 2= Disagree, 3= Agree, 4 = Strongly Agree

This section discusses the second research question on teachers' attitudes toward implementing Play-Based Learning (PBL) in the Teaching and Learning (PdP) of Early Mathematics, as detailed in Table 4.2. The overall mean score was 3.559 (SD = 0.506), indicating moderate agreement across most items (1, 2, 3, 4, 5, 6, 9, 10, 12,

13, 14, 15). Notably, item 8; "I like to use the PBL approach in teaching Early Mathematics" - had a higher agreement level (M = 3.666, SD = 0.479). In contrast, item 7 showed a lower agreement (M = 3.433, SD = 0.504), reflecting some discomfort with applying PBL, likely due to unfamiliarity. Overall, teachers expressed optimism that PBL could enhance students' mastery of Early Mathematics (M = 3.633, SD = 0.490).

Table 4.3

Teacher Motivation to Implement the Play Based Learning(PBL) approach in Teaching and Learning (PdP) Early Mathematics for preschool students

No	Item	Mean	SD
1	I am interested in teaching new techniques and skills in learning Early Mathematics.	3.566	0.504
2	I encourage the students to complete the Early Mathematics assignment within the period set by the group or each other.	3.500	0.508
3	Pupils are more enthusiastic to learn when I am using a Play Based Learning (PBL) approach.	3.666	0.479
4	I am more motivated when there are students completing tasks in Early Mathematics learning activities.	3.533	0.507
5	I encourage students to ask questions during Early Mathematics learning even if there are mistakes they make.	3.600	0.498
6	I set goals in teaching Early Mathematics.	3.566	0.504
7	I plan a teaching strategy for Early Mathematics.	3.620	0.493
8	I realize that the teaching approach I use helps students' Early Mathematics learning.	3.566	0.504
9	I adapted the original idea according to the changes while teaching Early Mathematics.	3.433	0.504
10	I always get support and encouragement from other teachers in teaching Early Mathematics.	3.433	0.504
	Total	**3.548**	**0.500**

Scale: 1= Strongly Disagree, 2= Disagree, 3= Agree, 4 = Strongly Agree

Teachers' Perceptions of Play-Based Learning (PBL) in the Teaching and Learning of Early Mathematics in Government Preschools in Selangor

As shown in the table, most respondents expressed strong agreement that pupils are more enthusiastic to learn when using a Play-Based Learning (PBL) approach (M = 3.666, SD = 0.479). This may be attributed to PBL's ability to integrate learning with enjoyment, thereby creating a dynamic and interactive learning environment.

On the other hand, there were fewer respondents who concurred with the statement that they adapt the original idea according to changes while teaching Early Mathematics (M = 3.433, SD = 0.504). Similarly, an equal number of respondents agreed with the statement that they always receive support and encouragement from other teachers in teaching Early Mathematics (M = 3.433, SD = 0.504). Teachers may resist adapting original ideas while teaching Early Mathematics for various reasons. One primary concern could be a lack of familiarity with new pedagogical approaches or updated curriculum standards.

Next, the third section of the research question in this study investigates the implementation of the Play-Based Learning (PBL) approach in the Teaching and Learning (PdP) of Early Mathematics for preschool students. The overall mean score was 3.531**,** and the standard deviation was 0.504**.** The majority of responses fall within the spectrum of moderate agreement, with respondents indicating moderate agreement on items 1, 2, 4, 5, 6, 8, and 9**,** while 63.3% of responses indicated strong agreement for item 7. However, item 3 falls into the category of having a low agreement level.

Table 4.4

Implementation of the Play Based Learning (PBL) approach in Teaching and Learning (PdP) Early Mathematics for preschool students.

No	Item	Mean	SD
1	I will ensure equal participation of students during activities.	3.500	0.508
2	I will give basic information to help students (picture material).	3.566	0.504
3	I create questions that match the teaching objectives.	3.466	0.507
4	I plan the optimal use of time and space.	3.566	0.504
5	I provide teaching aids such as instruction cards, board toys and so on.	3.500	0.508
6	I will explain the teaching objectives first before the play activities are carried out.	3.482	0.508
7	I encourage sharing information either between group members or with each other.	3.633	0.490
8	I determine the criteria for forming student groups.	3.500	0.508
9	I will act as a facilitator throughout the activity.	3.566	0.504
	Total	**3.531**	**0.504**

Scale: 1= Strongly Disagree, 2= Disagree, 3= Agree, 4 = Strongly Agree

Next, the third section of the research question in this study investigates the implementation of the Play-Based Learning (PBL) approach in the Teaching and Learning (PdP) of Early Mathematics for preschool students. The overall mean score was 3.531, and the standard deviation was 0.504. The majority of responses fall within the spectrum of moderate agreement, with respondents indicating moderate agreement on items 1, 2, 4, 5, 6, 8, and 9. However, 63.3% of respondents showed strong agreement for item 7. In contrast, item 3 falls into the category of having a low agreement level.

As can be seen, this table provides insights into the implementation of the Play-Based Learning (PBL) approach in the Teaching and Learning (PdP) of Early Mathematics for preschool students. The respondents agreed that they encourage the sharing of information either among group members or with one another (M = 3.633, SD = 0.490). On the other hand, fewer respondents agreed that they create questions that match the teaching objectives (M = 3.466, SD = 0.507), likely due to the complexity of

the learning process and the diverse ways in which students interpret and internalize information.

Table 4.5

The relationship between the teacher's attitude and motivation towards the implementation of Play Based Learning (PBL) approach in the teaching and learning of Early Mathematics

		Attitude	Motivation	Implementation
Attitude	Pearson Correlation	1	.806**	.876**
	Sig. (2-tailed)		<.001	<.001
Motivation	Pearson Correlation	.806**	1	.870**
	Sig. (2-tailed)	<.001		<.001
Implementation	Pearson Correlation	.876**	.870**	1
	Sig. (2-tailed)	<.001	<.001	

**.p<0.01

The Pearson-r analysis shows that there is a strong correlation between teachers' attitudes (r = 0.876, p = 0.001) and motivation (r = 0.870, p = 0.001) with the implementation of the Play-Based Learning (PBL) approach in the teaching and learning of Early Mathematics for preschool students. This indicates a significant positive relationship between teachers' attitudes and motivation and the implementation of PBL in Early Mathematics. Therefore, the researcher successfully accepted the alternative hypothesis of this study.

5.0 DISCUSSION, RECOMMENDATIONS AND CONCLUSION

5.1 Summary and Discussion of the Research Findings

The results discussed above are critical to the successful implementation of this research, and from these findings, the researcher may derive several implications. These results also provide relevant interpretations and insights that will be useful in guiding future studies.

5.1.1Teachers' Demographic

Table 4.1 clearly shows that the majority of respondents were female, accounting for 80%, while male respondents made up only 20%. In terms of age, the highest percentage of respondents (36%) were between 51 and 60 years old. An equal percentage (27%) fell within the age ranges of 21 to 30 and 41 to 50 years old, while the lowest percentage (10%) was recorded for the age group of 31 to 40 years old. Regarding educational qualifications, most respondents held a degree (97%), while only 3% were pursuing a Master's degree. No respondents reported having a diploma or PhD qualification. In relation to their current level of study, the majority were enrolled in undergraduate programmes (74%). Lastly, the highest percentage of respondents had between 21 and 30 years of teaching experience. The percentages for those with 11 to 20 years and above 31 years of teaching experience were the lowest, both at 5%. Meanwhile, a moderate proportion (30%) had between 1 and 10 years of teaching experience.

5.1.2 Teachers' attitudes towards the implementation of Play Based Learning (PBL) in Teaching and Learning (PdP) Early Mathematics for preschool students

The first research objective was to determine the level of teachers' attitudes toward implementing Play-Based Learning (PBL) in Early Mathematics in government preschools in Selangor. The findings showed that most teachers demonstrated a positive attitude, with a high mean score (M = 3.559, SD = 0.506). Teacher attitudes play a crucial role in shaping the classroom environment and influencing the effectiveness of the teaching process. Item 8 recorded the highest level of agreement (M = 3.666, SD = 0.479), indicating that most teachers enjoy using PBL and view it as an effective approach that aligns with preschoolers' developmental stages. At this age, children naturally learn best through play, exploration, and hands-on experiences (GGI Insights, 2023).

On the other hand, teachers showed lower agreement in feeling comfortable applying the Play-Based Learning (PBL) approach for teaching Early Mathematics (M = 3.433, SD = 0.504). Preschool teachers may experience discomfort when implementing PBL for several reasons. One key factor is the perceived lack of structure in PBL, which may make teachers feel uncertain about managing learning activities. In addition, teachers may be concerned about how to assess students' progress within a play-based framework, as traditional evaluation methods do not always align well with the spontaneous and varied nature of play.

5.1.3 Teaching and Learning (PdP) Early Mathematics for preschool students

The second research objective of this study was to identify teacher motivation to implement the Play-Based Learning (PBL) approach in the Teaching and Learning (PdP) of Early Mathematics for preschool students in Selangor. The findings indicate that a significant majority of teachers strongly agreed that pupils are more

enthusiastic to learn when teachers use a play-based learning approach. This is because teachers often find that when employing PBL, students participate more actively and are more motivated to learn. The nature of play stimulates curiosity, engagement, interest, and intrinsic motivation among preschoolers (Parker, Thomsen & Berry, 2022). Play is a natural and enjoyable way for young children to explore and make sense of their surroundings. However, one notable barrier is teachers' unfamiliarity with new pedagogical approaches and updated curriculum standards (Peterson, 2018). Educators who have long relied on traditional teaching methods may find it challenging to adapt to the changes required by PBL.

Next, the third section of the research question investigates the implementation of the Play-Based Learning (PBL) approach in the Teaching and Learning (PdP) of Early Mathematics for government preschool students in Selangor. The overall mean score and standard deviation were M = 3.531 and SD = 0.504. The majority of respondents strongly agreed that they encourage the sharing of information either among group members or with one another. This sharing of information and ideas requires students to organize their thoughts coherently and helps strengthen their understanding and knowledge of the learning content.

5.1.4 Relationship Between Teachers' Attitudes and Motivation Toward the Implementation of the Play-Based Learning (PBL) Approach in the Teaching and Learning of Early Mathematics

The final research objective was to examine the relationship between teachers' attitudes and motivation toward the implementation of the Play-Based Learning (PBL) approach in the teaching and learning of Early Mathematics. The Pearson-r analysis in Table 4.5 shows a strong relationship between teachers' attitudes ($r = 0.876$, $p = 0.001$) and motivation ($r = 0.870$, $p = 0.001$) with the use of PBL strategies in the teaching and learning (PdP) of Early Mathematics for government preschool students in Selangor. These findings indicate a significant positive relationship between teachers' attitudes and motivation and the application of PBL strategies in Early Mathematics. Therefore, the researcher was able to accept the alternative hypothesis of this study.

6.0 IMPLICATIONS AND RECOMMENDATIONS

The study reveals that government preschool teachers generally have a positive attitude and strong motivation toward implementing the Play-Based Learning (PBL) approach in teaching Early Mathematics. Teachers enjoy using PBL, believe that it enhances students' mastery of mathematical skills, and encourage creativity during lessons. Their motivation is strengthened by students' enthusiasm, their own interest in exploring new teaching techniques, and the support they receive from colleagues. Together, these factors contribute to the effective implementation of the PBL approach in the classroom.

REFERENCES

Abdul Gafoor, K., & Kurukkan, A. (2015). *Learner and Teacher Perception on Difficulties in Learning and Teaching Mathematics: Some Implications*. Eric Institute of Education Science. https://files.eric.ed.gov/fulltext/ED568368.pdf

Acharya, B. R. (2017). Factors Affecting Difficulties in Learning Mathematics by Mathematics Learners. *International Journal of Elementary Education*, *6*(2), 8. https://doi.org/10.11648/j.ijeedu.20170602.11

Adipat, S., Laksana, K., Busayanon, K., Asawasowan, A., & Adipat, B. (2021). *Engaging Students in the Learning Process with Game-Based Learning: The Fundamental Concepts*. International Journal of Technology in Education (IJTE). https://files.eric.ed.gov/fulltext/EJ1311472.pdf

Ahmad, N. L., Sho. S. L., Ab Wahid, H., & Yusof, R. (2019). *THE SIGNIFICANCE OF 21st CENTURY TEACHING AND LEARNING PRACTICES TOWARD STUDENTS*

DEVELOPMENT. International Journal of Education, Psychology and Counseling. http://www.ijepc.com/PDF/IJEPC-2019-28-03-06.pdf

Anders, Y., Roßbach, H., Weinert, S., Ebert, S., Kuger, S., Lehrl, S., & Von Maurice, J. (2013). *Home and preschool learning environments and their relations to the development of early numeracy skills*. Early Childhood Research Quarterly. https://doi.org/10.1016/j.ecresq.2011.08.003

Arlinghaus, K. R., & Johnston, C. A. (2017). Advocating for behavior change with education.

American Journal of Lifestyle Medicine, *12*(2), 113–116. https://doi.org/10.1177/1559827617745479

Arof, K. Z. M., Ismail, S., & Saleh, A. L. (2018). Contractor's performance appraisal system in the Malaysian construction industry: Current practice, perception and understanding. *International Journal of Engineering & Technology*, *7*(3.9), 46. https://doi.org/10.14419/ijet.v7i3.9.15272

Babajide, D. A., & Adesina. (2022). DATA PRESENTATION AND ANALYSINGf.

ResearchGate. https://doi.org/10.13140/RG.2.2.21896.29441

Balasubramaniam, R., & Maat, S. M. (2022). Game Based Learning (GBL): Impact on Students Achievement in Mathematics. *Jurnal Dunia Pendidikan*, *4*(4), 141–150. https://myjms.mohe.gov.my/index.php/jdpd/article/view/20777/11301

Baroody, A. J., Clements, D. H., & Sarama, J. (2019). Teaching and Learning Mathematics in Early Childhood Programs. *Research Gate*, 329–353. https://doi.org/10.1002/9781119148104.ch15

Barrett, D., & Green, K. (2009). *Pedagogical Content Knowledge As a Foundation for an Interdisciplinary Graduate Program*. Eric. https://files.eric.ed.gov/fulltext/EJ851876.pdf

Bidin, M. (2022, March 31). *Implementing The Teaching And Learning Processes Of Didik Hibur Edutainment Approach Among Remedial Education Teachers In Penang*. https://www.jocss.com/index.php/multidiscipline/article/view/101#:~:text=Abstract,to%20attract%20students%20to%20learn.

Bodrova, E., & J. Leong, D. (2015). Vygotskian and Post-Vygotskian Views on Children's Play. *American Journal of Play*, *7*(3). https://files.eric.ed.gov/fulltext/EJ1070266.pdf

Braak, D. T., Lenes, R., Purpura, D. J., Schmitt, S. A., & Størksen, I. (2022). Why do early mathematics skills predict later mathematics and reading achievement? The role of executive function. *Journal of Experimental Child Psychology*, *214*, 105306. https://doi.org/10.1016/j.jecp.2021.105306

Brace, I. (2018). *Questionnaire design: How to plan, structure and write survey material for effective market research*. Kogan Page Publishers. https://books.google.com.my/books?hl=en&lr=&id=mSRTDwAAQBAJ&oi=fnd&pg=PP1&dq=The+cost+of+building+a+questionnaire+is+cheap+and+the+time+allotted+is+short.+Researchers+can+obtain+data+or+information+from+a+larger+number+of+respondents+and+quickly.+(pdf)&ots=nywPHusUSM&sig=V5UZglQe5lg2zmV3-aTJqSIr5NQ&redir_esc=y#v=onepage&q&f=false

Brown, C., & Miller, D. (2023). The impact of play-based learning on mathematical reasoning in preschoolers. *Journal of Educational Psychology*, *38*(2), 215–230.

Chandio, M. T., Pandhiani, S. M., & Iqbal, R. (2016). Bloom's Taxonomy: Improving Assessment and Teaching-Learning Process. *Journal of Education and Educational Development*, *3*(2). https://files.eric.ed.gov/fulltext/EJ1161460.pdf

Companion, B. M. (2023, September 7). *How Real Time Feedback can Help in Real Time Learning*. BYJU'S Future School Blog. https://www.byjusfutureschool.com/blog/how-real-time-feedback-can-help-in-real-time-learning/

Create (C.) Courses. (2022). What is the traditional method of teaching? | Definition and Characteristics. Graphy Blog. https://graphy.com/blog/traditional-method-of-teaching/

Derman, M. T., Zeteroğlu, E. Ş., & Birgul, A. (2020, May 10). *The Effect of Play-Based Math Activities on Different Areas of Development in Children 48 to 60 Months of Age*. SAGE Open; SAGE Publishing. https://doi.org/10.1177/2158244020919531

De Vaus, D. A. (2006). Research design: a review. In D. de Vaus (Ed.), Research Design (pp. 23-55) London: Sage.

Dowd, M. (2018, June 25). *Advantages and disadvantages of qualitative and quantitative research.* The Classroom. https://www.theclassroom.com/advantages-disadvantages- of-qualitative-quantitative-research-12082716.html

Edwin, K. (2019). Reliability and validity of research instruments Correspondence to kubaiedwin@yahoo.com. *ResearchGate*. https://www.researchgate.net/publication/335827941_Reliability_and_Validity_of_Research_Instruments_Correspondence_to_kubaiedwinyahoocom

Emfinger, K. (2009). Numerical conceptions reflected during multiage child-initiated pretend play. *Journal of Instructional Psychology*, *36*(4), 326–334. https://www.semanticscholar.org/paper/Numerical-conceptions-reflected-during-multiage-Emfinger/9d672836e95f81f84fcf6fda3bb2312ffaa4fd6a

Evans, M. (2021). *Play-based Learning in the Early Childhood Mathematics Classroom: Culturally Sustaining Play*. CORNERSTONE. https://cornerstone.lib.mnsu.edu/icitl/vol2/iss1/2

Fauzi, F. (2022b, July 21). *Why Play Based Learning is Important for Preschoolers*. Little Playhouse Childcare Centre. https://littleplayhouse.com.my/the-importance-of-play- based-learning/#:~:text=What%20is%20Play%2DBased%20Learning,%2C%20social%2C%20and%20emotional%20development.

Ferlazzo, L. (2021, March 5). "Students respect teachers who they feel respect them" (Opinion). *Education Week*. https://www.edweek.org/teaching-learning/opinion-students-respect-teachers-who-they-feel-respect-them/2019/09

Fong Peng, C., & Fikri Ismail, M. (2020, May 11). *The Implementation of Play Approach in Teaching and Learning of Malay Language for Preschool Students*. https://ejournal.upsi.edu.my/index.php/JPAK/article/view/3400/2349

Gerring, J. (2004). What is a case study and what is it good for? American political science review, 98(2), 341-354.

GGI Insights. (2023, October 25). Early Childhood Education Research: Exploring the Latest Insights. *Gray Group International*. https://www.graygroupintl.com/blog/early-childhood-education-research

Gordon, J., & Hom, E. J. (2021, November 11). *What is mathematics?* livescience.com. https://www.livescience.com/38936-mathematics.html

Hirsh-Pasek, K. (2015). Playful Learning: The role of Play in Early Childhood education settings. *www.academia.edu*. https://www.academia.edu/19508680/Playful_Learning_The_Role_of_Play_in_Early

_Childhood_Education_Settings

Johnson, M., et al. (2023). Social interactions in play-based mathematics learning: A longitudinal study. *Journal of Applied Developmental Psychology*, *45*(1), 78–92.

Khairuddin, N. S., & Mailok, R. (2020). Pembelajaran berasaskan permainan dalam mata pelajaran sejarah menggunakan teknik mnemonik. *Journal of ICT in Education*, *7*(1), 9–15. https://doi.org/10.37134/jictie.vol7.1.2.2020

Khalil, M., & Zahoor-ul-Haq. (2019). Concept process with mathematical thinking tools under the domain of Piaget's theory of cognitive development. *Journal of Contemporary Teacher Education*, *111*, 1-12. https://www.researchgate.net/profile/Muhammad-Khalil-36/publication/339768488_Concept_Process_with_Mathematical_Thinking_Tools_under_the_Domain_of_Piaget's_Theory_of_Cognitive_Development/links/5e62fd1f4585153fb3c82a5b/Concept-Process-with-Mathematical-Thinking-Tools-under-the-Domain-of-Piagets-Theory-of-Cognitive-Development.pdf

Mahn, H., & John-Steiner, V. (2012). Vygotsky and Sociocultural approaches to teaching and learning. *Handbook of Psychology, Second Edition*. https://doi.org/10.1002/9781118133880.hop207006

Malaysia Education Ministry. (2018). *Garis Panduan Pengurusan Prasekolah*. Bahagian Pengurusan Sekolah Harian. https://www.moe.gov.my/muat-turun/pekeliling-dan-garis-panduan/2933-kpm-garis-panduan-prasekolah-vportal/file

Maulana, R., Helms-Lorenz, M., & Van De Grift, W. (2015d). A longitudinal study of induction on the acceleration of growth in teaching quality of beginning teachers through the eyes of their students. *Teaching and Teacher Education*, *51*, 225–245. https://doi.org/10.1016/j.tate.2015.07.003

Mazana, M. Y., Montero, C. S., & Casmir, R. (2018). Investigating Students' Attitude towards Learning Mathematics. *International Electronic Journal of Mathematics Education*, *14*(1). https://doi.org/10.29333/iejme/3997

Mcleod, S. (2023, November). *Piaget's Theory and Stages of Cognitive Development*. Simply Psychology.

https://www.simplypsychology.org/piaget.html#:~:text=According%20to%20Piaget%2C%20children%20are,their%20understanding%20of%20the%20world.

McMullen, K. (2022). *Education Advanced, Inc.* Education Advanced, Inc. https://educationadvanced.com/resources/blog/innovative-teaching-strategies-nine-techniques-for-success/

Mendo-Lázaro, S., Del Barco, B. L., Castaño, E. F., Del Río, M. I. P., & Gallego, D. I. (2018). Cooperative team learning and the development of social skills in higher education: the variables involved. *Frontiers in Psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.01536

Min, T. L. L., & Maat, S. M. (2022). Penerimaan Murid terhadap Pembelajaran Berasaskan Permainan dalam Matematik: Tinjauan Literatur Bersistematik. *Malaysian Journal of Social Sciences and Humanities*, *7*(12), e001962. https://doi.org/10.47405/mjssh.v7i12.1962

MSEd, K. C. (2023, March 15). *Validity in psychological tests*. Verywell Mind. https://www.verywellmind.com/what-is-validity-2795788#:~:text=Validity%20isn't%20determined%20by,construct%20validity%2C%20and%20face%20validity.

Murungi, C. G., & Manyara, C. O. (2018). *Teacher's motivation to use play as a medium of instruction*. International Journal of Pregnancy & Child Birth. https://doi.org/10.15406/ipcb.2018.04.00136

National Association for the Education of Young Children (NAEYC) and the National Council of Teachers of Mathematics (NCTM). (2010). *Early Childhood Mathematics: Promoting Good Beginnings*. National Association for the Education of Young Children (NAEYC). https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/resources/position-statements/psmath.pdf#:~:text=Throughout%20the%20early%20years%20of,crackers%20fairly%20with%20a%20playmate.

Nevenglosky, E. A., Cale, C., & Aguilar, S. P. (2019). *Barriers to effective curriculum implementation*. Research in Higher Education Journal. https://files.eric.ed.gov/fulltext/EJ1203958.pdf

Ojose, B. (2008). Applying Piaget's Theory of Cognitive Development to Mathematics Instruction. *The Mathematics Educator*, *18*(1), 26–30.

https://files.eric.ed.gov/fulltext/EJ841568.pdf

Parker, R., Thomsen, B. S., & Berry, A. (2022). Learning Through Play at School – a framework for policy and practice. *Frontiers in Education*, *7*. https://doi.org/10.3389/feduc.2022.751801

Parks, A. N. (2015). *Exploring mathematics through play in the early childhood classroom*. Teachers College Press. https://books.google.com.my/books?hl=en&lr=&id=vunDBQAAQBAJ&oi=fnd&pg=PP1&dq=Exploring+mathematics+through+play+in+the+early+childhood+classroom.+Teachers+College,+Columbia+University&ots=dkYfq0j8wK&sig=e6etF1Tag1NPskLIKexS26nBH1E&redir_esc=y#v=onepage&q=Exploring%20mathematics%20through%20play%20in%20the%20early%20childhood%20classroom.%20Teachers%20College%2C%20Columbia%20University&f=false

Patton, B. (2023). *Implementing Play-based Learning*. NWcommons. https://nwcommons.nwciowa.edu/cgi/viewcontent.cgi?article=1503&context=education_masters

Peng Chew, F., & Fikri Ismail, M. (2020). Pelaksanaan pendekatan bermain dalam pengajaran dan pembelajaran Bahasa Melayu murid prasekolah. *Jurnal Pendidikan Awal Kanak-Kanak Kebangsaan*, *9*(1), 14–25. https://ejournal.upsi.edu.my/index.php/JPAK/article/view/3400/2349

Peterson, A. (2018). Understanding innovative pedagogies: key themes to analyse new approaches to teaching and learning. *Organisation for Economic Co-operation and Development*. https://one.oecd.org/document/EDU/WKP(2018)8/En/pdf

Rajapaksha, P. R., & Chathurika, P. (2015). Problems Faced by Preschool Teachers When Using Teaching Aids in the Teaching Learning Process. *International Journal of Multidisciplinary Studies*, *2*(1), 111. https://doi.org/10.4038/ijms.v2i1.68

Ramli, L. I. B. (2017). *Attitudes of Preschool Teachers towards the Introduction of Inclusive Education (IE) in Malaysian Government Preschools*. White Rose eTheses Online. https://etheses.whiterose.ac.uk/19566/

Russo, J., Bragg, L. A., & Russo, T. (2021, March). *How primary teachers use games to support their teaching of mathematics*. Eric. https://files.eric.ed.gov/fulltext/EJ1297981.pdf

Saban, A. İ. (2009, January 1). *Management of teaching and class control*. Procedia - Social and Behavioral Sciences; Elsevier BV. https://doi.org/10.1016/j.sbspro.2009.01.370

Sabri, N. B., Nordin, N. B., & Mohamed, S. B. (2023). Exploration of Teaching Methods in the Implementation of Early Mathematics Teaching and Learning (PdP). *International Journal of Academic Research in Business and Social Sciences*, *13*(1), 700-713.

Smith, A., & Jones, B. (2022). Traditional approaches in early mathematics education. *Journal of Early Childhood Education*, *45*(3), 123–140.

Solans-Domènech, M., Pons, J., Adam, P., Grau, J. M. S., & Aymerich, M. (2019). Development and validation of a questionnaire to measure research impact. *Research Evaluation*, *28*(3), 253–262. https://doi.org/10.1093/reseval/rvz007

Steffek, E. (2023, August 31). *Education Advanced, Inc.* Education Advanced, Inc. https://educationadvanced.com/resources/blog/inclusive-education/

Sürücü, L., & Maşlakçı, A. (2020). VALIDITY AND RELIABILITY IN QUANTITATIVE RESEARCH. *Business and Management Studies: An International Journal*, *8*(3), 2694–2726. https://doi.org/10.15295/bmij.v8i3.1540

Sanghvi, P. (2020). Piaget's theory of cognitive development : a review. *Indian Journal of Mental Health*, *7*(2), 90. https://doi.org/10.30877/ijmh.7.2.2020.90-96

Siegle, D. (2023, January 16). *Research ethics and informed consent*. Educational Research Basics by Del Siegle. https://researchbasics.education.uconn.edu/ethics-and-informed-consent/

Staff Writer. (2020, March 31). *What Is a Mathematical Concept?* Reference.com. https://www.reference.com/world-view/mathematical-concept-e3329188627b8cff

Starovoytova, D. (2017). *Scientific Research, Writing, and Dissemination (Part 4/4): Dissemination of Scholarly Publications*. Journal of Education and Practice(USA). https://core.ac.uk/download/pdf/234641049.pdf

Steffek, E. (2023, August 31). *Education Advanced, Inc.* Education Advanced, Inc. https://educationadvanced.com/resources/blog/inclusive-education/

Sword, R. (2023, October 18). Effective Communication in the classroom: Skills for Teachers. *The Hub | High Speed Training*. https://www.highspeedtraining.co.uk/hub/communication-skills-for-teachers/

Taber, K. S. (2017). The use of Cronbach's Alpha when developing and reporting research instruments in science education. *Research in Science Education*, *48*(6), 1273–1296. https://doi.org/10.1007/s11165-016-9602-2

Taherdoost, H. (2021b, September 22). *Data Collection Methods and Tools for Research; A Step-by-Step Guide to Choose Data Collection Technique for Academic and Business Research Projects*. https://hal.science/hal-03741847

Tasripin, N, & Bakar, K.A. (2018). "Permainan interaktif' dalam pembelajaran pranombor dan pendidikan matematik prasekolah." In *Seminar Antarabangsa Isu-isu Pendidikan (ISPEN2018)* (pp. 136-141). http://conference.kuis.edu.my/ispen/wp-content/uploads/2018/08/15.nurdiyana_taspirin.pdf

Tularam, G. A. (2018, August 27). *Traditional vs Non-traditional Teaching and Learning Strategies - the case of E-learning!* https://www.cimt.org.uk/ijmtl/index.php/IJMTL/article/view/21

Ukpokodu, O. N. (2011). *How Do I Teach Mathematics in a Culturally Responsive Way?: Identifying Empowering Teaching Practices.* https://eric.ed.gov/?id=EJ955945

Zippert, E. L., Douglas, A., Smith, M. R., & Rittle-Johnson, B. (2020). Preschoolers' broad mathematics experiences with parents during play. *Journal of Experimental Child Psychology*, *192*, 104757. https://doi.org/10.1016/j.jecp.2019.104757