Early Childhood Mathematics Learning Profile

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Early Childhood Mathematics Learning Profile

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Abstrak

Riset ini dilatarbelakangi oleh tidak adanya profil pembelajaran matematika bagi anak usia dini. Riset ini bertujuan untuk menganalisis tentang profil kinerja guru berkaitan dengan pembelajaran matematika anak usia dini di kota Pontianak. Metode penelitian yang digunakan metode riset fenomenologi. Teknik pengambilan data dilakukan dengan survei kuesioner. Hasil survei dieksplorasi dengan diskusi kelompok terfokus dan wawancara mendalam untuk menggali segala kemungkinan yang dilakukan guru. Responden yang digunakan berjumlah 29 orang terhadap anak usia dini dan difokuskan pada profil pembelajaran matematika anak usia dini, pembelajaran seriasi dan penjumlahan untuk anak usia dini, dan pembelajaran konsep besar-kecil, banyak-sedikit, panjang-pendek, dan tinggi-rendah. Hasil riset ini dapat mengidentifikasi kecenderungan pembelajaran berpusat pada sudut pandang *behaviorisme* dalam pembelajaran matematika anak usia dini. Profil pembelajaran matematika anak usia dini sangat dibutuhkan agar pembelajaran pada lembaga pendidikan anak usia dini bisa dicapai lebih maksimal.

Kata Kunci: *Anak usia dini, pembelajaran matematika, profil.*

Abstract

This research was motivated by the absence of a profile of early childhood mathematics learning. This research aims to analyse the profile of teacher performance in relation to early childhood mathematics learning in Pontianak city. The research method used was phenomenological research method. The data collection technique was conducted with a questionnaire survey. The results of the survey were explored with focus group discussions and in-depth interviews to explore the possibilities of what teachers do. The 29 early childhood respondents focused on early childhood mathematics learning profiles, early childhood learning of seriation and addition, and learning of big-small, many-little, long-short and high-low concepts. The results of this research can identify learning tendencies centred on behaviourist perspectives in early childhood mathematics learning. A profile of early childhood mathematics learning is needed so that learning in early childhood education institutions can be achieved more optimally.

Keywords: *Early childhood, maths learning, profiles.*

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Introduction

The first years of a child's life are inevitably the essential foundation for his future development (Marshman & Goos, 2018). Mathematics and inevitability for early childhood are like two inseparable sides. This is indicated by the views of mathematics education experts of the National Council of Teachers of Mathematics [NCTM] and Education of Young Children (NAEYC), who include mathematics as part of the content of the early childhood education curriculum standards (Clements, D. & Sarama, 2013). Experts at both institutions assert that the designation of high-quality, challenging, and accessible mathematics education for children aged 3 to 6 is an essential foundation for future mathematics learning.

Several studies support this confirmation; for example, Foster et al. (2014) which summarizes that mathematical concepts and skills acquired during the preschool period are the strongest predictors for future mathematical achievements. In addition, Gazali, R. (2016) also confirmed the results of its research that early childhood mathematical knowledge not only determines mathematical success at the next level but also affects children's future development, especially reading success. Therefore, it is rational if mathematics education is an essential component of curricula worldwide (Nurwati & Salsabila, 2020).

What kind of mathematics learning process is it so that it produces mathematical knowledge as intended? Nonik, N. et al. (2013) affirm that mathematics must be presented in a humane and friendly way in early childhood. In fact, Hasbi (2022) emphasizes that the child's environment plays a vital role in the learning process because cognitive processes and environmental factors are integrated. Pujiaswati et al. (2020) named the child's environment as a milieu that eliminates pedagogical and didactic situations to determine the relationship quality between the teacher and the child. The relationship quality in question can be pedagogical and didactic actions that the teacher uses to condition the child to be responsible for his learning situation (Atit et al., 2020).

Related to pedagogical and didactic situations, there has been a renewed awareness of interest in the assessment of mathematics education over the past ten years—in particular, efforts to match the assessment with the development of mathematics curricula for early childhood (Marshman & Goos, 2018). While theoretical and practical issues of mathematics education research are increasingly turning to detailed considerations and are more social in nature. Although assessment activities in early childhood mathematics, not much have been published. However, according to the study of Clements, D. & Sarama (2013) on such theoretical and practical issues, each theme of an article on assessment can be evaluated (for example, document 3 can consist of 40% of the words of topic 1. 20% of the words of topic 2, 10% of the words of topic 3 and so on) by many vocabularies addressed to the "teacher," will emerge from one theme of the study.

Qualitative studies like this presumably do not stand alone if confirmed by a more significant research result. The study of Korpershoek et al. (2016), for example, analyzed 54 randomized and non-randomized intervention studies in the decade 2003-2013 on the presence/absence of four categories of strategies: focusing on teachers, on student behavior, developments in student socio-emotional, and on teacher-student relationships. Focusing on students' socio-emotional development seems to have the most significant contribution to the effectiveness of interventions, specifically to socio-emotional outcomes. In addition, provisional results were found that students' academic outcomes benefited from teacher-focused programs. Mathematics teachers' knowledge and professional skills have a critical effect on the quality of teaching and learning in their classrooms and, consequently, on student achievement (Foster et al., 2014)

However, continuous professional development is necessary to achieve significant results in student achievement. According to Gazali, R. (2016), professional development like this requires a long time, manpower, and pretty expensive resources. Therefore, it is rare to be an independent academic study outside of school teachers to lead to the discovery of

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pedagogical and didactic situations, thus determining the quality of the relationship between teacher and child that is effective in the daily practice of teachers in their classrooms (Goldsmith, L. et al., 2014).

On the other hand, the standard principles of learning and teaching mathematics issued by Iswara, P. et al. (2013) continue to disturb the scientific, moral sense of "why is there a theory whose level is rigor (sturdy)" unemployed? Goldsmith, L. et al. (2014) insinuate that early childhood teachers' math learning is routine (often incremental, nonlinear, and repetitive). According to Suryaningsih (2015), Impression is like being in a comfortable zone without exploring factors that can operate behind the scenes over a more extended period in shaping the beliefs and practices of mathematics teachers. In such cases, it is not without risks for the benefit of early childhood mathematics learning. The emergence of the issue of not caring about early childhood mathematics learning was exposed to Luhanarky et al. (2019) in a somewhat disturbing theme, "Improving the Quality of ECCE in Indonesia ."This theme implies there are academic and practical challenges regarding early childhood education. Therefore, it can be understood that in recent years, especially in Pontianak City, in the case of early childhood mathematics learning, for example, the research team has had difficulty finding references regarding the profile of early childhood mathematics learning potential.

There is one reference related to the potential profile of early childhood 5-6 years, namely a descriptive study conducted by Mutiara & Agustin (2017) that showed from 42 subjects of their study it was described that most children can be mathematical in matching, classifying, comparing and compiling. However, other phenomena, such as the issue published by Luhanarky et al. (2019) are implied to be somewhat contrary to the study's results.

Preliminary studies indicate that teachers generally do not involve child development as a basis for designing early childhood mathematics learning (Nurwati & Salsabila, 2020). So that the potential and changes that occur in them in mathematics learning tend to be neglected. Even if it happens as the results of previous studies, early childhood "needs to be smart quickly" as their parents perceive, and teachers tend to only meet the perceptions of those parents. The limitations of such an early childhood education concept, both those that occur in parents of students and teachers, have the potential to ignore their existence in the early childhood education (ECCE) space. The novelty of this research is that there is a description specifically to create early childhood mathematics learning based on child development monitored by teachers at school. Existing mathematics learning has not considered aspects of early childhood needs and development.

How much neglect occurs? The study describes the gap between previous studies' findings (see the study of Goldsmith, L. et al. (2014); Rachmawati, (2015) and what is happening right now in the ECCE space. The teacher empowers the true potential of the learner into pedagogical and didactic situations to finish the mathematically mature early childhood. This article chronicles a different phenomenon regarding the profile of mathematics learning in early childhood. This research aims to describe the profile of teacher performance in relation to early childhood mathematics learning in Pontianak city.

Methodology

In answering research questions, researchers choose qualitative research methods, namely phenomenology. This selection is based on the consideration that studies with the same theme as carried out by Mutiara & Agustin (2017) use quantitative descriptive methods that focus more on their learners. Meanwhile, this study is more focused on how the phenomenographic profile of the teacher in planning and implementing material learning shuffles, classifies, compares, and compiles indirect objects and direct mathematical objects. With this focus, the phenomenographic profile of the teacher's mathematics learning is described in the background of the corresponding psychological condition of the learner.

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The availability of a phenomenographic profile of the teacher, which is characterized by different phenomena and is studied from different times and locations, according to Witarsa (2022), is an advantage of qualitative research whose method, phenomenology. Therefore, the novelty of the results of this study is guaranteed by the chosen method.

With such methodological conditions, the research subjects were selected, namely PAUD teachers in Pontianak city, totaling 29 teachers with research objects shuffling, classifying, comparing, and compiling objects of learning mathematics. They have taught for an average of more than 5 (five) years.

Taking into account the COVID-19 pandemic, they were given a questionnaire online. After the questionnaire data was identified regarding mathematics learning and its implementation, it was followed up with an in-depth interview (in-depth interview) using the Focus Group Discussion (FGD) approach online 3 times during August-October 2020. I also conducted a deepening of offline interviews between research team members and colleagues.

The data obtained were then analyzed using Interpretative Phenomenological Analysis (IPA). The use of IPA analysis helps uncover participants' points of view on the social phenomena they experience (Witarsa & Dista, 2019). Especially in this study, the participant's perspective on early childhood mathematics learning went through the stages of: (1) Reading and rereading, the process of rereading interview transcripts and reviewing the meaning of data; (2) Initial noting, marking the findings of the first process, collecting data focusing on the topic of early childhood mathematics learning; (3) Developing Emergent themes, finding themes and codes from interview transcripts; (4) Searching for connections across emergent themes, this phase relates the themes that arise based on the chronological order of the emergence of themes and supervise between data that are analytical and theoretical in nature so as to produce prominent themes in research ; (5) Moving the following cases, completing the previous four stages, from one partition, then moving on to another participant and so on; and 6) Looking for patterns across cases, tracing similar patterns between participant expressions so that the main conclusions are the main themes that are often repeated from the participants. The research steps can be seen in Figure 1.

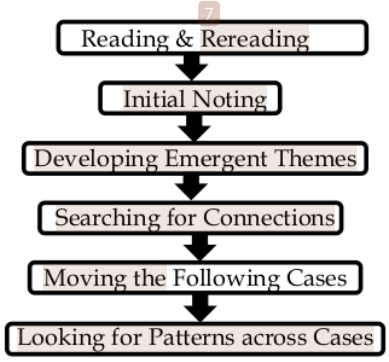

Figure 1. The Research Steps

Results and Disscussion

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In general, learning is taken using APE (Educational Game Tools) which are designed by teachers themselves based on the competence of developmental achievements according to the Regulation of the Minister of Education and Culture Number 147 of 2014 concerning the ECCE Curriculum. It is shown from the amount of data answered by the study subjects that 85% of the 29 teachers have fully used the government curriculum. This leads to the

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achievements of the student participation using references from the curriculum known as K-I (Core Competencies) and Basic Competencies (B-C). The details are code 3.5. Knowing how to solve everyday problems and behave creatively and code 4.5. Solving everyday problems creatively, and code 3.6. Get to know the objects around them (name, color, shape, size, pattern, nature, sound, texture, function, and other characteristics) and code 4.6. Conveys what and how the objects around him are familiar (name, color, shape, size, pattern, nature, sound, texture, function, and other characteristics) through various works. According to Luhanarky et al. (2019), the development aspects of the curriculum must be adequately conveyed with sincerity in preparing learning plans, tools, and supporting media.

The explanations of 5 of the 6 research subjects interviewed showed that teachers tend to be ignorant of systematic planning. It is shown from the use of themes with n learning preparation is not revealed by the subject. So that the initial mathematical concepts mostly use the form of working on assignments using worksheets from publishers' books.

The form of learning using LK by Pratiwi & Mustaji (2016) can be carried out on the condition that the theme adjustment is contextual to the children or real life. So that it can be understood that the use of books from pernerbit certainly has its drawbacks, namely that it is not necessarily by the theme in ECCE institutions and does not lues in using it. Caused by its shape, which tends to be followed only without consideration of adjustment. So the embodiment of K-I and K-D to be achieved is weighed less by using publishers' books.

Submissions that tend to use LK are finally reflected in the use of playing methods, music, and songs. In the game, the subject conveys a mathematical concept conveyed by demonstration, so the child sees and follows. According to Atit et al. (2020), this delivery method only uses behavioristic concepts in mathematics education. The impact is the lack of involvement in children building their own knowledge. As Steffe, L. (2017) points out, this concept of delivery tends to only use the teacher's point of view without involving children in building limited "objective" standards in mathematics. So that the achievement of mathematics as part of solving daily problems is patterned in a limited way and has not given children a space for freedom of thought.

Repeated habituation is also often used through singing activities with the fight for numbers assisted by the environment prepared in the classroom. It was found that mathematical concepts were also built by mentioning numbers routinely using the approach of songs. Such an approach shows that in using the singing method, there is a repetition characterized that the recognition of numbers is carried out by remembering from song every face-to-face learning supported by media facilities in the classroom. This pattern shows the lack of fulfillment of early childhood learning needs that require their own experience to build their own understanding of mathematics. This is based on the concept of meaningful mathematics learning for early childhood proposed by experts at (Suryaningsih, 2015). Understanding the concept of mathematics as a more profound learning outcome, not just remembering, requires an experiential context that directly intersects with the content of the cognitive structure of children and mathematical learners.

Serialization and numbering learning for early childhood

The concept of sorting based on the sequence series of dominant numbers is carried out by recognizing numbers as symbols of numbers by singing, using worksheets, and sums by using objects. The variety of methods used in learning this series from various sources of scientific journals has different points of view. The introduction of seriation carried out with the song method is basically fun for early childhood; in a study by Iswara, P. et al. (2013), learning to count by singing turns out to have its challenges in its delivery in early childhood, in itself, it was found that differences from the speed of development of girls who are more boys fast than boys. This finding attracts attention because various other studies tend to also combine playing methods with singing with results that tend to be satisfactory

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Suryaningsih (2015) So from the form of the method with singing that is done, it should be able to be used with a combination of other methods.

Rachmawati (2015) argue that the use of worksheets is not following the needs of early childhood who need learning resources and play activities as a means of learning. In line with this argument, Suci, R. et al. (2017) stated that children's worksheets often do not suit the needs of children with the form of instructions that are too long. The arguments and results of the study reinforce that the form of introduction to seriation and summation should be more careful in accommodating the needs of the child, who still needs a real object in learning. The form of learning from a piece of paper goes beyond the stages of cognitive development that are still in the preoperative period toward concrete operations. Expressions from participants who also use worksheets still often take advantage of worksheets from books published by publishers because they are readily available. But what is faced later is that the form of worksheets created by publishers tends to be less in line with the theme of learning in the classroom.

In addition to singing methods and worksheets, introduce the seriation of shapes, sizes, colors, and quantities for early childhood the forms of media used by objects. Teachers use objects through serialization demonstrations and APE (Educational Game Tools) designed by teachers. The material used, such as colored paper that is cut in such a way that it takes the form of a geometric shape, then introduced the concept of quantity through a counter exemplified by the teacher with a performance. The subject of the study is more instructive than inviting children to construct their mathematical knowledge. Witarsa & Alim, M. (2022) stated that the form of demonstration projects teachers to be the ideal model of learning outcomes. So, in this case, the concentration of building knowledge is that the child follows the example more.

Big-small, many-little, long-short, and high-low concept learning

The learning of large-small, many-little, long-short, and low-height concepts is carried out by experimental methods and singing. The experimental method is carried out through a thematic approach by utilizing a variety of theme-related objects. The study conducted by Rachmawati (2015) revealed that the introduction of large-small, many-small, long-short, and low-height concepts has proven to be successfully carried out using original objects related to themes, using natural materials available around children, and using delivery that involves more child participation. This reinforces that learning the essential mathematics concepts for early childhood will be more useful when children meet their developmental needs. According to the participants, conducting experiments together makes children more enthusiastic about participating in activities. Concepts like this reinforce the need for methods that are not only single enough to be carried out but are also combined according to the child's needs. Ulfah & Khoerunnisa (2018) through their research on how early childhood acquires knowledge through inquiry learning, it is emphasized that child development is actually interrelated between one aspect of development, especially in the study of the concept of measuring measurements and comparisons through natural objects as well as developing early childhood naturalist intelligence.

For example, what the participants conveyed was to measure something by making a simple scale, using ropes and wood to compare the magnitudes and smallness of an object. This learning is to apply random patterns formed, followed by inviting children to re-express knowledge from observations of the objects they observe and manipulate directly. According to research by Pratiwi & Mustaji (2016) the way of delivering such measurements is a form of assistance so that children can build their own knowledge. Mainly, the teacher, in the end, invites children to understand the process carried out as a form of confirmation of the acquisition that the teacher takes in this learning to invite children to have a dialogue with questions and answers. So that the child himself expresses his knowledge without being dictated to by the teacher. In general, Wibowo (2017) supports that the learning process in a

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tangible object supports students' learning outcomes. So experimentation, big-small, many-little, long-short, and low-height concepts are better for early childhood.

Meanwhile, through singing, according to the participant, the introduction of the concepts of big-small, many-little, long-short, and low-height can also be done. Findings from the song lyrics used, such as "raising and lowering" or "shrinking," are used while demonstrating with gestures. According to the participants, the children seemed to understand the concept. However, in this form of learning method, it is also indicated that teachers tend to use behavioristic theory. This can be seen from the form of instruction in the presentation of the material—not departing from what the learner knows (the content of the cognitive structure of early childhood). Because the songs sung are part of the routine, sometimes they fit the theme and often miss the related themes introduced on the day. According to Ulfah & Khoerunnisa (2018) singing is closely related to behavioristic concepts in early childhood learning. Still, this method has a good chance of good results because it is related to the knowledge of children involved in the concept of thinking children. It's not just a behavior change. So that the method of singing that is done repeatedly only becomes a routine and involves the childless in building his own knowledge of the concept of big-small, many-little.

Conclusions

Based on the results of the discussion, it can be concluded that the tendency of early childhood mathematics learning profiles tends to use the point of view of "behaviorism." The form of learning tends to habituate and repeat and is limited to children knowing numbers instead of children processing their knowledge as a basis for mathematical knowledge. The use of the theme has yet to be fully implemented. As a result, the application of mathematics tends to return to traditional methods of understanding, namely concepts that are separate from the lives of children.

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