

MATHEMATICS LEARNING MEDIA FOR EARLY CHILDHOOD: A TEACHERS' VIEW

Fauziah Rahmat¹

¹Universitas Pendidikan Indonesia, Jln. Setiabudhi No 229 Bandung, Indonesia
Corresponding email: fauziahrahmat@rocketmail.com

Abstract

This paper aims to discuss about teachers' view to mathematics learning media for early childhood. The existence of media is one important component in learning, not least in learning in early childhood. The study is based on data obtained from interviews and classroom observation to four early childhood teachers. Drawing on sociocultural approach, the result obtained that teachers view learning mathematics can be mediated with various tools and activities both structured and unstructured one. Through those activities, the teachers insert concepts, knowledge, and math skills. The finding has implications for the need to improve a capabilities call 'productive mathematizing'.

Keywords: *mathematics, early childhood, media, learning*

1 INTRODUCTION

The use of such media helps children to learn. Research to see the use of media in order to develop the mathematical ability of children has been done (for examples Andriantini, 2015; Ariyani, 2014; Cahyadi & Hernita, 2016; Devita Philia, 2015; Elia, 2015; Endira & Rianto, 2017; Epeni, 2013; Fauziddin, 2015; Haryani, Wadin, & Sofino, 2014; Haryuni, 2013; Lestaringrum, 2015; Martiana, 2014; Nur'aliyah, 2013; Qotimah & Astuti, 2015; R KOLLY, 2014; Rahayu, 2012; Ria Puji, 2015; Rohmah, Rustono, & Rifa'i, 2016; Wiwih, 2013; Wulandari, Wirya, & Tirtayani, 2014; Yatini, Ali, & Yuniarni, 2013).

Such action research or experimental research are generally done more often because they are considered to have certain advantages which are expected to give rise to practical solutions for teachers because it often departs from the assumption that teachers do not have enough media alternatives to implement mathematics learning effectively and fun which resulted in low achievement of the mathematical abilities of children (for

examples Amylia & Setyowati, 2014; Jawati, 2013; Maghfiroh & Diana, 2016; Purjiningrum, Wahyuningsih, & Rukayah, 2015).

Meanwhile, the voices and experiences of teachers become less explored. In fact, a number of studies have recommended the need for research that includes observations of classroom learning practices in order to gain a better and specific understanding of the practice of teaching mathematics for children (Ryoo et al., 2014). For that, this article is going to discuss how teachers view the media of learning mathematics for young children.

2 METHODS

This study is a case study involving four teachers from three different ECDs in three cities in Indonesia. Data were collected through interviews and observation. After collected, the data were analyzed with grounded theory technique. As for understanding the data, the sociocultural approach is used as the theoretical framework.

3 RESULT AND DISCUSSION

Mathematics and its concepts are acknowledged and embedded in our daily lives, math is everywhere (Dobbs, Doctoroff, & Fisher, 2003; K.W., 2011). Thus, teachers can and are more desirable to create a rich environment to spur early childhood readiness to start counting activities instead of teaching them directly (Prianto, 2011).

Agreed with these suggestions, the teachers who participate in this study also implement the learning of mathematics through the creation of a learning environment whether it is the design of various activities and tools that are structured or unstructured for example through special times while playing in beam centers or preparatory centers or natural materials centers, doing science projects, or routine activities such as rough motor playing or exercising, even through non-specific activities such as reading, reading, and eating together. The teacher inserts math concepts, knowledge, and skills such as measuring volume, estimating, classifying, learning scale, also making problem solving with arithmetic through such activities. The following interview quotes reveal it.

"Suppose children can learn math by using grain media. children put the seeds into a glass that has been plastered with the number symbol. if the glass is marked two, the child must enter two seeds, and so on. after the seeds are included, the child will count the number of seeds in the glass" (interview with Ibu Azizah)

Through the statement, it is also implied that teachers perceive the importance of the role of learning media that is concrete. Media use is valued as a tool that allows teachers to teach abstract mathematical concepts. Like the following statement.

"Sometimes math can be very abstract for children, but when using media that is manipulative, like props, children can learn faster. and, when the

concepts are linked to everyday life, the children will more easily learn math. so my opinion" (interview with Mrs. Angela)

However, since mathematical concepts are often mathematical logical knowledge then to some extent, teachers or adults can teach the concept directly but it is more important for teachers to encourage children to think and make logico mathematical relationships (Kamii, 2016). Kamii take an example of how when children learn the concept of numbers. Teachers can teach children to pass through real objects such as cakes or pencils because naming numbers involves conventional social knowledge. The name of the number is something that has been agreed upon. While in interpreting the numbers one, two, three, and so on, involved is the knowledge of mathematical logic.

Although mathematical logic knowledge is not something that can be taught directly, but adults can indirectly support the construction of mathematical logic knowledge through everyday activities that encourage children to think, to solve problems. As indicated by the study Kirkland, Manning, Osaki, and Hicks (2015) that physical activities that challenge high-order thinking can improve mathematical logic knowledge in preschoolers. The following interview quotes illustrate how teachers challenge young children to think mathematically through physical activity.

"We used diapers to encourage children to learn to estimate. we provide diapers, slockers, tubs filled with water. then we took a glass of water for a glass using a sloki. we pour the water into the diapers. and, we challenge the kids to find out the glass to how many diapers will leak. like that. and, with the kids learning one-to-one correspondence too, is not it?" (Interview with Mother Angela)

However, the role of the teacher is not completed only to provide such activity, since the mathematical experience gained by children can be

meaningless without the existence of verbal interaction facilities by teachers or other adults (Copple, 2004; Edens & Potter, 2013). Moreover, mathematical knowledge of children has been shown to increase dramatically when teachers are able to provide specific mathematical activities and follow-up through specific questions (Brendefur, Strother, Thiede, Lane, & Surges-Prokop, 2013). This suggests that social interaction is also a medium for early childhood learning. Like the following quote.

"When the children are learning to paint. they painted at the top, at the bottom. painting two houses. then the teacher asked the question how many houses have you painted? There are four. children have learned math. "(interview with Mr. Yana)

"We can also invite children to make estimations when they are playing blocks. when children build blocks to make a closed building. the child will try to find out how many blocks he will need to cover the block building. I will ask questions as the child builds. how many blocks do you need to keep this building covered properly? Children guess, five. I will ask again, if I use five beams, is the building perfectly closed? no. oh, means five beams are not enough to cover this building. still not enough. the kids guess again, Six. etc. until finally when the building is almost completely closed, the children chime in unison, aah eight, we need eight beams to cover it perfectly. Estimates."(Interview with Tantriandini's mother)

According to sociocultural theory, interaction is a facilitative space that enables a child to transcend his actual knowledge. A pedagogical instrument that helps teachers create conditions for learning to occur (Radford, 2011). In line with that, Lerman (2001) view interaction as a discursive contribution that can encourage increased participation in mathematical thinking or conversation in the potential development of children. Therefore, to provide a learning

experience of mathematics, children need to have the opportunity to be exposed to mathematical ideas in instructional interaction, whether interacting with the physical environment or with the social environment.

The participants of this study considered that the activities they offer, the media they provide can be used to provide these opportunities. Opportunities to encourage children to participate in mathematical thinking or conversation so that children can help to internalize mathematical ideas during their free play and guided play. This is consistent with the view that opportunities for children exposed to various instructional interactions can be defined as the learning experience itself (Paro et al., 2009), giving children a chance to be exposed to a variety of content in a mathematical area can be interpreted as a learning experience in mathematics.

The opportunity is recognized by teachers throughout the day, in almost all activities, ranging from the structured deliberately designed by teachers such as playing in the center of the block and other activities such as when prayer habituation. The following interview quotes reveal it.

"When dzikir friends use his finger. Each finger is counted three. So how many times round, we will count, fifteen, right. We need 33. One more round, 30, right. Add another three, 33. There mathematics is present. "(Interview with Ms. Tantriandini)

The statement revealed that teachers viewed the media of learning mathematics as not limited to things that are physical but also non-physical media, especially verbal interactions. This is relevant to the focus of the learning process in a sociocultural perspective that lies in the ways in which community members (especially adults and more capable companions) help children develop the first cognitive process through a collaborative activity. Therefore, although

there is a belief that children can construct their own knowledge, it does not necessarily give an understanding to deny collaboration and social interaction with teachers or others in constructing that knowledge.

This also reinforces the claim that collaboration and social interaction support the process of inquiry or the discovery of knowledge itself (Siegel & Borasi, 1994). However, to be able to engage children in instructional interactions that can expose them to mathematical ideas, teachers need to have the provision of the ability to capture the mathematical side of the child's activities, which van Oers (2014) call it "productive mathematizing". Teachers should have the ability to qualify to mathematically or model the child's activities mathematically or build mathematical concepts of the activity. Teachers need to have the ability to recognize non-mathematical activities such as dzikir to then make it an object that can be elaborated in mathematical terms.

The ability of productive mathematizing is important because after all the learning approach for early childhood suggested by the system and believed by the teacher is through play. Therefore, as an opinion van Oers (2010) in the context of play it would be more productive for teachers to teach by involving young children in mathematical interactions that support the students' mathematical thinking arising in their spontaneous action base. Therefore, more knowledgeable people are needed to support the emergence of mathematical thinking of early childhood by rearranging children's actions and speech.

4 CONCLUSION

The existence of the media in learning mathematics in early childhood is basically to facilitate the learning process to develop the mathematical ability of children of early age. However, teachers view the mathematics learning media more than concrete objects that can be played by children but more important

than that is the interaction medium, especially verbal interaction to support the early mathematical development of children. To optimize such interaction, teachers are expected to have a qualified ability to educate children's actions and elaborate them into mathematical ideas that can be internalized by the child.

This has implications for the teacher's competency development program because in order to support the mathematical development of early childhood through the interaction that spoil children on mathematical ideas, teachers must have a math knowledge of qualified. Thus, teachers can strengthen opportunities for good math learning for children at an early age.

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REFERENCES

- Amylia, L. R., & Setyowati, S. (2014). Pengaruh Outdoor Learning terhadap Kemampuan Mengenal Konsep Bilangan Anak Kelompok A di TK Tunas Harapan Menongo Sukodadi. *Jurnal Mahasiswa Teknologi Pendidikan*, 3(3).
- Andriantini, D. (2015). *Meningkatkan Kemampuan Mengenal Bentuk-Bentuk Geometri pada Anak Usia Dini melalui Media Gambar Geometri*. (Skripsi), Universitas Pendidikan Indonesia, Bandung.
- Ariyani, D. W. (2014). *Peningkatan Keterampilan Berhitung Penjumlahan Bilangan Menggunakan Media Manik-Manik Warna Dalam Mata Pelajaran Matematika Pada Siswa Kelas I SD Negeri 02 Demakan Kabupaten Sukoharjo Tahun Ajaran 2013/2014*. Universitas Muhammadiyah Surakarta.
- Brendefur, J., Strother, S., Thiede, K., Lane, C., & Surges-Prokop, M. J. (2013). A Professional Development Program to Improve Math Skills Among Preschool Children in Head Start. *Early Childhood Education Journal*,

- 41(3), 187-195. doi: 10.1007/s10643-012-0543-8
- Cahyadi, F., & Hernita, M. I. (2016). Peningkatan Keaktifan dan Kemampuan Berhitung melalui Media Puzzle pada Anak. *PAUDIA*, 5(1).
- Copple, C. E. (2004). Mathematics Curriculum in the Early Childhood Context. In D. H. Clementes, J. Sarama, & A.-M. DiBiase (Eds.), *Engaging Young Children in Mathematics Standar for Early Childhood Mathematics Education* (pp. 83-87). New Jersey: Lawrence Erlbaum Associate.
- Devita Philia, P. (2015). *Pengembangan Media Apron Hitung Untuk Meningkatkan Kemampuan Berhitung Anak Usia 5-6 Tahun Di Tk Pkk Kartini Padokan Kidul Tirtonirmolo Kasihan Bantul*. PG PAUD.
- Dobbs, J., Doctoroff, G. L., & Fisher, P. H. (2003). The "Math Is Everywhere" Preschool Mathematics Curriculum. *Teaching Children Mathematic*, 10(1), 20-22.
- Edens, K. M., & Potter, E. F. (2013). An Exploratory Look at the Relationships Among Math Skills, Motivational Factors and Activity Choice. *Early Childhood Educ J*, 41, 9. doi: 10.1007/s10643-012-0540-y
- Elia. (2015). *Pengaruh Permainan Tradisional Engklek Modifikasi terhadap Penguasaan Konsep Bilangan dan Geometri Anak Usia Dini*. (Tesis), Universitas Pendidikan Indonesia, Bandung.
- Endira, N., & Rianto, E. (2017). Pengaruh Media Matching Board terhadap Kemampuan Mengenal Konsep Geometri Anak Usia 5-6 Tahun di TK Rina Surabaya. *PAUD Teratai*, 6(1).
- Epeni, H. (2013). *Pengenalan Keterampilan Analisis Data pada Anak TK melalui Penggunaan Media Grafik*. (Skripsi), Universitas Pendidikan Indoensia, Bandung.
- Fauziddin, M. (2015). Peningkatan Kemampuan Klasifikasi Melalui Media Benda Konkret pada Anak Kelompok A1 di TK Cahaya Kembar Bangkinang Kampar. *Jurnal Obsesi*, 1(2), 12-25.
- Haryani, C., Wadin, W., & Sofino, S. (2014). *Penerapan Metode Bermain Dengan Media Playdough Dalam Meningkatkan Kemampuan Mengenal Konsep Bilangan Dan Lambang Bilangan Pada Anak Usia Dini*. Universitas Bengkulu.
- Haryuni, S. (2013). Peningkatan Kemampuan Mengenal Bilangan Melalui Media Domino Segitiga di PAUD Kenanga I Kabupaten Pesisir Selatan. *SPEKTRUM PLS*, 1(01), 104-118.
- Jawati, R. (2013). Peningkatan Kemampuan Kognitif Anak Melalui Permainan Ludo Geometri di PAUD Habibul Umami II. *SPEKTRUM PLS*, 1(01), 250-263.
- K.W., L. (2011). *Konsep Matematika untuk Anak Usia Dini*. Jakarta: Direktorat Pembinaan Pendidikan Anak Usia Dini Direktorat Jenderal Pendidikan Anak Usia Dini Nonformal dan Informal Kementerian Pendidikan Nasional.
- Kamii, C. (2016). Can Adult Teach Number Concepts to Young Children? *Beginning Profesional Development Workshop*, 59-62.
- Kirkland, L. D., Manning, M., Osaki, K., & Hicks, D. (2015). Increasing Logico Mathematical Thinking in Low SES Preschoolers. *Journal for Research in Childhood Education*, 29(3), 275-286. doi: 10.1080/02568543.2015.1040901
- Lerman, S. (2001). Cultural, discursive psychology: A sociocultural approach to studying the teaching and learning of mathematics. *Educational Studies in Mathematics*, 46, 87-113.
- Lestarinigrum, A. (2015). Pemanfaatan Media Biji-Bijian sebagai Sumber Belajar Bidang Pengembangan

- Matematika pada Anak Usia Dini. *Efektor (E)*, 1(26).
- Maghfiroh, O. W., & Diana, D. (2016). The Effect of Stick Box Portable Game to Increase Basic Mathematics Ability Children Five to Six Age (Study Eksperimen in Aisyiyah Bustanul Athfal Kindergarten Kaliwungu). *BELIA: Early Childhood Education Papers*, 5(1).
- Martiana, L. D. (2014). Upaya Meningkatkan Kemampuan Berhitung Melalui Metode Bermain Dengan Media Ular Tangga Pada Anak. *BELIA*, 2(2).
- Nur'aliyah, U. (2013). *Meningkatkan Kemampuan Operasi Penjumlahan melalui Penggunaan Media Realia*. (Skripsi), Universitas Pendidikan Indoensia, Bandung.
- Paro, K. M. L., Hamre, B. K., Locasale-Crouch, J., Pianta, R. C., Bryant, D., Early, D., . . . Burchinal, M. (2009). Quality in Kindergarten Classrooms: Observational Evidence for the Need to Increase Children's Learning Opportunities in Early Education Classrooms. *Early Education and Development*, 20(4), 657-692. doi: 10.1080/10409280802541965
- Prianto, P. L. (2011). *Kesiapan Anak Bersekolah*. Jakarta: Direktorat Pembinaan Pendidikan Anak Usia Dini Direktorat Jenderal Pendidikan Anak Usia Dini Nonformal dan Informal Kementerian Pendidikan dan Kebudayaan.
- Purjiningrum, A., Wahyuningsih, S., & Rukayah. (2015). Meningkatkan Pengenalan Konsep Penjumlahan dan Pengurangan 1-5 melalui Pembelajaran Contextual Teaching and Learning pada Kelompok A PAUD Permata Bunda Tahun Ajaran 2014/2015. *KUMARA CENDEKIA*, 3(3).
- Qotimah, Z. K., & Astuti, M. D. (2015). Peningkatan Kemampuan Mengurutkan Pola melalui Media Permainan Manipulatif pada Anak Kelompok A TK Al Mukhlishin Tegalgede Karanganyar Tahun Ajaran 2014/2015. *KUMARA CENDEKIA*, 3(2).
- R KOLLY, N. (2014). *Meningkatkan Kemampuan Mengenal Bilangan 1–10 dengan Menggunakan Media Konkrit Penutup Botol Pada Anak Usia Dini Di Kelompok A Cempaka Putih Kecamatan Sumalata Kabupaten Gorontalo Utara*. Universitas Negeri Gorontalo.
- Radford, L. (2011). Book Review: Classroom Interaction: Why is it Good, Really? Baruch Schwarz, Tommy Dreyfus and Rina Hershkowitz (Eds.) (2009) Transformation of knowledge through classroom interaction. *Educational Studies in Mathematics*, 76(1), 101-115. doi: 10.1007/s10649-010-9271-4
- Rahayu, N. A. (2012). *Efektivitas Penggunaan Media Permainan Ular Tangga dalam Mengembangkan Kemampuan Mengenal Konsep Bilangan Anak Taman Kanak-Kanak*. (Skripsi), Universitas Pendidikan Indonesia, Bandung.
- Ria Puji, L. (2015). *Peningkatan Kemampuan Mengenal Lambang Bilangan Melalui Penggunaan Media Kartu Angka dan Kartu Bergambar pada Anak Kelompok A2 TK Masyithoh Ngasem Sewon Bantul Yogyakarta*. PG PAUD.
- Rohmah, N., Rustono, R., & Rifa'i, A. (2016). Keefektifan Pembelajaran Kooperatif melalui Media Dadu dalam Pengembangan Kemampuan Matematika bagi Anak Usia Dini. *Journal of Primary Education*, 5(1), 42-48.
- Ryoo, J. H., Molfese, V. J., Heaton, R., Zhou, X., Brown, E. T., Prokasky, A., & Davis, E. (2014). Early Mathematics Skills From Prekindergarten to First Grade: Score Changes and Ability Group Differences in Kentucky, Nebraska, and Shanghai Samples. *Journal of*

- Advanced Academics*, 25(3), 27. doi: 10.1177/1932202X14538975
- Siegel, M., & Borasi, R. (1994). Demystifying Mathematics Education Through Inquiry. In P. Ernest (Ed.), *Constructing Mathematical Knowledge: Epistemology and Mathematics Education. Studies in Mathematics Education* (pp. 201-214). London, Washington DC: The Falmer Press.
- van Oers, B. (2010). Emergent mathematical thinking in the context of play. *Educational Studies in Mathematics*, 74(1), 23-37. doi: 10.1007/s10649-009-9225-x
- van Oers, B. (2014). The Roots of Mathematizing in Young Children's Play. In U. K. e. al. (Ed.), *Early Mathematics Learning* (pp. 111-124). New York: Springer Science+Business Media.
- Wiwih. (2013). *Upaya Meningkatkan Kemampuan Klasifikasi pada Anak Taman Kanak-Kanak melalui Media Balok Warna*. (Skripsi), Universitas Pendidikan Indonesia, Bandung.
- Wulandari, P. D., Wirya, N., & Tirtayani, L. A. (2014). Penerapan Numbered Head Together Berbantuan Media Kartu Angka untuk Meningkatkan Kemampuan Mengenal Lambang Bilangan. *Jurnal Pendidikan Anak Usia Dini*, 2(1).
- Yatini, T., Ali, M., & Yuniarni, D. (2013). Peningkatan Kemampuan Berhitung Permulaan dengan Menggunakan Media Gambar Pada Anak Usia 5-6 Tahun. *Jurnal Pendidikan dan Pembelajaran*, 2(12).