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A learning process for early childhood: a case of geometry and numbers

A Efriani^{1,2}, Z Zulkardi^{2*}, R I I Putri² and N Aisyah²

¹Department of Mathematics Education, UIN Raden Fatah, Indonesia

²Department of Mathematics Education, Universitas Sriwijaya, Indonesia

*Corresponding author's email: zulkardi@unsri.ac.id

Abstract. The teacher is a parent for young children in school. In maximizing learning in schools, the role of a teacher is needed. This study aims to describe the learning process for childhood by teachers both in planning, implementation, and evaluation of geometry and numbers. The subjects of this study were 30 teachers from 20 schools in South Sumatra. The method used is descriptive with qualitative and quantitative types. Data were collected using questionnaires and interviews. The results obtained that the implementation of learning undertaken by teachers both in planning, implementation, and evaluation has been carried out in each school. It's just that the implementation is not optimal. It is because there is no awareness of the teacher about the need for learning tools, learning is still not following the stages of development due to the limitations of the media and the lack of teacher creativity. It requires training as an evaluation of the activities that have been carried out.

1. Introduction

Education is the nation's most valuable asset because quality education will produce a quality generation and vice versa. The first education that a child will receive is early childhood education. According to the national education system law, no 23 of 2003 article 1, paragraph 14, early childhood education is an effort to foster children from birth to six years old through the provision of educational stimuli to help physical and spiritual growth and development to have the readiness to enter further education.

Early childhood education (ECE) in Indonesia began to develop rapidly, including in southern Sumatra. The development of ECE should improve the quality of learning for early childhood. However, what happens is that learning does not match what is expected. It is due to the learning patterns implemented that tend to be academic, namely learning that emphasizes children's abilities in reading, writing, and arithmetic [1]. Learning is less concerned with age and level of child development. This tendency is caused partly by the wrong understanding of the concept of early education in early childhood.

The change in ECE orientation that teaches reading, writing, and counting could be due to the demands of parents and also elementary schools who take tests before entering elementary school so that many ECE forget the principle of children's learning [2]. Though learning should be done in early childhood is to develop all the potential includes physical, cognitive, linguistic, and socioemotional.

One of the fields of education that must be introduced to early childhood is early mathematics. The introduction of early mathematics for early childhood is explained concretely and is associated with



real-life [3]. Children will better understand taught by playing and manipulating objects around them if understanding through writing and verbal explanation will not help children's charity [4].

Learning should emphasize how the teacher attempts to encourage or facilitate student learning, not on what students learn [5]. It illustrates that students play a more significant role in constructing knowledge for themselves and that knowledge is not the result of the transformation process from the teacher. Professional teachers must provide prerequisite knowledge, promote understanding of mathematics, engage and motivate learners, and need effective management [6]. So an experienced teacher is required in learning to produce quality learning.

Discussing the quality of ECE learning indeed cannot be separated from its main activities, namely the learning process (planning, implementation, and assessment) that takes place or is carried out at the ECE institution concerned. The appropriate learning process can produce quality human resources. It is because meaningful learning will respond to student learning processes [7]. Children will get meaningful learning according to what students need in solving problems faced in the surrounding environment [8]. The teacher, as a professional in the field of education, in addition to understanding philosophical and conceptual matters, must also know and implement technical issues [9]. Problems that are technical, especially activities to manage teaching and learning interactions. For this reason, researchers are interested in describing the learning process for early childhood on geometry and numbers content. Through this research, it is expected to illustrate how the learning process carried out by the teacher, starting from planning, implementation, and evaluation.

2. Methods

This study aims to describe the management of learning carried out by the teacher, which includes planning, implementation, and evaluation of geometru and numbers content. This research is a descriptive study with qualitative and quantitative types. Quantitative descriptive in this study is used to show the empirical validity and reliability of the instruments that will be used in the study. Meanwhile, qualitative descriptive in this study is to show the logical validity of the expert and describe the research results. This study involved 30 teachers from 20 schools in South Sumatra, where ten teachers played a role in testing the validity and reliability, and 20 teachers acted as research samples. Data obtained through questionnaires and unstructured interviews. The teachers filled out 25 statements from a questionnaire designed by researchers based on five indicators of learning process. The five indicators are grouped into two, namely the learning process in a normal situation and the learning process during a pandemic. Learning process in a standard case, there are three indicator, namely planning, implementation, and evaluation. While the learning process during the pandemic, there are two indicators, namely the learning process and learning planning in the new school year. The questionnaire used in this study uses a Likert scale with four alternative answers, as in table 1.

Table 1. Alternative questionnaire answers.

Alternative answers	Score	Information
Often	4	Every incident described in that statement must be done
Always	3	Every incident described in the statement is more done than not done
Rarely	2	Every incident that is described in the statement is much not done rather than done
Never	1	Every incident described in the statement was never done

After the questionnaire data is obtained, then it is analyzed, and the results of the analysis are taken into consideration by researchers for interviewing teachers. The interview aims to explore the information that teachers do in the management of learning. Interviews were conducted by contacting the teacher by telephone.

3. Result and discussion

This research was conducted on 29 June - 9 July 2020, involving 20 ECE in South Sumatra. Data collected from this research were in the form of questionnaires and interviews. The questionnaire was first made by the researcher then tested for validity and reliability. The validity test used is logic validity and empirical validity [10]. Logical validity is done based on expert judgment. Two experts have a role in validating both in terms of content, constructing, and language through email reviews, namely LO and YF. LO is a PIAUD lecturer with a curriculum concentration, and YF is an assessor of the ECE tire coordinator for the South Sumatra region. Based on the results of the validation obtained comments and suggestions from 2 experts, as shown in table 2.

Table 2. Comments and suggestions from experts.

Code	Comments and Suggestions
LO	<ol style="list-style-type: none"> 1. Add a description of the purpose of the questionnaire that will be given 2. Group the questions according to the indicators to be achieved 3. It is better to clarify the options of the choices, do not use a scale whose information is only at the base and the edge 4. We recommend that the language used should not be directly into mathematics, but learning that contains mathematical material because in ECE it is not directly specific to mathematics but in learning it is embedded in six aspects, one of which is the cognitive aspect which contains mathematical material
YC	<ol style="list-style-type: none"> 1. Statement 6 teaching materials should be replaced with the media 2. Statement 9 you should mention the principles of learning 3. Statement 10 should only mention the child's characteristics 4. Statement 11 should be replaced by concepts, transitions, symbols 5. Statement 15 clarified the character values 6. Statement 18 is not comparing but evaluating following the learning objectives of the learning device that has been previously planned, then the work of students is also explained that the portfolio

After testing the logical validity with experts, comments, and suggestions given are taken into consideration for revising the instrument to be used. Next, researchers consider and refine the questionnaire that was created based on comments and suggestions from the validator. In addition, for some suggestions from the validator that is considered in the form of adding description and purpose of the questionnaire, grouping questions according to indicators, changing option options using multiple-choice, and some inappropriate choice of words.

After the questionnaire was corrected according to the suggestion, then the questionnaire was made using Google form so that the questionnaire could be carried out online by adjusting the current conditions. It refers to the Circular Letter of the Governor of South Sumatra No. 800 of 2020 concerning the Implementation of the Work System and the Limitation of Travel Activities to prevent the spread of Corona Virus Disease (Covid-19). The google form link containing the questionnaire was then distributed to ECE teachers to be tested in empirical validity aimed at reassuring the statistical validity of the instrument. The sample used in this empirical validity is 10 ECE teachers who are not research subjects from different schools in South Sumatra. The following are the empirical validation test results, as shown in table 3.

The results of the validity test calculations, as in table 3, show that all values of $r_{\text{count}} > r_{\text{table}}$ With r_{table} for $N = 10$ with $\alpha = 5\%$, i.e., 0.0632. Therefore, it was concluded that all items in this research questionnaire were valid so that they could be used as research instruments. Then the reliability test is also performed to see the consistency of the instrument. The results were obtained from the reliability test using Cronbach's alpha formula with a level of $\alpha = 5\%$ and $N = 25$ of 0.937. Based on the reliability

coefficient, it was concluded that all questionnaires were reliable or consistent so that they could be used as research instruments.

Table 3. Validity test results.

Statements	Pearson correlation	Statements	Pearson correlation	Statements	Pearson correlation
1	0.634	10	0.773	19	0.882
2	0.693	11	0.693	20	0.738
3	0.882	12	0.882	21	0.641
4	0.933	13	0.693	22	0.693
5	0.691	14	0.882	23	0.882
6	0.693	15	0.634	24	0.933
7	0.882	16	0.882	25	0.693
8	0.882	17	0.882		
9	0.634	18	0.693		

After the instrument is valid and reliable, the instrument was ready to be trialed, so the researchers contacted ECE teachers who were different from the previous trials in South Sumatra via WhatsApp. After the teacher responds to the willingness to fill out the questionnaire, the researcher sends the Google form link to the teacher. This is shown in figure 1.



Figure 1. Data collection process by contacting teachers via WhatsApp.

The teacher is given two days to complete the questionnaire. Then the researcher analyzes the teacher's response, and then the results of the analysis are taken into consideration by researchers to contact the teacher to be interviewed. The following products are the average teacher response of the five indicators tested, as in figure 2.

Figure 2 shows the average results of teaching and learning carried out by the teacher. From these averages, it can be seen that the management of learning carried out produces results with frequent and rare categories. The following is an explanation for each indicator.

In the planning indicators in learning, there are two descriptors, which more dominant descriptors are done by the teacher, namely preparing a daily lesson plan, which is done more often than others. However, there are also teachers who rarely even prepare learning tools if they are not examined. The researcher knew this after the researcher dug deep into the information conducted by the teacher through interviews as follows:

Researcher : before teaching, teachers must prepare learning tools in the form of lesson plans. Do they keep being collected or what?

- Teacher 1 : Gathered, usually Saturday we make it for the next week
 Teacher 2 : No, it is the teacher's archive. The school requests that it be given only
 Teacher 3 : if there is a new examination made and usually only if there are student internships
 Teacher 4 : Collect, ma'am, if we make it weekly if it is checked

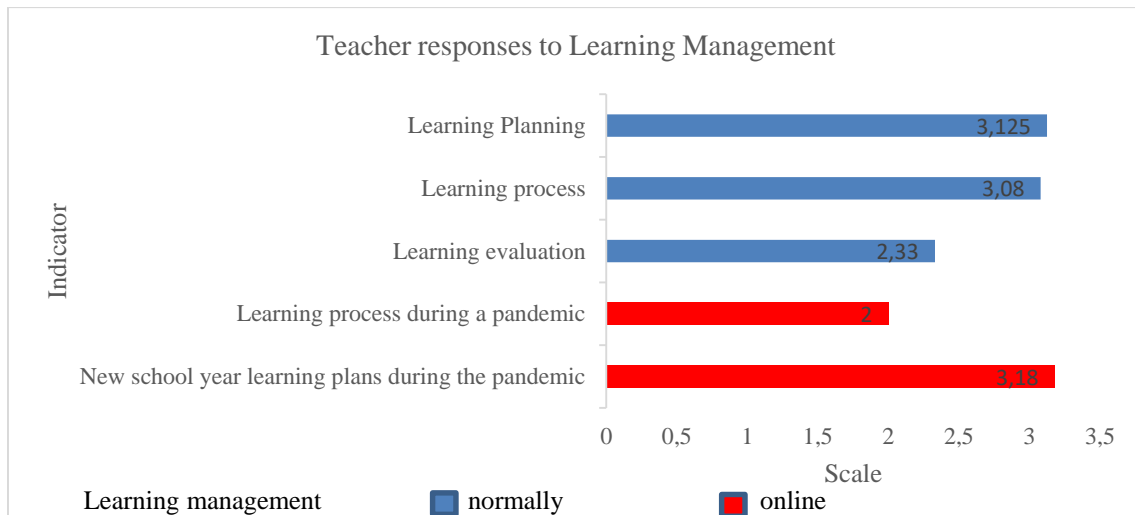


Figure 2. Average results of teacher responses to learning management.

It can be clearly seen from the interview above; the teacher is used to preparing weekly lesson plan made at the weekend before learning takes place. It shows that the teacher must plan learning opportunities to encourage the learning process that can be linked to student situations [11]. However, some teachers still lack awareness of the need for the learning device if the device is not collected, so they often utilize the learning device when there are only apprentices. Learning tools have a function to facilitate teachers in implementing or managing learning activities in the classroom [12] so that learning takes place optimally.

Learning tools made by the teacher in the form of lesson plans are recommended to contain six aspects of child development, namely physical, motoric, social-emotional, cognitive, language, religion, and art. However, there are still lesson plans made by the teacher that do not contain these six aspects, especially mental aspects that discuss mathematics. Based on the documents obtained by the researcher from the interview results, it shows that learning in cognitive factors related to mathematics is only as an apperception by asking children to mention numbers, various forms, and sequences without making activities that invite students to understand the concepts of mathematics.

In the learning process indicators, 14 descriptors are more dominant descriptors done by the teacher, i.e., the teacher often tries to present learning with techniques that are easy for students to learn. But the material that is not mastered by the teacher is often not taught. From the results of the interviews, the teacher has repeatedly tried to present learning that can help children in the learning process, as shown in the following footage.

- Teacher 5 : At school again learning to apply the centra learning model even though it is in a minimal state but it has led to the center, for example, in academic activities, from what time of academic learning, at what time we just move to the center
 Teacher 3 : as I was researching at that time using flashcard media, children immediately practiced, for example, child 1 holding the symbol number 7, other children, for example, holding picture 7 of the earth then they matched it and put it in a box, so the child did know the concept of not just memorizing memorization. Different from studying, as usual, if teaching, as usual, the teacher invites children to count 1-10, just sticking to the blackboard, number 1 like this, number 2 like this, so watch without them being directly involved, so they will be lazy because they feel accustomed to counting 1-10.

- Still, when tested using his form, he did not know what form 1 was like. It is better if the object taught is used in learning. For example, number 7, there is a form of 7, but sometimes it is constrained by the situation and also requires capital for its absorption.
- Teacher 1 : At school, you are taught not to use paper that only prints and continues to be used, but you should make the object directly. For example, by introducing crabs, you can use realia media such as fruit to form crabs from apples, you may use photos to continue to show these crabs, but we also draw crabs from other materials.

From the interview above, the efforts made by the teacher can be in the form of learning models or the media used. However, when using media, it is sometimes hindered by circumstances and economics that result in learning that is not as expected. It was resulting in the process of implementing learning using only activities from magazines, paper materials or waiting when there are apprentices because not all teachers can utilize real objects in the learning process as in the following excerpt:

- Teacher 2 : For example, the theme of animals, I take the example of animals in the sea like fish. Then first, I give the child worksheets to be colored then invited to fold the paper like a fish
- Teacher 4 : For example, in class B, there does not seem to be a real media bu. We often study using magazines. The magazine already has an image where the child lives, connecting the picture with the numbers
- Teacher 3 : Using real objects is rare, but that often happens when there are apprentices
- Teacher 5 : Suppose there is a thematic theme about animals, for example, pets. For instance, if you want to bring a cat, it's hard to keep on trying to find animals that are easy to obtain, for example, fish to get children to count the fish in the aquarium, but we have trouble seeing small fish -small, so we draw without using real objects, but if the theme of the tree, we explain first that the tree has roots, there are trunks, leaves are using the magazine then we take the children out immediately see it, mom, because coincidentally in our environment there is a guava tree, for children the curiosity asked, how come it's like that, ma, the shape, how come the root is big because look at the magazine the root is just a little small mom just like a line, but it turns out that when I see the original, it's big big.

From the description above, it appears that there is a teacher's effort in presenting learning with easy techniques. The business can be in the form of activities, media, and various methods. However, the media used by teachers are often unrealistic objects that result in a lack of basic knowledge of children. Also, some teachers use real objects as proof to the child, not as a conceptual deterrent at the beginning of the child. It results in errors in the child. In fact, in applying to learn, especially those related to mathematics, it starts with conceptual, transitions, then symbols. It is the role of the teacher who should be able to recognize learning opportunities in everyday situations that help children to use this opportunity as a learning situation [13]. If the basic knowledge of children is not built from tangible objects, children tend to fail in learning in the following year [14].

In addition, in learning, sometimes, the teacher does not apply all aspects of development in education. It is because the teacher sometimes forgets. After all, he is overwhelmed by the condition of the child in the class. Sometimes also does not know how to apply these aspects in activities. The following is an example of an explanation of cognitive elements, especially material taught by the teacher in the class.

- Teacher 1 : Suppose the cognitive aspect is from the way children think, creating from an apple has become a crab. For the second activity, we make paper and scissors tell the child to count the number of crabs that we discussed. There are 5 counts 1,2,3,4,5 but if the class is more crowded, sometimes forgets to explains the cognitive aspects
- Teacher 2 : Cognitive palette distinguishes the shape of fish; there are large and small
- Teacher 4 : Here ma'am, we know the numbers through the fingers first, through the numbers 1,2,3,4

From the teacher's explanation, it has not yet seen the stages of learning undertaken. It's just teaching it following the things that crossed his mind without reference to the stages of development. Here, ECE teachers need an in-depth understanding of early mathematics, including how early math knowledge and skills are related to children's mathematical knowledge and skills later on [15].

In the learning evaluation indicators, there are four descriptors where the teacher does the more dominant descriptors, and the teacher often evaluates the portfolio of children with the planned learning objectives. For evaluation, several schools carry out portfolio evaluations by collecting lesson plans made at the beginning of each week's lessons and portfolios from the results of student activities so that it can be seen whether the action that have been carried out are by the initial planning. Portfolio evaluation is carried out as a whole without making details based on developmental aspects. This is because the incomplete planning at the beginning of the lesson makes the review less detailed. In addition, evaluation of cognitive abilities is only to find out whether mathematical activities at the beginning of learning have been carried out or not, without exploring how mathematical activities should be taught. Based on the interview results with teachers, it can be known that the portfolio evaluated is only documented for the report at the end of the semester. Besides, the school does not make an archive for the needs of the school as in the following passage:

Teacher 1: Yes ma'am, everyday activities are photographed, because when the report card is for children, the activities must be printed and given to parents

Teacher 2: Every Saturday, there is usually an evaluation asking about progress, especially me, ma'am, because I have just been there

Teacher 3: not documented, but the palette of children's drawings made on the map when the end of the semester is distributed to children when photos are rare because sometimes they do not have time

Besides that, evaluation can also be done through community and seminar activities. However, seminar activities were attended by teachers only from within the school environment. Even though there were from outside the school and even then, it was limited as a representative only. While on their own will to look for a seminar is still lacking.

Teacher 1: Never ma'am, but if the seminar is from school, yes,

Teacher 5: not yet, ma'am, but if there are IGRA activities, we are sent by representatives, usually asked first by the mother (tomorrow there is no activity?), If there is no activity for representative representatives to take part in the IGRA seminar after we have finished distributing the activities to others

One of the reasons for the lack of seminar information was a lack of community, so the teacher might not get activity information. In addition, some have communities, but their members are from a variety of different majors, so that if you want to communicate, the problems experienced cannot be discussed. Markussen-Brown's research suggests that even though there is no community can be done through training [16]. It is because training provides teachers with consistent and direct support tailored to their individual needs, consequently increasing the awareness and practice of their specific skills [17].

In the learning indicators experienced during the pandemic, there is one descriptor in which the teacher has difficulty in the learning process. It is due to ineffective and efficient learning caused by parents who have a problem helping children learn at home because of the limited media. Also, it is not to mention children will get bored quickly because they only focus on listening to the activities given by the teacher, the concentration of children tends to be disrupted because of using a cellphone or other. Not everyone has a cellphone, and not everyone can buy a quota, especially for parents whose economy is middle-low. Besides, based on the emergency lesson plans made by the teacher, it appears that learning activities are limited and only recorded once a week of mathematics learning activities. The activities carried out are more dominant in using magazines. The following are some examples of activities that children do at home during a pandemic, as shown in figure 3.



Figure 3. Children's activities were carried out at home during the pandemic.

From the activities are shown in figure 3, it can be seen that many children's activities are focused on magazines given by teachers. Even though many activities at home that can be done between children and parents while still considering aspects of development needed by children. Some researchers revealed that home activities could be made learning through family involvement [18][19][20]. Children's learning is influenced by the way parents and children participate together in an activity [21]. It is seen that parent-child interaction becomes very useful for learning during study assignments at home [20]. However, some parents and teachers do not recognize daily activities have the potential to be involved in the learning process, especially mathematics [22]. Therefore, it is essential to increase the awareness of parents and teachers to include activities at home with mathematical ideas as a means of supporting children's mathematical development [23].

There are four dominant competitor descriptors in the learning plan indicators during the pandemic. First, the institution has prepared and made SOPs prepare for learning in the new school year in the form of new student registration SOPs, learning SOPs, and report card SOPs. While the decision to be taken is still not determined because of many considerations that must be faced.

The interview results obtained learning plans that will be conducted by the institution in the new school year during the pandemic—at the same time, continuing to consider the opinions of parents through positive communication with parents regarding the learning process at home by adjusting the situation and condition of parents and children. If there are children who are poorly monitored at home, the teacher can make visits to the child's home or can ask the child to come to school in turns by using the health protocol. The relationship between parents, children, and teachers has a significant influence to support the learning process of children [23].

4. Conclusion

The learning process carried out by teachers have been carried out in each school. The learning process during everyday situations is done both in planning, implementation, and evaluation. It's just that process in each school is not optimal. It is because there are still teachers who do not collect learning tools in the planning stage, the use of media that is still limited, and there are still learning that is not by the steps. There is a need for training for teachers as an evaluation of the activities they have done. Besides, for the learning process during the pandemic, teachers still lack recognition of activities at home that can be used as indirect learning between children and parents and for planning to learn the need for relationships between parents, teachers, and children so that learning can run optimally.

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References

- [1] Rachman E N A, Supriyati Y and Nurani Y 2020 *J. Obs.* **4** 665-75

- [2] Handayani O D 2018 *PAUDIA* **7** 71–84
- [3] Adjie N, Putri S U and Dewi F 2020 *J. Obs.* **4** 326–37
- [4] Wolfinger D M 1994 *Science and Mathematics in Early-Childhood Education* (America: Harper Collins College Publisher)
- [5] Ratumanan T G and Tetelepta Y 2019 *Jumadika* **1** 25–34
- [6] Wasserman N H 2010 *J. Math. Edu. Teach. Coll.* **1** 12–16
- [7] Nuraini N, Tindangen M and Maasawet E 2016 *J. Pendidik.* **1** 66–70
- [8] Widiati I 2015 *J. Pengajaran Mat. Ilmu Pengetah. Alam* **6** 106-11
- [9] Kunter M, Klusmann U, Baumert J, Richter D, Voss T and Hachfeld A 2013 *J. Educ. Psychol.* **105** 805–20
- [10] Fraenkel J R, Wallen N E and Hyun H H 2012 *How to Design and Evaluate Research in Education* (America: McGraw-Hill)
- [11] Gasteiger H and Benz C 2018 *J. Math. Behav.* **33** 4–22
- [12] Fathurrohman A and Nurhadi M 2016 *J. At-Tajdid* **5** 219–42
- [13] Bruns J, Eichen L and Gasteiger H 2017 *MERGA.* **19** 76–93
- [14] Lee J and Pant M D 2017 *Contemp. Issues Early Child.* **18** 99–103
- [15] College and Career Readiness Standard 2009 *College and Career Readiness Standards for Mathematics*
- [16] Markussen-Brown J, Juhl C B, Piasta S B, Bleses D, Højen A and Justice L M 2017 *Early Child. Res. Q.* **38** 97–115
- [17] Brunsek A, Perlman M, McMullen E, Falenchuk O, Fletcher B, Nocita G, Kamkar N and Shah P S 2020 *Early Child. Res. Q.* **53** 217–48
- [18] Kleemans T, Peeters M, Segers E and Verhoeven L 2012 *Early Child. Res. Q.* **27** 471–77
- [19] Skwarchuk S L, Sowinski C and LeFevre J A 2014 *J. Exp. Child Psychol.* **121** 63–84
- [20] Casey B M, Caola L, Bronson M B, Escalante D L, Foley A E and Dearing E 2020 *J. Appl. Dev. Psychol.* **68** 1–12
- [21] Carr A and Pike A 2012 *Dev. Psychol.* **48** 543–51
- [22] Galindo C, Sonnenschein S and Montoya-Ávila A 2019 *Early Child. Res. Q.* **47** 271–83
- [23] Fenton A, MacDonald A and McFarland L 2016 *J. Early Child.* **41** 45–53