Readiness in Teaching Science: Early Childhood Education Teacher’s Online Experience

Ria Novianti¹, Enda Puspitasari¹, Yeni Solfiah¹, Febrialismanto¹, Ilga Maria¹, Meyke Garzia²

¹Early Childhood Education, University of Riau, Pekanbaru 28293, Indonesia
²State University of Jakarta, DKI Jakarta 13220, Indonesia

ria.novianti@lecturer.unri.ac.id

Abstract. This research provides an overview of early childhood education teacher’s readiness in teaching science online during Covid-19 pandemic. This research uses descriptive quantitative method with 159 early childhood education teachers as the subject. Questionnaire designed based on holistic model of learning readiness that consist of three indicators, emotive-attitudinal readiness, cognitive readiness, and behavior readiness. The sampling technique used is simple random sampling. Data analysis techniques are present in a percentage form. The overall of early childhood education teacher’s readiness in designing science online learning in ready category.

1. Introduction
The best way to learn science is to do science that is what every scientist must have agreed with. This is how the children begin to ask questions, conduct investigations, collect data, and search for answers [1]. Child centred learning activities will involve children to be active learners in exploring their environments, this is the core of good science education. The introduction of science in young children does not mean learning science in a complex way but how to grow critical thinking skills, curiosity, conscientiousness, problem-solving skills, and systematic way of thinking through fun experimental activities. These activities are carried out not only to know the progress of a scientific process or the answer to an event but more importantly is to develop basic skills so that children can learn and understand the world around them in an interesting way [2]. Next, that the fundamental and major in science learning is developing the developmental and potential aspects that children have [3]. As known the basic science process skills for children include the ability to observe, compare, classify, measure, and communicate.

Science is confidential as a content area in the kindergarten classroom because it suits naturally with young children’s natural way of processing experience and their innate curiosity about how the world around them is functioning. Observing ice melting, studying the occurrence of rain, or mixing primary colours, are very interesting experiences for children. The during their first experience in one of these events, children may simply be interested and perhaps surprised. During the second experience, they create a richer representation of similarities and differences across the two experiences. After numerous experiences, they have formed a generalized understanding of that certain aspect of “how the world works” in that certain situation and start to create predictions about “what will happen next” [4].

The development of science and technology occurs very rapidly and has a great influence on the lives of children; therefore, teachers need to prepare quality and meaningful learning activities for children to make learning outcomes that can be used in real life. During the Covid-19 pandemic,
learning was carried out online which demanded teachers to make modifications on the learning process that was previously carried out face-to-face. Surely this is not an easy thing to do, especially in science learning that requires direct observation and practice. Thus, the role of teachers to deliver science in children's houses becoming more important.

The found that teachers’ attitudes toward teaching science are considered to be a significant factor in predicting developmentally appropriate teaching practices in science [5]. Some studies show a number of variables that affect the teacher's focal range of science learning including teachers with a science education background teaching better science concepts. In addition, teachers are close to nature, and teachers who look at the child as a powerful science learner. But years of teaching experience and teacher perception and involvement in the curriculum are not variables that affect science learning [6].

The quality of science learning in schools is greatly influenced by the readiness of teachers in designing and implementing such learning. This research measures the readiness of teachers using a holistic model of learning readiness designed by Maddox et al [7] based on Bandura [8] social learning theory. Holistic model of learning readiness consists of three parts: 1) emotive-attitudinal readiness which is interpreted as a) responsibility for the task, b) enthusiasm for a task, c) willingness to adapt to the task, d) comfort and independence in carrying out the task, e) appreciate the intrinsic value of task 2) Cognitive readiness consists of a) having cognitive and critical thinking skills that are important for performing tasks, b) being aware of strengths and weaknesses, c) making connections between tasks and reality on the field d) being aware of self-worth and willingness to carry out tasks, and (e) able to integrate concepts and tools from various disciplines. (3) Behaviour readiness, which consists of a) willingness to partner with colleagues and (b) able to manage time in achieving task objectives.

Online learning has its challenges both in planning and implementation. If the teacher prepares it carefully then the child will be able to study science at home. The media used for teaching science online such as video made by teacher, YouTube videos, pictures, which delivered through the online platform such as WhatsApp Group, Zoom, and Google Classroom. Children are asked to conduct a science experiment at home assisted by parents with equipment that can be found around the house and surrounding environment. As well as conducting various activities involving the ability to observe, compare, classify, measure, and communicate.

This research focuses only on the teacher's readiness in conducting online science learning in Riau Province. Therefore, through this research, the readiness of early childhood education (ECE) teacher’s online science teaching will be analysed to get information regarding obstacles and conditions that might need attention to improve its quality in the future.

2. Methodology
The purpose of this study is to know the readiness of ECE teachers in designing online science learning in early childhood during Covid 19 pandemic. This research uses a quantitative descriptive approach and was conducted in twelve regencies in Riau Province. The research period was conducted in July 2020. The samples in this study were ECE teachers in Riau Province with a total of 159 people. The sampling techniques used are simple random sampling. Selection or sampling/respondent members of the population carried out randomly without seeing strata in the population [9]. Below is a table 1 about samples of ECE teachers per district.

| No | District      | Number of Samples |
|----|---------------|-------------------|
| 1  | Pekanbaru     | 30                |
| 2  | Dumai         | 12                |
| 3  | Bengkalis     | 14                |
| 4  | Siak          | 24                |
| 5  | Kampar        | 9                 |
| 6  | Rokan Hilir   | 4                 |
| 7  | Rokan Hulu    | 7                 |
Data collection using closed poll and open poll designed in google form. Tools for obtaining data from questionnaires distributed to respondents to be answered in accordance with the circumstances or knowing the real conditions experienced by the respondent. Furthermore, the poll is also suitable for use when the number of respondents is large enough and spread over a wide area. Researchers use open-ended poll as it is necessary as a closed-poll instrument. The results of the poll are done by scoring 1-4. A questionnaire statement using a Likert scale with four alternative answers is to always be 4, often given a score of 3, sometimes given a score of 2, and was never given a score of 1. The data collection instrument in this study can be seen in the table 2 as follows:

| No | Indicators | Sub Indicators | Number of Items |
|----|------------|----------------|-----------------|
| 1  | Emotive-Attitudinal Readiness | Responsibility | 1 |
|    |             | Enthusiastic | 1 |
|    |             | Willingness to adapt | 1 |
|    |             | Independence | 1 |
|    |             | Appreciates the intrinsic value of a task | 1 |
|    |             | Critical Thinking | 1 |
|    |             | Being aware of strengths and weaknesses | 2 |
| 2  | Cognitive Readiness | Contextual Thinking | 1 |
|    |             | Being aware of self-worth and willingness | 2 |
|    |             | Integrate various disciplines | 1 |
| 3  | Behavioral Readiness | Partnership with colleagues | 1 |
|    |             | Manage time | 1 |
|    | Totals |             | 13 |

2.1 Data analysis techniques are present in a percentage form. As for the percentage formula as follows:

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\text{Percentage} \% = \frac{\sum \text{score result}}{\sum \text{maximum score}} \times 100 \%
\]

2.2 Percentage results categorized into four categories. Can be seen in table 3 below.

| Percentage     | Category     |
|----------------|--------------|
| 76% - 100%     | Very Ready   |
| 51% - 75%      | Ready        |
| 26% - 50 %     | Less Ready   |
| 0 % - 25 %     | Not Ready    |
Based on teacher’s answers to holistic model of learning readiness in science learning questionnaire, we will have a description of early childhood teacher’s readiness in preparing science learning online.

3. Results and Discussion
The teacher's readiness in conducting science studies is measured by the holistic model of learning readiness consisting of three indicators, namely emotive-attitudinal readiness, cognitive readiness and behavior readiness.

| Indicators        | Actual Score | Ideal Score | Percentage  | Category |
|-------------------|--------------|-------------|-------------|----------|
| Emotive-Attitudinal Readiness | 453.54       | 636         | 67.55%      | Ready    |
| Cognitive Readiness     | 390.8        | 636         | 49.73%      | Less Ready |
| Behavioral Readiness   | 517          | 636         | 49.69%      | Less Ready |
| **Totals**           | **55.66 %**  | **636**     | **636**     | **Ready** |

Table 4 shows the result, the overall of early childhood education teacher’s readiness in designing science online learning is 55.66% in ready category. Early childhood education teachers had a crucial role in science education. Though, previous research shown that teacher had lack knowledge in science [10]. According to Edwards & Loveridge, there are factors that affect the tendency of early childhood education teachers to assist children's science learning. The substantial factors seem to remain in individual teaching professionals: teacher attitudes, beliefs, level of knowledge in science topics and comprehension of natural science [11].

Next, teachers’ emotive-attitudinal readiness is 67.55%. Teachers are ready to be responsible and motivated in carrying out the learning process, adaptable to new duties and environment, and being independent in carrying out the task. Spektor Levy et al stated that teachers’ attitudes regarding science in pre-school can form children's connection in science and develop their scientific curiosity [12]. Teacher attitudes and beliefs toward science teaching affect instructional practices, curriculum fidelity and, ultimately, student outcomes [13]. According to Barlia, teacher's unique personality, such as closeness, empathy, and respect for students' potential can increase children's motivation to learn science. With good emotive-attitudinal readiness, children online science learning is expected to keep going well [14]. The ability to understand children comprehension in learning is pivotal for early childhood teacher. It is the strength that early childhood teachers should possess to embrace children and fill their learning needs [15].

Cognitive readiness is 49.73% this score includes the less ready category. Teacher reports that they had difficulties and limitations such as comprehension of science content, adaptation to online learning, lack of ideas and creativity in designing online science learning. It means the cognitive readiness of early childhood teacher still need to be improved. This indicator relates to the ability of critical and contextual thinking. The early childhood teachers lack confidence in science teaching and have a low knowledge base. Cognitive readiness also related to teacher’s awareness of her strengths and weaknesses, self-worth, and willingness to carry out tasks [16]. Teachers’ beliefs about their proficiencies in a content area, which is, their content self-efficacy is vital because it has effects for teaching practice and children outcomes [17]. The early childhood education teacher had poor science subject knowledge. It is also found that they were unaware of how little they know and how this may possibly affect their competence to deliver appropriate science experience for children [18].

Early childhood teacher’ behavioral readiness is 49.69%. It means they are less ready to collaborate with other teachers, the team teaching in school who teach science content. When teachers worked in preschool with high levels of staff collaboration, it will increase their self-efficacy and children’s engagement [19]. This indicator relates to time management stated that low self-efficacy in science and time-management issues as two possible obstacles for why early childhood education teachers may have difficulty teaching science [20].
In online learning, teachers are also required to cooperate with parents as their partners, because they are the one who will accompany the children to study at home. Based on the results of research conducted show that preschool teachers work intentionally to gain attention to specific competencies related to children’s learning and development and the preschool curriculum [21]. The skill to establish conversation with parents and increase their trust is important for establishing and maintaining collaboration between early childhood education centre and home. If mobile technologies are integrated into the parent-school collaboration work, it will be possible to benefit from mobile technologies about raising awareness on parents and consciousness raising of parents to increase academic success of the students.

4. Conclusion
In this study, the overall of early childhood education teacher’ readiness in designing science online learning in ready category. In order for the early childhood education teacher to be ready and teach science confidently, it is important to design a comprehensive professional development program to support teachers’ knowledge of early childhood science, so children are able to benefit from qualified early science teaching.

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