STEAM to R-SLAMET Modification: An Integrative Thematic Play Based Learning with R-SLAMETS Content in Early Childhood Education

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ABSTRACT: STEAM-based learning is a global issue in early-childhood education practice. STEAM content becomes an integrative thematic approach as the main pillar of learning in kindergarten. This study aims to develop a conceptual and practical approach in the implementation of children's education by applying a modification from STEAM Learning to R-SLAMET. The research used a qualitative case study method with data collection through focus group discussions (FGD), involving early-childhood educator's research participants (n = 35), interviews, observation, document analysis such as videos, photos and portfolios. The study found several ideal categories through the use of narrative data analysis techniques. The findings show that educators gain an understanding of the change in learning orientation from competency indicators to play-based learning. Developing thematic play activities into continuum playing scenarios. STEAM learning content modification (Science, Technology, Engineering, Art and Math) to R-SLAMETS content (Religion, Science, Literacy, Art, Math, Engineering, Technology and Social study) in daily class activity. Children activities with R-SLAMETS content can be developed based on an integrative learning flow that empowers loose part media with local materials learning resources.

 Keyword: *STEAM to R-SLAMETS, Early Childhood Education, Integrative Thematic Learning*

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1 INTRODUCTION

The STEAM learning approach in the context of Early-Childhood Education is still a new discourse. The STEAM approach is one of the efforts to implement integrative thematic learning that involves a number of learning content (Broadhead, 2003; Mengmeng et al., 2019; Science, n.d.; Taylor et al., 2018). An approach with STEAM is carried out through a variety of play activities according to the needs, characteristics and stages of children's development (Colucci et al., 2017; Lillard et al., 2013). In the context of early-childhood education, the use of the STEAM education is also seen as a form of academic-oriented learning (Dell'Erba, 2019; Sawangmek, 2019) This learning is considered to prioritize academic education rather than child development. Such learning practices are also a concern among academics, policy makers and practitioners in Indonesia (Wang et al., 2018).

STEAM is important because it allows teachers to combine several disciplines at the same time and facilitates learning opportunities that empower children to explore, challenge, study, discover and practice creative building skills (DeJarnette, 2018). It is a perfect fit to include the arts in the STEM disciplines because of STEAM's focus on innovation and design. The STEAM concept is natural for children, because they like to explore and experiment. Within their natural environment, and adding art to STEM, is to offer educators an additional option to present art-packed STEM concepts to children, especially at the elementary and early-childhood levels. Regarding to Quigley et al., (2017) opinion, in education, the STEAM conceptual model offer's educators the ability to teach effectively using trans disciplinary science.

Science, Technology, Engineering, Arts and Mathematics (STEAM) has become an increasingly popular acronym in the educational because of the recent trend to incorporate art and design in science, technology, engineering, and mathematics (STEM education). In Costantino (2018) study, the STEAM category can describe transdisciplinary curriculum model to be implemented across disciplines, such as investigating the role of art and design in STEM. This is a reference for researchers to modify STEAM to be broader, so that they can use the STEAM approach to be more comprehensive, by adding literacy, social studies, and religion. Religion is combined in STEAM because of national culture with various religions, but each religion has the same teaching, which is to unite all important life elements introduced to children through daily learning, such as introducing the existence of God to all of his creations in learning science, math, technology, engineering, and art.

Responding to the challenges of early-childhood learning, for a more substantive integration of art discipline material with the humanities and other subject areas such as science, technology, engineering, mathematics, social studies, and entrepreneurship, a pluralistic STEAM-driven model, easily adaptable in education refers to on any of these innovative paradigms impartially (Rolling, 2016). Over the last few years, there has been an increasing interest in incorporating STEAM-promoting practices into the formal education context (Cook & Bush, 2018). Other subjects such as history, music and geography could benefit from the STEAM mentality, apart from science and arts (Henriksen, 2017). The STEAM method is implemented through a modified project-focused learning model, showing that children are learning to develop data, literacy, and self-direction skills (Ridwan et al., 2017). To make it easier for teachers to organize learning, it is necessary to add literacy elements to STEAM.

The thematic approach is a way of teaching and learning, linking and incorporating multiple aspects of the curriculum within a theme (Varun A, 2014). There will be plenty of opportunities to connect with peers, teachers, parents, and good community engagement as all topics are incorporated. Thematic approach in ECE curriculum, that incorporates various areas of knowledge is deemed appropriate for improving the knowledge and skills of young children in early childhood education (Björklund & Ahlskog-Björkman, 2017).

The academic approach in ECE practice is considered to shift the position and essence of play in children. There are concerns that this approach will lead to early schooling in children. The condition is considered normal because many practitioners commit malpractice in early-child-

hood education services. Learning uses in kindergarten classes, mostly paper and writing materials focused on reading, writing and arithmetic exercises (Dell'Erba, 2019; Krogh & Morehouse, 2014; Wang et al., 2018). Such educational practices have resulted in children losing their playtime. Conceptualizations of successful play-based learning that teachers experience as part of a collaborative school community, the enactment of play pedagogy by teachers, and collaboration with home schools. The studies recommend implementing a holistic integrative model of support in ECE curriculum and actively trying to incorporate parents, teachers and kindergartens in creating an optimal experience of play learning for young children (Keung & Cheung, 2019).

Based on various research studies that present various opinions about modifications to STEAM (Ata Aktürk & Demircan, 2017; Badmus, 2018; Clapp et al., 2019; Conradty & Bogner, 2018, 2019; Cook & Bush, 2018; Costantino, 2018; DeJarnette, 2018; Doyle, 2019; Milara et al., 2020; Ridwan et al., 2017; Rolling, 2016; Sawangmek, 2019), and also their implementation in the ECE curriculum through thematic play-based learning (Ali et al., 2018; Fesseha & Pyle, 2016; Jay & Knaus, 2018; Keung & Cheung, 2019; Keung & Fung, 2020; Wong et al., 2011). This research focuses on the study of how the process of developing integrative thematic play activities containing STEAM content in ECE education units, as well as seeing the impact of modifying STEAM to R-SLAMETS in field implementation.

2 THEORITICAL STUDY

2.1 *STEM, STEAM, and R-SLAMETS*

STEAM is a broad term that seeks to integrative tie together education in science, technology, engineering, arts and mathematics, bringing together the methodologies of technical design typical of engineering and technology fields with the enquiry learning approach used in mathematics and science and the divergent style of thought coming from the arts. With regard to conventional ideas from multiple disciplines, STEAM must construct an indefinable transdisciplinary space. The theme of the universe, for example, if students do not identify what they are learning as science, technology, or art (Liao, 2016). Children's reflections on other things in learning show that transdisciplinary space has been achieved. In addition, they consider their learning to involve the creation of collaborative and critical-thinking skills through the application of STEAM skills.

Arts-enriched STEM approach (STEAM) are believed to improve science lessons and make them more appealing. The intervention generated long-term knowledge and developed stable intrinsic motivation scores, but with a single STEAM intervention, self-reported aspects of creativity were not affected (Conradty & Bogner, 2019). Experts recommend that educators use integrative methods to present STEM content through subjects using design methods to facilitate literacy for all students (Gess, 2019). Integrative STEM education refers to a learning method that focuses on technology / engineering design that consciously combines the concepts and practices of science and / or mathematics education with the concepts and practices of technology and engineering education. Through potential integration with other school subjects, such as language arts, social sciences, architecture, etc., integrative STEM education can be strengthened. Educators are expected to focus on a deliberately designed pedagogical approach by placing the teaching and learning process of STEM concepts and practices in a pedagogy based on technology / engineering design, art design, literacy, social studies, and religion.

Research has shown that providing early childhood and elementary-age children with meaningful hands-on STEM activities positively influences their attitudes and dispositions towards STEAM (DeJarnette, 2018). For preschoolers who are diligent and determined when designing, STEAM concepts are not too difficult; they naturally try to fix them when things don't turn out exactly the way they expected. Early exposure to the STEAM technique has many advantages for young children. Integrated and exciting learning interactions strengthen the interests and learning of students in STEM and help prepare them for the 21st century (Moomaw, 2012).

Some have begun to pursue a transdisciplinary approach, in which the incorporation of the arts into the STEM disciplines provides a radically new way for learners to discuss and solve real-world issues, as educators and researchers strive to identify and describe STEAM. When limited

to only five letters between the many others that can help students explore and clarify solutions to the puzzles and challenges they will face today and tomorrow, this transdisciplinary space can feel confined (Clapp et al., 2019).

The same thing is felt by ECE educators in Indonesia, who already have a standard curriculum for ECE, which stimulates children based on basic competencies. Therefore, adding three other aspects, namely religion, literacy, and social studies, is to make it easier for teachers to implement the STEAM approach, because the limit has been expanded to an additional eight letters, R_SLAMET. This alphabetical arrangement was chosen because the term R-SLAMET feels more familiar and is more distinctly Indonesian.

2.2 Integrative Thematic and Play-Based learning in ECE

Each curriculum will undoubtedly describe the programs and learning experiences that early childhood will go through. Learning experiences that occur naturally in children is play experiences (Gronlund, n.d., 2015). Playing is a natural activity that early childhood does throughout the day and throughout their age range. Through the experience of playing, children interact with objects, people, tools, situations and environmental conditions that can help them acquire knowledge, skills and various value institutions (Inglese et al., 2014; Jacman, 2012; Sancar-Tokmak, 2015). Playing is an activity that makes children happy. Playing is believed and proven to be the most natural, meaningful way of learning and has a great impact on the development of children's potential. Playing activities always make children happy to do various things, both alone and in groups (Jay & Knaus, 2018)(Peng, 2017). In an atmosphere of playing together with friends (peer group), many children dissolve or drift away with an atmosphere that is built or created by themselves. The playing atmosphere like this can be categorized as immersing or immersing play.

One of the keys and fundamental thoughts are the understanding that a good and correct curriculum in early childhood is a curriculum that is in accordance with the characteristics and stages of child development (Danniels & Pyle, 2018). In general, the characteristics and stages of early-childhood development are in play, so the right curriculum for that is a play-based curriculum (Whitebread, 2012; Wong et al., 2011). Play-based curriculum is focused on developing learning activities in order to achieve developmental content and learning program content based on play activities. The development of play activities is at the core of the abilities of professional teachers in curriculum development (Zosh et al., 2017). In some references, the educator's ability is usually discussed in a study of the emergent curriculum, which is designed in various forms of play activities after a study of developmental aspects, and the program is planned in learning tools.

Playing is synonymous with the world of children, even some experts call it early years is play (Jacman, 2012; Jay & Knaus, 2018). Playing is the main activity and needs of children throughout the early-childhood development range. Through play, a child reflects on a variety of activities filled with cheerfulness, fun and sincerity (Inglese et al., 2014; Sancar-Tokmak, 2015). For early childhood, playing becomes an activity that is carried out on a voluntary basis, without coercion, maybe even without end and ends and goals. Playing allows children to build various aspects of their personality such as knowledge, values, skills, attitudes and life skills that children can use to adapt and socialize with a wider environment.

Play-based curriculum (PBC) has a key component that becomes the basis and reference in providing educational services for early childhood. Key components in a PBC include development references, program content, learning processes, management of learning areas and assessments (Gronlund, 2015; Hennessey, 2016). The development component becomes the center for curriculum and learning tools for childhood education (Sancar-Tokmak, 2015). Development needs to be placed as a basis for consideration in improving other components, especially in the content of learning programs (religion and morals, science, literacy, art, mathematics, social studies and technology) and the learning process (play activities). The selection and exploration of content or learning material in early childhood must consider the characteristics and stages of development.

The learning process component in the play-based curriculum provides a reference overview of the choice of the pedagogical process in presenting an interactional learning model designed in the form of a play scenario. This shows the understanding that playing is a pedagogic process that is presented in the early years. The pedagogical approach to playing activities means that the learning process built through playing activities must be seriously presented a learning process or educational play activities (pedagogical instruction or pedagogical play) (Fesseha & Pyle, 2016; Pyle & Danniels, 2017). The learning process presented in the play-based curriculum must provide a play scheme that is continuous, meaningful and fun for children. The play-play scheme is designed in the form of a play activity scenario that has educational goals, contains playing content that is in accordance with the characteristics and stages of development as well as media and teaching materials are designed in an interesting way (Edwards, 2017; Finch et al., 1997; Gronlund, 2015).

In order to complement their practice, which includes building successful play-based learning, teachers must be able to develop pedagogical skills. Play-based learning development is contextual(Keung & Fung, 2020). Play-based curriculum is based on a number of play assumptions that form the basis of curriculum development and development. In simple terms, the curriculum is often interpreted as a learning experience that children will go through in an educational activity. Learning experiences that will be compiled and developed in the curriculum must be based on the main characteristic of early-childhood learning, namely play experiences (Kennedy & Barblett, 2010; Peng, 2017).

The play-based curriculum has at least four main components that will guide educators in providing ECE services. The four components referred to have been described in the previous section. One of the curriculum components that are at the core of learning is learning content. children activity content can be classified in the form of science, literacy, mathematics, art, social technology studies (Faas et al., 2017; Jacman, 2012). The content a number of concepts that knowledge, values and skills in accordance with their respective scopes.

The selection of learning content is adjusted to the needs, characteristics and stages of early-childhood development. Therefore, it is necessary to understand the contents of the content and how to develop it so that it becomes meaningful early enjoyable learning material for children (McLaughlin & Cherrington, 2018; Pyle & Bigelow, 2015). Early childhood learning content teaching materials can be packaged in a variety of interesting ways and media, for example, big books, comics and various forms of foster. Many kind of packages of ECE teaching materials can be used in the implementation of play-based learning.

3   METHOD

This research uses a case study method that uses a training activity background and a workshop on the implementation of playing R-SLAMET content based on loose part media. The study participants consisted of 37 active participants with backgrounds as early-childhood educators in various ECE units (17% formal and 83% non-formal). There are 90% of ECE educators who have never attended R-SLAMET training or the like and 10% of participants have attended R-SLAMET training for ECE units. Training held in meetings, the first meeting understanding the concept of learning. In the second meeting, participants must attend a comprehensive workshop. The third meeting, micro teaching training participants to evaluate training results. Data collection was carried out through participatory observation, interviews, focused discussions and analysis of document reflections on the results of activities submitted by the participants. Data analysis was performed using narrative analysis, which describes the process of assisting in understanding the concept and practice of designing and implementing loose part media-based R-SLAMET content playing.

4 RESULT AND DISCUSSION

4.1 *Orientation Change: from Competency-Based Practice to Integrative Thematic Play-Based Practice*

Along with the policy of implementing the competency-based curriculum in the 2013 curriculum, educators in ECE units have acquired a fairly permanent understanding of the concept that learning design (play) must start and be based on predetermined competency indicators. This is recorded in the statements and learning design documents prepared by ECE educators. The summary of the ECE educator's statements is revealed that we have always made the game based on the indicators of basic and core competencies, which previously were basic abilities. We often had difficulty connecting themes and competency indicators into play activities. Participants realized that the design pattern was too simple, and the activity was partial because one game was only intended for one indicator. After being given an understanding of the concept and illustration of an integrative thematic play plan containing STEAM content, participants feel and gain new understandings that show more integrated learning, use flexible themes and can contain a number of STEAM content in continuous play.

Science is used as the main example since, while the lexical requirements vary, the literacy standards of this discipline somewhat align with those of the others. In particular, areas of content, the vocabulary of science illustrates how language works. However, (Doyle, 2019) suggests related requirements from the Australian Curriculum (ACARA, 2018) prior to the discussion of languages and literacies and notes Australian government positions on STEM (Science, Technology, Engineering and Mathematics) education (Australian Government, 2015). The Arts are then highlighted as a pivotal resource for the STEM content areas as a mode of artistic study, representation and expression. Finally, as springboards for realistic classroom events, some ideas are given for the creation of school STEAM language and literacy.

4.2 *Repositioning between Developmental Content and Play Activities*

So far, participants have made aspects and indicators of development as learning content that must be improve into learning activities (play). The scheme follows the theoretical and practical flow of instructional design-based curriculum development. When given a play-based curriculum understanding, participants began to realize that naturally early childhood plays with various games that can reach many aspects of development at once. Participants responded to the video showing natural play in early childhood activity, saying "ow...that was my childhood play activity and I learned a lot from the game."

Through the illustration of the video show, participants are invited to reminisce about designing a game on a theme and playing scenario. After that, participants are invited to analyze play activities and each play scenario that is compiled will have an impact on what aspects and development indicators. Almost all participants gave correct answers and simultaneously. Finally, the participants began to reflect and grasp the understanding that activities that include regular and programmed play scenarios can actually build many aspects and indicators of development.

This process is what builds participants' awareness that developmental aspects and indicators are the impact or consequence of the games given to children. In this position, participants began to change their way of thinking from exploring content-based learning to play-based learning. and how their perspectives affect its implementation in ECE classrooms. The findings demonstrated differences in the concepts and implementations of play-based learning by participants in kindergarten classrooms. The play enactment, which was entirely different from learning, was identified by several participants, but also showed some confidence in the ability to learn through play. Although positive perspectives of play-based learning were described by all participants, more than half described the implementation of kindergarten programs, which did not completely incorporate play-based learning. In their introduction of play-based pedagogy, participants were also asked to describe obstacles they faced. Participants in both enactment classes reported that their play execution was experiencing difficulties. These findings support

the need for a clear and consistent concept of play-based learning to help decide how play is better incorporated and how academic skills are learned (Fesseha & Pyle, 2016).

4.3 *Play continuum and STEAM (R-SLAMET) content*

Training and workshop participants are also invited to compile play scenarios that are programmed with STEAM content (Science, Technology, Engineering, Art and Math). Researchers accompany and guide participants to find as many types of play (density of play) as possible on a theme and sub-theme without first thinking about aspects and indicators of development. After getting more than three play activities, participants are invited to choose one of the play activities, which will be compiled a play scenario that is continuous and has STEAM content.

Participants are guided to formulate a continuum of playing scenarios from the beginning of the game to unlimited activities. In each scenario, participants are invited to enter the appropriate learning content. For example, in the initial scenario, children are invited to pray before playing activities and asked the participants what learning content did we include? Participants simultaneously answered, that is religious and moral content. The scenario was continued with the child observes pictures and videos of the growth process of grass jelly plants. Participants were again asked what learning content fits this scenario? They answered science content. This activity is carried out until it becomes a continuum of playing activities filled with STEAM learning content. Based on this continuum play, participants can examine the aspects and indicators that are expected to emerge as a result of the assigned play scenario.

In line with research conducted by DeJarnette (2018) over the past decade, STEAM (Science , Technology , Engineering, Art, and Math) education has gained rising attention , particularly at middle and high school levels. At the early childhood level, this article focuses on the need for STEAM education. With their sense of curiosity and imagination, preschool children have a natural inclination for science. The researcher investigated how it will influence the arrangements, self-efficacy, and rate of implementation for teachers to include hands-on professional development, consistent encouragement, and rich resources for STEAM lesson implementation into the early childhood curriculum. The research also included observation by preschool children of the receipt of STEAM instruction. The results showed an improvement in the positive arrangements and self-efficacy of pre-school teachers, but the rate of teachers' adoption of STEAM lessons was initially reduced.

4.4 *Modification of STEAM Content to R-SLAMETS content*

Apart from STEAM, the curriculum content at ECE also provides learning content related to Literacy and Social Studies. Specifically, the ECE unit in Indonesia has a special content of religion and morals. Participants were then introduced to a complete analysis of curriculum content, namely R-SLAMETS (Religion, Science, Literacy, Art, Math, Engineering, Technology and Social Study). The implementation of content development is in principle the same as STEAM content-based playing activities, only being extended to playing the R-SLAMETS-based continuum. Participants are presented with illustrations of continuum playing activities containing R-SLAMETS content, either in whole or in part. To achieve these skills, participants are guided through the stages of developing continuous play with R-SLAMETS loads.

The addition of art to STEM becomes STEAM important even though most children do not become professional artists from year to year. As an acronym for educational creativity, STEAM promises to enhance the distinct findings emerging from art + design studios by immersing students in multiple knowledge bases covering the contributing domains of science, technology, engineering, art, and mathematics (Rolling, 2016). After Art is entered into STEM content, it changes to STEAM. R is for Religion in R-SLAMET because the religion from the ECE Indonesia curriculum is one of the components that can support children's morals and behavior. Therefore, in the STEAM application so as not to confuse teachers, we are trying to integrate religion into the STEAM implementation content format. This has been presented by recent research that explains the application of STREAM-based approach (Science, Technology, Religion, Engineering,

Art, and Mathematics) project-based learning models for student learning activities and student creative work item. The results showed that the introduction of the STREAM approach based on the project-based learning model had an impact on increasing student learning outcomes and their activities in learning activities made them more innovative in developing attractive products. There are four innovative products developed by students in this study, namely drip irrigation, water cycles, water quality testing, and story booklets with religious images. Great opportunities for primary school teachers to use the STREAM-based project-based learning model to increase students' curiosity, imagination, and social attitudes in learning (Azizah et al., 2020).

The dialogue in the photo is an illustration of the development flow of playing continuum with E-SLAMETS content which can be described in Figure 1:

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┌─────────────────────────────────┐
│   Theme Analysis & Sub Theme    │
└─────────────────────────────────┘
              │
              ▼
┌─────────────────────────────────┐
│   Identify the Variety of play  │
│      (Density of Play)          │
└─────────────────────────────────┘
              │
              ▼
        ┌──────────────┐
        │ Scenario of  │
        │     Play     │
        └──────────────┘
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┌──────────────────────────┐   ┌──────────────────────────┐   ┌──────────────────────────┐
│ Load R-SLAMETS content │◄───   │ Analysis of Development │   ───►│ Media Loose Part Selection │
│   │   │   Aspects and Indicators │   │   │
└──────────────────────────┘   └──────────────────────────┘   └──────────────────────────┘
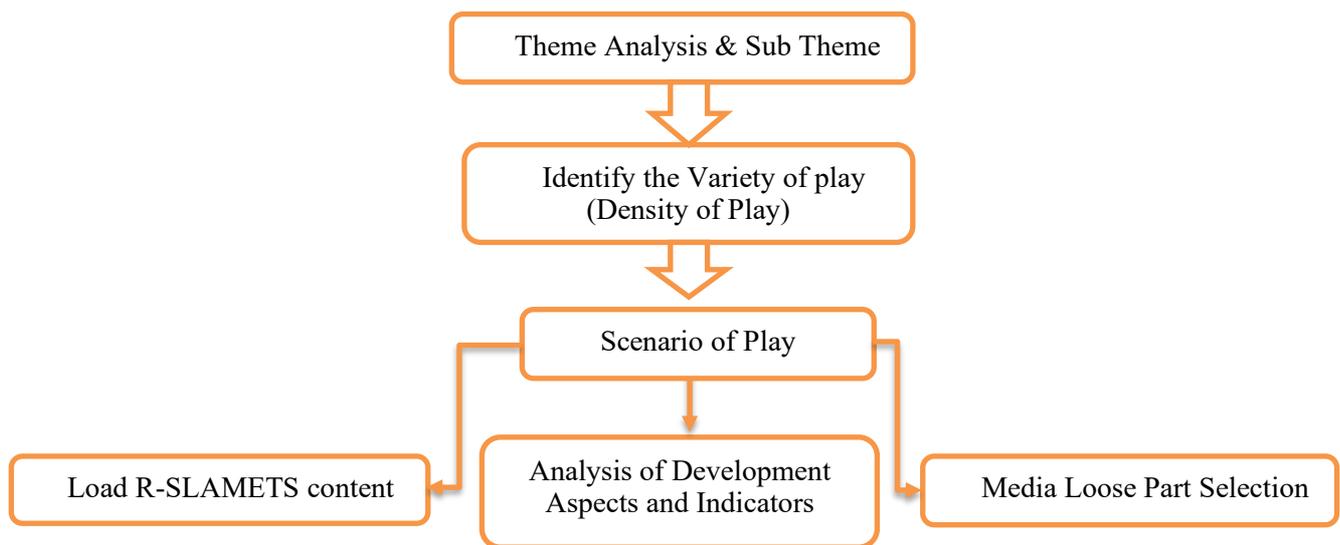
Figure 1. Continuum Play Development Flowchart with R-SLAMETS Content Load

The flow chart shows the development of playing continuum with R-SLAMETS content starting from; analysis of themes and sub-themes, identification of play types or density of children's play, drafting play scenarios with content SLAMETS, analyzed the aspects and indicators of development that were affected, and chose loose part media based on local materials.

4.5 *Strength of Loose Part Media*

Loose-part components provide children with opportunities to develop their imagination, collaborative actions, and cognitive functioning (Maxwell et al., 2008). With loose-part media, a significant consideration is that the materials are open-ended, to encourage unstructured child-led play, and to allow children to use these materials any way they want, while the idea of loose-parts has existed for many years. Loose-parts provide children with opportunities for unstructured play that adults do not dominate (Ridgers et al., 2012). Unstructured environments have minimal guidelines and rules set by adults who allow children to develop their own play activities and enable them to do so. Outdoor play environments with loose-part that are frequently altered to provide kids with challenges and a sense of wonder, as future play opportunities are continually evolving (Canning, 2010).

In general, early-childhood teachers and programs that accept the use of loose-parts have more flexible schedules, while enabling children to practice their freedom to play and develop individual control and self-regulation skills. Among preschool children, loose parts encourage varied play activities. Integrative thematic play activities that contain STEAM or R-SLAMETS content will be more effective, and meaningful when ECE are can find and use surrounding part materials and media from the loose environment. ECE educators who prepared loose media from the environment are able to develop continuous play activities with STEAM to R-SLAMETS

content quickly and precisely. The illustration of the show of loose part media can be drawn by the example on figure 2 & 3:

Figure 2. Children make geometric shapes from mangrove leaves and twigs

Figure 3. House design from dry twigs and leaves

This figure 2 & 3 illustrates that the use of loose part media in playing activities with STEAM or R-SLAMETS content has provided opportunities for children to be more active, creative and innovative. Children are involved in play activities that are continuous, meaningful and fun (immersion play). More precisely, identifying loose parts enable greater adoption and deeper discussions and professional development of the subject. Loose parts of the sample were classified as natural or manufactured, and terms defining loose parts were analyzed (Gull et al., 2019). Spencer et al., (2019) found educators considered to play loose outdoor parts with several social and cognitive advantages for preschool children who are important for optimum growth and development and overall health and well-being.

5 CONCLUSION

Advocacy of early childhood educators through training and workshops has helped improve professional quality on an ongoing basis. There has been a change in the mindset of implementing the operational curriculum from a partial competency-based approach to an integrative thematic Play-based approach that integrates STEAM content across learning. Educators demonstrate the application of thematic integrative Play-based into a continuum game scenario containing STEAM content and R-SLAMETS content. This process becomes more effective and efficient and meaningful when PAUD educators are able to elaborate and empower teaching materials and loose-part media based on local material sources. The implication of this research is to invite other

researchers to develop R-SLAMETS content, and become a new icon for STEAM learning in Indonesia.

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