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Introducing eco-literacy to early childhood students through digital learning

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ABSTRACT

The objective of this study is to introduce eco-literacy in early childhood and to look into the role of digital media in increasing children's awareness of eco-literacy in the era of society 5.0 on daily environmental issues. This study applied a literature review of various sources related to eco-literacy through digital media, especially YouTube as well as interviewing class teachers. The results showed that introducing eco-literacy to elementary school students can be accomplished by telling stories, watching videos, or organizing field trips. There are four important points in developing an eco-literacy attitude: developing empathy, joining the community, making observable things visible, and asking children not to cause environmental damage. In addition to digital activities, efforts to improve ecological literacy should be extended through programs and exchanges regarding the need of environmental protection the 5R (refuse, reduce, reuse, recycle, and rot) approach. Further studies in the same topic on teaching eco-literacy to elementary school students can be carried out in a more intensive way through relevant games to instill a love of the environment based on 5R strategies.

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1. INTRODUCTION

Current development progress is risky unless it is accompanied by environmental awareness. Humans tend to exploit natural resources indiscriminately with little regard for the consequences [1]. To create an environmentally conscious society, environmental awareness must be instilled in the next generation from a young age. Several environmental organizations have taken action to address the issue [2].

The use of information and communication technologies (ICT), especially YouTube, in eco-literacy education (EE) can help enhancing both teaching and student learning improvements. The primary objective of this study is to present a YouTube channel and prove how it can be used as a form of contemporary environmental education [3]. The primary goal was to teach those teachers how to plan and carry out environmental initiatives. The distance program was implemented through the use of a YouTube channel dedicated to the needs of the study.

Before participating in outdoor activities, children can learn a lot about ecology by watching a YouTube video. Through YouTube, they begin to connect environmental knowledge (ecological literacy) and have the opportunity to take appropriate action. Students will gain environmental literacy if their teachers are knowledgeable about the environment [4]. To improve children's understanding and awareness, YouTube

content should provide conceptual eco-literacy. The study then moves on to the importance of YouTube as a digital teaching tool for increasing children's environmental awareness, as well as the development of ecological literacy in children. EE, also referred to as sustainable development education, focuses on the current and future state of the environment and necessitates a mental shift. It aims to improve people's knowledge, skills, values, awareness, and ability to contribute to sustainable development and take action for nature conservation, greening the economy, and the creation of a just and equitable society.

Eco-literacy is all about understanding the principles of ecosystem organization and applying those principles to create sustainable human communities and societies [5]. A critical component of eco-literacy was the concept of using resources in such a way that they will be available in the future. An ecoliterate person is prepared to be a successful member of a sustainable society because they exhibit well-rounded abilities of the head, heart, hands, and spirit, including a natural awareness of the world and participatory action within and with the environment [6].

Numerous studies have demonstrated that attitudes are established very early in life, which is why it is crucial to instill the concept of eco-literacy in young children [7], [8]. Children grow healthier, wiser, and happier when they are exposed to the natural environment in as many educational and recreational settings as possible throughout their childhood [9], [10]. These long-term and considerable benefits contribute to their future well-being and contributions to the world as adults [11]. Several other studies highlighted media such as web-based science learning module as a reliable and effective medium for improving students' understanding of eco-literacy [12]; the impact of a web-based program created to educate social work students about environmental sustainability [13]. The study looks into how eco-literacy can be taught in formal and informal settings, as well as the role of the family, school, teacher, community, education, and government in promoting the values and lifestyle changes needed for sustainable societies and communities.

Integrating environmental literacy in the school curriculum will help elementary school students learn about the environmental issues, provide them a sense of control over their surroundings, and foster intrinsic attitudes toward sustainability. Similarly, engaging children through a YouTube channel allows them to see firsthand the importance of biodiversity and the urgency of ensuring a sustainable future for all life forms on Earth. The objectives of this study are to promote eco-literacy in early childhood and study the role of digital media in raising children's knowledge of eco-literacy in the era of society 5.0 on everyday issues related to the environment.

2. METHOD

This study was designed with qualitative method that applied both literature review and discovery learning approaches. Efforts to identify results of this study are linked to the topics to be examined by reading the most recent and relevant research journals, both national and international journals accessible either in print or online. The study technically enriched by results of interviews with class teachers teaching in three different elementary schools in Metro City of Lampung Province, Indonesia. From the reviewed literatures and references, this study seeks to know what applicable strategies used to understand the environmental issues, and to estimate roughly what research methods can be implemented for future studies.

3. RESULTS AND DISCUSSION

3.1. Introducing eco-literacy in early childhood

Capra coined the term " eco-literacy," suggesting that ecological principles apply to all living systems [14]. The ecosystem connects all of the elements in it, both natural and man-made [5]. Eco-literacy is defined as the ability to "read" the environment and "act" in order to be sustainable with all of our requirements [7], it is one's understanding of and attitude or actions toward the environment. It is the ability to comprehend natural processes that are relevant to our lives, including consideration of the implications of human actions [15]. Eco-literacy is also known as ecological intelligence. Intelligence is the ability to learn from experience and deal successfully with the environment, whereas ecology is an understanding of creatures and their habitats [16]. Environmental awareness defined by Marshall-Pescini *et al.* [17] is the complex interconnectedness of all living organisms and their surroundings. Meanwhile, eco-literacy, as stated by Pitman and Daniels [18], attempts to introduce and renew people's understanding of the need of global ecological awareness, in order to create a balance between human needs and the earth's capacity to defend itself.

Orr, center for eco-literacy (Capra), Cutter-Mackenzie and Smith [19], Wooltorton [20] and McBride *et al.* [6] have proposed an eco-literacy framework. The first is Orr's framework, which was proposed in 1992 and includes the fundamental concepts of ecological literacy: knowledge, concern, and practical ability. A broad understanding of how people and cultures interact with one another and with

natural systems, and how to do so in a sustainable way. Additionally, frameworks according to Capra in the center for eco-literacy used in 1997/2002/2013. There are four eco-literacy competency sets: i) head/cognitive approach from a systemic perspective, comprehending fundamental ecological principles (networks, nested systems, cycles, fluxes, development, dynamic balance), assessing impacts and ethical ramifications of human activities, envisioning long-term consequences of decisions; ii) heart/emotional care, empathy, and respect for other people and living beings, tolerance for other viewpoints, and dedication to equality and justice for all; iii) hands-on/active developing and implementing tools and procedures that society need in a sustainable manner, transforming beliefs into actual and successful actions, analyzing and adapting consumption of energy and resources; and iv) spirit/ connection feeling a strong tie with and deep appreciation for nature, experiencing wonder and awe of nature, feeling reverence for Earth and all living things [7].

According to Cutter-Mackenzie and Smith [19], there are four levels of eco-literacy: i) a lack of awareness and numerous misunderstandings concerning environmental issues; ii) nominal eco-literacy recognition and use of some fundamental terms used in socioecological systems, beginning to identify environmental problems and issues surrounding suggested solutions; iii) functional/operational eco-literacy knowledge and skills concerning the setup and operation of environmental systems and their linkages with human systems; and iv) highly developed eco-literacy a comprehensive understanding of how people and society interact with one another and with natural systems, and how to do so in a sustainable way; environmental crises, understanding of sustainability models; and the ability to synthesize environmental information and act in ways that lead to environmental sustainability.

Wooltorton [20] suggested six elements of eco-literacy, including a sense of place and active citizenship engagement in local culture, history, organic communities, and ecosystems; Systems thinking and relationships a feeling of relationality, connectedness, and context; the study of wholes, relationships, and networks with a focus on contextual knowledge, quality considerations, process attention, and pattern studies; educational pedagogy for sustainability an experiential, participatory, and multidisciplinary approach that focuses on the learning process; reading the worlds of environment and culture early contact with nature with eco-literacy as the first literacy. Understanding eco-literacy for early childhood adheres to the framework established by Capra in the center for eco-literacy [2], which includes understanding basic ecological principles and assessing the impact of human actions on the environment, empathy and respect for other people and living things, the ability to assess and adapt use of energy and resources, and finally a sense of admiration for nature.

Eco-literacy, as a new paradigm, initiates the movement as an effort to take care the environment and to increase awareness toward the community's ecology [14]. Introducing eco-literacy in early childhood is importance to develop their understanding about the importance of global ecology awareness, with the purpose to create the balance between community needs and earth capability in sustaining it. By having good understanding about eco-literacy, the children will get the basic principles of ecology and capable to realize it in their daily life. Eco-literacy needs to be provided in early childhood because an environmental care attitude instill from childhood will characterize children until adulthood [21]. In addition, by having environmental education the children will be more respectful with the nature. They will be more sensitive to the condition surrounding environment.

Introducing of Eco-literacy in early childhood can be done by connecting the emotional bonds with the nature. There are four points in developing eco-literacy attitude, namely; i) Developing empathy for all form of life. Teachers need to emphasize environmental awareness in the classroom to ensure students' senses of empathy develops. It is conducted to teach the students aware of their duties and responsibilities, namely protecting the nature; ii) Joining the community of earth lovers. By having the community, the students can share with their group and their responsibility about environmental sustainability will increase; iii) Making invisible thing to be visible. Actual learning activities will bring students closer to nature; and iv) Asking children used not to damage. students about not damaging nature. Such as not cutting planks haphazardly, not stepping on grass in the garden, and not pulling up plants carelessly.

Adults can begin teaching environmental awareness to children by infusing values including loving and caring for the environment in activities that they enjoy, such as telling stories about the importance of environmental preservation. By telling the stories it means that the children are provided the introduction of eco-literacy. Moreover, inviting the children to do fieldtrips. Fieldtrips activities such as visiting plantations, farms, zoos, parks, and protected forest. Fieldtrip activities can create fun atmosphere to children in learning about environment. In addition, introducing the eco-literacy can be done by watching the video through YouTube. Exploring environment by using audio visual media will make the invisible things be visible. Something that cannot be reached becomes possible by using YouTube.

3.2. The importance of teaching sustainability in early childhood

The earliest years of a childhood period are crucial. These years establish the child's existence and development, as well as laying the groundwork for the child's overall learning and development. Children develop the cognitive, physical, social, and emotional abilities required for life success during their first years of life [22]. The values, attitudes, actions, and abilities developed at this time can have a long-term impact on later life. Consequently, early childhood education clearly plays a significant role in encouraging ecological literacy and the development of environmentally conscious future generations. These early experiences are mostly determined by supportive family and community care practices, good nutrition and health care, and learning opportunities. These rely on beneficial interventions and investments for toddlers and families [23].

Children simply needs deletion, it can be in reduced form without "who are" nurtured from infancy have the best chance of achieving lifelong success, according to researchers and business leaders. Policymakers all over the country are building on this agreement. Whether the goal is to reduce crime, increase high school graduation rates, or provide all children with an equal opportunity to achieve their best dreams, evidence shows that making effective early investments can make a significant difference in getting children off to a good start [24] . In addition, sustainability in the classroom has a number of benefits including a greater interest in environmental education, positive impacts on student well-being such as the promotion of healthy lifestyles, and improved critical thinking skills [25].

A more detailed definition of eco-literacy includes three main categories, ranging from environmental knowledge and awareness to taking a stand and acting on environmental issues [26]. At the first level of literacy, students should learn and identify basic environmental terms. The capacity to apply environmental information and concepts to develop opinions about specific environmental concerns is the second level, which builds on the first. The third level of environmental literacy is the ability to receive and understand information, make decisions, and take action on a variety of environmental issues. Being eco-literate is being able to detect, categorize, and name a number of environmental components, as well as taking action and participating in decision-making on environmental issues and challenges [27].

One of the main principles from teachers developing sustainable practices is to take small efforts. There is no single factor that will make one’s endeavor "sustainable" in the short run. Rather than focusing on immediate benefits, actual sustainability integrates sustainable approaches wherever possible throughout the course of a setting. It could be large-scale objects like water tanks and solar panels, or small-scale behaviors like remembering to turn off the lights, using a restricted amount of water, composting trash, or pausing to think before turning on the air conditioning [28]. Finally, teaching children in the environment, about the environment, and for the environment can help them grow eco-literacy in early childhood education.

3.3. Promoting eco-literacy through YouTube

YouTube is a popular video-sharing website that allows users to collaborate, watch, and share videos. It was founded in February 2005 by Hurley *et al.* [29]. It is an online social network that offers its users audio and visual features. Young folks are currently highly fond of YouTube. This is so that it can detect motion in live visualization. The most well-known video platform on the internet, YouTube offers a variety of information in the form of dependable, moving visuals. This website is available to individuals who want to look for video material and watch it immediately [30]. It is a place for watching videos freely, the users only require internet connection to access the site [26]. By using YouTube, the students can access materials which is suitable for learning topics at school and create a fun learning styles to improve their understanding and skills [31]. Applying YouTube in the classroom helped students advance their technological literacy, time management, group work, and communication skills [32]. YouTube is accessible at any time and from any location, allowing parents to accompany their children's learning while they are at work. YouTube for elementary school is one of the most popular internet entertainments today. YouTube provides video which can improve students’ understanding of learning. YouTube displays audiovisual elements therefore the students can see the things and hear the sound. Media in the form of images, animation, sound and video can be used for teaching and learning process. The video can stimulate the students’ feeling, thoughts, and willingness so that it can develop the learning outcomes [33]. Similarly, the use of video streaming media in the classroom, such as YouTube, should be considered as an alternative educational means of boosting student engagement in their classroom lessons. When teachers use YouTube videos to introduce new concepts and explain concepts during main or close instruction, however, this potential use of video technology may have an impact on students’ learning process [34]. YouTube videos are used as learning tools as well as teaching stimulus [35], YouTube videos increase student engagement and participation in classroom [36] as well as improving students' academic achievement [37].

One of the teaching strategies that encourages students' participation in the learning process is discovery learning. When it comes to supporting students in obtaining the knowledge necessary for making

sense of new information and integrating it with the knowledge base, guided discovery learning is superior to pure discovery. Additionally, guided discovery learning is more successful and efficient than a minimally guided instructional strategy since it gives students the direction, they need to reach their desired learning objectives [38]. Effective discovery learning comprises three interconnected main spheres: issue representation and hypothesis generation, hypothesis testing through experiments, and reflective abstraction and integration of discovery experiences [39]. One of the applicable teaching resources taken from YouTube accessible on *Edukasi Anak Indonesia* [40], as seen in the following sample. There are five fundamental elements of eco-literacy: living system principles, nature-inspired design, ecological literacy and the transition to sustainability, and ultimately cooperation, community building, and citizenship [18], [41]. The following image of 5-minute videos provide simple ways to teach children to appreciate the environment by raising awareness of the potential hazards of littering and the importance of separating organic and inorganic waste in the environment in where they live. Figure 1 indicates the YouTube video content teaching about the important of environmental awareness.

Figure 1. Sample of eco-literacy on YouTube

EE is an effort to modify the behavior and attitudes of various parties or the community with the objective of developing knowledge, skills, and public awareness about environmental values and issues of environmental problems. In order for students to understand this, the teacher introduces them to EE, especially in the school environment. YouTube videos can be one of the alternative multimedia of teaching and learning for communicating explanations related to classroom knowledge [42]. Roleplaying, group projects, and computer simulation are all well-documented methods of providing a learning environment [43]. Teaching children about their environmental concerns through a YouTube channel is as objectively prepared as possible to help them understand how important the environment is, either at school or elsewhere. This teaching media strives to increase children's understanding of environmental protection in schools. EE in schools teaches students to take care of all the public facilities, to throw garbage in the trash, to sweep the classroom, and to become mindful of the importance of maintaining the school clean. This can be done by classroom teacher to do relevant project such as "keeping the environment at home". The objectives of the project were to raise students' awareness and independence in protecting their living environment at home. Maintaining the living environment at home by sweeping, mopping, and planting plants.

3.4. Practical implementation of eco-literacy in school and environment

The teacher should be able to design the variety of social interactions in environment by displaying the YouTube about taking care of garden, exploring the nature walk, visiting zoo, recycling yards, and planting. Young children will connect their knowledge from watching the video with their motor skills. It is better to continue their experiences including opportunities to run, jump, and climb in the natural environment. It can be stated that the digital Media has important role in introducing the eco-literacy among the early childhood. The role of digital learning media like YouTube can be sources of experience, exploration and discovery for children about ecology. They develop the curiosity, ask their own questions, and begin to develop reasoning and problem-solving skills through the pictures and video displayed. It is important for young children to learn, to listen, and to watch the appropriate knowledge about ecology and environment in order they have awareness to sustainability in nature.

Apart from digital activities, efforts to improve ecological literacy should be extended through programs and exchanges regarding the need of environmental protection. Capra developed a solution, eco-

design, even while dealing with rubbish. Ecodesign refers to the fundamental redesign of technology and social institutions to bridge the gap between human design and ecologically sustainable natural systems. The basic ecodesign concept is that waste equals food. All industrial goods, as well as trash produced throughout the manufacturing process, must eventually become material for something else. That idea corresponds with the ecological principle of cycles, which implies that every living being will continue to create waste, but that waste from one species will become food for others. All of these items attempt to produce zero waste or trash free. Where there is no trash going to the landfill, waste may be remanaged, as in the notion of ecodesign, which can be helpful for both people and other living things. There are various strategies that we can use, such as the 5R approach, which stands for refuse, reduce, reuse, recycle, and rot. These 5R create a guideline for students to develop a waste-free living.

The five key components of eco-literacy are the concept of living systems, natural-inspired designs, ecological literacy and transitions toward sustainability, and finally collaboration, community building, and citizenship. Teaching students to distinguish between organic and inorganic trash is a small step toward fostering a love of the environment in them. EE is necessary since the world we live in is dealing with a number of environmental issues. Another form of adverse environmental effects is improperly handled waste. Garbage that accumulates has an impact on the health of the environment. In environmental education textbooks *pendidikan lingkungan hidup (PLH)/*environmental education for elementary school students, there is a fairly simple environmental management effort referring to the 5R Program. It is anticipated that by providing such knowledge, students would be able to think critically when offered with waste-related issues at school and in their own neighborhoods, [44], [45].

The implementation of EE is supposed to become a habituation process, resulting in the development of behavior and attitudes among students to respect, love, and care for the environment. The elementary school students must acquire a concerned attitude towards the environment. It is expected by instilling a caring attitude toward the environment in students, they will dedicate themselves to caring for and maintaining the land, ensuring that instances of environmental devastation caused by people do not reoccur. Based on the explanations of several grade 5 elementary school teachers whom we interviewed at three different elementary schools in Metro City, Lampung Province, eco-literacy in the classroom can begin with activities carried out by students, such as planting and caring for plants, a culture of disposing of waste in separate waste between organic and inorganic, community service activities, bringing plants brought from home and arranging in the school (Pseudonym, personal comm., August 23, 2022). These stages where the components of eco-literacy learning must be interconnected and become a concern for the teachers. The objective of the interaction between components is to obtain maximum results and optimal achievement of the specified learning objectives. Eco-literacy learning should be more practice than theory in the classroom. The numerous practices that are carried out allow students to learn directly through the use of real objects. Students will surely receive numerous benefits from their classroom experiences (Pseudonym, personal comm., August 30, 2022). Based on such paradigm, students should be able to combine prior understanding with newly acquired information on the critical importance of preserving the environment (Pseudonym, personal comm., August 30, 2022).

Most of our interviewed teachers in some of the elementary schools in Metro City recommended implementing the 5R program as instructed in the textbooks *PLH*, *PLH* as an applicable learning resource, which accordingly have provided students with alternatives to comprehend, practice, and develop the values of attitude skills required to appreciate the reciprocal connections present between people and their environment. Bearing in mind, the 5R program can create comfortable and pleasant learning environments motivating children to be enthused about learning, it is essential that a basic attitude be established.

3. CONCLUSION

Understanding of eco-literacy must be fostered in children as early as possible since an environmental care attitude rooted in children as a child will influence them until adulthood. The way to introduce eco-literacy in early childhood can be given through learning about environment by using YouTube. The implementation of EE is supposed to become a habituation process leading to developing behavior and attitudes among students to respect, love, and care for the environment. All efforts in introducing eco-literacy can be accomplished by telling stories, watching videos, or organizing field trips. There are four important points in developing an eco-literacy attitude: developing empathy, joining the community, making observable things visible, and asking children not to cause environmental damage. Apart from digital activities, efforts to improve ecological literacy should be extended through programs and exchanges regarding the need of environmental protection the 5R approach (refuse, reduce, reuse, recycle, and rot). These 5R create a guideline for children to develop a waste-free living. This study suggests further

developments in teaching Ecoliteracy to elementary students such as by implementing games to inculcate love of the environment through 5R strategies.

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