

A Study on the Perceptions of Pre-service Early Childhood Teachers on Education for Sustainable Development (ESD) In South Korea

Suk kyung Jang¹⁾

Kookje University

Eun-Young Choi

Korea Institute of Child Care and Education

Abstract

Recently, the importance of sustainable development has been emphasized due to issues such as climate change, war, and global economic crisis, but the understanding of early childhood teachers, who are responsible for implementing sustainable development education, is not high, and the rate of sustainable development education in training courses is low. Therefore, the purpose of this study is to find future action plans by understanding the concept and level of awareness of pre-service early childhood teachers regarding Education for Sustainable Development (ESD). For this, we selected 29 third-year students currently enrolled in a three-year Early Childhood Education program at a university as participants. The concept map created by the prospective preschool teachers was analyzed in terms of upper concepts, hierarchy, feature scores, and density. The main results of this study are as follows. Firstly, the high-level concepts of ESD(Education for Sustainable Development) among prospective preschool teachers appeared similar in terms of sociocultural, environmental, and economic aspects. Secondly, both hierarchy and feature scores were higher for environmental aspects, whereas they were relatively low for sociocultural and economic aspects. Thirdly, the density results generally appeared to be similar. These results suggest the need to address the system of knowledge about ESD(Education for Sustainable Development) comprehensively in all subjects of the training process, to expand and deepen it

Keywords : *Education for Sustainable Development (ESD), Knowledge level of ESD, Concept map, Pre-service early childhood teacher*

Corresponding author, ¹⁾ Skjang94@hanmail.net

Introduction

Sustainable development expanded its concept in 1987 from environmental education to include sociocultural and economic sectors. Globally, education for sustainable development in early childhood is already being disseminated (Shin & Park, 2012; 29). Education for Sustainable Development (ESD) is an education aimed at a society where everyone can receive high-quality benefits and learn the values, behaviors, and lifestyles necessary for a sustainable future and society (UNESCO, 2004). Education for Sustainable Development (ESD) began with Agenda 21, adopted at the 1992 United Nations Conference on Environment and Development, which emphasized that education is an important factor in achieving sustainable development

The United Nations declared the “UN Decade of Education for Sustainable Development 2005-2014” in 2002 (UNESCO, 2004). The recognition that early childhood should be the starting point for education for sustainable development became prominent due to the “Gothenburg Recommendation on Education for Sustainable Development” in 2008 (Ji et al., 2015: 24). The 10-year period of education for sustainable development aims to integrate the principles, values, and implementation policies of sustainable development into all learning processes, with the consensus that educational efforts should be directed towards creating a more sustainable future for the current and future generations (UNESCO, 2004).

Education for sustainable development (ESD) can be defined as the acquisition and understanding of relevant knowledge, as well as the cultivation of competence to apply sustainable principles throughout various aspects of life (Hedefalk et al, 2015). In 2018, UNESCO emphasized that ESD should play a central role in achieving the Sustainable Development Goals (SDGs) adopted by the United Nations in 2015, aligning ESD with SDGs until 2030 through the Global Action Program on ESD (GAP), which was set to expire in one year. This led to the promotion of Education for SDGs (ESDGs), which highlights the importance of quality education and lifelong learning as essential means to achieve not only SDG 4 but all SDGs. Thus, ESD, within the context of SDGs, is defined as an educational effort beyond environmental education, aiming for sustainable development as a whole (Moon et al., 2019: 115).

In line with this, the World Organization for Early Childhood Education (OMEP: Organisation Mondiale pour l'Education Prescolaire) has been conducting projects since

2010 with a focus on nurturing young children to become members of a sustainable society (Kim & Kim, 2019). Particularly, Germany, the United Kingdom, and Australia have actively incorporated educational concepts into their curricula from an early stage (Davis, 2010). Germany has implemented national-level projects such as the BLK-21 Program for Education for Sustainable Development and the Transfer21 Program for Sustainable Development Transformation. The United Kingdom has been strengthening education for sustainable development from preschool to university, and Australia has been executing various activities through both formal and informal education systems (Kim et al., 2013).

In the wake of the Sustainable Development Committee's inception in 2000, South Korea demonstrated ostensibly substantial strides in legislating and strategizing for education focused on sustainable development. Nevertheless, with the emergence of green growth as a pivotal national policy objective in 2008, there was a perceptible paradigm shift towards green growth education. Consequently, this led to a reduction and fusion of the educational ambit for sustainable development with the study of environmentalism and green growth education (Yoo et al., 2013b: 78). Regarding early childhood education for sustainable development, extensive research has been conducted, encompassing methodologies, surveys germane to education for sustainable development (Ji et al., 2015), and scrutiny of educational curricula associated with sustainable development (Kim et al., 2014; Yoo et al., 2013b). Additionally, evaluations concerning teachers' perceptions and orientations of educational curricula have been conducted (Baek et al., 2014; Shin & Park, 2012). However, the rate of progress in these studies is reportedly languid relative to primary and secondary education (UNESCO Korean National Commission, 2014).

Jo(2012) highlighted that approximately 58.4% of indigenous research undertaken over the past decade concerning education for sustainable development has been centered on educational curricula and pedagogical methodologies. It is of note that critiques have been levied that the majority of the research introduces methodologies for sustainable development education without providing a lucid definition, thus suggesting an inadequate comprehension of the concept of education for sustainable development (Ji & Nam, 2007). Further commentary by Seo and Cho(2015) remarked on the absence of an academic and practical consensus on terms such as “sustainability,” “sustainable development,” and “education for sustainable development”. This has led to the rapid application of these concepts in educational contexts without adequate clarification. A study undertaken by Choi et al. (2020)

surveyed perceptions of terms related to sustainable development. It revealed that “sustainable development” had the highest recognition rate at 80.7%, whereas “Sustainable Development Goals” had the lowest recognition rate at 54.8%. Additionally, the study assessed the degree of reflection of the Sustainable Development Goals in educational and childcare curricula. The findings indicated that training materials were the primary source of awareness at 34.8%, with media and educational programs trailing at 28.7% and 25.5% respectively.

Education for sustainable development endeavors to cultivate a novel educational paradigm that emphasizes the understanding and transformation of values and attitudes from social, cultural, environmental, and economic perspectives. In this framework, long-term perspectives are fundamentally crucial. Hence, it can be posited that early childhood education should constitute the initiation point for future societal preparation (Ji et al., 2015; Davis, 2014; UNESCO, 2008). This assertion is predicated on the premise that early childhood is an essential phase for establishing the foundation for holistic development and for engendering an understanding of life, values, and actions in early lifelong education (Shin & Park, 2012). Recently, studies have been conducted targeting kindergarten teachers to explore their perception of Education for Sustainable Development (ESD) (Kim & Kim, 2019), their practical experiences and meanings related to ESD (Kim, 2020), and the perspectives of kindergarten teachers who have heard about ESD sharing their insights on the subject (Choi, 2018). These studies highlight the significance of implementing ESD during early childhood education and emphasize the importance of practical application in kindergarten settings.

Furthermore, kindergarten teachers recognize the gravity of global issues such as human rights, hunger and poverty, and environmental problems caused by climate change. They understand the need for ESD from social, cultural, environmental, and economic perspectives to perceive the realities of these issues accurately and gradually work towards recovery and improvement (Choi, 2018). In addition, Early Childhood Education and Care (ECEC) settings offer a foundation on which lifelong pro-environmental and sustainable attitudes can be built (Ärlemalm-Hagsér, 2013; Burnett, 2008). With the shift to a sustainable future a matter of urgency, Early Childhood Educators (referred to as ‘educators’ herein) play a significant role, empower-ing children to make informed decisions as they take individual

and collective action for sustainable change (Bahtićand & Višnjić Jevtić, 2020).

Despite an overarching understanding of the value of education for sustainable development (ESD), there is a noticeable shortfall in prospective early childhood teachers' awareness of specific content related to ESD (Jang & Choi, 2015). In relation to Sustainable Development Goals, they demonstrate a heightened awareness of “healthy and safe water management” and “healthy and happy life”. However, while they express significant intent to implement “quality education for all” and “gender equality,” their overall willingness to act upon these goals is less than their expressed consciousness of them (Yoon & Lee, 2022).

Recent research endeavored to examine the perception of future early childhood teachers concerning ESD via educational coursework (Kim & Choi, 2016) and sustainable development project activities (Jeong & Kim, 2020). Kim and Choi(2016) noted the crucial role of ESD targeted towards young children. The most pertinent components they identified within ESD for young children pertained to environmental, social, and economic domains sequentially. Early childhood educators who have participated in sustainable development projects demonstrated their ability to live sustainably and identified themselves as transformed contributors to a sustainable society, thus evolving into teachers adept at executing ESD (Jeong & Kim, 2020).

With an increased emphasis on the importance of ESD and the necessity for early childhood educators' awareness and execution thereof, there has been a discernible attempt to integrate ESD into teacher education curriculums. However, early childhood teachers, who are the primary implementers of ESD, show low comprehension levels, and the proportion of those who have encountered ESD in teacher education programs remains small. In contrast to prior eras, we currently find ourselves engulfed in a plethora of media addressing severe issues like climate change-induced temperature anomalies, water scarcity, global economic crises, poverty, and hunger. We might even encounter discomfoting experiences owing to these phenomena. By analyzing the awareness level and content of prospective early childhood teachers regarding ESD, this study aims to provide foundational data to more actively incorporate subjects, extra curricular programs, and their application pertaining to ESD in higher education. In line with this objective, the research questions formulated are as follows:

1. What is the content of the concept of Education for Sustainable Development (ESD) as depicted in the concept maps of pre-service early childhood teachers?
2. What is the level of the concept of Education for Sustainable Development (ESD) as depicted in the concept maps of pre-service early childhood teachers?

Method

Research Participants

The participants of this study were 29 prospective early childhood teachers who are enrolled in a 3-year undergraduate program in Early Childhood Education in Gyeonggi Province, South Korea. The participants were selected from the third-year students who have mostly taken courses related to early childhood education and have attended a special lecture on Education for Sustainable Development (ESD).

Research Procedures

Pilot Study

Prior to the main study, a pilot study was conducted with three pre-service early childhood teachers who are currently enrolled in the 3-year Early Childhood Education Department from October 11 to October 14. The purpose of the pilot study was to identify the difficulties, issues, and time required in the process of creating a concept map for Education for Sustainable Development (ESD). First, the concept of a concept map was explained, and the participants were asked to write down any words or concepts they knew about ESD before drawing the concept map. The results showed that the prospective early childhood teachers experienced some conceptual confusion regarding “Sustainable Development (SD)” and “Education for Sustainable Development (ESD)” and had difficulty understanding the relationship between higher-level and dependent concepts. To address this, a second pilot study was conducted.

The second pilot study was conducted from October 24 to October 26, the conceptual differences between “Sustainable Development (SD)” and “Education for Sustainable

Development (ESD)” were explained, and the participants were instructed to draw the concept map by connecting higher-level and dependent concepts with lines. The participants in the second pilot study were three prospective early childhood teachers who are currently enrolled in the 3-year Early Childhood Education program.

Main Study

Data collection for the main study was conducted in two groups from November 21, 2023, to November 30, 2023. The participants were 29 individuals within the enrolled third-year students of K University's Early Childhood Education program, excluding the six participants who participated in the first and second pilot surveys. After explaining the research objectives and the method of creating a concept map, the participants engaged in brainstorming about the concept of “Education for Sustainable Development (ESD)” and then proceeded to create the concept map according to the method explained. The specific process, content, and time required are as follows.

Table 1. *Process, contents, and time required to create a concept map for ‘Education for Sustainable Development (ESD)’*

Procedure	Contents	Time Required
Concept Map Creation Method Training	① Guide on the concept and creation method of concept maps ② Practice of concept map creation with a researcher on the topic of 'Education for Sustainable Development (ESD)'	20 minutes
Concept Map Creation	① On an A4 paper, write down the ideas related to 'Education for Sustainable Development (ESD).' ② On another blank A4 paper, place the topic of 'Education for Sustainable Development (ESD)' in the center and transfer the most comprehensive and general top-level concepts from step ①. Then, find and write down the first-level dependent ideas related to the top-level concept below. • Erase the concepts written in step ① from the paper in step ②. ③ Connect the top-level concepts and dependent concepts with lines. ④ Continuously write down and arrange the dependent concepts of the lower-level that are related to the first-level dependent concepts. Link the ideas that are believed to be related to each other. ⑤ Write connecting words on the connecting lines to reveal the relationships between the concepts.	40 minutes

We gave ample time to brainstorm and elaborate on concepts related to 'Education for Sustainable Development (ESD)'. After that, we referenced examples of concept maps with the theme of early childhood movement education, and hierarchically connected higher and dependent concepts altogether. During the writing, if a new concept came to mind, it was additionally noted and placed where it was deemed appropriate on the concept map and linked.

Data analysis method

A concept map is judged to be suitable for understanding the level of awareness of pre-service early childhood teachers regarding Education for Sustainable Development (ESD) because it can identify the structure of a concept as an integrated big picture by synthesizing information that generates thoughts or ideas about an object. Did. The analysis was carried out based on the methods of Sung-Kyung Sim et al. (2008), which are grounded on Novack & Gowin (1984), and Morine-Dersheimer (1993). The components of the concept map are composed of higher and dependent concepts, as shown in Figure 1.

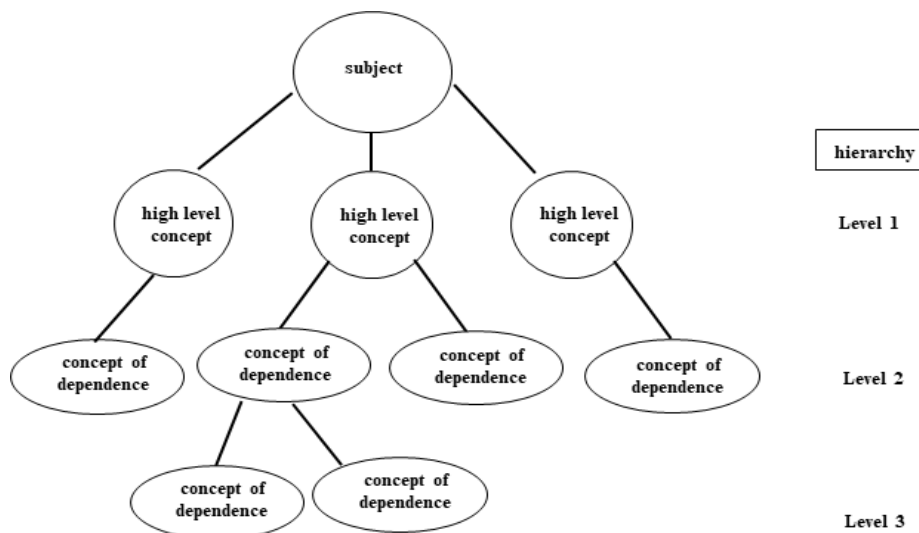


Figure 1. Components of Concept Map

Analysis of Knowledge on Education for Sustainable Development (ESD)

In order to understand the knowledge of pre-service early childhood teachers on Education for Sustainable Development (ESD), we analyzed the contents and frequency of higher and dependent concepts.

1) Contents of higher concepts and frequency according to the content.

As can be seen in Figure 1, higher concepts are those directly connected with the theme and can be considered to play a significant role in the concept map. The higher concepts appearing on the concept map of pre-service early childhood teachers were analyzed as follows:

- ① Record all higher concepts appearing on the concept map.
- ② The recorded higher concepts are integrated into similar terms to create a list.
- ③ Record the frequency of each item's higher concept and similar terms. The maximum frequency that one higher concept could appear across all pre-service early childhood teachers' concept maps is 29.

2) Contents of dependent ideas connected to the higher concepts and frequency per ideas.

- ① Record all level 2 dependent concepts included in the three higher concepts: social-cultural, environmental, and economic.
- ② Organize them by grouping similar terms together and record the frequency of each item.
- ③ Record the frequency after analyzing based on the core content and content elements of Education for Sustainable Development (ESD) in the social-cultural, environmental, and economic aspects, as presented in the study of early childhood ESD practice strategies (Table I-3-2).

Analysis of the Level of Knowledge on Education for Sustainable Development (ESD)

In order to understand the level of knowledge of pre-service early childhood teachers as shown in the concept map related to Education for Sustainable Development (ESD), we analyzed the specifics of the higher concepts, namely, the number, hierarchy, and score of the dependent concepts included in a single higher concept, and calculated the density.

1) Characteristics of Higher-Level Concepts

The characteristics of higher-level concepts are represented by the number of dependent concepts, hierarchy, and feature scores. The method of analyzing the characteristics of higher-level concepts can be illustrated through an actual example of a concept map for Education for Sustainable Development (ESD), as shown in Figure 2.

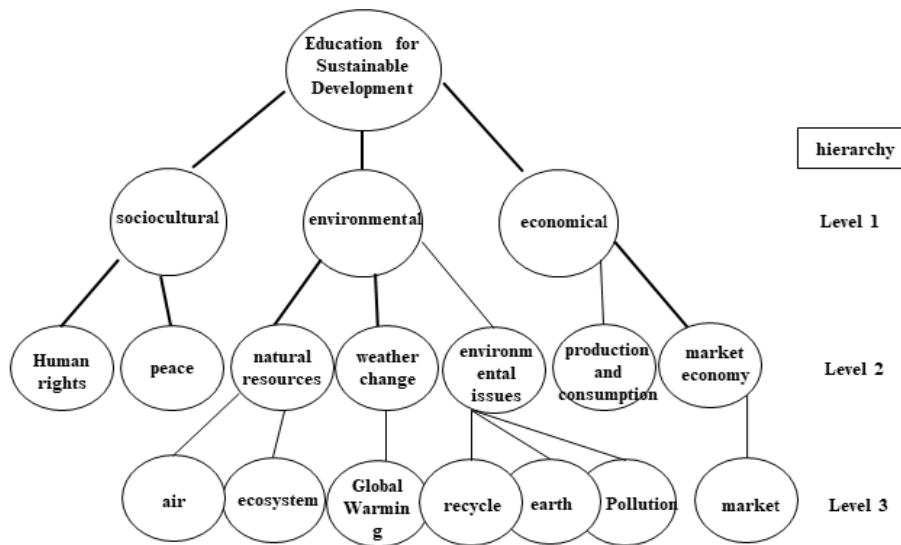


Figure 2. An Example of a Concept Map on Education for Sustainable Development (ESD)

(1) Number of dependent concepts included in one higher concept

Dependent theories are linked to higher concepts, and the more dependent theories included in a higher concept, the more content knowledge related to Education for Sustainable Development (ESD) is implied. Therefore, we counted all the dependent concepts linked to a higher concept and measured the average number of dependent concepts included in the same concept. For instance, in Figure 2, the number of dependent concepts included in the higher concept 'Socio-cultural' is 2, and in 'Environmental', it was 9. Lastly, in 'Economic', it was 3.

(2) Hierarchy

Hierarchy refers to how many levels the dependent concepts included in a higher concept go down. The further the hierarchy descends, the higher the level of the hierarchy, indicating

the expansion and differentiation of pre-service early childhood teachers' concepts, and how deep they are. The hierarchy is calculated for each of the higher concepts shown in the pre-service early childhood teachers' concept maps, and then the average is calculated. Looking at Figure 2, the hierarchy for 'Environmental' and 'Economic' is at level 3, and for 'Socio-cultural', it is at level 2. The hierarchy of the higher concepts is calculated for each of the higher concepts shown in the pre-service early childhood teachers' concept maps, and then the average is determined.

(3) Feature Score

The feature score refers to the proportion of the content related to the category each higher concept belongs to in the entire concept map. The more dependent concepts there are, the higher the feature score. It is calculated by dividing the total number of concepts, i.e., the sum of the higher and dependent concepts included in one higher concept, by the total score shown in the concept map. At this point, rounding off to two decimal places was performed. If you add the feature scores of each category in an individual teacher's concept map, it totals 1, and the feature score is higher for higher concepts that have many dependent concepts connected. Based on Figure 2, the calculation of the feature scores is as follows:

- Feature Score for the higher concept 'Socio-cultural': $3 \text{ (Number of concepts included in 'Socio-cultural')} / 17 \text{ (Total number of concepts)} = 0.18$
- Feature Score for the higher concept 'Environmental': $10 \text{ (Number of concepts included in 'Environmental')} / 17 \text{ (Total number of concepts)} = 0.59$
- Feature Score for the higher concept 'Economic': $4 \text{ (Number of concepts included in 'Economic')} / 17 \text{ (Total number of concepts)} = 0.23$

2) Density

sociocultural	environmental	economical
1	1	1
2	3	2
	6	1

3 categories (number of parent concepts)

Number of second-level dependent concepts

Number of third-level dependent concepts

Density represents how hierarchically and integratively the pre-kindergarten teacher's concept of Education for Sustainable Development (ESD) is organized. The example of calculating the density shown in Figure 2 is as follows.

Results

Pre-kindergarten teachers' concepts of Education for Sustainable Development (ESD)

1) Superordinate concepts of pre-kindergarten teachers' Education for Sustainable Development (ESD)

Superordinate concepts are directly linked to Education for Sustainable Development (ESD), representing the highest hierarchy in a concept map organized by superordinate and subordinate concepts. As the areas that pre-kindergarten teachers deem important about ESD can be reflected in the superordinate concepts, they provide insight into the content of knowledge pre-kindergarten teachers have about ESD. Thus, the results from the analysis of superordinate concepts appearing in the concept map to understand pre-kindergarten teachers' knowledge of ESD are as follows.

Table 2. *Superordinate concepts of pre-kindergarten teachers' Education for Sustainable Development (ESD)*

number	Superordinate concept	Similar terms	Frequency (%)
1	Socio-cultural	Social development, Growth, Population increase, Human rights, Information and communication technology, Peace	27(34.7%)
2	Environmental	Environmental protection, Health, Energy, Coexistence with nature, Environment	26(33.3%)
3	Economical	Economic development, Growth, Renewable energy, Energy, Global problem-solving, Program	25(32%)
total			78(100%)

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Pre-kindergarten teachers used a total of 78 superordinate concepts, which were categorized into three items after being grouped by similar terms. In addition, an analysis of the frequency by item revealed that the superordinate concept with the highest frequency was ‘sociocultural’. In other words, 34.7% of pre-kindergarten teachers used the ‘sociocultural’ concept as a superordinate concept, followed by ‘environmental’, and ‘economic’. Therefore, we can see that pre-school teachers prioritize the sociocultural aspect in the content of Education for Sustainable Development (ESD), followed by environmental and economic aspects. However, when looking at the frequency, it can be seen that sociocultural, environmental, and economic aspects are at similar levels for ESD.

2) Content and frequency of subordinate concepts linked to superordinate concepts

The analysis results of the content and frequency of the second-level subordinate concepts included in each superordinate concept of sociocultural, environmental, and economic aspects as shown in the superordinate concept are as follows.

Table 3. *Number of subordinate concepts included in the superordinate concepts*

	Dependent concept(Frequency)
Socio-cultural	human rights(15), gender equality(8), safety(7), peace(6), cultural diversity(5), multicultural and quality education(4), health and food(2), media(2), health behavior(1), basic lifestyle(1), future(1), development(1), person(1), sociability(1), social justice(1), market(1), physical health(1), psychological satisfaction(1), language(1), history(1), self esteem(1), war(1), prerequisites and methods(1), saving(1), mental health(1), discrimination(1), innovation(1)
Total	27(68)
Environmental	environmental issues(10), climate change and response(9), energy(9), natural resources(5), global warming(4), ecosystem preservation(3), environmental pollution(3), traffic(2), climate(2), nature(2), recycle(2), end starvation(1), endangered species(1), water sanitation(1), biodiversity(1), global responsibility(1), well-being(1), CO2(1), disaster prevention and reduction(1), saving(1), earth(1), sustainable food production(1), sustainable community(1)
Total	23(63)
Economical	green energy(10), production and consumption(7), market economy(6), economic growth(6), alleviate the gap between rich and poor(4), social problem-solving education for sustainable development(3), equality(3), saving(2), globalization health(2), health(1), cities and communities(1), quality of life(1), quality education(1)
Total	13(47)

The total number of dependent concepts included in the three superordinate concepts was 178, and the one with the highest frequency was human rights (15), which is included in the superordinate concept 'sociocultural'. This was followed by eco-friendly energy (10), which is included in the superordinate concept 'economic', and environmental problems (10), energy (9), and climate change response (9), which are included in the superordinate concept 'environmental'.

When looking at the three superordinate concepts individually, first, the results of analyzing the dependent concepts included in 'sociocultural' showed that human rights (15) had the highest frequency, followed by gender equality (7), safety (6), peace (6), and cultural diversity (5). When looking at the dependent concepts included in the superordinate concept 'environmental', they appeared in the order of environmental problems (10), response to climate change (9), energy (9), natural resources (5), and global warming (4). When examining the dependent concepts included in the superordinate concept 'economic', they were in the order of eco-friendly energy (10), production and consumption (7), market economy (6), and alleviating wealth gap (4).

The level of concept of sustainable development education (ESD) for pre-service preschool teachers

1) Characteristics of the superordinate concept of sustainable development education (ESD) for pre-service preschool teachers

To understand the level of concept of sustainable development education (ESD) for pre-service preschool teachers, the characteristics of the superordinate concept were analyzed and the density was calculated. The characteristics of the superordinate concept of sustainable development education (ESD) for pre-service preschool teachers can be understood through the number of dependent concepts included in one superordinate concept, the hierarchy, and the feature score. The averages and standard deviations of the number of dependent concepts included in each superordinate concept, hierarchy, and feature scores are as follows.

The number of dependent concepts included in each superordinate concept in the sustainable development education (ESD) conceptual map of prospective early childhood teachers appeared in the order of 'Socio-cultural (M=2.34, SD=1.45)', 'Environmental (M=2.28, SD=1.41)', and 'Economic (M=1.55, SD= 1.15)'.

Table 4. *Characteristics of the Superordinate Concept of Sustainable Development Education (ESD) for Pre-service Preschool Teachers*

high level concept	Frequency (%)	number of dependent concepts		hierarchy		attribute score	
		mean (M)	standard Deviation (SD)	mean (M)	standard Deviation (SD)	mean (M)	standard Deviation (SD)
socio-cultural	27(34.7%)	2.34	1.45	2.76	0.99	0.36	0.22
environmental	26(33.3%)	2.28	1.41	3.10	1.08	0.42	0.19
economical	25(32.0%)	1.55	1.15	2.76	1.30	0.22	0.12

Next, the hierarchy shows how far the dependent concepts included in a single higher-level concept have been expanded, and ‘environmental (M=3.10, SD=1.08)’ had the highest score. Looking at the results table, the fact that all categories have hierarchy scores in the range of 2 to 3 indicates that each higher-level concept and its associated dependent concept organization are divided into an average of 2-4 levels of detail.

Lastly, the characteristic score is determined by the number of dependent concepts belonging to a specific superordinate concept in a concept map, showing the proportion of the specific superordinate concept and the category of dependent concepts belonging to it in the concept map. The characteristic scores shown by prospective early childhood teachers about sustainable development education (ESD) were highest for environmental factors (M=0.42), followed by socio-cultural factors (M=0.36), and economic factors (M=0.22).

2) Density of Prospective Early Childhood Teachers' Concepts of Education for Sustainable Development (ESD)

Density demonstrates how hierarchical and integrated the placement of each superordinate concept and its related subordinate concepts are in a concept map. The density of the concept maps of 29 prospective early childhood teachers was calculated with the following results.

As shown in Table 5, the density of concepts regarding Education for Sustainable Development (ESD) ranged from a minimum of 1.00 to a maximum of 3.67, with an average density of 2.31. It can be observed that the concept map of Education for Sustainable Development (ESD) shows a similar distribution (SD=0.68) centered around the average.

Therefore, it can be inferred that the concept maps of Education for Sustainable Development (ESD) by prospective early childhood teachers are generally composed at a similar level.

Table 5. *Density shown in the concept map of Education for Sustainable Development (ESD) by prospective early childhood teachers*

number	Density	number	Density
1	2.33	16	2.18
2	1.50	17	3.67
3	2.08	18	1.82
4	2.44	19	1.40
5	2.00	20	2.33
6	3.00	21	2.33
7	1.00	22	2.25
8	1.67	23	3.33
9	1.67	24	3.63
10	2.56	25	2.18
11	3.36	26	2.00
12	2.50	27	1.78
13	2.30	28	2.56
14	1.80	29	3.50
15	1.83	M 및 SD	2.31, 0.68

Discussion

This study aims to provide basic data for pre-service early childhood teacher education on Education for Sustainable Development (ESD) in university education by understanding the content of pre-service early childhood teachers' concepts of ESD, and identifying their level of knowledge on these concepts. Based on the results of this study, the following discussions can be made.

Firstly, as a result of analyzing the content of pre-service early childhood teachers' concepts on ESD, most pre-service early childhood teachers recognized the 'sociocultural' aspect as the most important for ESD, followed by 'environmental' and 'economic'. Looking at the frequency, it was found that the sociocultural, environmental, and economic aspects are at a similar level for ESD. This differs from the view that the sociocultural and economic

aspects of green growth education related to ESD are neglected due to the concepts of ESD and green growth education being mixed (You et al., 2013), the argument that recognizing ESD as environmental education hampers changes in school practice because it does not connect with the education pursued by ESD (Lee et al., 2010). Considering research that suggests integrated curriculum is appropriate because ESD covers social, environmental, and economic problems holistically (Kwon, 2009; Park, 2013; Shin & Park, 2012), the revised 2019 Nuri Curriculum for children and play-centered learning makes access from an integrated perspective more feasible.

Next, analyzing dependent concepts showed that the most frequent was 'human rights' included in the superordinate concept of 'sociocultural', followed by 'eco-friendly energy' in the superordinate concept of 'economic', and 'environmental problems', 'energy', and 'response to climate change' in the superordinate concept of 'environmental'. Considering a study by Choi(2018) that says we need to acknowledge problems of human rights, poverty, and hunger as our own, these results tell us that pre-service early childhood teachers also acknowledge and recognize these issues as our problems. Lastly, when examining the economically related concepts, 'environmentally friendly energy' was frequently mentioned, while 'social justice' and 'physical health' were less commonly stated. These results align with a study conducted by Choi et al. (2020), which asked about the most emphasized elements of Education for Sustainable Development (ESD). The study found that human rights and safety accounted for approximately 55% of the total, while elements such as sustainable production and consumption, market economy, wealth gap reduction, disaster prevention and reduction, culture, energy, biodiversity, global and international responsibility, and sustainable food production each represented less than 1% of the responses. In addition, with the recent transition to a digital society, it can be interpreted as a result of being able to hear more about various human rights violation issues such as war, human rights issues in North Korea, damage caused by truth-based civil complaints, hate crimes against women, and damage caused by school violence. In this context, looking at the research results of Choi (2018), which shows that we need an attitude of acknowledging human rights issues prevalent around the world as our problems, pre-service early childhood teachers also already acknowledge human rights issues as our problems. It shows that you are aware of it. The result of most recognition of eco-friendly energy included in the economy was the result of exposure to public service advertisements or media reports that showed

interest in eco-friendly energy such as renewable energy for carbon neutrality, solar, wind, and hydro energy, and participation in climate education. can see. In comparison, the 'social' and 'economic' aspects, which showed relatively low scores, need to reflect specific factors that prospective early childhood teachers can recognize, such as the market economy and reducing the gap between the rich and the poor, and be substantially reflected in the training process. there is.

Secondly, examining the hierarchy and characteristic scores centered on the superordinate concepts of pre-service early childhood teachers showed that 'environmental' was the highest. This tells us that they are aware of various problem situations arising from the global environmental problems we are experiencing now, such as fine dust, global warming, and climate change, and that they can study them in various ways. In comparison, the 'social' and 'economic' sections that showed relatively low scores were the result of Maidou et al. (2019) who said that prospective early childhood teachers had a good understanding of the environmental aspects of SD, but were unsure about social and economic issues. It's the same. Therefore, it needs to be practically reflected in the content of sustainable development education so that pre-service early childhood teachers can recognize specific elements of the market economy and the gap between the rich and the poor.

Thirdly, the density of pre-service early childhood teachers' concepts on ESD generally showed a similar level, which suggests they have fragmented and separated knowledge about specific areas in common, and they cannot organize concrete concepts hierarchically in general concepts because they cannot create meaningful relationships between concepts (Shim et al, 2008).). Montebon (2018) pointed out that pre-service teachers have diverse conceptual understandings of what constitutes sustainable development, but their thoughts remain limited to the ESD concept. The study also pointed out that pre-service teachers do not understand that ESD encompasses other areas and does not simply focus on the environment, suggested that additional training and support is needed in terms of integrating ESD concepts into pre-service teacher teaching (Montebon, 2018). Research of Chinedu et al. (2018) also supported the need of reorienting teachers training programs by integration of Economic social, and environmental elements of ESD in curriculum of vocational teachers training programs. These results can be interpreted as indicating the limitations in the scope of content that prospective early childhood educators perceive in Education for Sustainable

Development (ESD). Furthermore, it suggests a lack of comprehensive understanding and of methods to collectively address social, cultural, environmental, and economic aspects. Therefore, it is necessary to have teaching methods and practical approaches that can have an integrated perspective on the social, cultural, environmental, and economic content at the stage of pre-service early childhood teacher training.

The following suggestions can be made for subsequent research based on the results of the above discussion and the limitations of this study. Firstly, after analyzing the concept map for sustainable development education for prospective early childhood educators, it revealed that the comprehensive concepts that should be addressed in early childhood sustainable development education are not adequately conceptualized and are biased towards specific concepts. It is necessary to go beyond the segmented approach to specific subjects related to society and the environment in the teacher training process so that pre-service early childhood teachers can form an integrated.

Secondly, this study analyzed randomly sampled prospective early childhood education major students in Gyeonggi Province; therefore, there are limitations to generalizing such findings. Therefore, hopefully future research will be expanded to consider prospective teachers from diverse regions and backgrounds, as well as the characteristics of different universities.

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