

Article

Environmental Education on Sustainable Principles in Kindergartens—A Foundation or an Option?

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Abstract: Preschool education plays an important role because it lays the foundation for a child's cognitive, social, and emotional development and shapes responsible and informed individuals. Early childhood education teaches values such as sustainability, environmental protection, and social responsibility. By integrating sustainability into preschool education, we are cultivating an environmentally conscious generation that will contribute to a more sustainable and resilient future. The aim of this study was to determine if there are differences in attitudes and knowledge about various aspects of sustainability (such as gardening, plants, food and proper nutrition, and waste recycling) among children attending two different kindergarten educational programs (ecological and language programs). The study was conducted using the F2F-PAPI survey method and included 58 children aged 4 to 6 years. The results showed that children from the ecological program had greater knowledge of sustainability topics than children whose program focused on early foreign language learning ($t_{(44)} = 12.542, p = 0.000$). Taking into account the desirable diversity of different educational programs in kindergartens, the results suggest that it is necessary to include environmental education to a greater extent as a foundation in the curricula of mandatory regular programs if we are to achieve some of the key sustainable development goals.

Keywords: early childhood education; sustainable development; knowledge; gardening; environmental education outcomes



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1. Introduction

Sustainable development is a multifaceted and evolving concept that has gained global attention in the quest for a balanced and resilient future. It is defined by the World Commission on Environment and Development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [1]. This definition emphasizes an intergenerational approach to development that incorporates economic, social, and environmental considerations to ensure the well-being of both present and future societies.

Education for Sustainable Development (ESD) plays a pivotal role in advancing the global agenda of Sustainable Development Goals [2]. As a catalyst for transformative change, education equips individuals with the knowledge, skills, and values essential for fostering sustainable societies. SDGs, ranging from quality education (Goal 4) to climate action (Goal 13), underscore the interconnectedness of social, economic, and environmental dimensions of development. ESD serves as a powerful tool to address these interconnected challenges by promoting critical thinking, environmental stewardship, and a sense of global citizenship [3]. By integrating sustainability principles into curricula, education not only prepares future leaders and citizens to tackle complex issues but also encourages a mindset that embraces innovation and responsible decision-making. In essence, the significance of

education in achieving SDGs lies in its ability to cultivate a generation capable of navigating the complexities of a rapidly changing world, fostering resilience, and working towards a more sustainable and equitable future. Research on ESD is steadily increasing [4], and the most influential, when considering the educational level, relates to higher education [5], although Early Childhood Education (ECE) is also well-represented [6].

Children are the foundation of future societies. It is therefore crucial to invest in sustainable educational practices from the earliest stages of their lives [7]. ECE plays a crucial role in shaping the cognitive, social, and emotional development of young children [8]. At this stage, children are like sponges, soaking up information and acquiring basic ideas about the world around them. Therefore, ECE programs have a lasting positive impact on various aspects of children's lives. For example, children who participated in quality early education programs exhibited higher cognitive skills, better social behaviors, and increased school readiness [9]. Moreover, early educational interventions positively influenced participants' educational attainment, employment status, and even reduced criminal activity in the long term [10]. The cognitive stimulation and social interactions offered in kindergartens contribute to the development of foundational skills necessary for academic success and emotional well-being [11]. Teaching ethical principles in kindergarten lays the groundwork for responsible decision-making. Children can be introduced to basic ethical concepts, such as fairness, honesty, and responsibility, through age-appropriate stories and interactive activities. This early exposure helps shape children's moral compasses and guides them toward making ethical choices as they grow older [12–14]. Therefore, investing in and prioritizing education in kindergartens is not only essential for individual child development but also has far-reaching societal benefits. By incorporating eco-friendly practices, promoting inclusivity, and optimizing resource allocation, kindergartens can contribute to the cultivation of environmentally conscious, socially responsible, and economically sustainable citizens. Kindergarten programs that incorporate sustainable practices, such as promoting healthy, locally sourced food and physical activities, contribute to the development of healthy lifestyle habits [15,16]. This approach not only benefits the immediate community [17] but also lays the groundwork for a sustainable future. As we strive to address global challenges, fostering sustainability in early childhood education becomes a crucial step in building a resilient and responsible society.

Early childhood education (ECE), particularly in kindergarten, plays a pivotal role in shaping a child's values and attitudes towards the environment [18–22]. Eco-education provides a holistic learning experience that contributes to cognitive, emotional, and social development. By fostering a sense of wonder, empathy, and responsibility for the natural world, kindergarten educators can lay the foundation for environmentally conscious citizens who will carry these values into adulthood [23]. Early environmental experiences have a positive impact on cognitive development [24]. Exposure to nature and sustainable practices during kindergarten years can enhance children's awareness of the environment, fostering a sense of connectedness to nature and an understanding of the interdependence between human activities and the natural world [25]. Nature-based activities stimulate cognitive skills, including observation, classification, and problem-solving [26]. Exposure to diverse natural settings has also been linked to improved concentration and cognitive performance [27], emotional well-being, and pro-environmental attitudes [28]. Engaging in activities like nature walks, observing plants and animals, and participating in hands-on experiments stimulates cognitive processes such as attention, memory, and problem-solving skills [25]. These experiences also lay the groundwork for understanding fundamental scientific concepts as they promote ecological literacy [29–31], which is crucial for understanding complex environmental issues. Kindergarten curricula that incorporate age-appropriate lessons on ecosystems, biodiversity, and conservation lay the groundwork for a generation that is well-versed in the principles of sustainable development. Ecological and environmental education in kindergartens contributes significantly to the emotional development of young children. Children who engage with nature from an early age are more likely to develop positive emotions towards the environment [27]. This emotional connection

not only enhances mental well-being but also establishes the basis for pro-environmental attitudes and behaviors in later life [32]. Nature experiences are associated with positive emotional well-being, reduced stress, and improved mood [33,34]. By creating opportunities for outdoor exploration and nature-based play, kindergartens can provide a supportive environment for emotional regulation and the development of empathy toward the natural world [35]. Connecting emotionally with nature in early childhood lays the groundwork for a lifelong commitment to environmental stewardship [36]. Ecological education fosters pro-environmental behaviors by instilling a sense of responsibility and connection to nature. Kindergartens that incorporate eco-friendly practices, such as recycling initiatives and sustainable resource use, provide children with tangible examples of environmentally responsible behavior [37]. Kindergarten serves as a socialization platform, and incorporating eco-education fosters a sense of community and cooperation. Collaborative activities like planting gardens, recycling projects, and group discussions about the environment promote social skills, teamwork, and a shared sense of responsibility for the planet [38].

In addition to the various environmental and ecological programs, there are many other special programs in kindergartens that allow children to spend more time doing activities that interest them (or their parents). For example, there are programs in the arts, sports, early language learning, and others. All of these programs are extremely valuable for children's development, but it is important to align them to some degree with the SDGs.

The aim of this study was to determine whether there are differences in attitudes and knowledge about different aspects of sustainability (such as gardening and horticultural production, plants, food and proper nutrition, and waste recycling) among children attending different kindergarten educational programs (ecological and language programs). The working hypothesis of this study was that children from the ecological education group have more knowledge about certain aspects of sustainable development than children from the language program.

2. Materials and Methods

2.1. Sample

The study was conducted with a convenience sample of 58 children from "Dugo Selo" kindergarten in the town of Dugo Selo in Croatia. The sample included children aged 5 and 6 from two educational groups: the eco-group "Bees" (hereinafter: EG) and the language group "Hedgehogs" (hereinafter: LG).

The eco-group consists of children who take part in an eco-program that promotes awareness of ecology and sustainable development. They acquire basic knowledge about the importance and methods of environmental protection, learn habits and skills that contribute to the preservation of nature and the rational use of natural resources, develop a positive attitude towards nature and the belief in the need to preserve it, and improve awareness of the need to protect their own health through proper nutrition and regular physical activity. The kindergarten is an active participant in the international eco-school/kindergarten project coordinated by state institutions.

The children in the language group take part in the English language learning program led by kindergarten teachers trained in early foreign language learning. The program has been audited by the Ministry of Science and Education of the Republic of Croatia.

2.2. Data Collection

The data were collected in April 2016 using the F2F (face-to-face) PAPI survey method, i.e., the technique of orally questioning children by educators using a printed version of the questionnaire. The children were read 17 closed questions and offered the answers, from which they could choose one. All necessary documentation was collected and informed consent was obtained from all people involved in the study. The study participants were informed of their right to terminate their participation in the study at any time and without providing reasons. Participation was voluntary, while the research results were anonymous and confidential, i.e., the data collected were used solely for the purpose of this research

and were not shared with other individuals or institutions. The responses were analyzed collectively at the level of the total sample, using an anonymized database, so that the research results obtained could not be linked to the identity of the respondents.

2.3. Characteristics of Respondents

The study included 58 children, of whom 43.1% were boys and 56.9% were girls. In terms of educational group affiliation, 53.4% of respondents belonged to the EG and 46.6% to the LG (Table 1).

Table 1. Overview of children by gender and educational program ($n = 58$).

Category	EG	LG	Total
Boys	11	14	25
Girls	20	13	33
All children	31	27	58

Note: EG, ecological educational group; LG, language educational group.

2.4. Survey Questionnaire

The questionnaire consisted of a total of 17 questions and two thematic units: an examination of the respondents' value–attitude structure (four questions) and a knowledge test (12 questions). The questionnaire also included a question on whether or not the children had a garden at home. The group affiliation (different educational programs) and gender of the children were recorded by the interviewer with the help of the kindergarten teachers.

The knowledge test was created on the basis of relevant scientific and professional literature and with the help of the teachers of both groups. The idea was to find indicators of knowledge about sustainability that the children from the eco group had not come into direct contact with in the workshops, while at the same time making the questions fully comprehensible for the children from the language group. Special care has been taken to ensure that the questions are fully understandable for all children and adapted to their age. The knowledge test consisted of 12 questions. Correct answers were awarded 1 point, i.e., the points ranged from 0 (all incorrect answers) to 12 (all correct answers).

Reliability was estimated using the Guttman Split-half coefficient. The first six questions form the first half of the entire test, and the last six questions form the second half of the entire test. According to Guttman's Split-half coefficient, the estimated reliability coefficient was 0.688.

2.5. Statistical Analysis

The data were analyzed using IBM SPSS Statistics (Version 27) software. The data were analyzed in relation to the educational group and gender of the respondents.

The empirical data were analyzed using the methods and procedures of descriptive, inferential, and multivariate statistics. In the framework of descriptive statistics, the variables were analyzed using univariate techniques and suitable descriptive statistical indicators (frequency distributions, percentage distributions of responses, mean values, and standard deviation). As part of the inferential statistical analysis of the data, the chi-square test was used to test the correlation of the nominal variables, and the *t*-test was used for two independent samples. The multivariate technique was applied to test the moderating influence of gender on the relationship between belonging to education groups and the level of knowledge, whereby a moderation analysis was conducted using the macro command PROCESS Procedure for SPSS Version 3.5.3. [39]. For the analysis, the variable measuring group affiliation was recoded such that children who participated in the eco-group were coded 1, while children who did not participate in the eco-group were coded 0. In the hypothesized moderation scheme, group affiliation was the independent variable, gender structure was the potential moderator variable, and knowledge was the dependent variable (Figure 1).

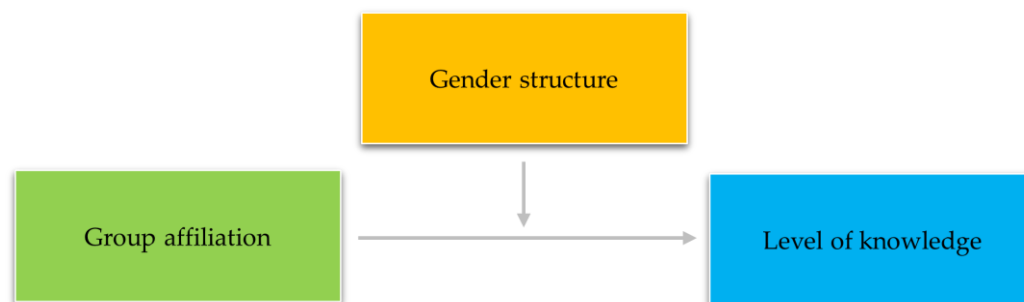


Figure 1. The hypothesized moderation diagram.

All statistical tests were performed at a 5% level of significance.

2.6. Ethical Consideration

As the research involved children under the age of 14, it was conducted in accordance with the Croatian Code of ethics for research with children. The procedure included the opinion of the Ethics committee of the kindergarten, on the basis of which the director of the kindergarten granted permission, as well as the written informed consent of the parents, which the kindergarten teachers obtained at a meeting with them. Although this was not required, the children provided their verbal consent.

3. Results

All frequencies of the answers of the two educational groups to the questions from the questionnaire are listed in Table 2.

Table 2. Frequencies of all answers from the survey questionnaire by educational groups ($n = 58$).

Variable/Question	The Variable Category	EG	LG	<i>n</i>	%
Do you have a garden at home?	Yes	12	11	23	40
	No	19	16	35	60
What tools do we use in gardening? *	Hoe	18	13	31	53.4
	Shovel	6	10	16	27.6
	Comb	0	0	0	0
	Rake	7	4	11	19.0
	Vacuum cleaner	0	0	0	0
What can be harvested in the garden? *	Tomato	21	9	30	51.7
	Carrot	5	6	11	19.0
	Phone	0	0	0	0
	Apple	5	8	13	22.4
	Lemonade	0	4	4	6.9
When can we pick fruits and vegetables from the garden? *	Only in autumn	5	1	6	10.3
	Only in summer	5	25	30	51.7
	Through the entire year	21	1	22	37.9
	Only in spring	0	0	0	0
What part of the day is best to water the garden? *	In the morning	22	2	24	41.4
	At noon	0	12	12	20.7
	In the evening	9	13	22	37.9
What do we use plants for? *	For food	23	27	50	86.2
	For reading	0	0	0	0
	For medicine	4	0	4	6.9
	For decoration	4	0	4	6.9
	For playing games on the computer	0	0	0	0

Table 2. Cont.

Variable/Question	The Variable Category	EG	LG	n	%
What does a plant need to live? *	Water	21	27	48	82.8
	Juice	0	0	0	0
	Snow	0	0	0	0
	Sun	10	0	10	17.2
What part of the plant attracts bees? *	Flower	31	25	56	96.6
	Leaf	0	0	0	0
	Root	0	0	0	0
	Honey	0	2	2	3.4
An apple with worms is not healthy. *	Yes	3	25	28	48.3
	No	28	2	30	51.7
Is the food we grow ourselves healthier than the food we buy in stores?	The one we buy in stores	0	10	10	17.2
	The one we grow ourselves	31	17	48	82.8
What is the most important meal of the day? *	Breakfast	26	13	39	67.2
	Lunch	5	14	19	32.8
	Dinner	0	0	0	0
	Snack	0	0	0	0
Which is healthier? *	Eat several times, but a little at a time	31	27	58	100.0
	Eat once, but a lot	0	0	0	0
Should we always wash fruits and vegetables before eating? *	Yes	31	27	58	100.0
	No	0	0	0	0
What can we do with the food we will no longer eat?	We can give it to someone	31	20	51	87.9
	We can throw it away	0	7	7	12.1
	We can plant it in the garden	0	0	0	0
Is there enough food in the world for everyone?	No	31	27	58	100.0
	Yes	0	0	0	0
Is it useful to sort waste? *	Yes	31	27	58	100.0
	No	0	0	0	0
	I don't understand what waste sorting means	0	0	0	0
What would you rather be doing?	Take care of the plants in the garden	26	11	37	63.8
	Play games on the computer	5	16	21	36.2
	Clean my room	0	0	0	0

Note: *, questions that were included in the knowledge test; EG, ecological educational group; LG, language educational group.

3.1. Gardening and Horticultural Production

The majority of children (60%) stated that their household did not have a garden.

When asked about the tools used for gardening, all the children provided the correct answer. The children from EG stated that the tools used for gardening were in this order: hoe (58%), rake (23%), and shovel (19%), and the children from LG stated that the tools used were in this order: hoe (48%), shovel (37%), and rake (15%).

When asked what can be harvested from the garden, the majority of respondents provided the correct answer (93%), while only four respondents answered incorrectly. The chi-square test revealed a statistically significant difference between the education groups ($\chi^2_{(3)} = 9.039, p = 0.022$). All children from EG answered the question correctly, while all incorrect answers were provided by children from LG who thought they could pick lemonade in the garden.

When asked about the time of year when fruit and vegetables can be harvested from the garden, 38% of respondents answered correctly (all year round), while 62% of respondents answered incorrectly. The chi-square test revealed a statistically significant difference between the education ($\chi^2_{(1)} = 25.137, p = 0.000$) and gender groups ($\chi^2_{(1)} = 6.001, p = 0.000$). The correct answer to the question was predominantly given by the children from EG (68%), while the children from LG only provided one correct answer (3.7%). Girls provided correct answers to a greater extent (51.5%), while boys provided incorrect answers (80%).

When asked about the best time of day to water the garden, 79% of respondents answered correctly (morning 41%, evening 38%), while 21% answered incorrectly. The chi-square test revealed a statistically significant difference in knowledge between the education groups ($\chi^2_{(1)} = 17.372, p = 0.000$). All children from EG answered the above question correctly, while the children from LG had mixed opinions about the best time to water the garden: 55.5% of them answered correctly, while 44.4% of them thought that it was best to water the garden at midday.

When asked how they would prefer to spend their free time, 64% of children answered that they would prefer to spend their time in the garden, while 36% of children answered that they would prefer to spend their time playing games on the computer. The chi-square test revealed a statistically significant difference between the education and gender groups. In terms of belonging to the education group, most children from the EG group would prefer tending plants and gardening, while most children from the language group would prefer computer games ($\chi^2_{(1)} = 11.622, p = 0.001$). In terms of gender, most girls would prefer gardening, while most boys would prefer computer games ($\chi^2_{(1)} = 30.123, p = 0.000$).

3.2. Plants

When asked how plants are used, all children provided correct answers, with most respondents (86.2%) answering that we use plants as food. The chi-square test revealed a statistically significant difference between the education groups ($\chi^2_{(2)} = 7.468, p = 0.014$), whereby the children from EG had more diverse opinions on the use of plants. Namely, about 14% of the children from the above group stated that plants can be used not only as food but also as medicine and decoration, while not a single child from LG mentioned this. Although no statistically significant difference was found between the sexes, more girls stated that plants can be used as decoration, and more boys stated that they can be used as medicine.

When asked about the plant's needs for growth and development, respondents from both education groups provided the correct answer. The chi-square test revealed a statistically significant difference between the groups ($\chi^2_{(1)} = 10.524, p = 0.001$). Children from EG mentioned water (67.7%) and sun (32.3%) as important factors for the growth and development of plants, while children from LG did not recognize the sun as a factor that is important for plant life.

When asked about the part of the plant that attracts bees, the majority of children (97%) answered correctly. Although the difference between the two groups was not statistically significant, all children from EG answered the question correctly, while the children from LG provided incorrect answers, whereby 7% of them thought that honey attracts bees.

When asked whether an apple with worms is healthy, 48% of respondents provided the correct answer, while 52% of respondents provided an incorrect answer. The chi-square test revealed a statistically significant difference between the education groups ($\chi^2_{(1)} = 39.732, p = 0.000$). Children from EG predominantly provided a correct answer to this question (90.3%), while children from LG had the opposite view and responded negatively to this statement. To be precise, only 7.4% of them answered the above question correctly.

3.3. Attitudes about the Proper Consumption of Food and Its Healthiness

When asked whether home-grown or store-bought food is healthier, 17% of respondents answered that store-bought food is healthier, while 83% of children answered that home-grown food is healthier. The chi-square test revealed a statistically significant difference between the education groups ($\chi^2_{(1)} = 13.873, p = 0.000$). All children from EG answered the question in the same way, namely, that it is healthier to eat home-grown food, while 37% of children from LG thought that food from the store is healthier.

When asked what the most important meal of the day is, 67% of respondents said breakfast, while 33% said lunch. The chi-square test revealed a statistically significant difference between the education groups ($\chi^2_{(1)} = 8.360, p = 0.005$). The children from EG

considered breakfast to be the most important meal of the day to a greater extent, while the children from LG considered it to be lunch to a greater extent.

When asked whether it is healthier to eat small meals several times a day or to eat once and a lot, all the children provided the correct answer: it is healthier to eat several times a day but in smaller quantities.

When asked how important it is to wash fruit and vegetables before eating them, all respondents provided the correct answer.

When asked what they would do with the food they would no longer eat, 88% of respondents answered that they would donate the food, while 12% of them answered that they would throw the food away. The chi-square test revealed a statistically significant difference between the education groups ($\chi^2_{(1)} = 9.140, p = 0.003$). All the children from EG responded to the above question by writing that they would give the food to someone, while the children from LG had a split opinion on surplus food, with 26% of them believing that surplus food should be thrown away.

All the children answered the question about the availability of food for everyone correctly.

3.4. Waste Sorting

When asked about the usefulness of waste separation, all the children from both education groups had a positive opinion.

3.5. Knowledge Test

The knowledge test included 12 questions from the questionnaire, with 1 point awarded for each correct answer. The lowest score achieved in the knowledge test was 8 points (3.4% of the children), and the highest score was 12 points (31% of the children), which corresponds to the highest possible total score (Table 3).

Table 3. Frequency distribution of all points in the knowledge test in relation to gender and education groups.

Test Score	Education Group		Gender		All Children	
	EG	LG	Boys	Girls	<i>n</i>	%
8	0	2	2	0	2	3.4
9	0	13	7	6	13	22.4
10	0	10	4	6	10	17.2
11	13	2	7	8	15	25.9
12	18	0	5	13	18	31.0
Total	31	27	25	33	58	100.0

Girls scored slightly better than boys on the knowledge test, and the children from the ecological group scored better than those from the language group (Table 4).

Table 4. Average results of the knowledge test by gender and educational groups.

Variable	The Variable Category	<i>n</i>	M	SD	SE
Gender	Boys	25	10.24	1.30	0.26
	Girls	33	10.85	1.15	0.20
Education group	EG	31	11.58	0.50	0.09
	LG	27	9.44	0.75	0.14

Note: M, arithmetic mean; SD, standard deviation; SE, standard error.

It was found that children belonging to different gender groups (homogeneous variances, $t_{(56)} = -1.887, p = 0.064$) did not differ significantly in their knowledge.

The children who participated in the eco-group differed statistically significantly from the children in the language group in terms of their level of knowledge (heterogeneous variances, $t_{(44)} = 12.542, p = 0.000$), whereby the children in the eco-group had

a higher level of knowledge ($M \pm SD = 11.58 \pm 0.50$) compared to the language group ($M \pm SD = 9.44 \pm 0.75$) (Table 5).

Table 5. The results of testing the statistical significance of differences in the level of knowledge between children belonging to different socio-demographic groups ($n = 58$).

Variable	The Variable Category	f	Levene's Test for Equality of Variances	t-Test for Equality of Means	M	SD
Gender	Boys	25	F = 0.921	$t_{(56)} = -1.887$	10.24	1.30
	Girls	33			10.85	1.15
Education group	EG	31	F = 5.196 *	$t_{(44)} = 12.542$ ***	11.58	0.50
	LG	27			9.44	0.75

Note: *, significant at $p < 0.05$; ***, significant at $p < 0.001$; M, arithmetic mean; SD, standard deviation.

The combined interaction effect of educational groups and gender structure proved to be not statistically significant for the prediction of the level of knowledge, i.e., no statistically significant moderation effect was found. Gender structure therefore had no influence on the relationship between group membership and knowledge, i.e., the relationship between group membership and knowledge did not change under the influence of gender structure (Table 6).

Table 6. The results of testing the moderating effect of gender on the relationship between group affiliation and level of knowledge.

Variable	95% Confidence Interval	SE	t-Value	p
A constant member	8.96 [8.20~9.71]	0.38	23.73	0.0000
Group affiliation	2.30 [1.20~3.41]	0.55	4.17	0.0001
Gender structure	0.33 [-0.15~0.81]	0.24	1.37	0.1777
Group affiliation by gender structure	-0.13 [-0.81~0.54]	0.34	-0.40	0.6921

Note: SE, standard error; p, statistical significance.

4. Discussion

The aim of this research was to gain better insight into the way different educational programs of kindergartens (in this case, the ecological group and the language group) influence attitudes and knowledge about different aspects of sustainability (such as gardening and horticultural production, plants, food and proper nutrition, and waste management).

4.1. Gardening and Horticultural Production

The research results showed that owning a garden at home was not necessarily the main motive for the children's participation in the eco-program. The children who participated in the eco-program showed more knowledge in the area of gardening, i.e., horticulture, which is understandable since their education is focused on this area. In addition to the educational process itself, better knowledge of plants and agrotechnical measures can also be associated with practical activities and workshops in the outdoor area of the kindergarten. This is in line with previous research, which also indicates that spending time in the garden or other green spaces within educational institutions has proven to be a great benefit to the educational process [40,41].

The result of outdoor activities also includes better information about the fruit and vegetables that can be harvested from the garden. Workshops on which vegetables were planted in a garden have contributed to this [42], even if may not always be easy for children to recognize a plant, especially if they do not constantly observe its development from

planting to the final product [43]. In addition to providing information, outdoor activities also improve the eating habits of young gardeners [44] and prepare them to become responsible eco-citizens [45]. In the context of knowledge about fruit and vegetables that can be harvested from the garden, it should be noted that four children from the language group believed that lemonade can be collected from the garden, which is quite difficult to explain but understandable to some extent, as it is not unusual for children to sometimes provide strange answers. In one study, for example, they answered that plants need cereals and sandwiches to grow normally [46]. It is possible that they have never heard of or drunk lemonade, but again, they were able to select fruits and vegetables that should be familiar to them (tomatoes, apples, or carrots). The broad knowledge of the children from the ecological group is also evident in the fact that they know that fruit and vegetables are also available in the winter months, even though the kindergarten is in the continental part of Croatia. This is because it is an area where not so many crops are grown in winter, in contrast to the Mediterranean part of Croatia, where it is warmer and where certain horticultural areas are also active in winter. The vast majority of children from the language group referred to summer, probably because they assumed that the fruits they consume the most are available in this season.

Ecological education also proved to be successful in understanding certain agrotechnical measures, such as irrigation, i.e., the time of day when the plants should be watered, and all those who participated in the program provided the correct answers (morning or evening). This was not the case in the other educational group. Here, a fifth of the children believed that the plants should be watered at midday, a time that is highly inappropriate for such a measure, as the plants could burn. Furthermore, this is the hottest time of day, when most evaporation takes place, so a greater amount of water is needed, which is not in line with the sustainable use of natural resources. It is therefore possible that the children of the ecological group have adopted a certain level of water-saving behavior, which is very important for the conservation of natural resources [47,48].

By actively participating in gardening and horticultural activities, the children from the ecological group developed a positive attitude towards gardening, as evidenced by the fact that these children preferred gardening to playing computer games. Such an attitude is very important, and it is hoped that it will be maintained in the future, as gardening has numerous physical, mental, and other benefits [49–51].

4.2. Plants

Participation in the ecological program enables a broader perception of plant cultivation, as well as an understanding of the possibilities of their use for many different purposes. For example, children who participated in this program recognize plants not only one-dimensionally (exclusively as food) but also as medicine and as decoration. Knowledge of the environmental factors related to the growth and development of plants is extremely important for understanding natural processes, with water and sunlight being among the most important factors. It should be noted that the sun was not mentioned by any of the children from the language program, which suggests that they are not yet familiar with certain basic biological processes, such as photosynthesis. Almost all children showed that they understood, to some extent, the interaction of different organisms in nature [52] because they knew the part of the plant that attracts bees. However, even in this case, two responses were recorded that are difficult to explain, namely, that bees are attracted to honey. These answers were provided by children from the language group. By asking about the healthiness of apples that have worms, an attempt was made to check whether the children were familiar, to a certain extent, with plant protection, i.e., organic and conventional production. Based on the results, it can be assumed that the children from the ecological group considered such an apple to be healthy, as it is a widespread opinion that worms do not go into an apple that has been treated with chemicals.

4.3. Attitudes about the Proper Consumption of Food and Its Healthiness

The preschool period is extremely important for the acquisition of habits of proper and quality nutrition. The results show that children, regardless of the educational group to which they belong, were well-informed about the right way to consume food. Regarding the quality of food, most of the children thought that food produced at home was healthier than food bought in the store. Of course, the answer to this question is not clear-cut, as food in stores is subject to strict controls before it is put on the market, which should mean that it is completely safe for health. Similarly, food produced at home is not necessarily completely healthy, even if the production process is fully controlled. Nevertheless, the responses indicate a certain familiarity with the benefits of home production, which is mostly perceived as ecological production, as products from local ecological producers or local family farms are often advertised in the media. A positive opinion about the benefits of home-produced food may also serve as future motivation to produce and consume more food in an environmentally friendly way.

Most of the children from the eco group recognized breakfast as the most important meal of the day, which is consistent with other studies [53,54], while the children from the language group wavered between breakfast and lunch. On a positive note, none of the children identified dinner as the most important meal of the day [55]. In addition, all children are aware that it is healthier to eat several times a day in smaller quantities rather than eating once in large amounts. Regardless of the educational program, all children were familiar with the importance of washing fruits and vegetables before eating them, which is extremely important in the context of acquiring habits for proper and safe food handling.

All children were aware of the fact that there is a shortage of food on a global level, while the children from the ecological group showed a higher level of social awareness and empathy, as they believed that surplus food should be donated and not thrown away [56,57]. Of course, it is important to point out that the answer to this question is not clear-cut because there may be cases where there is enough food but it is unevenly distributed, not only globally but also within individual countries. Nevertheless, it is important that children are made aware of this issue, as it is one of the prerequisites for ensuring that sensible food consumption becomes an integral part of their lives.

4.4. Waste Sorting

All the children were aware of the importance of waste separation and recycling and showed a positive attitude towards this issue, which is a major problem worldwide [58–60]. By acquiring the habits of correct waste sorting and recycling, children acquire indirect and direct knowledge about the harmfulness of certain types of packaging that are used daily and are extremely damaging to the environment. Through the synergy of positive habits and knowledge, they can become responsible environmental citizens who, for example, avoid plastic packaging as much as possible and thus directly force manufacturers to use sustainable materials.

4.5. Knowledge Test

Environmental education, which encompasses numerous sustainable development goals, has proven to be important in instilling knowledge and habits in children from an early age that contribute, to some extent, to the creation of a sustainable and resilient society. Although there are some studies that have found no differences between those who participated in eco-certified programs and those who did not [61], in this study, a statistically significant difference was found between the children from the ecological program and the children from the language program, both in the majority of individual responses (detailed in the previous subsections) and in the general knowledge test. Although this does not necessarily mean that all children from the environmental program will pursue a sustainable agenda throughout their lives [62], it is safe to say that they have been given a good foundation during their initial education period, upon which they can build on at

higher levels of education. This should certainly also be guaranteed, to some degree, for children attending other kindergarten programs [63].

4.6. Limitations and Further Research

The main limitations of this study are a relatively small convenience sample and an unvalidated knowledge test that was developed for ad hoc research purposes, which needs to be validated in future studies. However, the fact that children from the eco-program achieved better results could be an indicator of the external validity of the measurement instrument. For future research, it is recommended to include additional sustainability-related variables (questions) in the measurement instrument to increase its validity and to test it on a larger sample so that the results can be generalized. Notwithstanding the above limitations, certain conclusions can be drawn.

5. Conclusions

Special education programs in kindergartens have many benefits: they allow children to play sports, learn foreign languages, do art, learn math, and much more. However, research suggests that such programs may be too specialized and therefore do not sufficiently meet the SDGs. One possible reason for this is that these goals are primarily seen as recommendations, although they should perhaps be seen more as obligations. It is therefore necessary to create conditions to ensure that all children are at least familiar with the basics of sustainability.

As a foundation, it is necessary to include the concept of sustainability in the national curriculum for early childhood and preschool education. Although each kindergarten follows its own developmental path (depending on its specific conditions, personnel and spatial resources, and the social context in which it operates), it is the duty of each kindergarten to continuously orient itself towards the national requirements. For this reason, it is recommended that Education for Sustainable Development be included as one of the fundamental principles in the national curriculum. This will create conditions for a more comprehensive inclusion of environmental and sustainability education in regular and special kindergarten programs. Of course, the mandatory part of sustainability education should not take up the entire curriculum of all kindergarten programs because children should be respected and encouraged to spend most of their time doing what they enjoy (art, sports, learning languages, etc.), but they should be able to acquire basic knowledge about ecology, the importance of waste recycling, proper nutrition, and the like.

Once included in the national curriculum, the next step is to ensure quality ESD training for teachers, as they play a crucial role in passing on knowledge to children. It is recommended to involve higher educational institutions in this process so that teachers can acquire the latest scientific knowledge on sustainability.

To encourage kindergartens to engage in ESD and include sustainable practices in all or most of their programs (curricula), it is recommended that the state support these kindergartens with additional funding or in other ways. In addition, the state should provide kindergartens with all the necessary prerequisites and spatial requirements for the implementation of such education. For example, newly planned kindergartens should have suitable outdoor green spaces that offer opportunities for numerous useful activities: introducing children to plant life, growing fruits and vegetables (in addition to educational purposes, the produce can also be used in the kindergarten kitchen), conducting outdoor workshops, inter-group activities related to sustainability issues (e.g., waste recycling), and the like.

Even though specific knowledge is acquired in later educational systems, early childhood education is extremely important for the absorption of knowledge, the learning of skills, and the formation of attitudes and habits that will last a lifetime. This provides a good basis for children's future development as sustainably responsible individuals who will be the backbone of future societies. It is therefore necessary to promote education for sustainable development from an early age.

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