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Teachers' Connectedness to Nature, Education for Sustainable Development and the Contemporary Teaching of the Subject "Nature and Society" in Croatian Schools

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Abstract

The modern approach to teaching in schools is based on encouraging pupils' activity in learning about the natural and social phenomena; the pupil is an active participant in the teaching process. The "Nature and Society" subject curriculum emphasizes the use of ICT technologies and various teaching methods. The teacher, their practice, emotions, personality, and competencies play an important role in achieving the learning outcomes in school subjects, as well as in cross-curricular topics, such as is the Sustainable Development Curriculum. This paper presents a study that examined teachers' Love and Care for nature as an important component of promotion of ESD and the practice of using modern approaches in teaching of the subject "Nature and Society". The results of the study show that there is a statistically significant relationship between teachers' Love and Care for nature and modern approaches to learning and teaching the subject "Nature and Society" and the implementation of ESD in primary schools in Croatia.

Keywords: Education for sustainable development (ESD), Love and Care for nature scale, subject "Nature and Society", sustainable development curriculum, teacher(s).

Introduction

The subject "Nature and Society", as a cross-curricular subject, provides the content of numerous areas, focusing on the learning outcomes of the subject as a whole, but including that the student "understands their growth and development in interaction with others and nature, develops integrity, personal and national identity, and forms a positive attitude toward the self, others, nature, and society as a whole" (Ministry of Education and Science, 2019). The autonomy of the teacher emphasized in the curriculum also means that the teacher decides independently on the learning outcomes, and in this way and on this basis the personality of the teacher is emphasized. The teacher's role,

not only as a professional, but also their personality traits, which include their values, emotions, attitudes, affinity for certain content, and consequently the selection of adequate strategies, methods and procedures in the processes of learning and teaching, i.e., the achievement of learning outcomes, is an essential part of curriculum it.

Love and Care for Nature, according to Perkins (2010), is a scale used to measure connectedness to nature, i.e., an individual's emotional relationship with nature. According to the author, it refers to an individual's specific relationship with nature that can determine their subsequent behavior. In fact, numerous studies indicate that connectedness to nature should be fostered from an early age and in middle childhood, which means that childhood is a key period for developing positive feelings toward nature (Barrable, 2019; Chawla, 2020). In this way, the role of the educator or teacher as an "active" agent of these processes is clearly underscored, especially when we take into account that the systematic development of environmental sensitivity and ESD begins in early childhood institutions, preschools, and primary schools (Anđić, 2022). In this sense, this preliminary study examined primary school teachers' Love and Care for Nature and their practice of teaching the subject "Nature and Society" and implementing ESD in primary schools.

The Subject "Nature and Society", Connectedness to Nature, and ESD

The 2019 curriculum reform brought about significant changes in the processes of work practices in primary schools. Particularly visible changes, apart from the key principles of the constructivist approach to learning, are found in the structures of individual curricula with highlighted areas of learning outcomes. As part of the reform, new curricula were created for the lower grades (first through fourth grades), seven of which were cross-curricular. Within the "Nature and Society" curriculum, the most visible change is in the structure of the subject curriculum. In addition to the four prominent areas (Changes and Relationships, World Around Us, Individual and Society, and Energy), the curriculum also includes a special area that is considered a methodological approach – it is called inquiry-based research approach (Figure 1). It is important to emphasize that each area includes the code: A. World around us; B. Changes and relationships; C. Individual and Society; D. Energy, and the inquiry-based research approach has the code A.B.C.D. as an integral domain approach.

With this approach, the pupils are placed in the "center" of the teaching process – they are active "researchers" of their natural and social environment Thus, an essential principle of teaching in the subject "Nature and Society", the principle of homeland connectedness or closeness, encompasses not only the exploration of space and time and the content of one's homeland (in the narrower and broader sense), but also connectedness to the homeland, with an emphasis on the values of humanism, tolerance, emotional connectedness, and love of the homeland, nature, and society. One of the fundamental principles of planning and teaching is the networking of learning outcomes and their connection to the curricula of cross-curricular topics. Sustainable development is one of those curricula, and like other curricula of cross-curricular topics, it is based on expectations, not learning outcomes, which are evaluated at the end of each cycle. This curriculum also contains at its core the fundamental domains, in this case, three domains: Connection, Action, and Well-being, whereby their realization takes place in cycles (Figure 2).

Figure 1

Relation(s) Between Nature and Society Curriculum and Curricula of Cross-curricular Topics in the Republic of Croatia (modified by the authors)

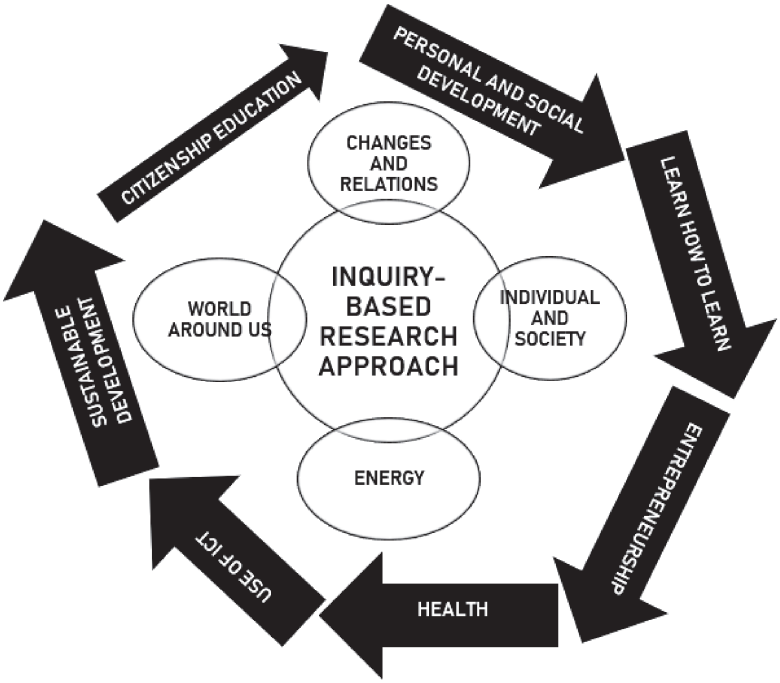


Figure 2

Structure of Sustainable Development Curriculum – Fundamental Domains (modified by the authors)



In the Connection domain, pupils' connection to all living beings, their family, community, and school, but also to nature and natural resources is highlighted. This domain emphasizes the need to implement ESD in all school subjects by "connecting" emotions, knowledge, skills, attitudes, and values of pupils, as well as teachers. Therefore, "connection" as a concept appears in important documents that regulate the practice of work in primary schools. An analysis of these documents shows that they are commonly understood concepts and outcomes that pupils need to know, and teachers need to promote.

The Nature and Society Curriculum (2019) emphasizes that modern teaching methodology is based on the use of cooperative active learning methods, practical work and research. It is evident that the use of a range of modern strategies, methods, and forms of work is expected in the teaching practice of "Nature and Society", and it is the teacher's responsibility to plan and facilitate this learning and teaching. It is important to emphasize that "primary school teachers lay the foundations for science teaching and thus for their science knowledge and science teaching skills ..." (Timoštšuk & Lumi, 2022, p. 117), but they also lay the foundations for interdisciplinary connections between subjects in school and for developing sensitivity to environmental and sustainability issues. Based on the new reform and curricula, it is evident that an interdisciplinary approach to learning and teaching sustainability is no longer an obstacle. As Hofman-Bergholm (2018, p. 25) stated, "one must develop an understanding of nature in order to properly appreciate and care for it"; but also have an "emotional competence and an individual style of action", because, "emotional competence is one of the main factors in the development of a person's professional and personal life" (Suleimanova & Ivanova, 2018, pp. 48–49). In the relevant literature, addressing the concept of "nature connectedness," the research has shown that an individual's emotional relationship with nature is significantly related to the individual's mental well-being, emotions, pro-environmental behaviors and other factors (Schultz, 2002; Nisbet et al., 2009; Ameli, 2022). Although numerous instruments have been developed, there is no universal way to measure it, nor is there a universal definition of the term (Anđić, 2022). It is most often described as love, empathy, responsibility towards nature, compassion towards natural living beings, belonging to nature, and it always includes the emotions of the individual towards nature and living beings. In terms of measurement, there are several important scales that have been developed to measure this construct, and there are also other measurement tools such as structured interviews, drawings, and computer applications that are particularly aimed at children. However, it should be noted that numerous contemporary studies indicate that, in order to develop sensitivity to the environment and ESD issues, it is essential to establish a link with the place(s) in which the pupil(s) lives. This includes the development of love, empathy, and connection to home, which requires work practices that should include precisely such elements of work – forms, methods, and sources through which the pupils can explore their environment, learn about the natural and social elements of their local or wider home, and experience learning. Work practices should include multiple multisensory experiences and vernacular learning that are at the core of developing sensitivity to the environment and creating a closeness to the place where the child lives (Selby, 2017; Ameli, 2022). Creating a sustainable self involves not only knowledge but also the transmission of values, attitudes, motivation, and responsibility, i.e., a personal transformation toward sustainability (Murray, 2012). These characteristics are consistent with the educational expectations of the Sustainable Develop-

ment Curriculum, but also with the outcomes of the "Nature and Society" Curriculum (Anđić, 2022). The teaching practice of the subject "Nature and Society" offers numerous opportunities, especially in the stronger connection of children with the environment and the creation of positive emotions and experiences that form the basis for future environmentally friendly behavior, but also in the development of scientific competencies (Anđić, 2022). Numerous studies emphasize the importance of teachers' personality traits in the context of teaching pro-environmental attitudes and promoting such behaviors (Anđić et al., 2019), as a factor of secondary socialization in the classroom, ensuring the transmission of knowledge, culture, values, and traditions (Pavičić Vukičević, 2013; Timoštšuk & Lumi, 2022). Atmaca (2017) and Salīte et al. (2021) emphasize the importance of contextual factors in teacher education (ESD) that can contribute to teachers' competencies for ESD (personality; emotions, knowledge etc.). Vanek et al. (2021, p. 1) state that a good teacher is a combination of personality traits such as humanity, wisdom, prudence, perseverance, etc. and competencies such as positive relationships with students, successful classroom management, recognizing the importance of motivation, etc. Similarly, in relation to self-efficacy in practice and motivation, Boeve-de Pauw et al. (2022) point out the indispensability of continuous professional development, especially in the field of ESD, which must begin with initial education. In this context and in the context of ESD, teachers' attitudes, their emotions, especially love for nature, as well as the practice of working at educational institutions are part of the research presented in this paper.

Methodology of the Research

Aims, Tasks, and Hypotheses

The aim of this research was to determine the relationship between primary school teachers' Love and Care for Nature and their teaching practices in the subject "Nature and Society". In accordance with this aim, the following tasks and hypotheses were established:

1. to determine the measuring characteristics of the instruments, i.e., the scale with which the research was conducted. – H1: Adequate measuring characteristics of the instrument, i.e., the scale, are expected;
2. to determine teacher's Love and Care for Nature, i.e., teachers' connectedness to nature. – H2: High arithmetic means of teachers' Love and Care for Nature, or teachers' connectedness to nature, are expected;
3. to determine teachers' practice in implementing the subject "Nature and Society" in terms of the use of ICT, practical work, cooperative learning, and the use of the school natural space. – H3: Teachers are expected to have a high arithmetic mean in evaluating the use of ICT, practical work, cooperative learning, and the use of the school natural (outdoor) space;
4. to determine if there are statistically significant correlations between teachers' Love and Care for Nature and the practice of teaching the subject "Nature and Society" in relation to the use of ICT, practical work, cooperative learning, and use the school natural (outdoor) space. – H4: it is expected to find statistically significant correlations between the Love and Care for Nature and the practice of teaching the subject "Nature and Society" in the use of ICT, practical work, cooperative learning, and the use of the school natural (outdoor) space.

Since this type of research has not been conducted in Croatia so far, it is difficult to compare the research results with similar research. The research was conducted as part of Sandra Mažar's Master Thesis "Teaching the Subject "Nature and Society" and the Nature Connectedness of Lower Primary School Pupils" (2022). In this paper, selected parts of this research are presented.

Sample, Measurement Instrument, and Research Methods

One-hundred and three teachers from nine primary schools participated in the study. Regarding gender, 98 of the participants were female and only 5 were male. The following data should be highlighted among the participants' other socio-demographic characteristics. The average age of the participants was 46 years. As for the teachers' professional experience, among N = 103 participants, four were in the internship phase, 13 participants had between 1 and 10 years of professional experience, 22 participants had between 10 and 20 years of professional experience, and as many as 44 participants had between 20 and 30 years of professional experience. 20 participants had more than 30 years of work experience. 22 participants taught in fourth grade, 18 participants taught in the third grade, 29 participants taught in the second grade, and 20 participants taught in the first grade. In addition, 14 participants taught in the so-called combined departments. The research was conducted in 2021 through an online survey and, in accordance with the ethical principles of conducting research, the participation was anonymous, voluntary, and with provided mandatory consent of the faculty, school principals, and the participants. A questionnaire with 15 items from the Love and Care for Nature Scale (LCN; Perkins, 2010) was used as a measurement tool to measure teachers' connectedness to nature. This scale was translated with the help of an official translator and adapted to the Croatian language accordingly. A Likert scale required participants to rate the extent to which they agreed with the statements provided: from 1 – strongly disagree to 7 – strongly agree. In addition to this scale, the questionnaire included nine questions that explored teachers' practices in teaching the subject "Nature and Society": Content, Knowledge, and Love for the environment, Collaborative learning; Practical work, Use of ICT, and Use of the school natural space in teaching this subject. Data processing was carried out with the statistical program SPSS v29.

Research Results and Discussion

The first task of the research was to determine the measurement properties of the instrument. Connectedness to Nature was measured using the Love and Care to Nature Scale adapted from Perkins (Love and Care to Nature, LCN, 2010). An exploratory analysis was conducted using the principal components method, followed by a confirmatory factor analysis using the maximum likelihood method. Then, the internal reliability of the scale items was tested using Cronbach's alpha coefficient. The results obtained are presented below. The Kaiser-Meyer-Olkin measure of sample adequacy (KMO) was 0.936, while Bartlet's test of sphericity yielded x2 = 1532.834 (105); p = 0.00, indicating the adequacy of the analysis design. The analysis performed with the principal component method confirmed two components. Pasca et al. (2020) also obtained similar results on the same scale. The maximum likelihood method on two factors with oblique

rotation explained 69 % of the common variance. In this context, however, it should be noted that Perkins (2010, pp. 16–17) emphasized in her study that the scale is one-dimensional, so the two-factor solution was discarded, and a one-factor analysis was performed, which eventually led to the explanation of 66 % of the variance. The reliability measure of the scale's Cronbach's alpha was $\alpha = 0.96$. The other questions in the questionnaire did not form a scale; therefore, their measurement properties are not presented. In accordance with the presented results, hypothesis 1 is accepted. Descriptive statistics were calculated in response to the second task, and the results of both tasks are presented in Table 1.

Table 1

Results of the Factor Analysis and Descriptive Indicators (M, SD; N) of Love and Care for Nature Scale

Love and Care for Nature Scale	Factor	M	SD
1. I feel a deep love for nature.	.682	6.31	.990
2. When I spend time in unspoilt nature, I feel that everyday worries have disappeared from my face.	.807	6.17	1.086
3. It is important to me to protect the well-being of nature for its own sake.	.699	6.56	.882
4. I often feel awe and admiration when I am in unspoilt nature.	.671	6.44	.915
5. I often feel a strong sense of care for the natural environment.	.516	6.26	.885
6. I feel spiritually connected to the rest of nature.	.762	5.69	1.197
7. I am often emotional when I am around nature.	.799	5.78	1.220
8. I enjoy learning about nature.	.765	6.16	1.007
9. When I am in the natural environment, I feel emotionally connected to nature.	.895	5.97	1.124
10. I believe that connecting with nature is important for my well-being.	.795	6.22	.989
11. I feel content and somehow at home when I am in unspoilt nature.	.908	5.88	1.207
12. I feel a personal connection with the rest of nature.	.930	5.84	1.312
13. I need to have as much natural environment around me as possible.	.854	5.72	1.200
14. When in nature, I feel joy simply because I am there.	.820	6.05	1.124
15. When I am close to nature, I feel as one with it.	.902	5.75	1.258

M = arithmetic mean, SD = standard deviation.

According to the obtained results, it can be stated that the teachers evaluate their Love and Care for Nature with high arithmetic means. The average mean of the whole scale is M = 6.05, which is interpreted as a high value and, thus, hypothesis 2 is accepted. The third task was related to teachers' practice in teaching the subject "Nature and Society", which was investigated through several questions. Research participants had to assess the extent to which they use ICT, practical work, cooperative learning, and the school natural spaces in teaching the subject "Nature and Society". In response to these questions, the participants marked their assessments on a Likert scale ranging from 1 – very little to 5 – often. With this in mind, the descriptive results obtained in these questions are presented.

Table 2

Results of the Research on the Teaching Practice in the Subject Nature and Society – Descriptive Indicators (M, SD; minimum, maximum, N) for the Use of ICT, Practical Work, Collaborative Learning, and the Use of the School Natural (Outdoor) Space

Teachers' practice	N	Minimum	Maximum	M	SD
Teaching "Nature and Society", I often encourage students to do practical work.	103	3	5	4.50	.624
I use ICT (information and communication technologies – PCs, tablets, smartboards...) when I teach the content of the subject "Nature and Society".	103	2	5	4.21	.788
I often use the school natural spaces for my work with students.	103	2	5	4.13	.848
I often use collaborative learning in teaching the subject "Nature and Society".	103	2	5	4.07	.795

N = number of participants, M = arithmetic mean, SD = standard deviation.

From the results presented in Table 2, medium-high and high arithmetic means are evident, based on which the proposed third hypothesis is accepted. The last task of this research was related to the correlation calculations between the Love and Care for Nature Scale, i.e., teachers' connectedness to nature and their work practices in the use of ICT, collaborative learning, practical work, and the school natural spaces. The pretest revealed an abnormal distribution of scores in the sample, so a nonparametric Spearman rank test was performed. The Love and Care Scale was presented as a linear composite (LCN_LK) in order to include it in the analysis. The obtained results are presented in Table 3.

Table 3

Results of the Correlation Calculations (rho) of the Love and Care for Nature Scale and the Characteristics of Work Practices in Teaching the Subject "Nature and Society" – Use of ICT, Practical Work, Collaborative Learning, and the Use the School Natural Space

	1.	2.	3.	4.	5.
1. Love and Care for Nature Scale	1				
2. Practical work	.512**	1			
3. School's natural space	.452**	.478**	1		
4. Collaborative learning	.292**	.589**	.511**	1	
5. Use of ICT	.034	.210*	.281**	.215*	1

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

The obtained research results show that there is a statistically significant and positive correlation between teachers' love and care for nature and the use of practical work, collaborative learning, and the school natural (outdoor) spaces in the teaching of the subject "Nature and Society". It was also found that there is no correlation between the

LCN Scale and the use of ICT media. The statistically significant values found ranged from a weak to a medium correlation effect (rho = .292**; rho = .592**). A significant medium positive statistical correlation was found between practical work and collaborative learning, which is understandable since many forms of collaborative learning are precisely aligned with student activity in the classroom, e.g., puzzles, group work, research groups, etc. At the same time, the results concerning the use of collaborative learning and the use of natural spaces are interesting, suggesting that learning in nature often takes place in forms of collaborative learning, i.e., the more natural spaces are used, the more forms of collaborative learning are used. The last, fourth hypothesis is partially accepted since no statistically significant correlation was found between ICT use and the teachers' love and care for nature. On the one hand, these results were to be expected and are consistent with some previous research, although it should be noted that this research was conducted before the introduction of new curricula (Reić-Ercegovac & Jukić, 2008; Džaferagić-Franca & Tomić, 2012). The lack of correlation between ICT and positive emotions toward nature is an expected result and is consistent with previous research (Gifford & Chen, 2016). It should certainly be noted here that many ICT tools can serve as a useful resource in the teaching of the subject "Nature and Society", such as the smart board (Kovačić & Čović, 2021), but they can also be used in natural spaces, e.g., a compass, early applications such as geolocators, for photography, and data collection, etc. An important part of teacher practice must be the emphasis on teachers' emotions, so the results of this research can be interpreted as important for gaining an awareness of their emotional competence, their own personal experiences and knowledge (Salīte et al., 2021), and their attitudes toward nature itself, but also for the practice of implementing ESD topics in the classroom. Teacher autonomy also includes reflection through processes of self-evaluation, action research, transformative pedagogy in teaching and learning in the subject curriculum "Nature and Society", and the Sustainable Development curriculum (Bedford, 2022). Therefore, new curricula and new approaches to teaching and learning offer many opportunities for the implementation of topics that are important for the subject "Nature and Society", but also for the Sustainable Development curriculum. Teachers are the main promoters of ESD in schools (Goller & Rieckmann, 2022), and "the effectiveness of educational practices should focus on empowering students to adopt eco-centric environmental attitudes" (Ferreira & Pitarma, 2021, p. 1). The role of teachers in these processes remains important and needs to be emphasized as professionals, as "reflective thinkers", but also as individuals.

Conclusion

The research examined the relationship between primary school teachers' Love and Care for Nature and their work practices in teaching the subject "Nature and Society" in schools. In relation to the tasks and hypotheses set, the results indicated that all set hypotheses are accepted, except for the last one, which is partially accepted. The results of calculating the measuring properties of the Love and Care for Nature Scale, which was used to measure the connectedness to nature, showed that the scale had good adequate properties in terms of validity and reliability and that it could be used in other studies. Moreover, the results showed that teachers highly valued their connectedness to nature, i.e., their love and care for nature. In addition, the research revealed that teachers used modern approaches to learning and teaching the subject "Nature

and Society" in their practice, i.e., ICT tools, school natural spaces, practical work, and cooperative forms of work. All mentioned aspects of work were evaluated with medium-high and high results. Correlation calculations revealed statistically significant and positive correlations between teachers' connectedness to nature and the use of collaborative forms of work, practical work, and natural spaces of the school, but not ICT use. The effects of these correlations range from weak to moderate and can be interpreted as highly indicative. It should be noted that interpretation of the results based on this research is limited, as this is still a preliminary study with a small, manageable sample, and an uneven number of participants by gender. This should definitely be taken into account in future research. In conclusion, the results of this study are very informative as they highlight the importance of teachers' connectedness to nature, i.e., that there is a significant relationship between teachers' emotions toward nature and their work practices. In this sense, these findings are consistent with research highlighting the importance of personality traits, emotions, and other subjective and contextual factors that influence or are associated with teachers' work practices. In ESD, fostering connectedness with nature is a prerequisite for the development of environmental sensitivity and sustainable development, and in this study, the relationship between just such positive emotions toward nature and teachers' work practices in the subject "Nature and Society" becomes clear(er). Initial teacher education and professional development programs in ESD must incorporate these factors: Emotions, Personality, and Values. Future research should certainly include other work practices, other subjects, and explore the meaning of these emotions in the context of learning about other content, and in ESD. Moreover, this research has shown that it is necessary to take into account precisely those factors that are an integral part of teachers' personality, emotions, values and attitudes, as well as their practice, and with which contemporary teaching and the quality of teaching processes of ESD, but also overall in schools are largely related or depend on.

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