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Exploring Attitudes toward Sustainability Education in a Group of Italian Preservice Teachers: The Role of Environmental Identity and Sense of Community Responsibility

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Abstract: In the current educational context, international institutions are being called to rethink education and declining new strategies that aim to teach sustainable behaviors. From this perspective, the present study aims to investigate the attitudes towards the sustainability of trainee teachers, verifying their connection with psycho-social variables, such as environmental identity and sense of community responsibility, and exploring their most common dispositions. In total, 126 Italian preservice teachers were involved in a mixed method study where they were asked to complete a questionnaire and participated in focus groups. The use of a combination of quantitative–qualitative methodologies has allowed us to obtain in-depth information about sustainability education. Quantitative data showed a virtuous circular relationship between environmental identity, attitudes towards education for sustainability, and the sense of community responsibility. Qualitative data showed the high frequency of two key action verbs, avoid and respect, but no specific reference to the educational field. After creating the target concept 'to teach', we observed a worrying absence of lemmas related to emotional dimension, and that the communication perspective is set on adults' point of view, rather than on pupils. Limitations, strengths, and practical implications have been extensively discussed, especially in relation to the field of teacher education.

Keywords: sustainability education; environmental identity; sense of community responsibility; teacher training; mixed method

1. Introduction

Rethinking education and declining new models and strategies that adapt to changing educational contexts is an imperative that institutions and organizations, in the international landscape, are pursuing (Grange 2018).

One of the most pressing emergencies of the current historical period concerns environmental issues and, more generally, the sustainable development of the planet. Indeed, the need to identify and implement best practices that serve as protective factors against the conditions of adversity in which the planet finds itself is increasingly discussed.

In line with this, in 2015, the representatives present at the United Nations Sustainable Development Summit adopted the new Agenda 2030 aimed at identifying the principles of education for sustainable development in all levels of education (Cebrián et al. 2020). The 2030 Agenda features 17 Sustainable Development Goals within which education and education are considered crucial tools for contributing to a society that is more equitable, socially just and of quality (Rieckmann 2017).

In the Italian landscape, environmental education has been related to educational dynamics; in fact, among the various documents produced, the important role that the Guidelines for Environmental Education for Sustainable Development (UNESCO 2012) has taken on emerges (Natalini 2021). This document is the result of a cooperative effort between the Ministry of the Environment and Protection of Land and Sea and the Ministry

of Education, University and Research and has the strategic objective of "creating the conditions to ensure that these practices are developed, increased, systematized, and made the living heritage of our society, so that they can form the basis of a new pact between citizens, across generations, for the development and growth of the country" (p. 7). With this in mind, the illustrated good practices are composed of three parts (sustainable development education context; educational paths and in-depth fact sheets) aimed at promoting useful trajectories to indicate paths of education and training for sustainable development.

Longhurst et al. (2014) defined education for sustainable development as a "process of equipping students with the knowledge and understanding, skills and attributes needed to work and live in a way that safeguards environmental, social and economic wellbeing, both in the present and for future generations" (p. 5). It emerges, therefore, how education provided by teachers, in learning contexts, can act as a protective and encouraging factor in developing skills that enable individuals to reflect on their actions, considering their respective current and future cultural, social, economic and environmental impacts (Tejedor et al. 2019).

In this context, it is possible to point out that teacher effectiveness is widely discussed, in the academic landscape, as student learning and performance turn out to be closely linked to teacher effectiveness (Kearney and Garfield 2019; Laurie et al. 2016). Linking teaching effectiveness with perspectives on Environmental Sustainability Education, UNESCO (2012) highlighted teacher training as a key element in adopting and implementing policies related to sustainable development. It is therefore of strategic importance to prepare teachers and future teachers for sustainable development education through ad hoc training and reflective programs and pathways (Darling-Hammond 2017; Estrada-Araoz et al. 2023; Ferreira et al. 2007).

From this perspective, in order to increase the level of cognition related to the perceptions and attitudes that teachers possess with respect to issues related to sustainable development, it is useful to first investigate some of the variables related to environmental education. In particular, we focused on environmental identity, sense of community responsibility, and attitudes towards sustainability education.

1.1. Environmental Identity, Sense of Community Responsibility and Attitudes towards Sustainability Education

Environmental identity (EID) is a dimension of self-identity. In particular, it is considered an aspect of a person's identity that describes an individuals' identification with the physical and natural world; hence, it is viewed as a sub-identity similar to other sub-levels, such as personal identity and social identity (Proshansky 1978; Proshansky and Fabian 1987; Twigger-Ross et al. 2003). More specifically, EID is defined as "a sense of connection to some part of the non-human natural environment (...) that affects the way in which we perceive and act toward the world; a belief that the environment is important to us and an important part of who we are" (Clayton 2003, pp. 45–46).

Like an identity, EID is also defined both as a product and a force (Rosenberg 2017; Clayton 2003). It is considered a product since it is the result of an individual's history and emotional connection to the environment. On the other hand, as a force, Clayton's and several consequent studies highlight how EID is associated with pro-environmental attitudes and behaviors (Clayton 2003; Clayton et al. 2021; Domalewska 2021). Indeed, there is a large body of research indicating that pro-environmental behavior is important to an individual's sense of self. For example, Gatersleben et al. (2014) and Whitmarsh and O'Neill (2010) found that values and identities are good predictors of some 'green' behavior.

In the last few years, education is considered to be a core discipline for disseminating sustainable development principles, and increased attention has been dedicated to education for sustainable development (ESD) (e.g., Acosta Castellanos and Queiruga-Dios 2022; Hallinger and Chatpinyakoop 2019; O'Flaherty and Liddy 2018). ESD refers to programs

and experiences that provide people with the knowledge, skills, and values necessary to shape a sustainable future. The literature reveals that, together with environmental identity, sense of community is another variable that may have an influence on attitudes towards sustainability (e.g., Ahmad and Abu Talib 2016). Sense of community refers to people's feelings of belonging and the interaction between them and their environment based on daily experiences (Coulombe and Krzesni 2019). Several scholars have highlighted that a sense of community is a key issue in person–place relationships, human behaviors, and psychological research (Rollero and De Piccoli 2010; Talò et al. 2014). Moreover, Nowell and Boyd (2014) underline that a characterizing aspect of the sense of community is the feeling of responsibility towards other members of the community. In this regard, the authors defined the sense of community responsibility as "a feeling of personal responsibility for the individual and collective well-being of a community of people"; (p. 231). This construct is connected to the management of crisis situations (Boyd and Martin 2022) and to the implementation of prosocial behaviors within a territorial community (Yang et al. 2020).

In a recent study, Lin et al. (2021) examined a theoretical model using, among other variables, sense of community and support for sustainable community development among the indigenous people of two communities in Taiwan that were relocated after the Typhoon Morakot struck Taiwan in 2009. The findings indicate that sense of community is an antecedent of support for sustainable community development in both relocated communities.

In particular, the current investigation will focus on teachers' attitudes toward sustainability education. In this regard, three studies that examined teachers' attitudes toward environmental sustainability issues were conducted in Nigeria (Kalu et al. 2005), Greece (Spiropoulou et al. 2007), and Australia (Kennelly et al. 2012). According to all three studies, teachers were attracted to teaching sustainability education, but lacked knowledge about sustainability-related topics, which ultimately undermined their confidence in doing so.

Moreover, several recent studies, mainly involving preservice teachers, revealed that ESD has very limited visibility in the educational system, both at school and higher education level (e.g., del Mar Alonso-Almeida et al. 2015; Fantinelli et al. 2023; Kalsoom et al. 2018; Singer-Brodowski et al. 2019). However, tentative courses have been demonstrated to be effective in improving teachers' attitude towards sustainable development. For example, in a study conducted in Pakistan (Nousheen et al. 2020), 287 student teachers of MA Education were offered a course on education for sustainable development during the second semester of their study program. The sixteen-week course included assignments, projects, discussion, and presentations. The findings of the study revealed that pre-service teachers in the experimental group reported a positive change in their attitude towards sustainable development after studying the ESD course compared to the control group.

Similar results were found in Malaysia by Tang (2018) in a sample of 122 engineering students attending a sustainable development course called Engineering Sustainable Development.

To the best of the authors' knowledge, there have been no studies conducted and published that investigate Italian preservice teachers' attitudes toward sustainability education. Hence, this study is offered in an attempt to fill this gap in the field of experience-based sustainability education.

1.2. Aim

Based on these premises, the aim of the present study was to investigate the attitudes towards sustainability of trainee teachers. Specifically, this research had the following two objectives: (1) to investigate the relationship between attitudes towards sustainability and towards sustainability education, environmental identity, and the sense of community responsibility; (2) to explore in depth the attitudes of trainee teachers regarding the ways that may foster sustainability education.

2. Materials and Methods

2.1. Participants and Procedures

The research involved a total of 126 preservice teachers, aged between 23 and 58 (M = 40, SD = 8.01). Most of the participants were female (83%) and were attending a course for teaching in secondary schools (74%). About half of the participants (53%) already had teaching experience, even if only for a few years (69% had no more than five years' experience). Finally, regarding familial status, most participants had a partner (60%) and at least one child (64%).

The recruitment of the participants, achieved through convenience sampling, took place during the lessons of a training course for support teachers. During a practical exercise, trainee teachers were asked to collaborate in the following two ways: by completing a self-report questionnaire (quantitative data) and by participating in focus groups on the topic (qualitative data).

The research received the approval of the ethics committee of Psychology of the University of Foggia. Furthermore, before participating, all participants were asked to provide their informed consent, in accordance with current legislation on the respect of privacy.

2.2. Quantitative Measures

As for the questionnaire, it was composed of a demographic section and the following scales.

The first scale used was the Attitudes toward Sustainable Development (A-SD) scale (Biasutti and Frate 2017), which includes four sub-dimensions for measuring attitudes towards environmental, economic, social and educational sustainability. Each sub-dimension is rated by 5 items, using a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). Given the purposes of the research, we have excluded the dimension of educational sustainability, as it refers to university teaching, and we have only taken into consideration the general dimension A-SD that showed good reliability ($\alpha = 0.86$). An example item is "Environmental protection is more important than industrial growth".

The second scale used was the Revised Environmental Identity (EID) scale (Clayton et al. 2021; Ariccio and Mosca 2023), which measures environmental identity, in terms of connectedness to nature and protection of nature. The scale includes 14 items, with a 7-point Likert scale ranging from 1 (not at all true for me) to 7 (absolutely true for me). Also in this case, for our purposes, it was helpful to use just the general factor EID that showed excellent reliability ($\alpha = 0.93$). An example item is "I think to myself as part of nature, not separate from it".

The third scale used was the Sense of Community Responsibility (SOC-R) scale (Boyd and Nowell 2017; Prati et al. 2020), which includes six items, with a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). This scale includes only the general dimension SOC-R, which showed very high reliability, with a Cronbach's alpha equal to 0.95. An example item is "I often feel the need to do things that are useful for my country even if the costs outweigh the personal benefits".

The fourth scale used was the Teachers' Attitudes Related to Sustainability Education (A-SE) scale (Ray et al. 2013), which evaluates disposition towards sustainability education through a 7-step semantic differential with 15 pairs of adjectives. The minimum value (1) corresponds to the negative adjective (i.e., not essential; useless; not important), while the maximum value (7) corresponds to the positive adjective (i.e., essential; useful; important). The central value (4) indicates a neutral position. The general dimension A-SE had an alpha value of 0.92, showing excellent reliability. Cronbach's alpha values, as well as the means and standard deviations of all dimensions, and the correlations between them are reported in Table 1.

Table 1. Association index for the lemma 'to avoid'.

LEMMA_B	COEFF	CE_B	CE_AB	CHI2	(p)
Wastage	0.528017	14	11	18.9665876	0
Wildfires	0.321288	5	4	6.532750644	0.011
Necessary	0.3175	8	5	4.624502979	0.032
Food	0.296334	18	7	0.974458598	0.324
Means of transport	0.293294	6	4	4.304132186	0.038
School	0.28843	19	7	0.645643748	0.422
Bike	0.271538	7	4	2.818969108	0.093
Correct	0.271538	7	4	2.818969108	0.093
Green	0.271538	7	4	2.818969108	0.093
To light	0.269408	4	3	4.205582853	0.04
Tree	0.269408	4	3	4.205582853	0.04
Cleaning	0.269408	4	3	4.205582853	0.04

Note. C.E.(A) = co-occurrences.

2.3. Qualitative Measures

As for focus groups, before putting them into practice, they were carefully prepared by the research team, which first dealt with the definition of the specific macro-areas to be investigated in order to achieve the desired objective. This process was carried out through the consultation of good practices present in the extensive literature on the subject (Rieckmann 2017; Cebrián et al. 2020; Natalini 2021), and through the consultancy of an expert in sustainability issues and an expert in the education field. At the end of this phase, the research group defined the following macro-areas related to attitudes toward sustainability education: climate change; protection of the territory; electricity savings; sustainable mobility; protection of plant life; waste disposal; protection of the sea; saving running water; avoidance of food waste; and wildlife protection.

With these areas in mind, we moved on to conducting six focus groups. As suggested by the literature (Bloor et al. 2001; Barbour 2018), each focus group had a conductor and an observer who were members of the research team. The observer was responsible for monitoring the entire activity, recording the group discussion, and reporting a summary of what emerged in a detailed report.

To start the activity, the conductor of each group explained the general aim of the research to all the participants. At this point, the conductor read to the group the descriptions of the macro-areas envisaged, asking the participants to define them according to a classification of urgency. Once these assessments were made and an "urgency" ranking drawn up, the group discussion was started for each individual macro-area (starting from the one felt to be most urgent). At the end of the activities, the conductors and the observers discussed what emerged in the individual groups and dealt with the transcription of the recordings made, thus obtaining qualitative textual data to be subjected to analysis.

3. Results

3.1. Quantitative Data

Quantitative data were analyzed using IBM SPSS ver. 27 and Mplus 8. After calculating the descriptive statistics and the correlations between the variables, a multivariate regression analysis was applied to verify the first objective of the present research. The analyses were performed in the context of Structural Equation Modeling (SEM) and Maximum Likelihood (ML) was chosen as the estimator. Missing data were treated by listwise deletion, which resulted in minimal data loss (<1%).

The goodness of fit of the models implemented to the data was verified using specific fit indices, such as the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR), the Comparative Fit Index (CFI) and the Tucker–Lewis Index (TLI). For the evaluation of the indices, we followed the guidelines formulated by Hu and Bentler (1999), according to which values of RMSEA $\leq$ 0.05, of SRMR $\leq$ 0.08, and of CFI and TLI $\geq$ 0.95 indicate a good fit of the model.

In the first model (Model 1), we set EID and SOC-R as predictors and A-SD and A-SE as outcomes, hypothesizing that environmental identity and sense of community responsibility could affect dispositions towards sustainability and towards sustainability education. However, the fit indices showed a poor fit for this model, with RMSEA = 0.069 [0.061, 0.072], SRMR = 0.091, CFI = 0.870, and TLI = 0.852.

This result prompted us to consult the modification indices and to verify a new model, with different relationships between the variables compared to those previously hypothesized.

Then, in the second model (Model 2), we hypothesized a circular relationship in which EID affects A-SD and A-SE that influences SOC-R, which in turn affects EID.

This model presented excellent fit indices (RMSEA = 0.048 [0.042, 0.055], SRMR = 0.062, CFI = 0.962, and TLI = 0.953) and good values in terms of explained variance, with 36% for A-SD, 40% for A-SE, 33% for SOC-R, and 42% for EID.

Furthermore, almost all the hypothesized relationships were found to be significant. In fact, it turns out that EID positively affects both A-SD (β = 0.57, $p < 0.001$) and A-SE (β = 0.60, $p < 0.001$). However, it seems that only A-SE has an effect on SOC-R (β = 0.34, $p < 0.001$), while the relationship between A-SD and SOC-R is not significant (β = 0.20, $p > 0.05$). Finally, the effect of SOC-R on EID (β = 0.36, $p < 0.001$) is also significant.

The significant relationships assumed in Model 2 and the related standardized coefficients B are shown in Figure 1.
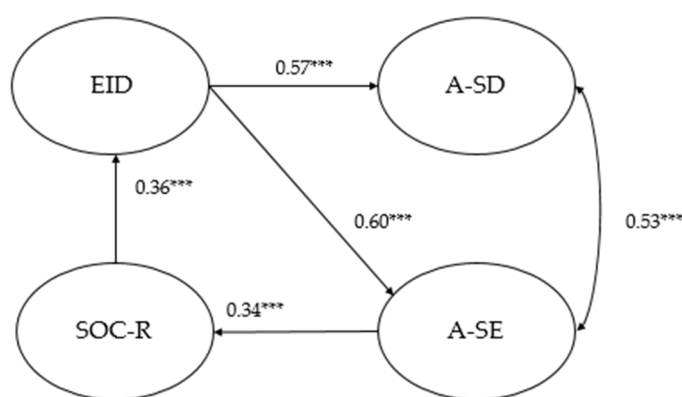
Figure 1. Model 2; Note: *** = $p < 0.001$.

3.2. Qualitative Data

Qualitative textual data obtained from the focus group interviews were analyzed through an automatic analysis of the content with the T-Lab 9.1 (Lancia 2004) software from a quantitative perspective, accompanied by a qualitative interpretation. T-Lab encompasses a suite of linguistic, statistical, and graphical tools, providing evidence about the most frequent words in the text, and identifies co-occurrences of words creating patterns of meaning; furthermore, through this software, it is possible to generate visual mapping of characterizing contents, useful for interpretative inferences. The implementation of mathematical algorithms offers rigorous and reliable analyses compared to traditional paper and pencil methods (Lancia 2004). Specifically, T-Lab computes occurrences and co-occurrences and this capability allows for analyzing the entire corpus of textual material. The main basic assumption of the method is that the most used words in the text are supposed to be the most important ones and relevant in the specific context for the participants (Benevene and Cortini 2010). Grounded theory, as proposed by Glaser and Strauss (1967), is the method's theoretical foundation for the bottom-up analysis or inductive processes. Through this, raw data prompt researchers to formulate theories from participants' opinions, reflecting their interpretations of the examined phenomena. In this case, data analysis is limited to interpretation, a process in which both concepts and relationships between words can be identified; grounded theory has already served as the foundation for analyses using T-lab in several studies (e.g., Di Martino and Zan 2010; Claver-Cortés et al. 2018; Molgora et al.

2022). According to the grounded theory approach, we used the collected data to discover a set of relations between concepts aimed at understanding how participants describe their own attitudes toward sustainability education. The interpretation of these relations (or co-occurrences) required a repeated reading of the texts and a continuous back and forth between T-lab outputs and data transcript.

Before we thoroughly explored the text, there was a preliminary preparation phase in which the transcripts of all focus groups were merged into a single "txt" file. As the file was uploaded in the software, there were two automatic preprocessing procedures, which required a supervision check. These procedures are the lemmatization and the disambiguation phases; the former refers to the process by which different linguistic forms are collected according to a common root. For example, the lemmas 'teaching' and 'teacher' can be merged under the same umbrella lemma 'to teach'. With regard to the disambiguation procedure, it has to be specified that T-Lab autonomously depicts semantic ambiguities, just as homograph words, for example, the Italian word 'pesca' means the act of fishing and the fruit peach. These two processes confirm the nature of content analysis, which is meant to investigate conceptual content that is concealed behind apparently distinct linguistic forms.

After text preparation, we proceeded with the automatic analysis of occurrences and co-occurrences, namely associations analysis; the cut-off of word occurrences was set at four, as it was suggested by past research papers implementing automatic content analysis (Benevene et al. 2017; Cortini and Tria 2014; Verrocchio et al. 2012). The associations analysis provides the graphical output displaying the most frequently cited word in the center, surrounded by words that have the highest co-occurrence rates with it.

Regarding our sample, the most cited word is the verb 'to avoid'; the co-occurrences are shown in Figure 2, where the keyword is in the middle and all the associations are represented in graphical terms. More specifically, the smallest is the distance between two linked words and the strongest is the frequency of co-occurrence. The relation is explained by the cosine coefficient, i.e., the association index (Lancia 2012), as detailed in Table 2.

Figure 2. Co-occurrence graph for the lemma 'to avoid'.

Table 2. Association index for the lemma 'to respect'.

LEMMA_B	COEFF	CE_B	CE_AB	CHI2	(p)
Ecosystem	0.44475	7	6	15.15727	0
Animal	0.435143	13	8	10.96369	0.001
Fauna	0.38075	13	7	6.87985	0.009
Flora	0.372104	10	6	7.504937	0.006
Recycling	0.3698	18	8	4.645736	0.031
Classroom	0.350823	5	4	8.722597	0.003
Species	0.346688	8	5	6.739663	0.009
Sea	0.326357	13	6	3.743249	0.053
To throw	0.320256	6	4	6.100436	0.014
Habitat	0.320256	6	4	6.100436	0.014
Beach	0.310087	10	5	3.869892	0.049
To teach	0.2965	7	4	4.306654	0.038
Nature	0.2965	7	4	4.306654	0.038
Life	0.2965	7	4	4.306654	0.038

Note. C.E.(A) = co-occurrences.

In accordance with the Standard for Reporting Qualitative Research (O'Brien et al. 2014), these outputs can be interpreted due to the fact that each word acquires meaning when contextualized within the discourse (i.e., through their interaction with neighboring words). The quantitative level of information is represented by the association analysis (occurrences and co-occurrences); the qualitative level of information is derived by the content expressed in the text and the related interpretation.

By observing and interpreting Figure 2 (target lemma "to avoid"), we can conclude that there is a first positive impression related to pro-environmental behaviors that teachers would like to encourage in pupils, for example, the intention to avoid wastage (cosine coefficient 0.52), or the attention toward risks deriving from wildfires (cosine coefficient 0.32). Going back to the focus group transcript, two examples of this statement are as follows:

Ex 1. «It is important to encourage children to eat the right amount of food *to avoid* waste».

Ex 2. «We need to teach children how important it is in summer, during the hottest months, to pay attention especially in outdoor spaces *to avoid* the risk of fires».

The intention to promote responsible consumption habits, by teaching children to value and consume food mindfully, aligns with principles of sustainable living and interconnectedness between personal behavior (such as food consumption) and environmental protection. The second example underscores a broader perspective on sustainability, encompassing the preservation of natural resources and ecosystems. Teaching children to be vigilant in outdoor spaces not only reduces the risk of fires, but also promotes a deeper understanding of environmental conservation and the importance of mitigating human impact on the environment.

Nevertheless, the most cited keywords can have a more in-depth reading, i.e., "to avoid" is a negative verb, meaning a call to a non-action, and it does not leave any space for a constructive nor proactive action; asking students to simply not do something can limit their innate vocation to experiential freedom. Alternatively, teachers could propose positive actions. Furthermore, especially when we are teaching something to young children, and given that their executive functions are immature, telling them exactly what we want them to do is much more effective in guiding their behaviors than telling them what not to do. When we ask a child to not pollute the environment, or to be good ecologists, they do not necessarily understand what they are required to do. Clear instructions like "Turn off the water when you're brushing your teeth", on the other hand, set a clear expectation and increase the likelihood that they will do what you are asking (e.g., Ward et al. 2020).

Further exploring the occurrence output, there is another key action verb, that is 'to respect'. It is apparently a positive and proactive message that teachers aim to communicate

to pupils; it is associated with several words describing different natural contexts (see Figure 3 and Table 2), such as ecosystem (cosine coefficient 0.44), fauna (cosine coefficient 0.38), flora (cosine coefficient 0.37) and beach (cosine coefficient 0.31).

Figure 3. Co-occurrence graph for the lemma 'to respect'.

Some statements from participants that were chosen as examples related to the lemma *to respect* are shown below.

Ex. 3: «Children can learn to take care of green spaces at home and school, *respecting* the habitats of other living beings».

Ex. 4: «*respecting* nature and cleanliness of the environment».

Ex. 5: «we can teach children to *respect* common resources».

Overall, these assertions may indicate that teachers could engage in promoting sustainability education on different levels of action.

The idea that teachers should pay particular attention to respect for the environment can be a good premise, but, for the same reason mentioned before, respect can represent a quite abstract and difficult concept for children since it implies recognition and expression of cognitive-affective states and appreciation emotions, such as esteem, admiration, kindness and care (Malti et al. 2020). Although teachers' attitude toward environmental respect is important, a potential critical point should be highlighted: there could be a gap between teachers' individual attitudes and children's inclination to learning; in particular, some intangible concepts would need practical explanation in order to elicit a kind of observational learning (Bandura 2003). The gap could be filled by practical examples and contextualized behaviours, in order to offer holistic education and foster the learning of pro-environmental behaviours in children (Ofei-Manu and Didham 2018; Luff 2018).

Surprisingly, there was a low occurrence of words related to the education context. However, as T-Lab is a question-oriented software, it is always possible to interact with it, setting a specific lemma as a keyword and creating a graphical representation of its associations. Hence, we created the target concept 'to teach' (after lemmatization process), as the aim was also to explore attitudes toward sustainability education.

Observing the output (Figure 4) and the related association indexes (Table 3), there is a strong association with the lemma 'child' (bambino), undoubtedly underlining the focus of the research.

Figure 4. Co-occurrence graph for the lemma 'to teach'.

Table 3. Association index for the lemma 'to teach'.

LEMMA_B	COEFF	CE_B	CE_AB	CHI2	(p)
Child	0.341882	11	3	8.501399	0.004
Right	0.308607	6	2	7.367485	0.007
Habitat	0.308607	6	2	7.367485	0.007
Awareness	0.308607	6	2	7.367485	0.007
To respect	0.2965	26	4	4.306654	0.038
To waste	0.285714	7	2	5.864279	0.015
Wastage	0.276026	30	4	3.072312	0.08
To differenziate	0.267261	8	2	4.747946	0.029
Animal	0.209657	13	2	1.852324	0.174

Note. C.E.(A) = occurrences; C.E.(AB) = co-occurrences.

Some examples from the textual data are as follows:

Ex. 6: «We *teach* how to differentiate».

Ex. 7: «Our task can be to *teach* children to become familiar with animals».

Ex. 8: «At school, we *teach* children to use water in the right quantities (for washing hands, for example)».

In addition, some potential serious issues should be carefully considered. First, the co-occurrences refer mainly to actions or to environmental matters such as food, wastage, animals, habitat. There is a worrying absence of lemmas related to the emotional or affective dimension; moreover, the communication perspective is set on adults' point of view, rather than on children/pupils. Since emotions play a crucial role in shaping attitudes, behaviors and decision making, ignoring them in educational aims might limit the effectiveness of sustainability education.

This potential emotional gap seems to suggest the urgency of teacher training that is specifically oriented to environmental education.

4. Discussion

This study has focused on the factors that can promote education for sustainability, paying attention both to mainly individual dimensions, such as environmental identification, and to more contextual dimensions, such as the sense of community responsibility. In addition, the study has allowed us to explore the ways that trainee teachers consider most effective for sustainability education.

The results from quantitative data showed that environmental identity (EI) can be a good predictor of both attitudes towards sustainable development (A-SD) and attitudes towards sustainable education (A-SE) in our sample. This is in line with previous literature. Indeed, in the vision of Rosenberg (2017), identity and EID (e.g., Clayton 2003) may act both as a product and a force. As a force, it was highlighted in a number of investigations how EID is associated with pro-environmental attitudes and behaviors (e.g., Clayton 2003; Clayton et al. 2021).

In turn, A-SE had an influence on the sense of community responsibility (SOC-R). On the other hand, A-SD had no influence on it in our sample. It seems that teachers with a positive attitude toward sustainable education are able to transform their individual belief and values into something useful on a wider scale – e.g., their community. Various studies have highlighted that often, teachers experience a high sense of generativity, which can be explained as an adult's natural sense of responsibility toward the next generation (McAdams and de St. Aubin 1992; McAdams and Logan 2004) and the sense of community is also a component of generativity.

As part of a circular vision, SOC-R was a predictor of EI. SOC-R emphasizes the experience of a community as a responsibility that was found to be a stronger predictor in explaining higher order engagement requiring greater investment of time and resources (Nowell and Boyd 2010, 2014). The explanation of SOC-R as both predicted by A-SE and a predictor of EI may reside in the fact that the tension between individual self-focus and collective good is reduced when individuals' community membership is salient, meaning that people are more likely to act in ways that protect and sustain the environment when their sense of identity is based, at least in part, on the place where they live in (Forsyth et al. 2015), as explained in Tajfel and Turner (1986)'s social identity theory. The theory's (Tajfel and Turner 1986) prediction that a collective orientation is associated with environmentally responsible behaviour is consistent with two other intertwined lines of research, place and studies of community identity. Just as social identity theory suggests that an augmented social identity may foster a pro-group orientation, community-level approaches suggest that "members of cohesive communities are more likely to respond in positive ways to the common concerns of life in the local society" (Theodori and Kyle 2013, p. 59).

The results from the qualitative data are in line with past research describing the relevance of teachers as role models for their students (Lazarowitz and Naim 2013; Liang et al. 2022), showing their potential influence in shaping children's pro-environmental behaviors. In addition, with specific regard to sustainable education, teachers can create a potential spillover effect toward parents (Duvall and Zint 2007; Lawson et al. 2018); evidence shows that children can promote the acquisition of pro-environmental knowledge, attitudes, and beliefs with their close relatives. This topic could be further investigated in future research.

However, our findings made clear that teachers need specific adequate training to promote sustainable development education, as it seems that they are missing awareness about the right attitudes and approaches in sustainability education, being too focused on abstract concepts (such as *respect*) without making it understandable for children.

Ad hoc training should help teachers in offering model behaviors, fostering experiential learning in children leading by example, encouraging critical thinking and promoting empathy. Specific training could have a double positive effect, as it would also raise teachers' self-efficacy and motivation, which are among the strongest predictors of job performance and job satisfaction (Schwarzer and Hallum 2008; Sulla and Rollo 2023). Last but not least, according to our participants, sustainability education seems to overlook emotional aspects, which are crucial in shaping sustainable attitudes and behaviours (Brosch and Steg 2021); indeed, ignoring affective dimensions may limit the effectiveness of sustainability education (Dunlop and Rushton 2022).

Limitations and Strengths

The results obtained from the study should be considered while taking into account some limitations. First, the recruitment of the participants, which took place through convenience sampling, does not allow a broad generalization of the results obtained. Second, the sample is mostly made up of females and this lack of homogeneity did not allow us to verify any gender differences in the scores of the measured variables. Another aspect that may prevent generalizability of these results lies in the fact that the quantitative data were collected using a cross sectional design. Future research, using a longitudinal design, could assess how teachers' attitudes toward sustainability education develop over

time. Finally, it should be underlined that the sample was made up of trainee teachers with limited teaching experience. This aspect did not allow us to verify the association, which is probably significant, between the level of experience and attitudes regarding education for sustainability. Future research should investigate the attitudes towards sustainability education of in-service teachers, as how they understand sustainability education and how they are integrating it into their classroom practice may differ greatly from the practices of teachers that have less experience in terms of years of teaching. In general, future studies are needed to confirm the evidence found, overcoming the limitations underlined here.

Nonetheless, the study conducted also has clear strengths. The first strength is the choice to implement a triangulation of methods, using both quantitative and qualitative data. This choice was due to the nature of the study's topic, which is still partly unexplored, and it can be useful to collect opinions and experiences from first-line professionals in order to design a tailor-made intervention and training. In line with the triangulation approach, the qualitative method is not used as an explorative and preventive stage of investigation, nor as a subordinate method for the quantitative part. Instead, qualitative data collection has real autonomy in terms of both data collection and interpretation (Cortini and Tria 2014; Denzin 2012). Moreover, triangulation of methods can improve the data analysis reliability, as it is assumed by the standards for reporting qualitative research, i.e., SRQR (O'Brien et al. 2014), and the guidelines for qualitative research (Critical Appraisal Skills Programme 2018).

A further strong point is represented by the possibility of using the evidence found in the context of teacher training, proposing useful indications to future teachers regarding the development of good practices that can favor education in sustainability.

5. Recommendations

In conclusion, with regard to specific training for teachers, there could be a two-fold focus, including fostering a sense of community responsibility and acquiring a more effective style of communicating and teaching sustainable development. These urgencies share a common dimension, i.e., a social discrepancy between the individual or micro-level and the community or meso-level. This kind of discrepancy is already known and investigated in environmental psychology; often, individuals tend to perceive their actions and behaviours as irrelevant with regard to the global size of the environmental issue (Maréchal 2010). A possible method of positive intervention seems to engage both individuals—teachers in our case—and the community as well to define shared rules and expectations (De Groot 2019). Education aimed at providing concrete information on environmental issues is the most effective (Stern 2000), including the effects of personal actions on the environment or effects on personal financial situations (Coen et al. 2019).

The second focus of an ad hoc training program would be on communication and teaching style; the connection between a personal attitude toward sustainability and the children's learning could be found in the promotion of experiential learning. It is meant as a holistic, systemic approach, which includes perception, cognition, and behaviour (Kolb 2014). Teachers may start by developing and/or discussing some rules with their pupils.

According to the IRIS Center for Training Enhancements (2014), in order for them to guide pupils' behaviour, rules should be operationalized, i.e., they should be objective, behavior-specific, describing what to do, written with appropriate language for age, and short. Operational definitions help to clearly define behaviors, namely what we expect the students to do. Creating an operational definition will avoid using language that makes judgments or assumptions. Indeed, defining behavior to this level reduces confusion and ensures that everyone can understand what we expect from them, regardless of their age and/or cognitive skills. Writing rules is an essential component of educational programs and the rules should be pertinent to specific area(s) – and not generic. When writing rules, "best practice also suggests that rules are written in a positive manner (e.g., what to do rather than what not to do) and visibly posted for the students to regularly refer to" (Casey and Carter 2016, p. 3).

Setting such rules might be the first step for the effective implementation of a program related to education for sustainable development (ESD) (e.g., Acosta Castellanos and Queiruga-Dios 2022).

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