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Exploring the Acceptability of an Environmental Education Program for Youth in Rural Areas: ECOCIDADANIA Project

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Abstract: Background: There has been a growing interest in environmental education programs to improve environmental awareness and behavior change among school-aged youth. Yet, assessment of the approaches aligned with citizen science principles emphasizing community participation and empowerment is scarce. The present study aimed to explore the acceptability of the "ECOCIDADANIA" environmental education program targeted at youth in rural areas. Methods: The program was applied for two years in the municipality of Gouveia, and it involved nature walks methodologies combined with citizen science. A total of 107 students participated in the program. Eighteen participants (13 youth and 5 teachers) were selected as key informants, and semistructured interviews were conducted to assess the appropriateness of the intervention and the perceived benefits. Results: The program was demonstrated to be acceptable to youth and teachers, and its benefits included increasing students' knowledge, skills and self-efficacy, discovering the territory, promoting environmental awareness, strengthening social relationships between peers and educators, and contributing to the promotion of individual and collective well-being. All the participants were satisfied with the program's activities and recommend its continuation in the school context. Conclusions: Programs of this nature could foster environmental activism and enhance environmental sustainability at the local level, which reinforces the entrepreneurship profile of the youth.

Keywords: youth; environmental awareness; participatory methods; education

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1. Introduction

Given the impact of environmental change, society faces significant geophysical, biological, and socioeconomic challenges [1]. Moreover, some studies characterize youth as one of the most vulnerable groups affected by the current and future nefarious impacts of environmental degradation [2–4]. However, research highlights the need to address this vulnerability through capacity building and creative solutions. Preparing young people to cope with these changes [5] can be achieved by developing opportunities in education (knowledge) and training (skills), which are pivotal in preparing young populations to adapt and be resilient [6,7].

A growing interest has been in promoting and developing environmental education programs to improve literacy, attitudes, skills, and behavior among school-aged youth [8–10]. In Portugal, the Directorate General of Education (DGE), as well as the environmental entities of higher education and civil society, have developed a guide entitled "Environmental Education for Sustainability" [11], which has been integrated into Education for Citizenship. Framed by the current Sustainable Development Goals

(SDGs) and Agenda 2030, this tool provides teachers and other education stakeholders with guidance on how they can inspire values, actions, and behavior change regarding the environment. This framework has been applied in formal national curricula and at different levels of the education system, from kindergarten to secondary school [12].

Nonformal learning methods used by civil society organizations also strengthen and develop environmental awareness (this refers to a predisposition to react to environmental issues in a specific manner [13]) in youth groups [14,15]. In addition, prior studies have demonstrated that engaging young participants in activities and experiences in real-world contexts can increase their ecological knowledge, environmental participation, and values regarding conservation and sustainability concerning the natural surroundings [16–18]. However, intervention programs that integrate nonformal education and participatory methods, such as nature walks and citizen science, are still scarce in rural contexts. In this sense, this study aims to provide an empirical example of how youth engagement can occur in a rural context using participatory methodologies based on the experiences of the "ECOCIDADANIA" [ECOCITIZENSHIP] program. This intervention program was implemented in rural inland Portugal and aimed to promote environmental awareness among school-aged youth.

1.1. Youth, Active Citizenship, and Environmental Issues

Currently, many countries worldwide are rethinking their use of natural resources and the role that global citizens have in managing the environment [19]. The strong influence of the "ecological emergency", as referred in the 2019 UN Climate Summit [20], led to a global wave of environmental activism, thus galvanizing young people and communities around the world to take action through individual and collective initiatives, such as school climate strikes and forming a new generation of so-called "Do-It-Ourselves" (DIO) protesters, thereby demanding policy action to reverse environmental degradation [21–23]. The right and responsibility of young people to participate and be involved in shaping their futures and of their communities, as set out in the United Nations Convention on the Rights of the Child (CRC) [24], has therefore taken on new forms. Formal political participation (voting and party membership) has transformed into issue-based participation through campaigns, social movements, and citizen-to-citizen interactions. However, such initiatives are less pronounced in inland rural areas, where demographic aging and depopulation are severe and isolate young voices. Moreover, young people in such areas suffer directly from the impacts of climate change, such as forest fires, and have concerns that should be mobilized [25,26].

According to the ENEC [27], Education for Environmental Citizenship (EEC) is defined as "the kind of education that provides a coherent and appropriate body of knowledge as well as the necessary skills, values, attitudes, and competencies with which an environmental citizen should be equipped to participate in society as an agent of change". Recent work emphasizes that EEC is a multifaceted concept that addresses proenvironmental behavior and citizens' attitudes toward environmental protection and social change [9,28].

As a result, the use of participatory education approaches that focus on citizens' environmental engagement, together with local partnerships (i.e., schools, community organizations, and local government agencies) in a bottom-up perspective, is essential to engage young people in the restoration and ongoing monitoring of their local environment [29]. These approaches simultaneously promote competencies, such as critical and creative thinking and problem-solving, which are essential for developing entrepreneurship in young people [30] and are supported by the Portuguese government's guidelines on the profile of students in the 21st century after leaving compulsory education [31,32]. In summary, participatory approaches that acknowledge the importance of recognizing how young people can participate as citizens in everyday aspects of the community through action and collaborative learning should be widely adopted [33,34].

1.2. Engaging Young People in Nature Walking and Citizen Science Approaches

Programs that directly promote youth leadership are suggested to be more effective in community-based learning [35]. This approach is crucial to develop an active and participative citizen in the decision-making democratic process and for fostering problem-solving initiatives [36,37]. Young people's entrepreneurial actions can emerge as projects, campaigns, research, community, or peer education. Nonetheless, community-based approaches that identify and analyze problems through "action research" should be the predominant method [38].

Furthermore, the premise of place-based education proposed by Sobel [39] states that engaging and connecting young people with all aspects of their place, including history, culture, and the natural environment, can foster a sense of ownership, and they tend to see themselves as people who can contribute to their communities. This approach also contributes to promoting entrepreneurial and sustainability-oriented skills [40]. Nevertheless, youth are more likely to engage in science content when it is personally relevant, thereby consequently developing proenvironmental behaviors [41].

In turn, walking methodologies [42], such as nature walks (i.e., to better understand nature by immersing oneself in it [43]) or walking tours (i.e., to apprehend and reflect what life in a given region looks like by exploring the sense of belonging [44]), include long walks on nature/hiking trails, activist walks, school-based walking projects, and other diverse practices and approaches [45]. These are examples of qualitative Participatory Active Research (PAR) methods for environmental education that can promote awareness and meaningful thematic conversations about affection, somatic and sensory place relations, spatial engagement and responsiveness, youth education, environmental literacy, and the exploration of human experience and knowledge of the natural environment, as well as proenvironmental attitudes and behaviors [45–47]. Following another perspective, walking methods can also be a form of artistic practice, as they can reveal the embodied ways in which individuals and material contexts are interwoven in daily life [48,49]. Additionally, spending time in nature enhances multiple physical and mental health benefits [50]. To better understand young people's perspectives, participatory methods such as nature walks can be a friendlier approach for facilitators to engage in dialogue with young people and let them speak in their own words [47]. In addition, the walking methodology involves knowledge generation in synergy with other note-taking tools, such as photo and video recording, to capture the movement experience in a sensory and social environment [51].

In conjunction with nature walking, citizen science is an approach that offers the opportunity to involve residents, researchers, municipalities, and relevant community organizations in the observable phenomena of the natural environment and biodiversity to collect various data elements (e.g., photos, narratives, etc.) and submit information to dedicated websites or mobile apps [52]. It is also a participatory action research method that helps improve collaboration and engagement, as well as empowers people, organizations, and the community throughout the process of discovering the territory, discussing, advocating, and promoting change [53]. During these specific moments/events, proposals have been presented and voiced to promote a participatory model of democracy [54]. Citizen science can have various definitions, but the "ECOCIDADANIA" project identified itself with the description proposed in the report of the European Union's environment working group [55], which states that "*Citizen Science encompasses many different forms of citizen engagement in science. This can include mass participation schemes where citizens use smartphone apps to submit wildlife monitoring data, as well as smaller scale activities, for example, grassroots groups participating in local policy debates*…" (p. 17). Therefore, the "ECOCIDADANIA" program is an innovative approach differentiating itself from other intervention programs that only focus on traditional indoor learning [56].

1.3. Aim

The main goals of this study were the following: (i) develop an environmental education program—entitled "ECOCIDADANIA"—involving nature walks and citizen science

approaches; (ii) explore the acceptability of the program by members of the school community (students and teachers) in a rural area; and (ii) assess the youth satisfaction with the program activities. Although the acceptability assessment focuses on individual perceptions, it reflects the school community's views on the appropriateness of the intervention program [57].

2. Materials and Methods

2.1. Study Setting: Social, Cultural, and Economic Characteristics

This study occurred between 2019 and 2021 in the Gouveia municipality, an inland small rural area of Portugal. Gouveia is composed of 16 parishes with 12,222 inhabitants [58]. Over the past ten years, the municipality has lost 1500 inhabitants. The decline was highest in the 25–64 age group [58]. Nevertheless, the results do not deviate far from the national trend. The potential of the municipality of Gouveia to serve as a beacon for environmental sustainability is considerable, as more than 50% of its total area is classified as "protected" and is part of the 88,850 ha that comprise the Serra da Estrela National Park [59]. The region's cultural and economic heritage is still closely linked to pastoralism, viticulture, and agriculture, thus shaping the land and the opportunities offered to the youth. In addition, distance, combined with a poor public transportation network, act as barriers isolating youth from both urban and academic centers. As a result, their ability to connect and engage with environmental organizations or even participate in research projects in summer schools is scarce, thus limiting their experiences and perceptions of the issue. Civil society organizations, such as "GAF—Grupo Aprender em Festa": https://grupoaprenderemfesta.pt (accessed on 21 January 2020), play an important role, since they promote community-based interventions, including various social groups, to collaboratively reflect on the sustainability of the territory.

2.2. Participants and Procedures

One hundred and seven students (M = 50; F = 57), with ages ranging from 12 to 17 years old, from 6th to 12th grade, enrolled in the Gouveia School Group and participated in the program [60].

Eighteen participants (13 students and 5 teachers) were selected as key informants to assess the acceptability of the intervention program and its perceived benefits.

Inclusion criteria for key informants were as follows: (i) youth actively involved in the 24-month intervention program (e.g., participating in all the phases of the program) that accepted to participate in the interview and (ii) teachers with management positions or teaching areas related to citizenship and natural sciences education and directly involved in the intervention program [60]. This study was approved by the Piaget Institute Ethical Commission (No. 1/2019). Written informed consent was obtained for all participants. In the case of students, consent was sought from their legal representative and assent from the participant.

2.3. The "ECOCIDADANIA" Environmental Education Program

The "ECOCIDADANIA" program lasted 24 months (from March 2019 to February 2021) and aimed to improve local environmental awareness. Young people acted as collaborators or leaders of small projects that led to environmental entrepreneurship through dynamics associated with creating active conservation actions to improve local environmental management and to stimulate change [60].

The program included participatory methodologies, such as nature walks combined with citizen science, that were relevant for discussing socioenvironmental issues (e.g., ecosystems, local biodiversity, and biological conservation) and acquiring local ecological knowledge. The "ECOCIDADANIA" intervention program was conducted by two facilitators with specific training in areas such as Biology/Ecology and Psychology and with the support of experts in specific related fields (e.g., fungi and bird identification). The intervention included three phases described in Table 1.

Table 1. Phases of the '"ECOCIDADANIA"' environmental education program.

Phases	Components	Goals	Main Dynamics
I	Questioning	- Explore environmental and sustainability contents and issues - Promote environmental awareness - Foster individual and group participation and cohesion - Enhance communication and problem-solving skills	- Text and visual graphic material with environmental-related topics - Truth and myths and fact-checking exercises - Short films viewing - Participatory group debate and discussion
II	Nature-based learning (outdoor)	- Immerse, observe, and understand the local natural surroundings - Register of local biodiversity - Environmental awareness and assessment - Contact with thematic experts in the environmental systems - Discover community and individual connections - Promote a sense of belonging, health, and well-being - Foster individual and group participation and cohesion - Enhance communication and critical thinking	- Nature walking, hiking, or walking tours - Citizen science approach - "ECOCIDADANIA" mobile application-based environment assessment tool
III	Community Delivering and Advocacy	- Elaborate on local environmental issues and concerns - Propose ideas and solutions - Evaluate and reflect together on socioenvironmental change	- Citizenship, Environment, and Sustainable Development Forum

In the first moment (Phase I), the youth had contact with concepts and thematic areas (e.g., climate change, ecosystems, biodiversity, circular economy, among others) in a classroom context through active dynamics and proposal exercises to promote questioning and reflection (e.g., truth or myths, short movies debates, photovoice methods). As a result, a working group designated "ECOPros" was created.

In a second moment (Phase II), these group members ("ECOPros") met regularly and on a voluntary basis to observe, think, and act on the environment and the sustainability of their daily-life contexts and, consequently, on the territory as an ecocommunity. The walking methodologies (e.g., walking tours and nature walks), combined with citizen science, allowed for the exploration and contact with local nature trails and biodiversity, thus revealing themselves as moments of discovery and construction of relationships with peers interacting with the natural world. The average duration of an activity was a full day. This intensive approach motivated youth to identify, categorize, and learn about the site's ecology and biodiversity richness. This method has been used to assess an ecosystem but can also be an educational tool [36]. The facilitators and the invited experts also helped with species taxonomy and reviewed the species diversity identified during the walk at a particular site. Concurrently, tools were provided to help with species identification, such as field guides, hand lenses, butterfly nets, and binoculars. In addition, an "ECOCIDADANIA" mobile application (developed by Isabel Silva, Samuel Duarte, and Bruno Esteves) was created (available at https://grupoaprenderemfesta.pt/ecocidadania/app, accessed on 30 August 2023), thereby making it possible to record geotagged photos, as well as field notes, of the species to a specific location/trail (Figure 1). These data files are uploaded to a secure server where collective data reports can be generated. This tool enabled the

creation of a database of sightings and locations of biologically relevant sites in the Gouveia municipality.

Figure 1. "ECOCIDADANIA" mobile application.

In a third moment (Phase III), proposals and ideas from the "ECOPros" were presented in the "Citizenship, Environment and Sustainable Development Forum", which is defined as "a privileged space for dialogue, presentation, and deliberation of proposals from the meeting groups and an instrument of participatory democracy and the construction of development based on democratic participation" [61]. This forum involved the youth peers in the school community, decision makers, and relevant stakeholders (e.g., school board, municipal council, NGOs) in a direct and horizontal dialogue intended to be positive, collaborative, and constructive.

2.4. Outcome Measures

2.4.1. Assessment of Acceptability and Satisfaction

The acceptability refers to the degree to which an intervention program is appropriate to the characteristics of the target audience [62]. In turn, the satisfaction can be defined as an attitude resulting from an assessment of participants on the educational experience provided by the intervention program [63]. When assessing interventions that aim to encourage behavioral and social changes, researchers commonly use qualitative methods. Qualitative interviews can be a valuable means of gathering detailed information on participants' perspectives and experiences relating to the intervention program [64,65]. Therefore, in this study, qualitative data was collected through semistructured interviews to assess the acceptability and satisfaction with the program intervention. An interview script composed of predetermined open-ended questions [65] was applied to a sample of eighteen key

informants (youth, n = 13; teachers, n = 5). A researcher trained in qualitative research conducted the interviews face-to-face in a private room at the scholar context. The interviews lasted for 40 min, and descriptive notes were taken to collect nonverbal responses. The interviewed participants were asked about their experiences with the "ECOCIDADANIA" program activities through the following questions: What do you think is the relevance of this project for environmental education?; To what extent did the activities and dynamics implemented contribute to promoting knowledge and environmental awareness among young people?; How satisfied are you with the activities carried out by the program?; To what extent would you recommend continuing the intervention program?.

Qualitative Analysis

Audio-recorded interviews were transcribed, analyzed, and coded using thematic analysis. Two independent raters followed the steps proposed by Braun and Clark [66], which included data familiarization, initial code formulation, theme searches, theme reviewal, and, finally, the definition and naming of themes. We used *ATLAS.ti* 22, a computer-assisted qualitative data analysis software to carry out the coding process. Through discussion, the evaluation team resolved coding discrepancies and finalized a set of 17 codes. Thereafter, these codes were sorted into subthemes based on the identified material's similarities. Afterward, the subthemes were further categorized into three broader themes that reflected the subjective experiences, acceptability, and satisfaction of the participants.

2.4.2. Environmental Actions

The environmental actions reported the involvement of the program participants in active citizenship initiatives to not only acknowledge and better understand the local natural surroundings and ecosystems, but also to engage in participatory processes of speaking, reflecting, and proposal/idea development to safeguard natural areas of the municipality [67]. This indicator was measured using a quantitative approach assessing the number of nature walks, the number of local species identified, and the number of youth proposals/ideas proposed to solve environmental issues.

3. Results

3.1. Acceptability and Satisfaction of the "ECOCIDADANIA" Program

Individual interviews were used to explore the perception of acceptability and satisfaction of the "ECOCIDADANIA" program by key informants representing the target audience for whom the intervention was intended. Overall, the findings showed that all participants considered the program relevant and appropriate to the current environmental and sustainability challenges. Three main themes emerged from a thematic framework approach: (i) perceived benefits and appropriateness; (ii) facilitators and barriers to implementation; and (iii) satisfaction and suggestions for improvement (see Table 2).

Table 2. Qualitative data analysis: themes and subthemes that emerged from the interviews (n = 18).

Themes	Sub-Themes	Number of Occurrences
Perceived benefits and appropriateness	Knowledge, empowerment, and self-efficacy	15
	Discovery of the territory and the promotion of environmental awareness	9
	Social relationships and community well-being	6
Facilitators and barriers to implementation	Perceived facilitators	14
	Perceived barriers	4
Satisfaction and suggestions for improvement	Satisfaction with the program and activities	18
	Suggestions for improvement	3

3.1.1. Theme 1: Perceived Benefits and Appropriateness

The intervention contributed to promoting the following: (i) knowledge, empowerment, and self-efficacy; (ii) discovering the territory and promoting environmental awareness; and (ii) social relations and community well-being. Firstly, the methodologies adopted by the program, from debates to walking tours or nature walks, were highlighted by all key informants as a privileged means to acquire knowledge related to the fauna and flora of the territory, recycling processes, and composting techniques, among others. The educators identified the potential of this intervention in consolidating academic learning through contact and interaction with the real context, thereby contributing to the empowerment of students: "*The activities developed enriched the curriculum, motivated the students, awakened their curiosity and pleasure in building knowledge, and allowed us to make the most of the time and enrich learning, since we worked on themes common to several subjects, allowing interdisciplinary work/activities*" [female, 46 years]. The promotion of students' civic intervention skills, reinforced by the constant stimulation of active participation in the different dynamics included in the program, was also reported: "*The ECOCIDADANIA project, through the work sessions, debates and field trips organized by its technicians with the school community, has enhanced the students' civic intervention skills, combining the knowledge acquired in the various subjects with active and participatory intervention. It has made students more capable, promoting assertive practices in favor of environmental protection and preservation*" [female, 43 years]. In addition, students' and teachers' reports suggested the program's potential to promote self-efficacy, particularly in terms of the perceived ability to actively contribute to promoting environmental change: "*(. . .) now we can alert more people, we can grow as a project and we can do something for what belongs to everyone*" [young female, 16 years].

Regarding the program's effect on environmental awareness, youth and their educators reported that the intervention program created opportunities to explore and appreciate natural patrimony and biodiversity through contact with different ecosystems during the walking tours or nature walks. The recognition of environmental transformations at a local and global level was also highlighted: "*(. . .) now I have a different notion of what is going on in the world*" [young female, 16 years]; "*I think it was important for us to learn that we can all make a difference. Because before, we knew from school that the planet was changing and that there was climate change, but we didn't know what we could do through simple gestures. And now we're seeing that we really can do a lot*" [young male, 16 years]. From the educators' perspectives, this proximity contributed to the promotion of a more active role and mobilization for the development of actions in favor of environmental preservation, thereby stimulating the capacity for critical reflection and changes of attitudes: "*(. . .) students developed attitudes, values, and skills that motivated them to investigate and seek to explain observed situations*" [female, 46 years]; "*Mobilized the population to change their behavior and habits. Valued positive behavior in terms of the impact it will have in the future. Demonstrated that the return on good practice is always positive*" [female, 43 years].

Another perceived benefit of implementing "ECOCIDADANIA" was the promotion of social relationships through close contact with peers, educators, and the community, which enhanced by the dynamics of the program. The results suggested that the shared experiences strengthened cohesion and a sense of belonging: "*(. . .) We all took care of the garden that became everyone's, and everyone became responsible for taking care of it.*" [female, 60 years]. It was also highlighted by young people and their educators the relevant role of the intergenerational dimension in the construction of shared knowledge in the area of sustainability: "*(. . .) together we learned and shared experiences, moments of conviviality between people of different ages and with different knowledge*." [female, 60 years]. This interaction was also reported as an opportunity for different generations to help each other promote individual and collective well-being.

3.1.2. Theme 2: Facilitators and Barriers to Implementation

The methodologies used in the program's activities were one of the main facilitators of young people's involvement (e.g., nature walks, dynamic presentations of potential

environmental projects, and collaboration in the creation of an app). Many of them reported that the fact that the program moved away from a merely expository approach led to more assiduous and active participation in the dynamics. However, some of the key informants reinforced some constraints to the implementation of the activities, namely, the pandemic context experienced. According to the teachers, a greater fear of contagion and a previous period of confinement contributed to a lower level of mobilization for participation. On the other hand, "ECOCIDANIA" has emerged as an opportunity to strengthen socialization and other social skills (e.g., assertiveness), which could be compromised by social isolation, especially at an early stage of development: "*I don't consider it a barrier, but it was a conditioning factor in the development of activities to have to go through a period of confinement that made it difficult to mobilize the students to a greater degree than if the project had been developed on a regular, face-to-face basis; It has boosted students' civic intervention skills, combining the knowledge acquired in the various subjects with active and participatory intervention. It made the students more capable, promoting assertive practices in favor of environmental protection and preservation*" [female, 43 years]. Another barrier listed by the youths was the overload of school dynamics and the potential difficulty of conciliating some of the activities with academic demands: "*(. . .) Not everyone is organized enough to make time for this project. Some of us are going through a very important school year in our lives and it's not always easy to reconcile our studies with other activities.*" [young male, 16 years].

3.1.3. Theme 3: Satisfaction and Suggestions for Improvement

All the teachers and students who were part of the group of key informants said they were satisfied with the "ECOCIDADANIA" activities and recommended their continuation, mainly because of their potential to promote learning, sensitivity to current environmental problems, and socialization: "*Yes, I would recommend it because my experience has been very pleasant, I've learned a lot, and I've spent a lot of time with friends and other fantastic people*" [young female, 16 years]; "*It's important that there are more young people who are aware of what's happening in the world and are better at trying to help*" [young male, 16 years]. Despite this, some suggestions for improvement emerged from the teachers' reports and could be considered for the continuation of the project, namely, (i) promoting a greater regularity of project sessions; (ii) introducing educational content illustrating the return of good practices (e.g., presentation of the results of previous projects); and (iii) promoting the dissemination of activities on social networks to reach a greater number of youths.

3.2. Environmental Actions

The program involved 14 conducted nature walks that were directly targeted at youth. Another direct outcome was the number of species identified and recorded, namely, 140 in total (101 animalia, 23 plantae, and 16 fungi; [68]). Furthermore, the "ECOPros" proposed 18 projects/ideas (Table 3) that were developed based on the environmental problems identified during the nature walks. Ten of these (55.6%) were successfully implemented (55.6%) during the 24 months of the project.

Table 3. List of the different proposals constructed and implemented by the "ECOPros" during the "ECOCIDADANIA" project. Y = Yes; N = No.

Proposal (No.)	Name	Implemented (Y/N)
1	Farewell to disposable plastic	N
2	Nature walks supporting material	Y
3	EcoNests: birds, bats, and insects	Y
4	Sustainable transport: electrical bicycles	N
5	Intergenerational community garden	Y
6	Forest of trash: cleaning activity	N
7	ECOMARKET [biological and sustainable street market]	Y
8	"ECOCIDADANIA" Podcast	Y

Table 3. *Cont.*

Proposal (No.)	Name	Implemented (Y/N)
9	"ECOCIDADANIA" Club in a school context	Y
10	Environmental activism: event at Sr. Calvário square	Y
11	CineEco: short film festival	Y
12	Informal Portuguese Conversation sessions—inclusion and active citizenship	Y
13	Invasive plant species: removal and prevention	Y
14	Reforestation: the aftermath of the 2017 great fires	N
15	Recycling bins in a school context	N
16	Creative ashtrays: upcycle old materials	N
17	Swap market	N
18	Botanical Garden School—in the natural space of the Secondary School	N
	TOTAL	10

4. Discussion

Our results showed that the "ECOCIDADANIA" program, which involved approaches such as nature walks combined with citizen science, showed high acceptability and satisfaction. This project contributed to promoting young people's environmental awareness, empowerment, self-efficacy, and a greater sensitivity to act for sustainability causes. This intervention created opportunities for youth to have more information about their natural surroundings and to understand how actions affect the well-being of local environments. According to Hungerford and Volk [69], nature walks provide space for "needs assessment" and for the creation of "proposals for problem-solving", which are essential for promoting empowerment and the impetus for environmental action.

The qualitative data collected from key participants also suggested that the "ECOCIDADANIA" program was able to strengthen the sense of belonging and connection to nature among youth groups, which led to 18 proposals for improving the environmental status of the different ecological sites visited during the nature walks. Collective action towards a common goal is seen as more effective [70], as approximately 56% of the proposals were completed through the collective efforts and commitment of the "ECOPros".

There was congruence between the students' and teachers' perceptions that participatory and observation methodologies promoted contact with the biological richness and intensified the connection to the environment and the need for its preservation. The mobile application was also an outcome of the intervention program, as it allowed for the registration of biodiversity throughout the outdoor dynamics, thereby being a resource for use in future pedagogical approaches.

In line with Boeve-de Pauw and Halbac-Zamfir [71], the experience of the "ECOCIDADANIA" program supported the idea that young people benefit from nonformal education as a privileged approach to work on promoting environmental awareness and sustainability of the territories. Citizen science has also been widely recognized and supported in the existing literature for promoting participatory democracy and active citizenship by stimulating active constructive engagement with community issues [72]. Contact with nature, both virtual and on-site, positively impacts the ability to reflect on life problems [73] and can increase the intention to participate in nature-based activities in the future [74].

This study also proposed that the collaborative and coconstructive dynamics between citizens and experts in nonformal contexts can facilitate community science from a bottom-up perspective, as was achieved through the "ECOCIDADANIA" intervention program and reported by the youth and educators. In this context, each participant was stimulated to identify problems and solutions to local environmental issues. The collective commitment of the community and partners to actively participate in developing a more sustainable society promotes informed, consistent, and enduring environmental citizenship [19,72].

Environmental educators provide opportunities, tools, and experiences for young people to acquire knowledge about the environment through positive attitudes and actions [75].

In the "ECOCIDADANIA" program, the encouragement for proenvironmental action by youth was paramount. The literature has suggested that variables such as "environmental awareness", the "sense of belonging", and the "appreciation of the territory" [76] are recognized as "entry-level variables" in environmental education and should be a priority target for intervention. The results achieved with the "ECOCIDADANIA" program suggested the promising character of this approach in promoting these components at the level of environmental education [69].

The active participation of youth in the community is beneficial to their individual growth [36], and the novelty associated with the program activity motivates young people to engage, analyze, and understand their local community and environment from a different perspective. Citizen responsibility and confidence in one's abilities to achieve individual and group goals are enhanced. However, more importantly, self-esteem, identity, and a sense of pride in the territory are strengthened through these approaches [75,77].

Limitations of the Study

Nevertheless, the results presented should be cautiously interpreted due to the implementation of the project in a single geographical area in the inland of Portugal. In this sense, future studies would benefit from replicating the "ECOCIDADANIA" intervention program in other locations. In addition, the collection of quantitative data should be considered as a complement to the evaluation of the effectiveness of the intervention by using more robust experimental designs that allow the follow-up of young people throughout the intervention process. Comparing this approach with other programs, which are purely focused on educational strategies, will provide a better understanding of the added effects of the nature walks and citizen science methodologies included in the program.

5. Conclusions

The results of this study constitute a further advance in understanding the role of nonformal education, namely, through nature walks and citizen science, in promoting environmental awareness in rural communities. The data pointed to a need to increase the frequency and quality of sustainable outdoor education programs and to reduce the gap between traditional indoor learning and outdoor environmental learning. Pedagogical approaches using progressive, youth-centered methods, digital and participatory media, and that balance personal discovery and group sharing can be promising intervention strategies in environmental education.

Thus, our findings reinforce the relevance of implementing practical forms of experiential learning, which can be adapted and adopted for different age groups, educational levels, and educational agents. Therefore, mobilizing knowledge and attitudes toward sustainable development is crucial and enhances environmental entrepreneurship actions [78].

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