EFFECTS OF SCHOOL-BASED ENVIRONMENTAL CLUBS: FOSTERING ENVIRONMENTAL AWARENESS AND STRENGTHENING ECO-CITIZEN BEHAVIORS AMONG STUDENTS

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ABSTRACT

Objective: Given the concerning environmental state on a global scale and also in Morocco, environmental education becomes imperative to contribute to the desired change towards more sustainable and responsible practices. In this context, environmental clubs, as a form of environmental education, particularly catch our attention due to their potential to raise awareness and mobilize the younger generation. Consequently, the aim of this research was to assess the impact of environmental clubs on students’ environmental awareness and the adoption of eco-citizen behaviors.

Method: In the context of our study, we adopted a quantitative research approach to objectively analyze the impact of environmental clubs on students’ environmental awareness and adoption of eco-citizen behaviors. To carry out this analysis, we utilized the Propensity Score Matching method to control for selection biases and ensure a valid comparison between students who participated and those who did not participate in the environmental clubs. Our sample consisted of 255 students in the control group and 241 students in the treatment group. Data were collected using a questionnaire focused on assessing environmental awareness and the adoption of eco-citizen behaviors. This data was then processed and analyzed using the SPSS software, allowing us to obtain statistically reliable and relevant results.

Results: The comparison of scores between the two groups revealed a notable difference. Indeed, participating students displayed higher scores, whether in the “awareness” aspect or in the “eco-citizen behavior” aspect. Furthermore, when comparing the means using the t-test for independent samples, we observed significant results. Consequently, we reject the null hypothesis, indicating that the observed difference is not due to chance but rather reflects a genuine effect of the environmental clubs on students’ awareness and eco-citizen behaviors.

Conclusions: In the present study, we concluded that environmental clubs have a positive impact on students’ environmental awareness and also contribute to the adoption of eco-citizen behaviors. These findings highlight the significance and relevance of these clubs in the educational context. Therefore, it is imperative to take further action to strengthen and generalize the presence and efficacy of these environmental clubs in educational institutions, with the aim of fostering a generation that is both aware and proactive regarding environmental challenges.

Keywords: environmental education, environmental club, eco citizen.

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EFEITOS DOS CLUBES AMBIENTAIS ESCOLARES: PROMOVER A CONSCIENTIZAÇÃO AMBIENTAL E FORTECIDER OS COMPORTAMENTOS ECOCIDADÃOS ENTRE OS ESTUDANTES

RESUMO

Objetivo: Tendo em conta o estado ambiental preocupante à escala global e também em Marrocos, a educação ambiental torna-se imperativa para contribuir para a mudança desejada no sentido de práticas mais sustentáveis e responsáveis. Neste contexto, os clubes ambientais, enquanto forma de educação ambiental, chamam a nossa atenção, em particular, devido ao seu potencial para aumentar a sensibilização e mobilizar a geração mais jovem. Consequentemente, o objetivo desta pesquisa foi avaliar o impacto dos clubes ambientais na consciência ambiental dos estudantes e na adoção de comportamentos eco-cidadãos.

Método: No contexto do nosso estudo, adotamos uma abordagem de pesquisa quantitativa para analisar objetivamente o impacto dos clubes ambientais na consciência ambiental dos alunos e adoção de comportamentos eco-cidadãos. Para realizar esta análise, utilizamos o método Propensity Score Matching para controlar os vieses de seleção e garantir uma comparação válida entre os alunos que participaram e aqueles que não participaram dos clubes ambientais. Nossa amostra foi composta por 255 alunos do grupo de controle e 241 do grupo de tratamento. Os dados foram coletados por meio de um questionário voltado à avaliação da consciência ambiental e da adoção de comportamentos eco-cidadãos. Esses dados foram então processados e analisados usando o software SPSS, permitindo-nos obter resultados estatisticamente confiáveis e relevantes.

Resultados: A comparação de escores entre os dois grupos revelou uma diferença notável. De fato, os estudantes participantes mostraram notas mais altas, seja no aspecto da "conscientização" ou no aspecto do "comportamento cidadão ecológico". Além disso, ao comparar as médias usando o teste t para amostras independentes, observamos resultados significativos. Consequentemente, rejeitamos a hipótese nula, indicando que a diferença observada não se deve ao acaso, mas reflete um efeito genuíno dos clubes ambientais na consciência dos alunos e nos comportamentos eco-cidadãos.

Conclusões: No presente estudo, concluímos que os clubes ambientais têm um impacto positivo na consciência ambiental dos alunos e também contribuem para a adoção de comportamentos eco-cidadãos. Estes resultados destacam a importância e relevância destes clubes no contexto educacional. Por conseguinte, é imperativo tomar novas medidas para reforçar e generalizar a presença e a eficácia destes clubes ambientais nas instituições de ensino, com o objetivo de promover uma geração que seja simultaneamente consciente e proativa em relação aos desafios ambientais.

Palavras-chave: educação ambiental, clube ambiental, cidadão ecológico.

1 INTRODUCTION

At the dawn of the 21st century, the world is witnessing an unprecedented series of environmental crises. The rapid rise in terrestrial temperatures, exacerbating extreme weather phenomena, underscores the urgency of climate change (IPCC, 2014). Habitat
degradation and pollution have also led to an alarming erosion of biodiversity, with an estimated one million species at risk of extinction (IPBES, 2019). In this ecologically fragile landscape, the responsibility to shape a society that is both aware of the stakes and proactive largely falls to education (UNESCO, 2017). An education focused on environmental protection not only raises awareness of current challenges but also equips individuals with the skills and values necessary to navigate and solve these challenges (Tilbury, 1995).

Environmental education proves essential for several reasons. Firstly, it facilitates the transition from passive awareness of environmental problems to proactive and informed action (Hungerford & Volk, 1990). It fosters active citizenship, encouraging individuals to play a pivotal role in protecting their local and global environment. Moreover, in an increasingly complex world, environmental education provides critical and systemic thinking skills, allowing learners to understand the interconnections between humans, society, and nature (Orr, 1992). Lastly, it represents a long-term investment, shaping generations that respect, value, and work towards sustainability, which is crucial to ensure the balance and well-being of future ecosystems and societies (Sterling, 2001).

At the heart of educational initiatives aimed at raising awareness about environmental protection, environmental clubs in schools emerge as paramount pedagogical tools. These clubs, by merging theory with practice, provide students a platform to deepen their understanding of environmental issues while actively engaging in tangible actions (Hungerford & Volk, 1990). They embody a form of environmental education that goes beyond mere knowledge transmission, fostering skills, attitudes, and behaviors conducive to sustainability (Tilbury, 1995). Thus, by incorporating these clubs into the school curriculum, a holistic approach to learning is promoted where students become both learners and agents of change (Sterling, 2001).

The ultimate aspiration of environmental education transcends mere knowledge acquisition. It aims to cultivate robust "environmental citizenship" among learners. This concept, encompassing awareness of ecological issues, the will to act, and the ability to make informed decisions in favor of the environment, emerges as an essential pillar in shaping committed and responsible individuals (Dobson, 2007). Environmental education, emphasizing environmental citizenship, seeks to transform learners not only into informed consumers but also into active agents of change, capable of molding a
sustainable society for future generations (Huckle, 1996). It is in this spirit that the importance of environmental education takes on a new dimension, positioning environmental citizenship as a crucial milestone in our collective quest for an ecologically balanced future.

In the face of the growing gravity of environmental challenges, the role of environmental clubs within Moroccan educational institutions warrants special attention. These clubs, envisioned as an embodiment of environmental education, aim to catalyze a profound change in learners' environmental perception and awareness. However, a crucial question arises: Do these initiatives, as deployed in Morocco, genuinely inspire students to adopt pro-environmental behavior? And ultimately, do they effectively contribute to shaping an aware and committed eco-citizen for the future? This issue will be the guiding thread of our investigation, seeking to assess the real impact of these clubs on the eco-citizenship journey of Moroccan learners.

2 THEORETICAL FRAMEWORK

Environmental Education (EE) has evolved over the years to address the mounting concerns related to environmental degradation and climate change. Since the initial initiatives by UNESCO and UNEP in the 1970s, culminating with the Tbilisi conference in 1977, EE has been acknowledged as crucial for raising awareness, informing, and empowering individuals to actively partake in environmental preservation (Tilbury, 1995). It aims not just to impart knowledge but also to shape attitudes and behaviors that are environmentally conscious (Palmer, 1998).

The approach to Environmental Education (EE) has undergone several transformations, notably by integrating concepts such as sustainable development. This was particularly influential following the Brundtland report of 1987 and the United Nations Conference on Environment and Development (UNCED) in 1992 (Corney, 2006). The focus was thus placed on the interconnection between environmental, economic, and social issues. EE then became a cross-disciplinary subject that not only focuses on understanding ecological problems but also seeks to place them within a broader socio-economic context (Stevenson, 2007).

Theorists have also emphasized the importance of the participatory approach in Environmental Education (EE). According to Hungerford and Volk (1990), genuine environmental education must actively engage learners in concrete actions and critical
reflections. It's not just about instilling facts, but about promoting critical thinking, encouraging citizen participation, and empowering individuals to act in favor of the environment. The ultimate goal is to produce informed, responsible, and committed citizens in search of solutions to environmental challenges (Wals, 2009).

From this theoretical framework, it's clear that Environmental Education (EE) goes beyond merely raising awareness about environmental issues. It aspires to a profound change in how individuals perceive their relationship with the environment and how they interact with it. This shift naturally leads to the concept of eco-citizenship, which emerges as a logical evolution of EE. Eco-citizenship is not just about knowledge of the issues, but about adopting a proactive approach to solving them. It is in this context that we approach the next point in our discussion: "EE towards eco-citizenship", to examine how environmental education can not only inform but also transform citizens into agents of change for a sustainable future.

2.1 THE EMERGENCE OF ECO-CITIZENSHIP THROUGH ENVIRONMENTAL EDUCATION

The concept of "environment-focused citizenship" emerges as a key element of ecological policies, closely associated with the idea of environmentally respectful development. Since the early 1980s, these ideas have been discussed on the global stage, gradually influencing national guidelines as well as the rhetoric of non-governmental organizations, civil society, and the business world. Consequently, this type of citizenship is intrinsically connected to the vision of environmentally respectful development. It also presents political, economic, and social facets, leading to a diversity of research approaches. This explains why this concept is sometimes referred to by terms such as "sustainable citizenship", "green-focused citizenship", "eco-centered citizenship", or "global and proactive citizenship", although the latter two are perceived as having a broader scope, encompassing an expanded definition of citizenship. In this study, we will use "eco-citizenship".

Eco-citizenship encompasses a deep understanding of ecological issues, highlighting the perception of socio-environmental challenges, the rights and responsibilities of individuals within their political community, an awakening to personal values oriented towards ecology, and the ability to align these values with the expertise required for environmentally respectful decisions. Moreover, it values the proactive
involvement of citizens in managing ecological issues. Fundamentally, this concept has developed as an encompassing notion, integrating a variety of elements, such as skills, knowledge, postures, principles, and beliefs essential to the management of environmental issues, as well as abilities for dynamic citizen participation in the social fabric.

Ecological learning is an approach where awareness, information, perspectives, skills, involvement, and enthusiasm are fundamental to achieving the ambition of environmentally friendly behavior (Hungerford & al., 1980; Hungerford & Volk, 1990).

"Ecocitizenship education" is conceptualized as a mode of education that encourages a harmonized and relevant acquisition of knowledge, skills, ethics, visions, and abilities essential for every ecocitizen (Hungerford et al., 1980; UNESCO, 1993). This training prepares individuals to actively intervene in society at various levels (local, national, global), promoting both individual and collective initiatives to address current ecological issues, prevent future environmental dilemmas, foster sustainable development, and establish a respectful relationship with nature (Sterling, 1992). The significance of this education lies in its ability to empower citizens to assume their responsibilities and rights towards the environment, to identify the deep roots of environmental crises, and to encourage conscious intervention and civic participation in addressing these systemic roots, all while valuing justice for present and future generations (Hungerford & Volk, 1990).

In accordance with the proposed definition, the fundamental objective of Environmental Education is to equip students with a harmonious array of knowledge, skills, principles, perspectives, and positive actions, urging them to become "catalysts for change" for the environmental cause. This also aims to raise their awareness of the crucial importance of ecological challenges and to anchor eco-responsible approaches within their expressions of citizenship and political engagement. In this perspective, Hadjichambis and Paraskeva-Hadjichambi, through their recent studies conducted within the ENEC, have outlined the pedagogical framework of EE, suggesting eight educational strategies contributing to EE, including: (a) Learning based on the local context, (b) Challenge-centered learning, (c) Citizen ecology training, (d) Eco-justice-oriented teaching, (e) Intervention skills acquisition, (f) Learning through community engagement, (g) Action-oriented participatory research, and (h) Inquiry-based scientific learning. However, it is specified that, although these pedagogical methods bring to EE, none are
complete in themselves to cover all the aspirations and goals of EE. Continuing their reflection, Hadjichambis and Paraskeva-Hadjichambi detailed the expected outcomes of EE, including: (a) addressing current ecological issues, (b) anticipating and avoiding future environmental challenges, (c) promoting sustainability, (d) establishing a benevolent relationship with nature, (e) exercising eco-responsible responsibilities and rights, (f) discerning the systemic origins of ecological issues, and (g) encouraging thoughtful and proactive involvement.

Over the past four decades, with a particular focus on environmental psychology, numerous efforts have been made to develop models addressing human behavior. The goal was to identify the factors influencing this behavior to guide it towards eco-responsible directions (Darnton, 2008; Jackson, 2005). These models have particularly looked at individuals' beliefs, perspectives, and principles as key elements predicting their behavior. According to this line of thought, if one could identify and adjust beliefs leaning towards or against environmental inclinations, it would then be possible to redirect behaviors. This approach is based on the central idea that behavior stems from a logical and primarily reasoned sequence of decisions made by individuals who act in a more or less logical manner (Harrison and Davies, 1998).

A particularly popular model for studying these interactions is Ajzen's (1991) "Theory of Planned Behavior." It is presented as an evolution of the previous "Theory of Reasoned Action" (Fishbein and Ajzen, 1975). According to this theory, the intention to adopt a certain behavior, which naturally precedes the behavior itself, is influenced by three main factors: the individual's attitude toward the behavior, their perception of others' opinions about it - known as subjective norm - and their belief in their ability to perform the behavior, which is referred to as perceived behavioral control. One of the advantages of this theory is its flexibility, allowing for the integration of new variables (Ajzen, 1991). Over time, many variables, such as beliefs, past actions, ethical norms, emotional perceptions, personal identity, and self-confidence related to behavioral control, have been incorporated (Conner et al., 1998; Mannetti et al., 2004). However, Jackson (2005) warns that as more variables are incorporated, the predictive capacity of the model may plateau while becoming too complex for practical implementation.

The "Theory of Planned Behavior" proposed by Ajzen (1991) explores how behaviors evolve in various situations, including the environmental domain. Ajzen identifies three key elements that influence behavior: 1) Behavioral beliefs, which are
related to an individual's conviction about the consequences of their actions; 2) Normative beliefs, based on perceived social norms, where an individual acts or refrains from acting based on what they believe others expect of them; and 3) Control beliefs, which assess whether a behavior is perceived as easy or difficult to perform. According to Ajzen, these beliefs play a crucial role in how a person engages in causes, including environmental initiatives.

According to Bamberg (2003), models of human behavior often focus on elements such as attitudes, values, and beliefs, which he regards as "constant guides in the face of situations." The underlying logic is that if these cognitive elements can be identified and adjusted, it would lead to behavioral changes in various aspects of an individual's life. However, a more contemporary perspective acknowledges that individuals are not isolated from their social environment. In fact, in certain situations, the external context might have a predominant influence compared to cognitive elements (Stern, 2000). Rather than challenging the central idea of models, which is that individual decision-making could be "faulty" (Maloney and Ward, 1973) and requires intervention, this perspective has encouraged the inclusion of various contextual indicators to enhance the understanding of individual decisions (Barr, 2003; Martin & al., 2006; Olli & al., 2001).

According to Hungerford and Volk (1990), human behavior towards the environment can be broken down into three distinct categories, as illustrated in Figure 1, summarizing their model. These categories include initial elements, personal elements, and empowerment elements, all of which play a crucial role in shaping environmentally friendly behaviors. At the core of these initial elements, we find "environmental awareness," perceived as a central element. Next, personal elements encompass factors that have profound meaning for the individual and influence their eco-responsible behavior. Two dominant aspects in this category are "detailed understanding of ecological issues" and "individual engagement." Empowerment elements, on the other hand, pertain to an individual's conviction of their capacity to positively influence the ecological future. In this perspective, Hungerford and Volk (1990) have highlighted factors such as "mastery of ecological action methods," "perception of control," and "willingness to intervene" as key determinants of environmentally responsible behavior.
2.2 ENVIRONMENTAL CLUBS AS A GROUND FOR ENVIRONMENTAL EDUCATION

Environmental clubs in Morocco are emerging as valuable instruments for promoting environmental education. Positioned at the intersection of formal pedagogy and civic action, they are embedded in the Moroccan educational landscape that increasingly recognizes the importance of raising awareness about sustainability and environmental challenges.

Environmental clubs, integrated within educational institutions, play a crucial role in putting the principles of environmental education into practice. These clubs function as learning grounds where theory meets practice, enabling students to engage in concrete actions while enhancing their understanding of environmental issues.

By relying on robust pedagogical frameworks, such as those described by Kolb (1984) on experiential learning, these clubs provide an immersive learning experience. Students are placed at the core of real environmental issues, allowing them to apply theoretical knowledge to concrete situations while developing an enhanced sense of responsibility and belonging to their environment (Hungerford & Volk, 1990).

Furthermore, these clubs often tend to focus on local issues. In Morocco, for instance, this might include water management in semi-arid regions, reforestation initiatives to combat desertification, or pollution awareness campaigns. By dedicating themselves to local concerns, students can witness the direct impact of their efforts. This local focus thereby strengthens their commitment and provides them with a sense of making a genuine difference in their community (Ballantyne & Packer, 2005).

These clubs, beyond raising awareness, aim to cultivate in students cross-cutting skills such as decision-making, teamwork, and problem-solving – essential skills for future responsible citizens engaged in the preservation of their environment (Tilbury, 1995).
In the Moroccan context, the establishment and vitality of environmental clubs are not by chance. Indeed, their importance is underscored by an array of official documents, including Ministerial Note No. 42/2001, which regulates the creation and activation of educational clubs. This direction is further reinforced by Ministerial Notes No. 87/2003 and No. 155/2011 concerning the activation of school life, demonstrating the state's intention to fully integrate these clubs into the national educational landscape. Additionally, Framework Law No. 51-17 and Morocco's strategic vision, notably through the roadmap, further consolidate this approach by providing a broader framework for environmental initiatives within the education system.

However, the success of these clubs largely depends on their ability to evolve in response to the changing needs of the community and the environmental landscape. Morocco, as a developing country facing unique ecological challenges, requires an adaptive approach to Environmental Education. The significance of integrating local and traditional knowledge into the curriculum, for instance, cannot be underestimated.

It's also worth noting that the success of environmental clubs in Morocco is not solely attributed to their theoretical framework or pedagogical approach. The passion, commitment, and determination of the teachers, students, and community members who support them play an equally crucial role.

In summary, environmental clubs in Morocco embody the intersection of theory and practice in Environmental Education. They provide students with a platform to turn their knowledge into action while drawing inspiration from the specific needs and challenges of their local context. By combining education and action, these clubs pave the way for a future where environmental education is not just a subject of study but also a way of life. As we continue to explore the concept of EE toward "ecocitizenship," it becomes evident that environmental clubs in Morocco are pioneers of this transformation.

3 METHODOLOGY

In order to rigorously assess the impact of environmental clubs on the promotion of ecocitizen behavior, we have chosen the propensity score matching method, a widely recognized approach for estimating causal effects in social sciences (Rosenbaum and Rubin, 1983). This method involves pairing each member of the treatment group (in our case, students who are members of environmental clubs) with a similar participant from the control group, thus providing an unbiased estimate of the treatment effect (Stuart,
2010). By doing so, we aim to neutralize potential disparities between the two groups and, consequently, obtain a more precise measure of the actual influence of environmental clubs on students' behavior (Ho et al., 2007). The correct implementation of this method is intended to ensure that our conclusions are based on a solid foundation, minimizing the risk of erroneously attributing behavioral differences solely to club participation (Morgan and Winship, 2015).

3.1 SAMPLE

_Treatment Group (Environmental Clubs):_

The treatment group in this study consisted of 241 participants. These participants were selected from active members of environmental clubs in two public institutions. To ensure complete representativeness, all active club members within these institutions were invited to participate in this study.

_Control Group:_

The control group consisted of 255 participants. These individuals were drawn from two public institutions that did not have environmental clubs. Random selection was applied among the students of these institutions to create this sample (Stuart, 2010).

A crucial criterion in this study was geographical proximity. To minimize confounding effects related to location, the decision was made to choose pairs of institutions (one with a club and the other without) that were close to each other. This approach aimed to mitigate potential influences of local contexts on students' behaviors and ensure that the differences observed between the two groups were primarily attributable to the presence or absence of environmental clubs (Ho et al., 2007).

The Table 1 details the socio-demographic specifics of our sample: within the treatment group, we have a distribution of 52.5% men and 47.5% women, while the control group shows 47.7% men and 52.3% women; it's noteworthy that both genders are well represented, providing a balanced distribution. The survey encompasses both rural and urban environments, and we have also considered both literary and scientific educational paths, ensuring diversity and adequate representation for our analyses.

| Table 1. Gender and Socio-Demographic Distribution in Treatment and Control Groups |
|---------------------------------|---------|---------|
| The existence of an environmental club | No (0) | Yes (1) |
| Gender | male | 52.5% | 47.7% |
| | female | 47.5% | 52.3% |
| Age | 11 – 15 years | 0.8% | 52.7% |
| | 16 - 20 years | 98.4% | 47.3% |
Data Collection:

In the empirical part of our study, a rigorous data collection method was implemented. Data were collected through a questionnaire administered individually to each student participating in the environmental club, ensuring comprehensive coverage of our target population.

Our questionnaire is structured into two main sections:

Awareness (Perception): The objective of this section is to assess the impact of the clubs on increasing students' awareness of environmental issues. It aims to determine whether active participation in the clubs enhances understanding of ecological challenges, raises greater awareness of the urgency of current environmental issues, and promotes individual responsibility for ecosystem preservation.

Ecocitizen Actions: This section goes beyond a simple evaluation of knowledge; it seeks to determine whether exposure to and engagement in the clubs result in tangible changes in environmentally friendly behaviors. It explores the adoption of concrete actions, the transformation of daily habits, and the incorporation of sustainable practices into students' lives, while highlighting the relevance and effectiveness of the clubs as tools for awareness and action.

Each of these segments evaluates students in four key areas: energy, water, waste, and biodiversity. These domains were selected following a preliminary study of the club's activities, ensuring the relevance and appropriateness of our approach.

The analysis of responses relies on the use of a 5-point Likert scale. This choice, based on previous research, allows for nuanced and precise responses, facilitating the understanding of students' attitudes and behaviors (Jones & Thurstone, 1955; Likert, 1932). The Likert scale, by offering a range of response options, proves to be an effective
instrument for measuring attitudes, opinions, and perceptions, especially in the environmental domain (Dillman, Smyth, & Christian, 2009).

4 RESULTS AND DISCUSSION

The objective of our study was to measure the impact of environmental clubs on the pro-environmental behavior of participants. To achieve this, it was crucial to use an analysis method that could eliminate or minimize biases that might skew our results. Therefore, the choice was made to use the propensity score matching method, and the analyses were conducted using IBM SPSS software.

Propensity score matching has significant advantages when it comes to making comparisons between groups. The main benefit of this method is its ability to create comparison (or "control") groups that are similar to the treated group on a set of observed characteristics (Rubin, D. B. 2001). In other words, it allows for the comparison of individuals who participated in environmental clubs with others who did not but have similar profiles on other relevant variables. This ensures that the differences observed in pro-environmental behavior are not due to other confounding factors (Rosenbaum, P. R., & Rubin, D. B. 1983).

By using this method, we were able to isolate the actual effect of environmental clubs on pro-environmental behavior, neutralizing the impact of other variables that could influence the results. Thus, the conclusions drawn from our analysis provide a clearer and more objective view of the impact of clubs on participants.

To ensure rigorous matching of individuals in our study, we paid particular attention to the selection of control institutions. Geographic proximity was a key criterion to eliminate any potential bias due to locality (Cutter, 1995). Furthermore, to ensure relevant comparison, we made sure that the selected institutions belonged to the same educational level, whether it was middle school or high school.

To further refine this matching and ensure a robust analysis, several variables were integrated into our model, as depicted in Figure 2:
**Course:** The specialization or course chosen by the individual can influence their sensitivity or exposure to environmental issues. This may reflect an interest or predisposition to pro-environmental behaviors.

**Father's Education Level:** Various studies have shown that parents' education levels can influence the values, beliefs, and behaviors transmitted to their children. For example, a parent with a higher level of education may be more inclined to value and transmit environmental concerns.

**Mother's Education Level:** Similar to the father's education level, the mother's education level also plays a significant role in the transmission of values and attitudes towards the environment.

**Sources of Environmental Information:** The information channels preferred by an individual can influence their understanding of environmental issues. A person who primarily obtains information through engaged media or environmental documentaries may have a different perspective than someone who obtains information through other means.

These variables were chosen not only for their theoretical relevance but also because they provide a nuanced approach to understanding pro-environmental behavior.

Table 2 presents the results obtained after performing the matching using the propensity score:
According to our methodology, we identified 166 students in each group who match in terms of the selected baseline variables. Using the propensity score matching method, this results in a successful matching rate of 69%, equivalent to 166 perfectly matched pairs.

Figure 3 clearly illustrates the distribution of the two groups before and after the matching process. Before matching, disparities are visible between the distributions of the two groups. However, after applying the propensity score matching method, the two groups exhibit nearly identical distributions, highlighting the success of our matching method and the similarity achieved between the groups.

Following the propensity score-based matching, we have created two well-defined sets: one composed of participant individuals and the other of non-participants. These two now similar groups provide us with the opportunity to precisely evaluate the impact of environmental clubs on ecological behaviors and awareness. This matching ensures that both groups are comparable concerning variables that might influence their scores, thus ensuring a reliable assessment of the club’s effect.
In the section dedicated to environmental awareness in our questionnaire, two distinct components were identified. The first revolves around a test aimed at evaluating students' knowledge of various environmental issues. The second, on the other hand, aims to determine, through a 5-point Likert scale, the extent to which students believe that a certain habit or behavior can harm the environment. To provide a concrete measure of this awareness, a score was calculated for each student based on their responses. A high score indicates an increased awareness of environmental issues.

Regarding the ecocitizen actions section, students were asked about the frequency with which they engage in various environmentally-friendly behaviors, ranging from "never" to "very often." Just like in the previous section, an average score was derived from each student's responses to quantify their daily ecocitizen engagement.

The results are illustrated in Figure 4. Upon examining the graph, it is evident that the scores of students who participated in the clubs significantly differ from those of students who did not. From a descriptive standpoint, it can be readily stated that environmental clubs have a notable impact by increasing students' environmental awareness and inducing a more positive orientation towards the environment. To determine if this effect can be directly attributed to club participation, we will conduct an independent samples t-test after propensity score matching.

![Figure 4. The distribution of scores obtained by students](source)

Source: Prepared by the authors

After descriptively demonstrating that the impact of the clubs is beneficial both in terms of environmental awareness and eco-citizen behavior, we proceeded to use the
independent samples t-test. This test determines whether the observed difference between
the means of the two groups can be attributed to chance or if it is statistically significant.

The null hypothesis of the t-test suggests that there is no significant difference
between the two groups, meaning that their averages would come from the same
population. The p-value is an indicator of the likelihood of observing such a difference if
the null hypothesis were true. A p-value less than 0.05 is typically interpreted as an
indication that the difference is not due to chance.

In our study, the details of this analysis are presented in Table 3. These results
proved to be significant, indicating a notable difference between students participating in
the clubs and those who do not, in terms of awareness of environmental challenges and
eco-citizen actions.

Furthermore, the Levene's test, which assesses the equality of variances between
the two groups, also turned out to be significant for our two variables of interest. This
strengthens the validity of our t-test results as it confirms the homogeneity of variances.

<table>
<thead>
<tr>
<th>Independent Sample Testing</th>
<th>Levene's test for equality of variances</th>
<th>t-test for equality of means</th>
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<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
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Source: Prepared by the authors

In summary, based on the propensity score matching method, our results are
significant and clearly support our initial hypothesis. Environmental clubs, as a form of
EE, play a crucial role in raising students' awareness. They not only increase their
environmental awareness but also equip them with a better understanding of current
ecological challenges. Furthermore, our study shows that these clubs positively influence
students' behavior, guiding them towards an ecocitizen approach. Thus, environmental
clubs emerge as an essential tool for shaping the ecocitizens of tomorrow, who are aware of the issues and actively engaged in protecting our planet.

5 CONCLUSION

In conclusion, our study demonstrates the significant effectiveness of environmental clubs in raising awareness and engaging students in active ecocitizenship. The importance of environmental clubs cannot be underestimated. They reflect a dynamic, participatory, and action-oriented education. However, their success and sustainability are closely tied to institutional support and adequate teacher preparation. To build a generation that is conscious and proactive, it is imperative to overcome these obstacles and recognize EE as a fundamental pillar of our educational system.

It is crucial to take further action on the curriculum. While we acknowledge a cross-cutting vision of EE in current programs, the idea of introducing a dedicated subject for this education could strengthen its importance and visibility within educational institutions.

The widespread implementation of the "Eco-School" program across all schools in the country would standardize environmental education, ensuring that every student is exposed to the same essential information, regardless of their geographical location or socio-economic background.

Furthermore, the role of teachers is central. We strongly recommend encouraging them not only to create more environmental clubs but also to actively participate in them. However, this will only be possible if institutions recognize the importance of these activities in shaping students' education. Thus, integrating extracurricular activities, including club leadership, into teachers' working hours would be a significant advancement. Taking action from the initial training of teachers is crucial. By focusing this training on the development of environmental practices, an ecological awareness is instilled from the outset in future educators. These trained and sensitized teachers then become vectors for transmitting an environmental ethic from the foundation of education (Junger, A. & al.; 2023).

Currently, the world is undergoing an unprecedented digital transformation, profoundly altering the way we live, work, and learn. Digital education, with its vast possibilities, has proven to be a revolution, offering multiple opportunities for learning and engagement for students worldwide. Digital tools and platforms have opened doors
to more interactive teaching methods, richer resources, and global connectivity. However, as digital education gains popularity and relevance, it is crucial to value and strengthen it in the field of Environmental Education. In this context, the integration of digital tools can amplify its impact. For the successful fusion of EE and digital education, it is imperative that educational institutions ensure educators are well acquainted with the various digital tools, platforms, and programs at their disposal. By mastering these resources, they can use them optimally to enhance their teaching and make environmental learning more engaging and effective. Beyond educator training, it is our collective duty to ensure that all students, regardless of their socio-economic background, have equal access to educational resources (Zahynei-Zabolotenko, Z. & al.; 2023). In an increasingly digitized society, ensuring equitable access to digital education is not only a matter of social justice but also a key element in securing a sustainable future for our planet.

In conclusion, the positive impact of environmental clubs is undeniable, but to build a generation that is truly aware and proactive in addressing environmental challenges, a comprehensive and coordinated effort from all educational stakeholders is essential.
REFERENCES


