

Impact Of Environmental Education On The Development Of Environmental Awareness: A Systematic Review

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Abstract

The objective of this systematic review was to analyze the impact of environmental education on the development of environmental awareness by evaluating 11 selected studies. The methodology involved a comparative analysis of published research, classified according to criteria such as origin, study type, methodological approach, and contributions. Studies from various countries and both quantitative, qualitative, and mixed approaches were included. The results indicated that educational programs with interdisciplinary and participatory approaches are the most effective in fostering meaningful environmental awareness. It was observed that environmental education is particularly impactful when implemented from early stages, positively correlating with the development of sustainable attitudes. However, deficiencies in public policy implementation were identified, as regulations in various contexts fail to adequately influence the formation of strong environmental awareness.

Regarding the methodologies used in the studies, quantitative approaches predominated (46.7%), though there is a growing interest in qualitative approaches, allowing a deeper analysis of the factors influencing environmental awareness. The conclusions highlight the need for stronger public policies and well-designed educational programs that integrate cognitive, affective, and behavioral dimensions of environmental awareness. Additionally, community participation and continuous evaluation are essential to ensure the effectiveness of these programs.

Keywords: *Environmental education, environmental awareness, interdisciplinary, public policies, community participation.*

1. INTRODUCTION

In recent decades, the world has witnessed an alarming increase in environmental problems, such as pollution, biodiversity loss, and climate change. These phenomena not only affect ecosystems, but also put the quality of life of future generations at risk (IPCC, 2021). Faced with this situation, the urgent need to generate significant changes in human behaviors to reverse environmental damage has been recognized. Globally, governments, non-governmental organizations and educational institutions have promoted various initiatives in order to foster greater environmental awareness and responsibility (UNESCO, 2020).

One of the main mechanisms proposed to face this crisis is environmental education. This form of education aims to sensitize people to ecological issues and equip them with the knowledge needed to adopt sustainable practices in their daily lives (Sterling, 2014). Through environmental education, it seeks to promote a change in attitudes and behaviors towards the environment, in order to preserve and restore natural resources (Gough, 2018). However, although the potential benefits of this tool have been theorized, its real impact on people's environmental awareness is still debated in different contexts (Bonnett, 2020).

The development of environmental awareness in local populations is crucial to achieve an effective transformation in the interactions between humans and nature. Environmental awareness is not limited to knowing ecological problems, but involves a deep understanding of the causes and consequences of these problems, together with an active commitment to solving them (Kollmuss & Agyeman, 2002). Despite the importance of this concept, many educational programs lack adequate integration of components that drive critical reflection and environmental activism in local communities (Wals et al., 2014).

In this sense, it is pertinent to explore how environmental education contributes to the development of authentic environmental awareness in different cultural and geographical contexts. Research has shown

that there are significant variations in the effectiveness of environmental education according to the social, economic, and cultural characteristics of populations (Heimlich & Ardoin, 2008). However, the extent to which these factors influence the success of educational programs and how their implementation can be improved to maximize their impact on environmental awareness is still unknown (Monroe et al., 2019).

In the case of Peru, the city of Trujillo faces particular environmental challenges that demand an educational approach adjusted to its local reality. Increasing urbanization, increased pollution, and deforestation in the region have exacerbated environmental problems, requiring immediate action (MINAM, 2021). However, educational strategies aimed at promoting environmental awareness in the population of Trujillo have not always achieved the expected results (Torres et al., 2020). This raises the need to evaluate how environmental education programs are being implemented and what their true impact has been in transforming citizens' attitudes towards the environment.

The relationship between environmental education and the development of environmental awareness is not linear. While teaching ecological principles is expected to lead to increased environmental awareness, the reality is more complex (Moseley, 2000). Factors such as the level of community participation, access to educational resources, and individuals' personal experiences can influence the effectiveness of environmental education (Rickinson, 2001). In this sense, it is essential to analyze how these variables interact with each other to determine the results of environmental education programs in specific contexts such as that of Trujillo (Muñoz et al., 2021).

Despite the efforts made, there is still no clear consensus on the best educational strategies to promote lasting environmental awareness in populations (Stevenson et al., 2013). Previous research has explored diverse approaches, but has often neglected a comprehensive analysis of how specific social and cultural factors influence the reception and adoption of sustainable practices (Ballantyne & Packer, 2005). This paper seeks to provide a more complete perspective on how environmental education can influence the development of environmental awareness, considering local contexts and the social dynamics of populations (Stern et al., 2014).

Consequently, this systematic review aims to evaluate the impact of environmental education on the development of environmental awareness, with a particular focus on the city of Trujillo. Through the identification of previous studies and the integration of their findings, it is expected to contribute to the understanding of the best educational practices to promote sustainability in communities, as well as to highlight the areas that require further research and attention to improve the effectiveness of environmental education programs (Tilbury, 2011).

II. THEORETICAL FRAMEWORK

Regarding the existing literature; Valenzuela and Quispe (2022) aimed to evaluate the impact of environmental education programs on changing pro-environmental attitudes in secondary school children in Lima. The methodology used was quasi-experimental, with an experimental group and a control group. The sample was composed of 120 high school students from a public educational institution. Structured questionnaires were used to measure environmental attitudes before and after the intervention. The results showed that students who participated in environmental education programs had a significant improvement in their level of awareness and disposition towards sustainable behaviors, compared to the control group. In conclusion, environmental education programs have a positive impact on raising awareness and adopting pro-environmental practices among students.

Gonzales et al. (2023) sought to evaluate the effectiveness of environmental education strategies in the development of environmental competencies in rural populations of Arequipa. A qualitative methodology was used, with a case study approach. The sample was made up of 45 people from rural communities. Semi-structured interviews and participant observation were used as instruments to collect information. The results indicated that participatory workshops and hands-on outdoor activities were effective in increasing understanding of and commitment to environmental preservation. In conclusion,

environmental education in rural contexts must include practical and contextualized activities to maximize its effectiveness.

Huamán and Castro (2021) aimed to analyze the impact of the inclusion of specific modules on environmental problems on the ecological awareness of higher education students in the La Libertad region. A quantitative methodology with a pre-test-posttest design was used. The sample included 150 students from different university careers. The instruments used were environmental awareness assessment questionnaires. The results showed that the inclusion of environmental modules in the curriculum significantly improved the level of knowledge and the ability of students to identify and propose solutions to local ecological problems. In conclusion, integrating environmental education into higher education contributes positively to the development of ecological awareness.

Müller et al. (2020) sought to determine the impact of environmental education programs on modifying the environmental behavior of high school students in German schools. They used a quantitative methodology with a pre-test and post-test design with a control group. The sample included 200 high school students. A questionnaire on environmental attitudes and behaviors was used as an instrument. The results showed that students exposed to interactive activities and awareness programs exhibited more pro-environmental behavior, compared to those who did not participate in the programs. In conclusion, environmental education programs based on interactive activities are effective in promoting positive environmental behaviors.

Wong and Lee (2021) aimed to investigate how environmental education influences the development of pro-environmental behaviors among urban residents of Beijing. The methodology used was mixed, combining surveys and in-depth interviews. The sample was composed of 300 urban residents. The instruments included questionnaires to measure environmental awareness and interviews to delve into participants' perceptions and practices. The results indicated that informal education, such as community campaigns and family activities, had a positive impact on raising awareness of air pollution and taking measures to reduce the carbon footprint. In conclusion, informal environmental education plays an important role in the adoption of sustainable behaviors in urban contexts.

Rodríguez et al. (2022) aimed to analyze the impact of environmental education on the ecological awareness of rural communities in Chiapas. A qualitative methodology with an ethnographic approach was used. The sample consisted of 50 inhabitants of rural communities. The instruments used included in-depth interviews and focus groups. The results showed that awareness-raising workshops and practical activities significantly increased the level of knowledge and willingness of participants to get involved in environmental protection. In conclusion, the adaptation of educational content to the cultural and social context of rural communities is crucial to achieve greater effectiveness in the development of environmental awareness.

Environmental education is defined as an educational process whose objective is to develop in individuals knowledge, skills, attitudes and values that allow them to act in favor of the environment and sustainability. According to Sterling (2014), environmental education should be a transformative tool, which not only informs students about environmental problems, but also motivates them to adopt pro-environmental behaviors and actively participate in the protection of the environment. This approach promotes a change in people's relationship with the environment, favoring the adoption of sustainable and responsible practices.

One of the most relevant theories for environmental education is David Kolb's (1984) Experiential Learning Theory. This theory states that learning is a dynamic process in which experience plays a central role. Kolb says that individuals learn best through direct experience, which is fundamental for environmental education, since contact with nature and active participation in environmental activities allow for a greater understanding of ecological problems and encourage engagement with the environment. In the field of environmental education, experiential learning facilitates the internalization of knowledge through practical activities, such as reforestation or waste management, promoting an emotional connection with the environment.

Another relevant theory is the Theory of Reasoned Action by Fishbein and Ajzen (1975), which holds that people's attitudes and beliefs influence their intentions and, consequently, their behavior. In the context of environmental education, this theory suggests that environmental information and knowledge provided to individuals can change their beliefs and attitudes towards the environment, which will eventually lead to changes in their behaviour. In this way, environmental education can be an effective

tool to transform pro-environmental intentions into concrete and sustainable actions, as long as the factors that affect individual decisions, such as social norms and the perception of control, are considered.

Environmental education is made up of several dimensions that allow the educational process to be approached in a comprehensive way. Gough (2018) mentions three main dimensions of environmental education: cognitive, affective, and behavioral. The cognitive dimension refers to the knowledge and understanding of environmental problems, as well as the causes and consequences of these problems. The affective dimension involves the development of positive attitudes towards the environment, including concern for and appreciation of natural resources. Finally, the behavioral dimension is related to the adoption of concrete actions to protect the environment, such as reducing the consumption of resources or participating in environmental campaigns.

According to Hungerford and Volk (1990), the cognitive dimension alone is not enough to promote behavior change, since it is also necessary to influence attitudes and develop skills for action. In this sense, environmental education must be understood as an integral process that seeks, in addition to knowledge, motivation and empowerment of individuals to act in favor of the environment. In this way, the cognitive, affective and behavioural dimensions interact with each other to achieve a significant change in people's behaviours towards the environment, reinforcing the crucial role of education in sustainability.

Environmental awareness is defined as the level of knowledge, attitudes, and actions that individuals possess in relation to the environment and its protection. According to Kollmuss and Agyeman (2002), environmental awareness involves a complex process that includes understanding environmental issues, developing positive feelings towards nature, and motivating to engage in pro-environmental behaviors. That is, it not only comprises the cognitive dimension of knowledge about the environment, but also the emotional attitudes and values that lead to environmental action. This awareness is essential for sustainability, as only through a comprehensive understanding and emotional commitment to the environment can the behavioural change necessary to address today's ecological problems be promoted.

A theory relevant to the understanding of environmental awareness is Ajzen's (1991) Theory of Planned Behavior. This theory states that a person's behavior is determined by his or her intention to act, which is influenced by three main factors: the attitude toward behavior, the subjective norm, and the perceived control of behavior. In the context of environmental awareness, this theory suggests that in order for individuals to adopt pro-environmental behaviors, they must have positive attitudes toward caring for the environment, perceive that significant others value that behavior, and feel that they have the control necessary to act sustainably. Therefore, environmental awareness develops when these three dimensions are aligned, allowing intentions to be translated into concrete actions.

Another relevant theory is the Social Identity Theory of Tajfel and Turner (1979), which holds that people tend to act in accordance with the norms and values of the groups to which they belong. In terms of environmental awareness, this theory highlights the importance of belonging to social groups that value the environment and promote sustainable behaviors. According to Clayton (2003), environmental identity is an extension of social identity that influences the way individuals perceive and act in relation to the environment. If a person identifies with a pro-environmental group, they are more likely to adopt positive behaviors towards the environment, contributing to the development of a stronger environmental awareness.

Environmental awareness can be broken down into three dimensions: cognitive, affective, and behavioral, according to Hungerford and Volk (1990). The cognitive dimension refers to the knowledge that individuals have about the environment, ecological problems and their causes. This dimension is critical, as it provides the basis for understanding the seriousness of environmental issues. The affective dimension is related to feelings, values and attitudes towards the environment, including the development of an emotional connection with nature. Finally, the behavioral dimension involves the willingness and ability to act in favor of the environment, through specific behaviors such as recycling, reducing consumption and participation in community activities.

Stern (2000) complements this approach by suggesting that responsible environmental behavior depends on a combination of personal, social, and contextual factors. The cognitive dimension, although important, does not always guarantee adequate environmental behavior; Emotions and attitudes (affective dimension) are crucial to promote the necessary actions. In addition, environmental awareness is influenced by the social and cultural context in which individuals operate, reinforcing the need to work in all dimensions in an integrated manner to achieve a true transformation towards sustainable practices. Environmental education, therefore, must address not only knowledge, but also emotions and practical action to foster effective environmental awareness.

III. METHODOLOGY

The present research employed a qualitative approach with a type of study based on systematic review. This type of methodology allows synthesizing and rigorously analyzing the existing literature on a specific topic, which is essential to know the current state of knowledge and the existing gaps on the impact of environmental education on the development of environmental awareness. According to Siddaway et al. (2019), a systematic review is a valuable method for pooling relevant evidence, identifying patterns, and evaluating the consistency of findings, thus providing a comprehensive view of the study phenomenon.

The study design is a systematic review, which is based on the collection, selection, and analysis of research articles previously published in indexed academic journals. The systematic review was carried out in accordance with the guidelines of PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Moher et al., 2009), ensuring the transparency and replicability of the search and selection process of the articles. This design allows for a critical and in-depth analysis of the existing literature, contributing to the understanding of the key variables: environmental education and environmental awareness.

The variable "environmental education" was conceptually defined as a training process whose objective is to promote knowledge, skills, and attitudes for the protection and preservation of the environment (Sterling, 2014). Operationally, the implementation of programs, courses, workshops and activities related to environmental education described in the selected articles was considered. On the other hand, the variable "environmental awareness" was conceptually defined as the level of knowledge, attitude, and commitment towards the environment and its preservation (Kollmuss & Agyeman, 2002). Operationally, it was measured through the assessment of change in attitudes and behaviors towards the environment, as described in the results of the studies reviewed.

The study population consisted of research articles published in the last five years in indexed journals, which addressed the issue of environmental education and its impact on environmental awareness. For the selection of studies, specific inclusion and exclusion criteria were established. The inclusion criteria were: studies evaluating environmental education programs, research published between 2018 and 2023, peer-reviewed articles available in English or Spanish. Exclusion criteria included studies that did not specifically address the relationship between education and environmental awareness, publications prior to 2018, and non-peer-reviewed papers, such as editorials and letters to the editor.

The instrument used for data collection was the bibliographic file, a tool that allows recording key information about each of the selected articles, such as authors, year of publication, objectives, methodology, results and conclusions. According to Hernández-Sampieri et al. (2014), the use of bibliographic records facilitates the organization and analysis of the information collected, which is essential to identify patterns and make comparisons between the different selected studies. Each bibliographic record was systematically structured to ensure uniformity in data collection.

The method of analysis consisted of a qualitative synthesis of the results reported in the selected studies. Common themes, differences, and contradictions between studies were identified to provide a comprehensive view of the impact of environmental education on the development of environmental awareness. The thematic analysis technique (Braun & Clarke, 2006) was used, which allows identifying and organizing significant patterns in the literature. Through this analysis, we sought to understand the

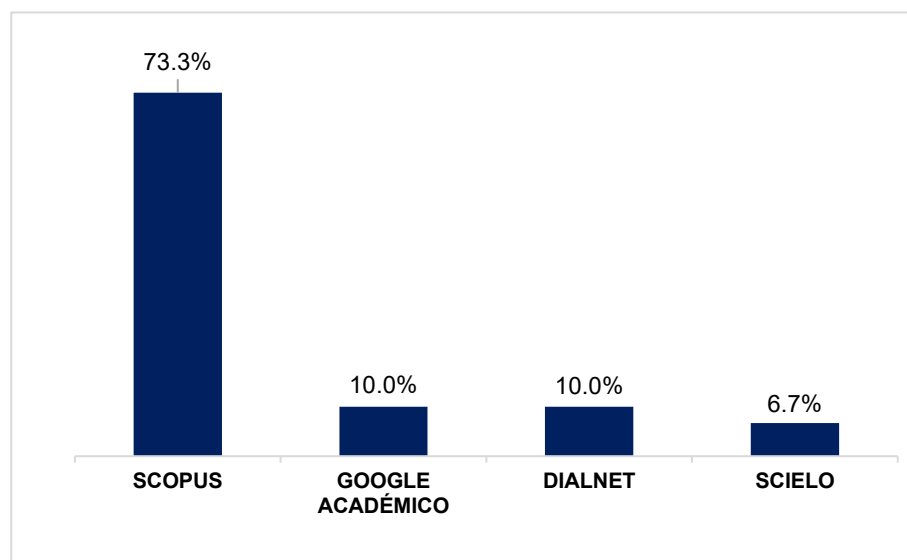
environmental education strategies that have shown the greatest effectiveness and the factors that influence the development of environmental awareness in different contexts.

As for the ethical aspects, the fundamental principles of scientific research were respected. No primary data were collected and no intervention was performed with human subjects, so the approval of an ethics committee was not required. However, the copyright of the studies analyzed was respected, properly citing all sources of information according to the publication standards (APA, 2020). In addition, objectivity and transparency were guaranteed in the selection and analysis of studies, avoiding biases that could affect the quality of the review.

IV. RESULTS AND DISCUSSION

The systematic review on the impact of environmental education on the development of environmental awareness encompasses a diverse body of research demonstrating the importance of this approach in fostering sustainable attitudes.

Figure 1 Search engines



The origin of the selected studies is visible depending on the search engine used. Similar to the general results of other research, Scopus was the most relevant source, contributing 73.3% of the studies included in this review, while Google Scholar, Dialnet and Scielo represented 26.7% of the total.

This distribution indicates that, although other databases offer valuable studies, most of the high-quality research comes from Scopus, highlighting its importance in the field of environmental education.

Figure 2 Document Type



The distribution of the selected type of document follows one of the inclusion criteria, which only admitted theses or articles. In this case, 6.7% of the documents reviewed were theses, while the remaining 93.3% were scientific articles published in academic journals. This reflects the predominance of peer-reviewed scientific literature in research on environmental education and environmental awareness.

From the analysis, it was possible to identify 11 studies relevant to the subject; such as the study by Rueda (2017), where a program was implemented in a rural community in Lambayeque, Peru, which identified deficiencies in the environmental awareness of students, teachers, and the community. This work proposed the creation of the Environmental Council for Rural Educational Development (CADER) to

guarantee the sustainability of the program, reflecting the importance of a participatory and community approach in environmental education.

In research conducted by Jara Valverde and Tapia Molina (2022), the relationship between environmental education and environmental awareness in high school students in Abancay, Peru, was studied. The results indicated a significant correlation ($r = 0.8239$) between both concepts, underlining the positive impact that education has on the environmental awareness of young people. This study reinforces the need for effective educational programs in the early stages of school life.

Díaz Saganome (2019), for his part, examined the shortcomings in environmental education policy in Colombia, highlighting that, despite the existence of environmental regulations, a lack of awareness persists in society. The essay proposes the revision of educational methodologies to raise awareness among the population about the importance of taking care of natural resources, emphasizing that environmental education must be more effective in generating changes in society's behavior.

Arriola (2017) addressed the relationship between environmental education and environmental awareness in students of the Faculty of Civil Engineering of the César Vallejo University in Lima. This study found significant correlations between environmental education and the cognitive, affective, and conative dimensions of environmental awareness, suggesting that training in these aspects is crucial in technical careers such as engineering, where career decisions can have a direct impact on sustainability.

The study by Hurtado and Solórzano (2021) evaluated the impact of environmental education on the awareness of students at the Mater Misericordiae Educational Unit in Ecuador. Through an initial diagnosis, unfavorable results were identified in the affective, cognitive, dispositional, and active dimensions of environmental awareness. However, the implementation of an educational program allowed a significant improvement in the students' knowledge and environmental behavior.

Núñez Tobar et al. (2023) analyzed the integration of environmental awareness into the Chilean curriculum, finding an imbalance in the teaching of the dimensions of environmental awareness. The study showed that cognitive and dispositional aspects predominate over affective and behavioral aspects, which limits the integral development of a critical and active environmental awareness among students.

Hernández Vigil (2020) presented an essay proposing strategies for the incorporation of environmental education in Peruvian universities. This work emphasizes the importance of integrating sustainable development into curricula, in accordance with the UN Sustainable Development Goals, and highlights that universities have a fundamental role in the formation of leaders with environmental awareness.

The article by Hanco Halire and Campana Concha (2019) explored the relationship between environmental awareness and environmental education in fifth-grade students in educational institutions in Abancay, Apurímac. The results showed a very high correlation ($Rho = 0.952$) between both variables, suggesting that environmental awareness significantly influences students' environmental values, beliefs, and attitudes.

Flores Hinostroza et al. (2023) addressed the issue of education for sustainability in the context of the National University of Education in Ecuador. The study focused on the need to implement reforestation and ecological restoration programs on the university campus and its surroundings to reduce environmental pollution and raise awareness among students about the importance of preserving the natural environment.

The work of Estrada Araoz et al. (2020) evaluated the effectiveness of the "Let's Take Care of the Environment" program in primary school students in Madre de Dios, Peru. The results indicated that, after 12 educational sessions, students significantly improved their level of environmental awareness, going from a regular level to a high level, which demonstrates the effectiveness of this type of program in basic education.

Finally, Díaz's (2019) essay reviewed the failures in environmental education in Colombia and the lack of awareness in society, suggesting that poor environmental education contributes to the lack of care for the environment. This article underscores the need to improve educational plans and awareness-raising strategies to address this problem in the Colombian context.

The articles selected according to their contribution were analyzed:

Article	Context	Type of Study	Main contribution
Rueda (2017)	Environmental education in a rural	Educational program with a	Design of an educational program with an ecosystem and

		community in Lambayeque, Peru	participatory approach	interdisciplinary approach to improve environmental awareness
Jara Valverde & Tapia Molina (2022)		Relationship between environmental education and environmental awareness in students in Abancay, Peru	Correlational study	Significant positive correlation between environmental education and environmental awareness
Díaz (2019)	Saganome	Environmental education and environmental awareness policy in Colombia	Critical essay	Identification of shortcomings in environmental education policy in Colombia
Arriola (2017)		Environmental Education in Civil Engineering Students at UCV, Lima	Correlational study	Significant Relationships Between Environmental Education and Dimensions of Environmental Awareness in University Students
Hurtado & Solórzano (2021)		Environmental education in students of an educational unit in Ecuador	Evaluation study	Significant improvement in environmental awareness after the implementation of educational strategies
Núñez Tobar et al. (2023)		Analysis of the integration of environmental awareness in the Chilean curriculum	Qualitative Documentary Analysis	Identification of an unbalanced integration of environmental awareness in the Chilean curriculum
Hernández (2020)	Vigil	Environmental Education Strategies in Peruvian Universities	Critical-propositional essay	Proposal of strategies to integrate environmental education in universities
Hanco Halire & Campana Concha (2019)		Relationship between environmental awareness and education in students in Abancay, Apurimac	Correlational study	Very high correlation between environmental awareness and education in elementary school students
Flores Hinostroza et al. (2023)		Education for sustainability at the National University of Education, Ecuador	Participatory action research	Proposal for an ecological restoration program to improve environmental awareness
Estrada Araoz et al. (2020)		Effectiveness of an environmental program in elementary school students in Madre de Dios, Peru	Experimental study	Evidence of the Program's Effectiveness in Improving Environmental Awareness in Elementary Students
Díaz (2019)		Failures in environmental education and lack of awareness in Colombia	Critical essay	Criticism of the lack of effectiveness of environmental education in Colombia

The results obtained from this systematic review on the impact of environmental education on the development of environmental awareness offer important guidelines that could be applied in various ways in the educational, political and social spheres. Here are some possible applications:

Contribution	Practical Application
Development of ecosystem and interdisciplinary educational programs.	Create programs that involve the educational community, such as the Environmental Council for Rural Educational Development (CADER).
Reinforcement of environmental education from early stages.	Implement activities and curricula that directly relate environmental education to awareness at an early age.
Review of environmental education policies to improve their effectiveness.	Modify and adjust regulations so that environmental education is more effective and contextualized.
Incorporation of educational strategies in university education.	Include modules on environmental awareness in university degrees, especially in those that directly affect the environment.
Promotion of community participation in environmental programs.	Encourage active community participation in environmental programs to ensure their long-term sustainability.
Better integration of the dimensions of environmental awareness in the curricula.	Better balance the affective, cognitive, dispositional and behavioral dimensions of environmental awareness in the curricula.
Use of participatory methodologies to promote active awareness.	Implement techniques such as participatory action research to ensure that students acquire active environmental awareness.
Evaluation of existing environmental programs to improve their effectiveness.	Evaluate current environmental education programs, identifying areas for improvement to make them more effective.
Development of environmental leaders from universities.	To train professionals with knowledge in sustainability, in accordance with the UN Sustainable Development Goals (SDGs).
Adjustment of educational programs according to the needs and context of the students.	Design educational strategies that are adapted to the specific realities and needs of each group of students.

Based on the above; It can be said that in order to improve environmental education policies, it is essential to adopt a comprehensive approach that allows for a more effective approach to current environmental challenges. A first step would be to ensure that environmental education is a fundamental and transversal part of school curricula, so that it is not limited to a specific subject, but is present in all areas of knowledge. This would allow students not only to acquire theoretical knowledge, but also to be able to apply environmental principles in various contexts. According to Núñez Tobar et al. (2023), one of the weaknesses identified in the Chilean curriculum is the predominance of cognitive and dispositional dimensions over affective and behavioral dimensions. To achieve greater effectiveness, it would be necessary to balance these aspects, allowing students to understand and become emotionally involved with environmental issues.

The active participation of the community is another key factor in improving environmental education policies. Involving social actors beyond students and teachers, such as parents, local authorities and community members, can strengthen the impact of educational programmes. Rueda (2017) highlighted that, in a program developed in a rural community in Lambayeque, Peru, the creation of the Environmental Council for Rural Educational Development (CADER) was crucial for the entire community to be involved in the protection of the environment. This shows that the participation of multiple actors in the educational process not only enriches learning, but also generates a sense of shared responsibility towards the environment.

Continuous evaluation and adjustment of educational programs are also critical to ensure that policies are effective. Tilbury (2007) stressed that successful policies include periodic evaluation mechanisms,

which allow adjustments to be made as programs are implemented. This is particularly important in a context where environmental problems are evolving rapidly and solutions must be constantly adapted. For example, Estrada Araoz et al. (2020) evaluated the effectiveness of an environmental education program in primary school students in Peru, finding that after the implementation of the program, levels of environmental awareness improved significantly. This shows the importance of regularly measuring the impact of policies and making the necessary modifications to improve outcomes.

One aspect that should also be improved is the training of teachers in environmental education. Policies should ensure that educators are well prepared to teach about environmental issues, providing not only theoretical content, but also pedagogical tools that allow them to integrate these topics in practical and meaningful ways into their classrooms. According to Díaz Saganome (2019), one of the problems in Colombia is the lack of preparation of teachers to address environmental education effectively. Investing in teacher training could have a lasting impact on the quality of environmental education and on the development of critical awareness among students.

Another key element is the incorporation of action-based learning strategies. According to Hungerford and Volk (1990), meaningful learning in environmental education occurs when students are an active part of solving real environmental problems. Hurtado and Solórzano (2021) applied this approach in their research in Ecuador, demonstrating that students significantly improved their environmental awareness when they were involved in practical activities and projects based on their local environment. Including participatory learning strategies in education policies could ensure that students develop a deeper and more active environmental awareness.

Environmental education policies must also be aligned with the UN Sustainable Development Goals (SDGs), as proposed by Hernández Vigil (2020). Universities, in particular, have a crucial role to play in the formation of future environmental leaders, and it is necessary for educational policies at this level to promote sustainability as a basic principle in all academic programs. This involves not only teaching about sustainability, but also making sure that educational institutions act as models of sustainable practices in their management and daily operations.

Strengthening education policies also involves ensuring that they are inclusive and equitable. Rural communities and those in situations of environmental vulnerability should be prioritized in the implementation of environmental education programs, since they are usually the most affected by environmental degradation. Jara Valverde and Tapia Molina (2022) found that environmental education has a significant impact on the environmental awareness of secondary school students, reinforcing the idea that these policies should be available to all educational levels and in all regions, regardless of their geographical location.

In addition, policies should include an ethical dimension that fosters students' ability to make informed and responsible decisions in relation to the environment. According to the Brundtland Commission (1987), environmental education must go beyond the simple transmission of knowledge to promote skills that enable people to live sustainably. This means that educational programs must be oriented not only to teach about environmental problems, but also to develop competencies that allow students to act ethically and responsibly in the face of these challenges.

Finally, environmental education policies must be conceived as a long-term investment. The actions and programs implemented today will have an impact on future generations, and it is essential that governments and educational institutions work together to ensure the sustainability of these efforts. Environmental education should not be seen as a peripheral issue, but as a central component of education policies, crucial to ensuring a sustainable future for all.

V. CONCLUSIONS

–Environmental education is most effective when it is implemented in an interdisciplinary and participatory manner, as demonstrated by Rueda (2017), where community participation significantly improves environmental awareness.

- The integration of environmental education into school curricula must better balance the cognitive, affective, and behavioral dimensions, as Núñez Tobar et al. (2023) point to a cognitive predominance that limits the comprehensive development of environmental awareness.
- Environmental education in early stages is crucial to form conscious citizens. Studies such as that of Jara Valverde and Tapia Molina (2022) confirm that an educational intervention from childhood can have a positive and lasting impact on environmental awareness.
- Public policies on environmental education need to be reviewed and strengthened. According to Díaz Saganome (2019), existing regulations in countries such as Colombia are not effectively implemented, which affects the formation of adequate environmental awareness.
- Most of the studies reviewed use quantitative approaches, indicating a preference for measuring the impact of environmental education through numerical data, although there is a growing interest in qualitative approaches for a more in-depth analysis of the factors that influence environmental awareness.
- Continuous evaluations of environmental education programs need to be implemented to ensure their long-term effectiveness. Estrada Araoz et al. (2020) demonstrate that educational programs improve environmental awareness, but their success depends on constant monitoring and adjustments based on the results obtained.

REFERENCES

1. Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
2. Arriola, C. (2017). Education and the development of environmental awareness in civil engineering students at the César Vallejo University. *Campus Magazine*, 22(24), 5. <https://doi.org/10.24265/campus.2017.v22n24.05>
3. Ballantyne, R., & Packer, J. (2005). Promoting environmentally sustainable attitudes and behaviour through free-choice learning experiences: What is the state of the game? *Environmental Education Research*, 11(3), 281-295.
4. Bonnett, M. (2020). Environmental education and the issue of nature. In P. Higgins & D. Jickling (Eds.), *Sustainability education*. Springer.
5. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101. <https://doi.org/10.1191/1478088706qp063oa>
6. Clayton, S. (2003). Environmental identity: A conceptual and an operational definition. In S. Clayton & S. Opatow (Eds.), *Identity and the natural environment: The psychological significance of nature* (pp. 45-65). MIT Press.
7. Díaz Saganome, D. N. (2019). Shortcomings in environmental education policy and lack of environmental awareness in Colombia. Nueva Granada Military University.
8. Díaz, D. (2019). Shortcomings in environmental education policy and lack of environmental awareness in Colombia. Nueva Granada Military University.
9. Flores Hinostroza, E. M., López González, W. O., & Paredes Benavides, A. G. (2023). Education for sustainability: Environmental awareness and education. *Ibero-American Journal of Research in Education*, 7(1), 82. <https://doi.org/10.58663/riied.vi7.82>
10. Estrada Araoz, E. G., Mamani Uchasara, H. J., & Huaypar Loayza, K. H. (2020). Effectiveness of the Let's Take Care of the Environment Program in the Development of Environmental Awareness of Primary School Students in Madre de Dios, Peru. *Ciencia Amazónica (Iquitos)*, 8(1), 282. <https://doi.org/10.22386/ca.v8i1.282>
11. Gough, A. (2018). Education and the environment: Policy, trends, and the problems of marginalization. *Environmental Education Research*, 24(4), 1-13.
12. Hanco Halire, D., & Campana Concha, A. R. (2019). Environmental awareness and environmental education in fifth grade students in the educational institutions of the Abancay - Apurimac area, 2018. *Big Bang Faustiniiano*, 8(2), 518. <https://doi.org/10.51431/bbf.v8i2.518>
13. Heimlich, J. E., & Ardoin, N. M. (2008). Understanding behavior to understand behavior change: A literature review. *Environmental Education Research*, 14(3), 215-237.
14. Hernández-Sampieri, R., Fernández Collado, C., & Baptista Lucio, M. P. (2014). *Research Methodology* (6th ed.). McGraw-Hill.
15. Hernández Vigil, E. P. (2020). Environmental education and the strengthening of environmental awareness in university students. *YACHAQ*, 3(1), 116. <https://doi.org/10.46363/yachaq.v3i1.116>
16. Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *The Journal of Environmental Education*, 21(3), 8-21. <https://doi.org/10.1080/00958964.1990.10753743>
17. Hurtado, T., & Solórzano, B. (2021). Environmental education for environmental awareness in students of the Mater Misericordiae educational unit, Calceta Cantón Bolívar. *Escuela Superior Politécnica Agropecuaria de Manabí Manuel Félix López*.
18. IPCC. (2021). *Climate Change 2021: The Physical Science Basis*. Cambridge University Press.
19. Jara Valverde, G. M., & Tapia Molina, T. (2022). Education with an environmental focus and the development of environmental awareness in students of Abancay. *Revista Latinoamericana Ogmios*, 2(4), 32. <https://doi.org/10.53595/rlo.v2.i4.032>
20. Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239-260. <https://doi.org/10.1080/13504620220145401>
21. MINAM. (2021). *National Report on the State of the Environment in Peru 2021*. Ministry of the Environment of Peru.

22. Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine*, 6(7), e1000097. <https://doi.org/10.1371/journal.pmed.1000097>
23. Monroe, M. C., et al. (2019). Chapter 4: Improving educational impact in environmental education. In *International Handbook of Research on Environmental Education*. Routledge.
24. Moseley, C. (2000). Teaching for environmental literacy in higher education. *Environmental Education Research*, 6(3), 275-285.
25. Muñoz, V., et al. (2021). Environmental education and the development of ecological skills in urban contexts. *Education and Society*, 22(1), 55-78.
26. Núñez Tobar, J., Vargas Navarrete, N., Oyarzún Morel, J. D. D., & Oyarzún Morel, J. D. D. (2023). Analysis of the integration of environmental awareness in environmental education in the Chilean curriculum. *Pensamiento Educativo: Journal of Latin American Educational Research*, 60(2), 5. <https://doi.org/10.7764/pel.60.2.2023.5>
27. Rickinson, M. (2001). Learners and learning in environmental education: A critical review of the evidence. *Environmental Education Research*, 7(3), 207-320.
28. Rueda, R. (2017). Environmental education program to promote environmental awareness. Pedro Ruiz Gallo National University.
29. Siddaway, A. P., Wood, A. M., & Hedges, L. V. (2019). How to do a systematic review: A best practice guide for conducting and reporting narrative reviews, meta-analyses, and meta-syntheses. *Annual Review of Psychology*, 70(1), 747-770. <https://doi.org/10.1146/annurev-psych-010418-102803>
30. Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56(3), 407-424. <https://doi.org/10.1111/0022-4537.00175>
31. Stern, P. C., et al. (2014). Understanding the social and behavioral aspects of climate change. *Proceedings of the National Academy of Sciences*, 111(4), 15821-15828.
32. Stevenson, R. B., et al. (2013). Critical issues in the sustainability movement. *Journal of Environmental Education*, 44(4), 1-7.
33. Sterling, S. (2014). Separate tracks or real synergy? Achieving a closer relationship between education and sustainable development. *Journal of Education for Sustainable Development*, 8(1), 89-112.
34. Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. G. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33-47). Brooks/Cole.
35. Tilbury, D. (2011). Education for sustainable development: An expert review of processes and learning. UNESCO.
36. Torres, J., et al. (2020). Evaluation of environmental education strategies in Trujillo: Results and challenges. *Journal of Environmental Education of Peru*, 11(3), 45-61.
37. UNESCO. (2020). Education for Sustainable Development: A Roadmap. United Nations Educational, Scientific and Cultural Organization.
38. Wals, A. E. J., et al. (2014). Social learning towards sustainability: Global narratives, regional programs, local actions. *Sustainability*, 6(3), 1412-1435.