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Training processes and environmental management: a contribution to education for sustainable development

Procesos de capacitación y gestión ambiental: una contribución a la educación para el desarrollo sostenible

Trinidad Esmeralda Vilchis Pérez
Universidad Autónoma de Guerrero (México)

José Luis Aparicio López[1]
Universidad Autónoma de Guerrero (México)

Esperanza Terrón Amigón
Universidad Pedagógica Nacional (México)

Columba Rodríguez Alviso
Universidad Autónoma de Guerrero (México)

Hilda Janet Arellano Wences
Universidad Autónoma de Guerrero (México)

Benjamín Castillo Elías
Universidad Autónoma de Guerrero (México)

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Abstract

Recognizing the importance of the role of teachers in addressing environmental issues in the classroom helps to generate better development prospects. The objective of this research was to assess the effects of a training process on environmental thinking of teachers at a private

[1] Email: joselopez@uagro.mx

university. We worked with the methodology of social representations, mixed approach, and a sample of 20 teachers. Data were analyzed using frequency tables and graphs, content analysis and natural semantic networks. The results show that teachers share *reduced*, *anthropocentric-technical* and *globalizing* social representations. The representation field focuses on nature, its care and administration. This research has implications for teaching; it demonstrated the importance of developing training processes for an adequate approach to environmental and sustainability issues in a teaching team. A limitation of the research was found in the contingency conditions due to the COVID-19 pandemic. The study concludes that updating processes on environmental issues are a resource to enrich teachers' ideas and arouse their interest in education for sustainable development.

Keywords: teacher training, social representations, environmental thinking.

Resumen

Reconocer la importancia del papel de los profesores al abordar los problemas ambientales en el aula ayuda a generar mejores perspectivas de desarrollo. El objetivo de esta investigación fue evaluar los efectos de un proceso de capacitación sobre el pensamiento ambiental de los profesores de una universidad privada. Se trabajó con la metodología de representaciones sociales, enfoque mixto y una muestra de 20 profesores. Los datos se analizaron mediante tablas de frecuencia y gráficas, análisis de contenido y redes semánticas naturales. Los resultados muestran que los docentes comparten representaciones sociales reducidas, antropocéntrico-técnicas y globalizadoras. El campo de representación se centra en la naturaleza, su cuidado y administración. Esta investigación tiene implicaciones para la enseñanza; demostró la importancia de desarrollar procesos de capacitación para un enfoque adecuado de los problemas ambientales y de sostenibilidad en un equipo docente. Se encontró una limitación en las condiciones de contingencia debido a la pandemia de COVID-19. El estudio concluye que los procesos de actualización en tema ambientales son un recurso para enriquecer las ideas de los profesores y despertar su interés en la educación para el desarrollo sostenible.

Palabras clave: capacitación docente, representaciones sociales, pensamiento ambiental.

Introduction

The great challenges facing the world today have made the member countries of the United Nations (UN) feel the need to propose alternatives to eradicate extreme poverty, hunger, and armed conflicts, as well as to promote climate change mitigation. Since 2015, the Sustainable Development Goals (SDGs) of the 2030 Agenda have become a strategy to address these problems and act for the benefit of people, the planet and prosperity, as well as to strengthen universal peace and cooperation between countries [Organización de las Naciones Unidas [ONU], 2015).

The vision of this global agenda was included in the document Education for Sustainable Development Goals, issued by the United Nations Educational, Scientific and Cultural Organization (UNESCO), where commitments are established for the implementation of pedagogies that favor the transformation of the lifestyles of the population (UNESCO, 2017), likewise this article considers the SDGs as an alternative to the challenge of transforming the modern global system and in search of a balance that addresses the most pressing needs (UNESCO, 2017).

SDG 4 Quality Education, in its target 4.7, recognizes Education for Sustainable Development (ESD) to ensure that students develop cross-cutting competencies in sustainability and acquire knowledge that will make them informed individuals, able to understand and take responsibility for the impact of their actions on the environment. (UNESCO, 2017).

For this reason, it is important for educational institutions to study the results of the ESD implementation within academic structures and the impact of culture (Begum, Jingwei, Haider, Ajmal, Khan & Han, 2021), attitudes (Marcos-Merino, Corbacho-Cuello & Hernández-Barco, 2020; Sayan & Kaya, 2016), perceptions (Maurer & Bogner, 2019), participation (Valackienė & Kairienė, 2019), training and communication (Hamón, Martinho, Ramos & Aldaz, 2020; Kanyimba, Richter & Raath, 2014; Murphy, Smith, Kelly, Pitsia & Martínez, 2021) in its development. The interest is because automatic educational practices have been identified, focused on sporadic activities that seek to address specific problems but do not include a deeper reflection on their origin (Benayas, Marcen, Alba & Gutiérrez, 2017; Taddei, 2011), mainly in some environmental management processes that are carried out as part of ESD.

The literature review identified that environmental management is conceptualized as a mere combination of processes for the reduction of the institution's negative impact on the environment (Organización Internacional de Normalización, Sistemas de Gestión Ambiental [ISO 14001], 2015). The evaluation of these processes does not include the assessment of the knowledge acquired by the actors, the impact it has on their ways of thinking and acting, and the contribution in their knowledge, thoughts and actions for sustainability (Benayas et al., 2017).

This analysis also revealed that: (a) teachers participate in few environmental training or updating sessions, where the contents have a technical and remedial approach that focuses on momentary solutions, which translates into *reduced* Social Representations (SR) of the environment, as established by Terrón & González (2012). This leads to passive attitudes of little commitment to the institution and the environment, which limits deep reflections on the human-environment relationship (Taddei, 2011); and (b), activities to approach environmental issues and ESD monitoring are implemented by management personnel, who often lack professional training in environmental issues (Kadji-Beltran, Zachariou & Stevenson, 2012; Müller, Lude & Hancock, 2020).

Education has the challenge of contributing to the solution of environmental problems from a complex and multidisciplinary vision, which includes the development of skills in teachers to guide students towards harmonious coexistence with the environment and with people (Fuertes-Camacho, Graell-Martín, Fuentes-Loss & Balaguer-Fàbregas, 2019; Pauw, Gericke, Olsson & Berglund, 2015). Therefore, training in environmental issues is fundamental as a tool for the implementation of ESD, since it allows the improvement of professional competencies with the incorporation of active learning methodologies, in practices that have traditionally been developed with a mechanical and remedial approach (Benayas et al., 2011; Terrón & González, 2012; Collazo-Expósito & Granados-Sánchez, 2020).

To integrate ESD in educational institutions, it is necessary for teachers to have skills to plan, execute, lead, and evaluate environmental management actions (Benayas et al., 2011). The analysis of the incidence of these skills in their ideas, thoughts, behaviors, and attitudes can evidence the importance of including sustainability in their training, given the influence of these aspects in their teaching practice and in their students (Begum et al., 2021). The study of SRs allows access to these collective elements through a specific methodology.

The identification of SRs can be useful to understand the symbolic constructions that teachers elaborate on the environment and sustainability, as well as the sense and meaning they give to them. The analysis of the collective common sense thinking on these issues allows access to the way in which individuals interpret reality and determine their actions (Mireles, 2019; Moscovici, 1979).

Authors such as Terrón & González (2012), Morote and Hernández (2020) and Mireles (2019), propose an approach with teaching teams, to know how they assume their participation in environmental activities, the meaning they construct and the sense of the information they transmit to their students. These data can contribute to establish a direct link between the management of environmental issues and academic work, a necessary condition to achieve sustainability in educational institutions (Benayas et al., 2011; Taddei, 2011).

Varela-Losada, Arias-Correa, Pérez-Rodríguez & Vega-Marcote (2019), agree with the previous statement, emphasizing the importance of including in the initial training of teachers' actions that allow them to reflect on environmental and sustainability issues, and to acquire a new way of seeing and understanding the world.

On the other hand, Vilchis, Aparicio, Terrón, Rodríguez & Arellano (2021), identified lack of knowledge of the term environmental management and *reduced* SR in teachers of a private school community; a utilitarian character predominated, focused on economic savings; likewise, the representations of sustainability were characterized as *weak*, since they related them to the conservation of natural resources for human benefit. The study led to the proposal of a teacher training process to promote the construction of more complex SRs.

With this background, the central question of this research arose:

What are the effects of a training process on environmental and sustainability issues on teachers' SRs?

Considering the foregoing, the objective was to assess the effects of a training process on environmental thinking of teachers at a private university.

The present research contributes to the understanding of the complex relationships between SR and ESD; it seeks to offer empirical evidence on the advantages of broadening the study of environmental management, incorporating the academic and the social; to delve into the thoughts, feelings, and emotions that a training process on environmental and sustainability issues can generate in teachers, and its possible influence in the schoolroom.

Analysis of the formative processes from the Social Representations

The implementation of ESD in educational institutions requires methodologies to evaluate its effects. The literature that addresses this topic is extensive, but it focuses on assessing the results through parameters that allow achieving certification, as well as recording student behaviors resulting from its application (Berglund, Gericke & Chang-Rundgren, 2014; Pauw & Petegem, 2011; Olsson, Gericke & Chang-Rundgren, 2015; Pauw et al., 2015). Other papers emphasize the importance of ESD teacher training; however, their evaluation focuses on the end products or student achievement outcomes following the application of ESD pedagogies (Collazo-Expósito & Granados-Sánchez, 2020; Murphy et al., 2021).

It is important to know the impact of ESD on students; however, teachers are a fundamental part of achieving the objectives pursued by ESD, so it is necessary to investigate how teacher training processes affect not only the acquisition of knowledge, but also their way of thinking, feeling and acting.

In order to examine how teachers, give meaning to the topics addressed in training, the study of social representations (SR) can be useful, since its methodology allows understanding the symbolic constructions that individuals and groups elaborate when they select new information from the surrounding environment and incorporate it into their daily knowledge (Moscovici, 1979).

Through the Theory of Social Representations, Moscovici (1979) proposed a method to understand the way in which social groups interpret their reality. Although he does not offer an operational definition of SRs, he conceives them as sets of ideas, images and attitudes in constant change that produce behaviors derived from the relationships that people establish with the environment that surrounds them.

According to Moscovici (1979), SRs have three dimensions: information, field of representation and attitude. The first refers to the way in which the group selects part of the knowledge that surrounds it and incorporates it into its daily life; the second is the meaning that the group gives to the object of representation; the third refers to the evaluative and emotional reaction that individuals manifest to the information received and internalized.

To access SRs, there are qualitative methods that correspond to the processual approach, focused on the social construction of SRs and in which interviews, questionnaires, surveys, and life histories are mainly used (Fuentes & Murillo, 2020). Quantitative methods can also be applied that seek to know the specific modalities adopted by SRs in terms of their central core; for this purpose, free association, associative charts are used, as well as methods for identifying the organization and structure of SRs (Piña & Cuevas 2004). According to Abric (2001), the combination of both methods allows a better understanding of the object of study.

SRs are neither general nor universal; they are developed around an object, subject, situation, or event, and are expressed by a particular social sector; they serve to relate the world to everyday life and these associations determine the group's behavior towards the environment (Jodelet, 1986).

The characteristics described above have allowed the study of SR to be addressed in different fields, including education.

There is an abundant bibliography on SRs constructed in the school, where the role of educational agents is emphasized, because through them it is possible to access the way in which they construct a particular way of thinking about the processes that take place within them (Piña & Cuevas 2004).

One aspect of these studies is the one that analyzes environmental education and sustainability from the teachers' point of view. A representative example is that carried out by Terrón and González (2012) in the study of environmental education, social representations of basic education teachers and their educational implications, in which they proposed a typology of SRs in environmental education. To this purpose, they delved into the teachers' thinking on how to approach the human-nature relationship in environmental education, considering a wide spectrum that ranges from anthropocentric ideas in which

nature is thought of as a resource used by the economic system for production, to those that move towards a conception in which human beings are included as part of nature and are aware of their responsibility in the use they make of it; he analyzes its context, the political, economic and social system to draw conclusions about environmental problems and the need to achieve equity and social justice.

The typology of Terrón and González (2012) classifies these thoughts in five categories:

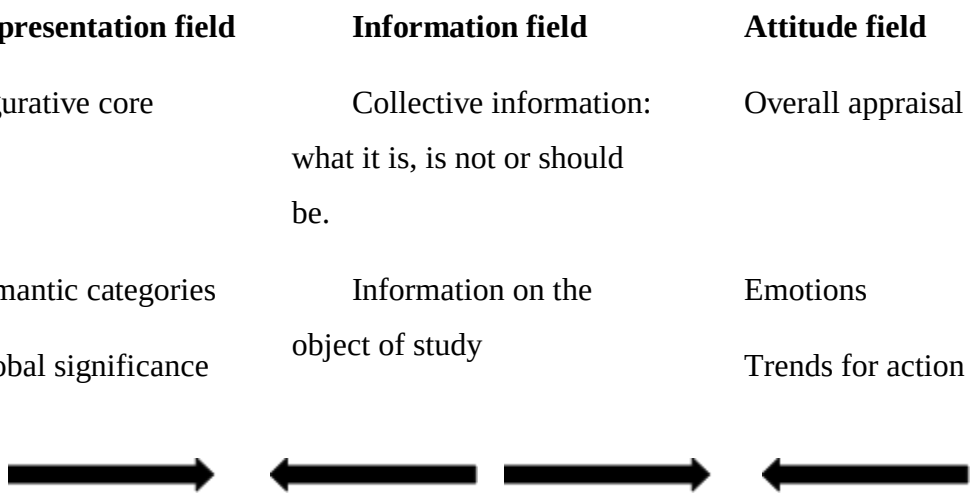
- Reduced. Nature is given intrinsic value. The environmental problem is restricted to ecological deterioration.
- Globalizing. There is a harmonious relationship between society-nature. Capacities and values are developed.
- Anthropocentric-technical. This considers progress and preservation, using rational skills and the belief that science and technology will solve the environmental crisis. Resources are used to satisfy human needs.
- Integral. There is a humanistic sense that reflects a search for balance between social welfare and nature, for a better coexistence between societies.
- Critical. They include reflections that question socio-cultural, political, and economic aspects and their relationship with environmental issues; they propose changes.

This typology is considered important to evaluate the SRs of teachers with pedagogical training, since it allows identifying how they incorporate environmental information or information on sustainable development into their knowledge and express it in their daily professional work.

For Mireles (2019), one of the main tasks in SR studies is to access the field of representation, to know its constituent elements and the way in which they are organized, related and integrate a figurative nucleus; for it, the author elaborates diagrams or tables to visualize the relationship that the actors give to the elements that make up the representation. In this way, as Moscovici (1979) points out, the most important ideas can be distinguished, translated into reality and the dynamics of their associations identified (Figure 1).

Figure 1.

Elements of the three-dimensional analysis of SRs.



Note: Own elaboration based on Mireles (2019).

The identification of SR can be a starting point for the implementation of ESD training programs, in which the approach to environmental management from a transdisciplinary, comprehensive, and humanistic approach (Fuertes-Camacho et al., 2019; Terrón & González, 2012, Vilchis et al., 2021a; Vilchis et al., 2021b), contributes to the transformation of educational practice, environmental thinking and the implementation of processes that guide towards sustainability. Authors such as Escoz-Roldán et al. (2019), Ferrari, Ballegeer, Fuertes, Herrero, Delgado, Corrochano, Andrés-Sánchez, Marc-Bisquert, Garcia-Vinuesa, Meira, Martinez & Ruiz (2019), Morote & Hernández (2020), Ortega-Sánchez, Alonso-Centeno & Corbí (2020) and Meira-Cartea, Gutiérrez-Pérez, Arto-Blanco & Escoz-Roldán (2018), consider that it is necessary to develop strategies for teachers to integrate SR of the broader environmental problem and contribute, both in the training of future graduates and in the design of possible solutions to a problem, as serious as it is urgent.

The study of environmental management from SR theory has several implications; it focuses more on collective rather than individual practices; it delves into the ideas that motivate environmentally relevant actions and contributes to new thinking, aimed at dissolving social inequalities and creating global environmental justice (Batel, Castro, Devine-Wright & Howarth, 2016).

1. Materials and Methods

1.1. Type of research and scope

The research had a mixed approach of descriptive scope; the design was non-experimental and cross-sectional. A questionnaire was designed for the collection and analysis of quantitative and qualitative data, with closed-ended, open-ended, multiple choice and free word association questions. To analyze the responses to the questionnaire, it was considered pertinent to use the typology proposed by Terrón and González (2012), since it allows classifying the ideas according to the approach given to the man-nature relationship. Moscovici's (1979) three dimensions of SRs were considered: information, attitude, and field of representation. In addition, the processual and structural approaches were applied; the former based on content and the latter on hierarchization. Its development covered the period August 2020-February 2021.

1.2. Population and sample

The research was carried out at the Universidad Español Campus Diamante, located in Acapulco, Mexico; it was chosen for the following reasons: a) its educational model promotes training in values, entrepreneurship and educational quality; b) it has broad coverage at three educational levels (middle school, high school and undergraduate); c) its infrastructure was designed to contribute to environmental care; and d) its directors show a growing interest in leading the institution towards sustainability.

During the 2020-2021 school year, the secondary and high school community was made up of 2 directors, 1 academic coordinator, 4 administrators, 2 maintenance people, and 210 students, served by 32 teachers from different disciplines. This group of teachers was considered as the population for the development of this study. Since it was a small population, it was decided to conduct a census, all of them received the questionnaire designed to collect the information; however, since only 20 teachers answered it (n=20), for methodological convenience it was decided to include them in the study sample. Considering the above, the sampling was simple random.

1.3. Methodological procedure

This study is part of a broader doctoral research. Based on the results obtained in a diagnostic stage (pre-test) of the SRs of the teachers of the same institution (Vilchis et al., 2021a), a training agenda (intervention) was developed with four courses, designed and taught by specialists in the proposed areas. It was carried out through videoconferences; each course had a duration of two face-to-face hours and two hours of independent work. The topics were: environmental management, principles of environmental integration, environmental integration strategies, and environmental education (Vilchis et al., 2021b). All academic staff participated in this activity (n=32).

Against this background, in the present research, a three-phase evaluation of SRs (post-test) was carried out:

1.3.1. First phase. Construction of the instrument

The questionnaire designed by Vilchis et al. (2021a) was used as a reference; it was adjusted and divided into five sections (Table 1).

Table 1

Sections and axes of analysis of the questionnaire

Section	Analysis axes	Response type	Procedure for data analysis
1. General data	Age, place of birth, marital status, sex, schooling	Multiple choice	Frequency tables and graphs in Excel
2.Information sources/knowledge	Sources of academic information. Type of SR that people construct with the information (of environmental management: reduced, globalizing, anthropocentric-technical, integral, or critical).	Open-ended questions	Content analysis
3. Representation field	Words related to environmental management.	Free association of words	Natural semantic networks
4.Purpose/Focus	Objective of environmental management.	Multiple choice	Frequency tables and graphs in Excel
5.Attitudes/Participation	Tendencies towards participation in an institutional environmental management program. Type of attitudes towards the possibility of implementing an environmental management program.	Open-ended questions	Content analysis ranking

Note. Elaboration based on Vilchis et al. (2021a).

The purpose of the questionnaire was to determine the general characteristics of the teachers and the information they receive and select from the environment, as well as the attitudes they express after having received training on environmental issues. The five sections consisted of closed and open-ended questions and free word association. The validity and reliability of the instrument was obtained through the expert judgment technique. The construct was presented to a group of five specialists in environmental issues, management and social representations; they discussed the relevance and cohesion of the items and made adjustments until reaching an agreement and validating it.

1.3.2 Second phase. Application of instruments

The questionnaire was designed in a Google form. It was sent to the faculty's institutional e-mails, until the corresponding sample was completed (n=20).

1.3.3 Third phase. Data analysis

Subsequently, the file with the closed responses to the questionnaire was exported to Excel, version 2013; the information was analyzed by means of frequency tables and graphs.

The answers to the open questions were processed with the qualitative content analysis method, methodology that is applied to the social sciences in which the meaning and the grouping of thematic categories are prioritized. It consists of a preliminary reading, to identify possible categories, followed by an in-depth reading to classify them; finally, they were encoded to record their frequency (Mayring, 2014). The free association of words was analyzed with the technique of natural semantic networks applied to RS, used by Mireles (2019).

The first fifteen words with the highest semantic value were considered and distributed into four quadrants. Each quadrant represented 25% of the semantic distance between words. The quadrants were ordered from highest to lowest semantic weight, with each word moving closer to or further away from the central nucleus according to the weight obtained.

The M value (semantic value or MV) was obtained by multiplying the frequency of each word by the hierarchy given to it by each subject when writing it (first, second or third place). The semantic distance (frequency value of the semantic value of the FVMG

group) is the distance between each word; it was calculated using a rule of three, starting from the word with the highest semantic weight (MV), which represents 100%. The semantic distance is shown in percentage and forms the SAM (Semantic Association Memory) set or figurative core of the representation.

1.4. Ethical considerations

In order to comply with the ethical criteria for research on human subjects, established in the Declaration "Helsinki II" the Bioethics Committee of the Universidad Autónoma de Guerrero, approved the specifications for consent for participation, included in the questionnaire (CB-001/2019). By answering the questionnaires, the subjects accepted the terms of reference; they were informed of the purpose of the research and the use that would be made of the data, guaranteeing confidentiality and anonymity. As a way of thanking and validating the study, the results were made known to the university's educational community.

2. Results

This section presents the results of the questionnaires to learn about the SRs shared by teachers after the training agenda. In four of the sections, the achievements are detailed in the form of frequencies, since according to (López, 2002), content analysis allows categorizations and counts with which groupings can be made. In the representation field section, the central core is shown a four-quadrant scheme (Mireles, 2019). The achievements are presented in the order of each of the sections of the questionnaire.

2.1. General Information

The faculty is mostly composed of people between 22 and 32 years old (80%); single (65%); and with a bachelor's degree (80%). The male gender predominates (60%). Regarding the place of birth, most refer to the city of Acapulco (70%) (Table 2).

Table 2

General population data

Aspects	Answer	%
Age	22-32	80
	33-43	15
	44-63	5
Origin	Acapulco, Guerrero, México	70
	Other municipalities in the state of Guerrero	10
	Other places in the country or other countries	20
Marital status	Never married	65
	Married	30
	Divorced	5
Genre	Men	60
	Women	40
Scholarship	Bachelor´s Degree	80
	Masters Degree	20

Note. Own elaboration

2.2. Information and knowledge

Twenty-five percent of the population surveyed stated that they had received information on the care of resources or solid waste management from different areas of knowledge; these types of responses were categorized as various and occupied first place in the mentions. In second place they referred to Natural Sciences (20%) and in third place to Biology (15%).

The subjects, Sustainable Development, Ecology, Entrepreneurship and Mathematics each received 5% of the mentions; 5% said none; 5% said all.

As for the activities or events carried out at school, the ones with the highest incidence were the transversal projects (35%), followed by waste collection and separation (15%); essays, readings and lectures add up to 5%, and videoconferences, 5%.

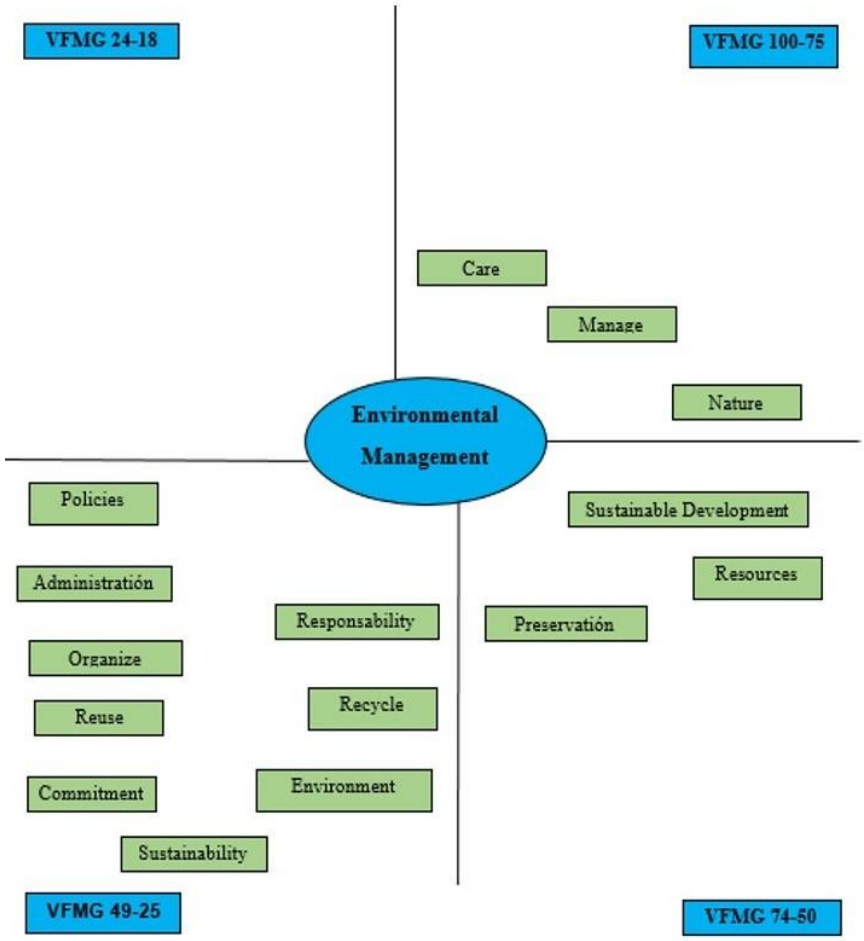
The sense and significance that the participants gave to environmental management was categorized using the classification proposed by Terrón & González (2012) as a reference. A predominance of *reduced* SRs (25%) and *anthropocentric-technical* SRs (25%) was observed, followed by *globalizing* SRs (20%). Ten percent of the participants stated that they did not know the meaning of environmental management.

2.3. Field of representation

Regarding the structure and organization of the SRs, the achievements obtained are detailed in Figure 2.

Figure 2

Four-quadrant schematic of the semantic network kernel (SAM set).



Note. The distribution of the words was made considering the semantic distance (VFMG) according to the values indicated in each quadrant. Within the 15 words that formed the core of the semantic network, no words were found with VFMG between 24 and 18, so the fourth quadrant is empty. Own elaboration based on Mireles (2019).

The meaning that teachers give to environmental management is centered on care and management, as these are the main elements located in the first quadrant; the term nature is also found but separated from the first two by twenty points. In the second quadrant

are sustainable development, resources and conservation. All three terms are related to the conservation of resources for a development that can be sustained over time. The remaining nine evoked words are in the third quadrant. Some are related to values (responsibility and commitment); others to remediation (recycle and reuse), the natural environment (environment), conservation (sustainability) and administration (management, organization and policies).

The data show that care is identified as the main objective of environmental management, but the terms administration and nature also have an important weight due to the relationship between the meanings of the words management-administration and environmental-nature, commonly assumed as synonyms. Subjects interpret environmental management as referring to the care of nature through its proper administration.

The word conservation is in the second quadrant, close to resources and sustainable development, revealing that participants consider it important to conserve resources so that future generations can enjoy them. The appearance of the term responsibility and commitment in the third quadrant is indicative of the identification of environmental management with values. Actions aimed at remediation, recycling and reuse are also placed in this quadrant. The word sustainability is mentioned, with a broader and more comprehensive meaning than sustainable development. Finally, management, organization and policies are related to the term "management" in its economic meaning.

2.4. Purpose and approach

Seventy percent of the participants identified environmental management with an economic approach, since they related it to administration in two ways: within the institution with the care of materials to *save money*, and in the environment through the idea of nature as a *resource* that should be extracted moderately so that it can remain at the service of human beings for a longer period. They considered it important for the institution to comply with environmental regulations, an aspect that is part of the administrative processes.

It is also related to social aspects, such as the care of natural resources, because everyone has the right to them (15%), and environmental aspects, which have to do with the implementation of efficient systems for the reduction and management of waste, as well as the care of water and light, to reduce the negative impacts of the institution on the natural environment (15%).

2.5. Attitudes and participation

In a hypothetical situation in which the educational institution was invited to participate in an environmental management program, the participants were asked how the institution should respond. 63% said they would be willing to participate; 11% considered that a survey should be conducted to get the school community's opinion; 21% believed that training should be offered to staff before starting; and 5% said they did not know how the university would respond to this invitation.

3. Discussion

This study aimed to evaluate the effects of a training process for the reconceptualization of environmental issues in a group of professors from a private university. The main findings are discussed below.

3.1. Information

The obtained results in the information dimension are considered significant because they emphasize the influence of the topic *principles and strategies of environmental integration (transversality)*, addressed during teacher training. They represent an institutional advance over the multidisciplinary approach, since in a previous study carried out in the same institution (Vilchis et al., 2021a), the field of Natural Sciences prevailed as a reference source.

This finding allows us to empirically verify the influence that surrounding information has on the formation of SRs. The training provided elements that were incorporated into their set of ideas, thoughts, opinions, and data that allowed them to identify environmental management as part of different branches of knowledge. The confrontation this new vision with their previous knowledge transformed their common sense thinking and influenced their active participation in the design and implementation of cross-cutting projects developed in the institution. These projects allowed them to put into practice collective work driven by the perspective of multidisciplinary work and to involve their students in the approach to environmental issues from different subjects.

This event confirms that the information acquired through joint experience can transform SRs and influence the actions of those involved, as established in one of the principles of the theory enunciated by Moscovici (1979).

The results show that the training contributed to the development of sustainability competencies in teachers, as well as to the structuring of more complex and multidisciplinary thinking.

According to UNESCO (2), this is the kind of thinking that allows the formation of participatory subjects who are aware of their responsibility in the maintenance of environmental integrity, economic viability, and a fair society. By analyzing environmental issues from a broader perspective, teachers contribute to achieving this objective, since they have information that will allow them to transmit to their students the need to address contemporary challenges from a global perspective that includes the valuation of human and non-human life, as well as the fair distribution of economic and environmental wealth. Fuentes-Camacho et al. (2019) and other authors (Collazo-Expósito & Granados-Sánchez, 2020; Pauw et al., 2015; Valackienė et al., 2019; Olsson et al., 2015), affirm that these is the first steps allow the implementation of sustainability in educational institutions.

With the information received, the teachers constructed *reduced*, *anthropocentric-technical* and *globalizing* SRs of environmental management; this result evidence the mobilization of ideas, since in a previous study a significant percentage did not know the

term and in the rest, thoughts that related it to nature, as a biological component, predominated (Vilchis et al., 2021a). After the intervention, the teachers reinforced their concepts of environmental management and sustainability and incorporated the economic and social components of SR.

This contribution is consistent with the findings of Terrón & González (2012), who identified that the focus of the school crusade training programs strongly influenced the type of representations that teachers constructed and reflected in their practice. By designing training processes that allow teachers to build a more holistic vision of the environment, we contribute to transcend the restorative and utilitarian approach focused on restoring the previous state of nature in order to continue making indiscriminate use of it and move towards more complex and dynamic SR.

3.2. Representation field

The figurative core obtained through the free association of words showed that care and management have greater semantic weight, which coincides with the type of SR identified (reduced and anthropocentric-technical) and with the economic focus and purpose that was shown to be predominant. The data indicate that the meaning given to environmental management to make it objective focuses on the what for, transcending the how, which predominated in previous research, within the same institution (Vilchis et al., 2021a).

This transformation of meaning shows signs of a collective environmental awareness, in which an analysis of environmental management focused on long-term purposes is beginning to emerge, overcoming immediate, ephemeral, and meaningless remediation measures.

The achievements coincide with research that suggests that through training processes it is possible to overcome the reductionist view of environmental issues (Benayas et al., 2017; Meira-Cartea et al., 2018; Morote & Hernández, 2020; Ortega-Sánchez et al., 2020; Taddei, 2011; Berglund et al., 2014) and strengthen the leadership of managers to explore alternatives in the curriculum, pedagogy and educational policies (Kadji-Beltran et al., 2012; Müller et al., 2020).

Considering that SRs are the product of the relationship that is established between the members of a group and the surrounding information (Fuentes & Murillo, 2020), the new ideas and values that emerged in the group of teachers, can influence decision-making regarding the environmental management processes that are developed in the institution, In this sense, managers could strengthen their training in this field to have elements that allow them to analyze the study plans and programs, the existing educational policy, as well as international proposals that promote the development of sustainability competencies.

As stated by several authors (Hamón et al., 2020; Murphy et al., 2021; Sayan & Kaya, 2016; Varela-Losada et al., 2019), teachers have a strong influence on the competencies that their students build. The transformation of ideas and meanings described above can have a positive impact on them, by transmitting new approaches to environmental management during their classes, thereby strengthening ESD.

An integral and shared vision of environmental management in the school community that considers the three dimensions (environmental, economic, and social) is an element that contributes to the environmental debate in the seeking for the scope of the SDGs of the 2030 Agenda.

3.3. Attitudes

According to Moscovici (1979), attitudes are evaluative expressions that arouse emotions and lead to action. In this dimension, teachers expressed a positive attitude towards participating in an environmental management program; however, they also mentioned two important aspects: consulting the opinion of the school community and training them before starting. In a previous study, these aspects were minimally referred to (Vilchis et al., 2021a); after the intervention they became more representative. It was possible to generate a reflection on the importance of preparation for collective work, as well as the need to have sufficient information to be able to act correctly.

Attitude was analyzed to understand how the formative process influenced the transformation of meanings, and how these generated emotions in the construction of values that drive people to show enthusiasm for participation. The achievements obtained reinforce the findings of Escoz-Roldán et al. (2019) and Pauw & Petegem (2011), who state that attitudes and ideas influence pro-environmental decision-making.

The progress recorded is directly associated with the information dimension (Marcos-Merino et al., 2020) and shows the need to strengthen environmental management actions through training processes that can have an impact on the professional and personal development of teachers. This would contribute to awaken motivation, an indispensable element in the implementation of ESD programs (Hamón et al., 2020).

While studies on pro-environmental attitudes in educational institutions have shown that factors such as environmental risk perception (Sayan & Kaya, 2016), eco- and anthropocentric conceptions of the environment (Maurer & Bogner, 2019), as well as moral elements in culture (Begum et al., 2021), have a strong influence on the actions undertaken in this regard, the study of SRs, as stated by Batel et al. (2016), investigates the ideas, thoughts and values that give rise to them, with the purpose of finding elements for their transformation.

4. Conclusions

This research has implications for teaching; it demonstrated the importance of developing training processes for an adequate approach to environmental and sustainability issues in a teaching team. It was possible to consolidate *reduced*, *anthropocentric-technical* and *globalizing* SRs, establishing the basis to move towards integral and critical ones. This contributes to the transformation of the predominant anthropocentric conception today.

The study of the SRs allowed us to learn how teachers internalize the information they receive from the environment, the meaning they give it.

It was found that, although SRs are dynamic and changing, they need to be strengthened through training processes that contribute to the achievement of more solid, integral, and critical representations in which man is recognized as part of nature and not its dominator.

This is a fundamental element to develop values that allow us to identify the importance of rebuilding human relations and improving the distribution of wealth, so that people coexist in a harmonious world where they take from nature what is necessary for the benefit of all.

The transformation in the thinking, ideas and values of teachers could have an impact on a change in their professional practice in the classroom and in the formation of future generations that develop a greater social and environmental commitment.

The willingness of the teaching staff to join the efforts to incorporate ESD in their institutional activities, as well as in the generation of environmental awareness in the context of the SDGs of the 2030 Agenda, is highlighted.

A limitation of the research was found in the contingency conditions due to the COVID-19 pandemic, since it was not possible to observe in person in the classroom the results of the training in the individual practices of each teacher, as well as in the collective ones, referring to the students.

Limitations

A limitation of the research was found in the contingency conditions due to the COVID-19 pandemic, since it was not possible to observe in person in the classroom the achievements of the training in the individual practices of each teacher, nor in the collective ones, referring to the students.

Suggestions

It is suggested to follow up on the study of SRs as a line of research, since it is necessary to assess how teachers incorporate environmental issues in a transversal way in the development of their respective subjects and how this impacts the performance of students and their involvement in environmental management processes.

Data Availability

The questionnaire data used to support the findings of this study are available at https://forms.gle/FV5vEFyvJk4SF4237

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