Environmental Competencies for Sustainability: A Training Experience with High School Teachers in a Rural Community

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Abstract: Solid teacher training can be a transcendental tool in solving the most pressing environmental problems of our time. The purpose of this study was to reinforce the competencies of in-service teachers through a training process on environmental and sustainability issues. The research was carried out during the 2020–2021 cycle in Preparatory School No. 47 of the Autonomous University of Guerrero. We sought to broaden the teachers’ knowledge of environmental education for sustainability, the sustainable development goals and methodological strategies. The information was collected through an initial questionnaire, as well as the record of teachers’ activities during the course, which was structured in four topics: socio-environmental problems, environmental education for sustainability, sustainable development goals 2030, and methodological strategies. The training process influenced the teachers’ perception, achieving a more complex vision of the topics studied. The didactic and pedagogical strategies proposed facilitated the integration of transversal activities in their discipline. The work carried out demonstrated the importance of strengthening training processes that include methodological strategies such as transversality taking advantage of the physical characteristics of the rural community. Teachers develop environmental competencies for sustainability in their educational practice, to contribute to the integral formation of their students.

Keywords: competencies; environmental education; sustainability; transversality

1. Introduction

Incorporation of sustainability in education finds one of its greatest barriers in the field of teaching; the latest reforms to the curricula do not address it clearly; in addition, most of the experiences are isolated and do not reach all students [1]. Therefore, the teacher is called to participate as a critical agent to find ways to develop more sustainable societies [2].

Current environmental problems, such as pollution, global warming, deforestation, or depletion of natural resources, are slowly gaining importance among the citizenry [3], but the real threat of the 21st century is the inability of human beings to see beyond extravagance, illusory control of nature and consumption, as synonyms of progress and overcoming [4], which have put at risk the continuity of life as we know it [5,6].

Faced with environmental problems, education has the challenge of building strategies to improve learning and develop competencies to face the challenges [7,8]. The school is a privileged space for the generation and implementation of novel educational practices that contribute to environmental protection [9].

A large study was carried out in Hungary, the Netherlands, and Italy to design a training program based on twelve competencies for sustainable development, with the intention that it would also have an impact on students [8]. Along this path, a large number of universities in the Latin American region have incorporated sustainability, Environmental Education (EE) and recently Environmental Education for Sustainability.
(EES) as one of their objectives and strategies of social responsibility; however, this formal progress does not end up translating into substantive and structural changes in university communities; nor has it become a model of environmental coherence for the societies it serves [10]. For example, in Brazil a study was carried out to identify the difficulties that teachers face when working with environmental education [2].

In Mexico’s urban and rural localities, the panorama is no different. In a study conducted with residents, local authorities, and teachers of High School of the Autonomous University of Guerrero (UAGro), in the town of Texca, in the municipality of Acapulco, Mexico, it was determined that the lack of environmental sense and commitment, contamination by agrochemicals, and poor management of urban solid waste are critical problems; from the academy, this should drive the development of actions to mitigate the problems [11]. The literature on the Mexican bachelorship has documented the implementation of EE-oriented and student-focused training strategies, but have neglected teacher training [12–18]. Other works have only focused on teacher perception [19–21]. Some more focus on training teachers who are in preservice or beginning their training as future teachers; they conclude that there are different tools, approaches, and strategies for EE to be integrated into the curriculum and generate new socio-environmental relationships [22–24]. While these works suggest that the strategies empower teachers, these ideas need to be strengthened with the development of new research.

With these inquiries, the objective of this research was to strengthen the environmental and sustainability competencies of the teachers of High School No 47 of Texca, Guerrero, through the development of a training program. The questions that guided the work were: Do teachers have the competencies for sustainability that UAGro seeks to develop in their students? and What strategies can the teacher develop to strengthen the sustainability competence in their students, and thus influence their rural context?

1.1. Environmental Education for Sustainable Development

In 1992, UNESCO proposed Education for Sustainable Development (ESD); its major thrust was between 2005 and 2014, when the Decade of Education for Sustainable Development was promoted. In 2015, United Nations Organization (UNO) members signed the 2030 Agenda; special importance was given to education; goal 4 points out that quality education is integral to sustainable development and an essential strategy in achieving the rest of the goals [25]. Target 4.7 establishes that by 2030 it should ensure that all students acquire the theoretical and practical knowledge necessary to promote more sustainable lifestyles; it promotes topics such as human rights, gender equality, the promotion of a culture of peace, non-violence, global citizenship, and valuing of cultural diversity and the contribution to a sustainable development culture [26].

Although progress in environmental matters has been fruitful [27], there is still a need to promote actions aimed at changing the conditions and circumstances that gave rise to the problems [28]; one of these actions is training, so that future generations are capable of generating solutions in the different environments they inhabit [29] and concretize the development of the Sustainable Development Goals (SDG 2030).

In Mexico, Higher Secondary Education Curriculum 2018 sets out in the graduation profile that students must progressively develop learning and competencies throughout their school career. One of the competencies is environmental care, and its attributes are: (a) understanding the importance of sustainability and assuming a proactive attitude to find solutions; (b) thinking globally and acting locally; and (c) valuing the social and environmental impact of innovations and scientific advances [30].

Thus, it is necessary for teachers to strengthen their knowledge so that they become active subjects of cultural change and the generation of knowledge of their own habitat [19,31]; it is they, who, through their cognitive-affective activity, construct meanings about the reality they study [32].
1.2. The Teacher as an Agent of Change

The work of the teacher is fundamental in the teaching and learning of the environmental dimension [19,33–35]; their role is to act as a mediator between the information, resources, and materials they provide to their students. Teachers are required to have the capacity to integrate environmental issues into the different disciplines and identify ideas related to each of them [36], without losing interest in academic knowledge and its fundamental concepts [28], favoring holistic thinking of socio-environmental issues [37].

For the development of environmental care competence in students, teacher training is required to include theoretical, pedagogical, and methodological strategies [38] to activate individual and collective environmental awareness, inside and outside the classroom [12,13,39–44] and to face the challenges [45]. In this sense, complementary courses on sustainable development, the impact of technology on society, environmental care, professional ethics, participation and equality are essential [46]. Likewise, the designing strategies such as pedagogical projects, curricular environmentalization, and mainstreaming of the environmental axis should be the primary objective [47–53].

The transversality strategy can have an impact on the comprehensive training of students, to articulate horizontally or vertically contents and/or subjects in an educational program and overcome the fragmentation of knowledge areas [53]; achieving this requires ongoing training work by teachers [54].

2. Materials and Methods

It was decided to conduct the research in Preparatory 47 of the Autonomous University of Guerrero for the following reasons: it is a recently opened school, located in the rural area of the municipality of Acapulco (Figure 1), with a community organization for the generation of self-consumption products, such as corn, beans and squash; the 12 teachers showed willingness and enthusiasm; the local authority and the population granted facilities for the sanitation of the main stream and the taking of samples for biochemical studies, with the intention of recovering the artesian well that supplies water to the entire community; the research team also reflected on the environmental care competency that is included in the high school curriculum, but is not reflected in an improvement in the socio-environmental conditions of the community; finally, it was considered that in a school in a rural community it is more feasible to develop field practices that complement the educational process, as opposed to schools located in urban areas.

Figure 1. Location of the community of Texca; Acapulco, Guerrero.
The methodological framework was based on the qualitative–quantitative paradigm [55]. From this approach, common foundations were sought in relation to the educational phenomena, the informants, the analysis of rural situations, the teachers’ experiences, and the data. The analysis of the information made possible the formative work with teachers to reflect upon their educational practice and generate improvements.

In consideration of the responsibility that all work must have, this research and the derived works are revised by the Bioethics Committee of the UAGro, with opinion number CB-002/2019, that promotes the responsible and integral use of the information collected during the different stages of research.

The entire teaching staff of Preparatory School 47 participated in the research, which allowed us to have a joint perception of the educational institution.

Two phases were considered for the development: (1) A diagnosis of knowledge about EE in which 12 teachers participated (50% women and 50% men) with an age range between 25 and 46 years old, with respect to their academic background; 75% completed a bachelor’s degree and 25% have a master’s degree in subjects such as English, Mathematics, Biology, History, Chemistry, Geography, Ecology, Reading Workshop, Philosophy, Literature, Computer Science and Ethics; and (2) a training course in EE and sustainability as central axes, in which 100% of the teachers participated. The work was carried out between October 2020 and May 2021.

2.1. Phase I. Diagnosis

Two questionnaires were designed, the first one allowed to know aspects of the educational model of the high school [56,57]; it has 10 questions with a Likert scale of four response options (disagree, indifferent, agree, and strongly agree). To validate the reliability of the instrument, Cronbach’s alpha values between 0.899 and 0.916 were obtained for all items, which represents acceptable reliability.

The second instrument inquired about the importance of EE and collaborative work; it consists of 13 questions with a Likert scale of five response options (strongly agree, agree, no opinion, disagree and strongly disagree). The items of this instrument showed a Cronbach’s alpha between 0.737 and 0.809, it is considered acceptable.

It was proceeded to apply the questionnaires. The teachers participated anonymously and voluntarily in this work, which guaranteed the reliability of the information. Later, the responses were entered into a database in Excel and SPSS version 25 for analysis and graphing.

2.2. Phase II. Design and Implementation of a Course-Workshop

Based on the diagnosis (Phase I) of teachers’ knowledge and local problems identified by Moctezuma et al. [11], an educational intervention was designed for teachers with the purposes of: (1) Developing knowledge of the environmental dimension, sustainability, as well as a critical analysis of their role in the education of new generations; and (2) generating actions with their students to promote the development of the “care for the environment” competence in their daily lives.

The training took place over four weeks. The four topics were structured in sessions of four hours each, adapted to the available time of the teachers; these were: (1) The socio-natural relationship and socio-environmental problems of the context; (2) the evolution of EE, the emergence of education for sustainable development, and the sustainable development goals SDG 2030; (3) the curricular transversality of the environmental axis, and (4) didactic strategies to address environmental issues in the classroom.

Videos, scientific journal articles, contextual information (socio-environmental problems), discussion questions, short activities, and personal experiences of the teachers were used as learning resources for each session. The design was made with a constructivist orientation. The presentations focused on topics close to the teachers’ experience, with real problems, images of the context and experiences in another academic unit, belonging to the same university.
A facilitator, whose profile and experience was in line with the corresponding topic, led each session. Collaborative work was encouraged through the contribution of ideas for reflection, debate, and critical analysis.

3. Results

Knowledge of institutional documents and the perception of local or global environmental problems were revealed as the first factors that place teachers before the need to address environmental issues in their discipline (Figure 2).

The information obtained from the survey indicates that 100% of the teachers have knowledge of the competency-based approach; 88% know that there is a competency oriented to care for the environment and 64% know that their educational model seeks to develop 11 competencies. These results are in line with the university’s educational model. With regard to action, 100% of the teachers are willing to contribute to the generation of a change, only 31% have been trained in environmental issues and 13% have completed a diploma course in competencies; these results make evident the lack of training programs to develop knowledge and strategies on environmental issues in all disciplines.

The second section of the questionnaire focused on the importance, motivation, and factors that influence training on environmental issues, as shown in Figure 3.

From the responses obtained, 81% of the teachers fully agree on the need for continuous training to enable them to address current socio-environmental problems. This same percentage recognizes that the school should contribute to the attention of environmental problems, developing environmental competencies in students; 75% totally agree that there should be a link between the school and the community to achieve collaborative work between disciplines and with the participation of the educational authorities. Sixty-nine percent totally agree in giving continuity to the work that is promoted, and believe that the evaluation will allow the necessary adjustments to be made to improve the work of the participants.

The second questionnaire was answered by 11 teachers; the instrument focused on identifying attitudes. Figure 4a,b shows the responses to each item.

When teachers were asked if they consider EE to be an additional burden and without adequate strategies, 46% disagreed completely and 27% disagreed. Another aspect of interest is that 82% consider the participation of the community in the EE activities carried out inside and outside the classroom to be essential; in the same sense, 46% of the teachers agree and 27% totally agree that the population is aware of the problems that affect them and could offer strategies to mitigate them.

Regarding the need for training with an environmental focus, 73% of teachers strongly agree that knowledge of the subject is required; in the same sense, 91% strongly agree that they should have knowledge of the SDG 2030, and 82% strongly agree that they should manage interdisciplinarity. However, they recognize that the current educational model still fails to integrate sustainability, as their opinions are divided between agree (18%) and disagree (28%); 55% totally agree that the Institutional Development Plan 2017–2021 of the UAGro, has the commitment to develop the SDG 2030 [57].

On the other hand, a question that divided their opinions, between totally agree (18%) and totally disagree (18%), was whether science and technology are the only way to solve current socio-environmental problems. They were also asked if the current strategies in EE lack clear objectives regarding their implementation and the purpose they pursue, 37% disagreed and 37% agreed; likewise, 37% totally agreed that the implementation of programs from a transdisciplinary approach still has little practical development and, therefore, they do not understand how to integrate environmental contents in their learning units.

In the last section of the questionnaire, they were asked if they should generate changes in their consumption and measure their ecological footprint, 64% totally agree; but with the question on how the indicators help to measure progress toward sustainability, they show a lack of knowledge, since the answers are divided between totally agree (37%) and have no opinion (37%).
Figure 2. Teachers’ knowledge of their educational model and competencies.

Figure 3. Knowledge of the need to address environmental issues.
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**Figure 4.** (a) Initial teacher evaluation: importance of EE and collaborative work. (b) Initial teacher evaluation: importance of EE and collaborative work.

### 3.1. Results of the Course-Workshop

This section describes the results obtained in the course-workshop for teachers to develop competencies for sustainability, through four topics distributed in four sessions. Details of each session can be found in the Appendix A.

#### 3.1.1. First Session: Environmental Problems

In this first approach, some questions were raised for discussion: What is a socio-environmental problem?, how to strengthen teacher performance?, and what role do young people have in addressing environmental problems in their community?
Teachers reflections were oriented toward the multi-causality of socio-environmental problems, among them: (a) Degradation caused by socio-natural interaction itself (any human activity generates an alteration to the environment); (b) as a natural response to the degrading process of the environment (natural phenomena that are intensified by the deterioration of ecosystems); (c) problems generated by that indissoluble link between economy and ecology (the utilitarian use of nature); and (d) those caused by inadequate policies and the weakening of the social bond that generates great inequality, forcing the less favored to exert greater pressure.

The teachers suggest more processes like the one developed here, in order to broaden their knowledge and be generators of the social and environmental change that is required. In addition, they emphasized the role of education in training young people to develop values and behaviors that transcend the classroom and are reflected in actions in favor of caring for the environment and improving the conditions of their surroundings.

3.1.2. Second Session: Environmental Education, Education for Sustainable Development and the Sustainable Development Goals 2030

This module began with the following question: What are the SDGs 2030 and what is their function? In their answers, some teachers stated that they did not know what they were or what their purpose was; others related them to an international agreement focused on eradicating inequality, reducing poverty, generating changes in society and caring for the planet.

With these ideas, the analysis of each of the SDG 2030 focused on showing the importance of contributing to their development through education. With the work carried out, the teachers recognized that the SDGs 2030 have implicit social needs, among which education, health, dignity and equality, prosperity, and peace stand out, while promoting environmental protection; they also valued that this last aspect guides the competencies for sustainability that they seek to develop in the students.

3.1.3. Third Session: Transversality

With the previous knowledge, the teachers’ enthusiasm for learning about environmental issues and how to integrate them into their disciplines stands out. This exercise motivated them so that in future works they will seek to integrate the environmental approach in a transversal way in their didactic sequences, such as (1) the strategies design, (2) the application with the students, and (3) the evaluation of the results obtained, to measure the progress and start a new cycle.

3.1.4. Fourth Session: EE Educational Strategies to Develop with Students

Some concepts related to pedagogical strategies were presented and the work done by Tapia et al. [58], consisting of a reservoir of activities for the transversalization of the Sustainable Development competence, was addressed.

Second, the teachers were asked about the actions they have promoted within High School No 47 for environmental preservation; they acknowledged that they contribute to generate environmental values and behaviors in their students through waste collection campaigns, PET (polyethylene terephthalate) collection, creation of green areas inside the school, dissemination of awareness posters for the community, and collection of expired medicines, but they recognize that they do it more by initiative or campaign generated from an academy, than by a sense of social responsibility.

According to the teachers, the training process allowed them to broaden their vision and to have elements on the need to integrate the environmental and sustainability axis in their learning units; it also allowed them to understand the complexity of the socio-environmental problems, and urgently integrate environmental issues for integral education of young people.
4. Discussion

Texca, like other rural communities in Mexico (with less than 2500 inhabitants), has poor social conditions and a lower quality of education than the cities. However, this community has some advantages for young people to strengthen their environmental care competencies. The extensive natural environment makes it possible for students to better understand and participate in the conservation of natural resources, such as vegetation, water, soil, and air; in addition, there is greater interaction between the school community and the local population, so it is feasible for the actors to organize themselves to take pro-environmental action. Some of the results of the research encourage these ideas.

Results showed that more than 40% of teachers at Texca Preparatory School No 47 consider environmental issues to be important for the comprehensive education of students; and more than 80% think that the school can contribute to developing environmental skills. This motivation can be used to initiate projects that link students with the rural community of Texca. This position is consistent with the work of Wanchana et al. [24], who suggest that participation and networking provide opportunities for parents, the community, and other departments to support school management and the construction of more complex learning resources.

The recognition of sustainability as a priority among the teachers of Preparatory School No. 47, becomes an essential factor to promote environmental culture among them, but the willingness is not enough; according to Isaac-Márquez et al. [59], it is necessary to provide more resources, infrastructure, and integrate curricular transversal axes to channel environmental concerns and transform them into well-founded decisions and actions, in accordance with a culture of sustainability. In this sense, it is important for the local government of Texca to coordinate with the municipal and state governments, with businesses and other social agents, and thus build an expanded educational community [60], which transcends the high school.

Teachers consider necessary the insertion of EE in their academic work; this attitude coincides with the work of Tan and Pedretti [61] and Marques and Regina [2], in which teachers point out that it is fundamental for teaching in the school context; however, they also highlight some difficulties for this integration, such as finding resources, time, and complying with the curricular contents, having conceptual clarity beyond a naturalistic vision, having spaces for self-training in environmental issues and accessing strategies that are applicable to their learning units in a cross-cutting manner.

Undoubtedly, training processes can help teachers to overcome these difficulties; in these processes it is necessary to address their life experiences, for their contextualization within the discussions, because environmental knowledge is not only the result of professional training and disciplinary knowledge, but also comes from environmental knowledge, its history, and experiences [2,62].

Likewise, the work carried out confirms that the design and implementation of proposals aimed at improving knowledge and providing strategies to address environmental problems in their context, have a positive impact when teaching staff work collaboratively, generating contributions from their different disciplines. As suggested by Wanchana et al. [24], teachers should know their own communities, as well as their problems and the spaces where they can generate actions from the educational field. After all, for the study of EE, the main didactic resource should be the surrounding environment itself [2]. In this way, Texca’s rural environment can function as a great laboratory for sustainability.

The integration of environmental care competencies should be systematic and complementary throughout the curriculum, addressing the pillars of sustainability. It should be taken into account that in a single course it is not possible to develop all the competencies in their different levels. It must be a progressive work, adapted to the maturity level and skills of the students [1]. Achieving success in the implementation of competency-based learning requires deepening teachers’ knowledge of what, how, and in which contexts they can be developed transversally to improve their margin of success [63]; therefore, the
training process of this research was designed with the aim of providing conceptual clarity on context-specific problems, as suggested by Martínez Castillo [64].

The work contributed to the understanding of the conceptual and methodological implications and challenges for incorporating the environmental perspective into the curriculum; it also allowed observing the influence of the sociocultural context, the institutional context, the role of the actors, and the implications of incorporating the SEE into the curriculum. Generating training processes can help teachers to reflect and guide them to be more creative, innovative, reflective, and critical about the environment [65].

The results confirm what Valderrama-Hernández et al. [20] pointed out about the need to involve teachers in the development of EE and sustainability, in order to favor the understanding of socio-environmental problems from a holistic and systemic viewpoint. However, the fact that teachers have a philosophically and sociologically richer and more reflective vision of the environmental dimension does not guarantee its transmission to students, it is necessary to work on the generation of a new educational language that achieves the cooperation of different disciplines and teamwork; after all, what is sought is to generate epistemic coherence, which transits from the theoretical and political plane (from what) to practical development in the classroom (how), transcending from “what is said to be done” to “what is actually done”. This can contribute to improving Texca’s socioeconomically disadvantaged rural conditions.

It is worth mentioning that although the SEE can have a greater impact in an experiential environment [66], the health crisis due to COVID-19 limited the realization of activities with groups of people [67], therefore, it was decided to carry out virtual activities. The appropriate use of Information and Communication Technologies has made it possible to carry out the training process that would not have been possible in the event of a contingency, also presents with a wide range of approaches that can be adapted to the needs of teachers and their students [67,68] and the resources generated are available for future consultation.

The worst mistake would be not to learn from this crisis to take care of others, nor to take care of our natural habitat [69].

5. Conclusions

The diagnosis identified conceptual, didactic, and procedural difficulties regarding the mastery of competencies for an adequate incorporation of the environmental dimension in the curriculum. Inquiry into the previous limitations constituted a starting point for the design of a teacher training process that contributed to the development of environmental competencies and, specifically, to the correct search for a solution to the socio-environmental problems of the community.

The training program designed created an epistemological dialogue for the construction and deconstruction of ideas, as well as traditional methodological, pedagogical, and didactic strategies, in the search for an adequate integration of the environmental dimension in the curriculum; this does not translate into an overload of activities for the teacher, but rather concretizes the social function of the school in and with the rural community, taking advantage of the natural environment.

The work carried out resulted in greater conceptual clarity for teachers, which will help them to identify classroom processes and procedures that contribute to the development of critical, analytical, and reflective postures in students.

This research presented certain limitations. On the one hand, the COVID-19 pandemic made it impossible to generate strategies in public spaces, and prevented face-to-face activities with young people and the population. Another incomplete process was to re-evaluate whether teachers were able to integrate environmental contents in their different subjects. Undoubtedly, these are pending tasks that will require new research processes in order to concretize the environmental competencies in the students’ actions.

Finally, this research represents an initial exploration in a rural community in Acapulco, Mexico. Although the population of the institution where it was developed is small, the
research is relevant for replication in other institutions with similar conditions, and is of value to any UML teacher seeking to expand their knowledge in SEE and contribute to the SDGs of the 2030 Agenda.

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**Institutional Review Board Statement:** The study was conducted in accordance with the Declaration of Helsinki and was approved by the Bioethics Committee of the Autonomous University of Guerrero (protocol code CB-002/2019, approved on 18 March 2019) and with the consent of the principal of the High School No 47 of the UAGro in the community of Texca, Guerrero, Mexico.

**Informed Consent Statement:** Participants were informed of their anonymity and their right to withdraw from the research at any time and that the data would be published.

**Data Availability Statement:** Data are available upon request to the authors.

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**Appendix A ANNEX Section**

Course: Strengthening of environmental competencies for sustainability with high school teachers.

Objective: Strengthen the environmental and sustainability competencies of the teachers of High School 47 of Texca, Guerrero.

| Session | Working Hours | Topics | Facilitator |
|---------|---------------|--------|-------------|
| 1–4     |               | Session 1: The socio-natural relationship and the socio-environmental problems of the context. | PhD. Erick A. Galán Castro. MSc. Luis Miguel Moctezuma |
| 2–4     |               | Session 2: The evolution of EE, the emergence of education for sustainable development, and the Sustainable Development Goals SDG 2030. | MSc. Esmeralda Vilchis P. MSc. Luis Miguel Moctezuma |
| 3–4     |               | Session 3: The cross curricular transversality of the environmental axis. | PhD. Columba Rodríguez A. PhD. José Luis Aparicio L. |
| 4–4     |               | Session 4: Didactic strategies to address environmental issues in the classroom. | PhD. Héctor P. Tapia, Dr. José Luis Aparicio. MSEt. (Master in English teaching) Concepción Rojas Casarrubias. |
| Opening |               | Presentation of the course objectives and work dynamics. Comments by the teachers on the expectations of the course. | |
| Session 1 | Environmental problems and the socio-natural relationship. |
|-----------|------------------------------------------------------------|
| **Subtopic 1** | The multicausality of environmental problems and their different consequences. |
| Didactic strategy | Resources |
| Conference | Power Point Presentation |
| Supporting Material | Suggested References: [5,11,38,70–83] |
| **Test of previous knowledge on environmental issues.** |
| **Objective** | Teachers understand the complexity of environmental problems. |
| **Problematization of the topics presented:** | What is a socio-environmental problem? How to strengthen teacher performance? and What role do young people have in addressing environmental problems in their community? |
| Brainstorming | Raising doubts and reflective comments on the presentation |
| Logbook | Teachers recognize global and local issues |
| **Subtopic 2** | Socio-environmental problems of the context |
| Conference | Power Point Presentation |
| Diagnosis of the community [11] | Teachers recognize the elements that participate in the generation of socio-environmental problems in the community. |
| **Closing:** | Summary of the teachers’ doubts and comments on the importance of knowing the socio-environmental problems in order to contribute to their mitigation. |
| | It is suggested that participants take a tour of the community to identify and learn about local environmental problems. |

| Session 2 | Environmental Education, Education for Sustainable Development and the Sustainable Development Goals 2030 |
|-----------|----------------------------------------------------------------------------------------------------------|
| **Opening:** | Introduction of the speakers. The module begins with the following question: What are the SDGs 2030 and what is their function? Teachers’ comments and contributions are noted. |
| **Subtopic 1** | The SDG-2030 The importance and purpose of the SDG-2030 is described. |
| Didactic strategy | Digital Resources |
| Educational video Conference | Power Point presentation |
| Supporting Material | The SDGs—what they are and how to achieve them. Available online: https://www.youtube.com/watch?v=MCKH5xk8X-g (accessed on 20 April 2021). Suggested references: [25,26,70–83] |
| **Goal** | Teachers recognize the importance of the SDG-2030 and the need to contribute to their development. |
Subtopic 2
Environmental education (EE) and environmental education for sustainable development (ESD) (its evolution, concepts and objectives). Sustainability indicators. (examples).

Conference Videos Power Point presentation

Suggested references:
[11,15,40,41]

“La historia de las cosas” (The history of things). Available online: https://www.youtube.com/watch?v=i3mnDp1B9_Y (accessed on 20 April 2021).

“La historia de las soluciones” (The history of solutions). Available online: www.youtube.com/watch?v=YORUqmHpUlk (accessed on 20 April 2021).

Teachers understand the importance of sustainable development as a way of life and the need to generate strategies for its development.

Closing: Based on the videos, generate a debate on the need to contribute to sustainable development and the SDGs.

Session 3
Transversality.

Opening: Presentation of the facilitators.
The starting point is to know the meaning that teachers give to transversality and competencies.

Subtopic 1
Competencies: (Concepts and their attributes) The integration of the environmental care competency in the high school level at UAGro.

Didactic strategy Conference Digital Resources Power Point presentation Supporting Material Suggested references:
[23,32,53,56,57,65,84–87]

Objective Teachers understand the concept of competencies and their objectives.

Subtopic 2
Environmental Education as a transversal theme.

Conference. Power Point presentation Suggested references:
[19,23,32,53,61,65]

Teachers reflect on the importance of addressing EE.

Subtopic 3
Methodology for the transversality of the environmental axis.

Conference Diagnosis Power Point presentation Instrument: Diagnosis on the linkage of the transversal axis “Environment” in the graduate profile. Methodology proposed by Aparicio, et al., (2014) [61,64,84–87] Suggested.

Teachers reflect on the need for collaborative work to address socio-environmental problems.

Closing: Final reflections on the importance of developing environmental content in its sequence following three steps: (1) the design of strategies, (2) implementation with students and (3) evaluation of the results obtained, to assess progress and make adjustments.
**Opening:** Participants express their opinion regarding the advantages and disadvantages of being able to address EA in their learning units.

| Subtopic 1 | Strategies to address EE in the classroom (definition, type and purpose). Reflection: What is a pedagogical strategy? SEP (School Environmental Projects). |
|---|---|
| Digital resources | Power Point presentation PRAE. (SEP) [https://www.youtube.com/watch?v=qvU0kV-JLRE](https://www.youtube.com/watch?v=qvU0kV-JLRE) (accessed on 20 April 2021). |
| Didactic strategy | Conference Discussion Educational Video |
| Supporting material | Suggested references: [22,33,34,58,68,85–92] |
| Goal | Teachers recognize the advantages and disadvantages of addressing the strategies in their learning units. |

| Subtopic 2 | Pedagogical proposals to transversalize the Sustainable Development competence in the HSL of the UAGro. |
|---|---|
| Conference Presentation | Power Point presentation Teachers narrate their experiences with their students. |
| Didactic Strategies | Didactic Strategies developed by Tapia et al. (2018) [30,58,85–90] |
| Teachers recognize the importance of incorporating strategies into their sequence to promote EE. |

**Closing:** Final reflections on the purpose and achievement of the course and how it will help them to generate changes in their activity. Audio recording of the contributions that the course generated for each teacher.

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