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*Artículos científicos*

## **Estrategia prospectiva para promover la educación ambiental en el quehacer docente**

***Prospective Strategy to Promote Environmental Education in Teaching***

***Estratégia prospectiva para promover a educação ambiental no ensino***

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## Resumen

Este estudio tuvo por objetivo promover competencias ambientales en docentes de tres programas educativos de nivel licenciatura de la Universidad Autónoma de Guerrero (UAGro): Sociología, Economía y Derecho; ello se dio a través de la implementación de un curso de educación ambiental no formal denominado *La incorporación de la educación ambiental con enfoque transversal en el currículo*, que se aplicó en septiembre-octubre de 2016. Es un estudio mixto, por ser un tema vinculado con la educación y por el hecho de que el investigador fue parte del objeto de estudio, se empleó el enfoque de la investigación-acción. Se utilizó la rúbrica en la medición de aprendizajes y competencias adquiridas. La muestra fue por conveniencia: decidieron participar 20 profesores considerando los tres programas. En la evaluación de dicho curso se evidenció que los docentes lograron significativamente comprender saberes ambientales y el diseño metodológico de ambientalizar el trabajo que realizan, así como sus programas de unidades de aprendizaje y secuencias didácticas.

**Palabras clave:** currículo, competencias, docente, educación ambiental, estudiante, secuencia didáctica.

## Abstract

The objective of this study was to promote environmental competencies in teachers of three undergraduate educational programs of the Universidad Autónoma de Guerrero (UAGro): Sociology, Economics and Law. This occurred through the implementation of a non-formal environmental education course called *The incorporation of environmental education with a transversal approach in the curriculum*, which was applied in September-October 2016. It's a mixed study, because it is a topic linked to education and because the researcher was part of the object of study, the action-research approach was used. A rubric was used to measure the learning and skills acquired. The sample was for convenience: 20 teachers considering the three programs decided to participate. In the evaluation of said course, it was evidenced that the teachers were able to significantly understand environmental knowledge and the methodological design of greening the work they do, as well as their learning unit programs and didactic sequences.

**Keywords:** curriculum, competences, teacher, environmental education, student, didactic sequence.



## Resumo

O objetivo deste estudo foi promover competências ambientais em professores de três programas de ensino de graduação da Universidade Autónoma de Guerrero (UAGro): Sociologia, Economía e Direito; Isso ocorreu por meio da implantação de um curso não formal de educação ambiental denominado A incorporação da educação ambiental com abordagem transversal no currículo, que foi aplicado no período de setembro a outubro de 2016. É um estudo misto por se tratar de um tema vinculado à educação e pelo fato de o pesquisador fazer parte do objeto de estudo, foi utilizada a abordagem da pesquisa-ação. Uma rubrica foi usada para medir a aprendizagem e as habilidades adquiridas. A amostra foi por conveniência: 20 professores considerando os três programas decidiram participar. Na avaliação do referido curso, constatou-se que os professores foram capazes de compreender de forma significativa o conhecimento ambiental e o desenho metodológico de esverdeamento do trabalho que realizam, bem como seus programas de unidades de aprendizagem e sequências didáticas.

**Palavras-chave:** currículo, competências, professor, educação ambiental, aluno, sequência didática.

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## Introduction

Regarding teaching work, in addition to promoting pedagogical skills, environmental skills should be disseminated, and together implement teaching strategies and techniques whose voice of command is environmental education. The Educational and Academic Model of the Autonomous University of Guerrero [UAGro] 2004 already proposed the inclusion of this element. The 2013 Educational Model strengthened it even more, and added that the methodology of this dimension was transversal. The environmental dimension, being linked to the undergraduate level curriculum at UAGro, permeates the competencies, the graduation profile, the curriculum map, the learning unit programs and the sequences. Thus, teachers can train environmentally and acquire environmental skills.

Environmental problems get complicated, they affect the planet and society. The university must include the environmental issue transversally in the careers it offers in order to contribute to the sustainability that the world requires. Those who attend to the development and restructuring of the curriculum must establish procedures to include the

environmental axis in a study plan, in a learning unit program, in a didactic sequence. In addition, offer teachers strategies to carry out the environmental dimension in the tasks they perform. The theoretical and methodological foundations to implement the environmental dimension in the university curriculum, specifically at UAGro, are the educational models of 2004 and 2013. In these documents, sustainability and environmental problems are considered as guiding principles that must be addressed.

The reason that has led to include the environmental dimension in curricula in educational institutions is the current environmental and socio-environmental problems. Deforestation and desertification, the greenhouse effect, the pollution of seas and oceans are some of the most alarming manifestations that we are experiencing (Cortés, Aragonés, Amérigo and Sevillano, 2002, p. 279). Hence the importance of education. Education for sustainable development enables each human being to acquire the knowledge, skills, attitudes and values necessary to forge a sustainable future. Educating for sustainable development means incorporating the fundamental themes of sustainability into teaching and learning, for example, climate change, disaster risk reduction, biodiversity, poverty reduction and sustainable consumption (Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura [Unesco], s. f.).

Regarding sustainability, it refers to seeking stability or balance between the social, cultural and economic aspects, always keeping in mind the health of the environment. There are those who use the terms sustainability, sustainability and sustainable development interchangeably, since, for practical purposes, they mean the same thing (Quiroz, del Amo and Ramos, 2011). For Hopwood, Mellor and O'Brien (2005), the concept of sustainable development strongly links the environment and socio-economic issues

The suggested method for integrating the environmental dimension into the curriculum is mainstreaming. Mainstreaming is a process that runs through the curriculum with content that is present throughout the educational process. Said contents are culturally relevant and necessary for life and coexistence, since they provide answers to social problems and contribute to forming in a special way the model of citizens that society demands. These are topics that do not necessarily have to make up a particular subject or receive special treatment within the curriculum, but must be addressed in all areas that make it up and in any specific learning situation (Palos, cited in García, 2009). The mainstreaming of the environmental element in the study plans must consider the components of the environment axis (water, air, soil and energy). The contents of the environmental axis are proposed around

four topics: water, air, soil and energy; and within these, human behavior in relation to said resources, such as importance, availability, use, problems and alternatives (García, 2009). Thus, the components of the environment element will be transformed into knowledge, skills, attitudes and values or competencies (Aparicio, Rodríguez and Beltrán, 2014).

One of the pedagogical underpinnings of this study is the competence approach and sociocultural constructivism. Teachers need to promote skills and knowledge about the environment.

Tobón (cited in Casaña, 2015) ensures that the competencies are:

Complex performance processes with suitability in certain contexts, integrating different knowledge (knowing how to be, know how, know how to know and know how to live together), to carry out activities and / or solve problems with a sense of challenge, motivation, flexibility, creativity, understanding and entrepreneurship, within a perspective of metacognitive processing, continuous improvement and ethical commitment, with the goal of contributing to personal development, the construction and strengthening of the social fabric, the continuous search for sustainable economic-business development, and the care and protection of the environment and living species (p. 22).

Sociocultural constructivism has its origin in the works of Lev S. Vygotsky and postulates that knowledge is acquired, according to the law of double formation, first at the intermental level and later at the intrapsychological level; in this way, the social factor plays a determining role in the construction of knowledge (Serrano and Pons, 2011).

In the field of environmental education and education for sustainability, the dimension of the future is a common component of the different currents or positions (Huckle, 1992; Junyent, Geli and Arbat, 2003; Hicks, 2002; Sterling, 1996; Tilbury, 1995; all cited in Kong and Junyent, 2013). This idea stands out in the UNESCO Decade of Education for Sustainable Development document (cited in Kong and Junyent, 2013), where emphasis is placed on the following educational actions: 1) it is the primary agent of transformation towards development sustainable, increasing people's capacities to transform their visions of society into reality; 2) fosters values, behavior and lifestyles required for a sustainable future; 3) it is a learning process of how to make decisions that consider the future of equity, economy and the ecology of all communities, and 4) builds the capacity for future-oriented thinking (Kong and Junyent, 2013).

In many cases, universities aim to respond to the needs of the context with emerging themes that should be included in the curriculum, such as human rights, the environment, among others, through transversal axes; However, in some cases, teachers are not updated or trained in knowing the methodology of intervening in this regard, and thus, apply it in the work they carry out. In this order of ideas, training is necessary through courses, workshops or non-formal education programs, such as the one carried out in this work.

The teaching of courses or programs designed and organized for a group of people implies training them, preparing them, or, as it is called in the competence approach, promoting knowledge, skills, attitudes and values to perform efficiently in the work or activity that is carried out. performed.

This study is part of a mixed methodology. Qualitative and quantitative techniques were considered. Regarding the qualitative part, an action-research approach was adopted because the researcher is part of the object of study. Likewise, because the research was developed in an educational environment with the promotion of environmental competencies of teachers and the description of the facts found was reached, with the evaluation carried out. In the quantitative aspect, it should be noted that a rubric was used that included a numerical scale to indicate results on the respective evaluation. It is also worth mentioning that said instrument contemplated indicating qualitative data.

The objective of this study was to promote environmental competencies in teachers of three undergraduate educational programs: Sociology, Economics and Law; This occurred through the implementation of a non-formal environmental education program called The incorporation of environmental education with a transversal approach in the curriculum, which was applied in September-October 2016. In accordance with the proposed objective, a Strategic method to incorporate the environment axis in the curriculum (study plan, learning unit program, didactic sequences, competences). A non-formal environmental education program was applied aimed at teacher facilitators of the sample academic units of this study (Economics, Sociology and Law) on the strategic incorporation of the environment axis in the curriculum with orientations of environmental education and a constructivist perspective with the objective of generating environmental competencies and introducing environmental education across the curriculum. The activities carried out in the course were evaluated to identify which were the learning acquired by the teachers.

In general, the results related to the promotion of environmental competencies with the implemented course led to the understanding that teachers promoted environmental



competencies on the importance of including the environmental dimension in the curriculum and specifically in their teaching work.

In correspondence with the above, it was also possible to have a non-formal environmental education program, its didactic sequence and didactic material (Methodological guide to implement environmental education transversally).

The promotion of environmental competencies in teachers make it possible for them to be able to integrate the environmental dimension transversally in the tasks they perform; for example, including this topic in a study plan, in a learning unit program, didactic sequence or in didactic strategies that they use to promote student learning. These competencies, in some cases, are not present in teachers or facilitators because they did not receive training from the university or educational institution that requires them to implement them.

## Method

This study was mixed. That is, it combines quantitative and qualitative views during the empirical phase of the study (Moscoso, 2017). Through time, the human being has been in constant search of new knowledge; Quantitative research is one of the ways to obtain it, having its support in the inquiry through cognitive elements and numerical data extracted from reality, statistically processed to test theories (Del Canto and Silva, 2013). A characteristic element in this research that frames the quali-quantitative was the use of the rubric that led to understanding the skills and learning acquired. The rubrics or assessment matrices provide another horizon in relation to the traditional grades that assess the degree of student learning, expressed in numbers or letters (Gatica and Uribarren, 2013). Regarding the qualitative methodology, Osses (2006) states that qualitative research is oriented to the in-depth study of the complex social reality. Likewise, the method selected for this study was action research. Martínez (2006) establishes that the action research method is the only one indicated when the researcher not only wants to know a certain reality or a specific problem of a group, but also wants to solve it. Action research is a qualitative methodological option in education (Colmenares, 2008).

## Population and sample

The UAGro Statistical Yearbook 2013-2014 (2014) states that the academic staff between the upper secondary level (baccalaureate and university technician) and higher (bachelor's, master's and doctorate) is 2312 workers. The total number of teachers working at the undergraduate level is 1,162, of which 779 are men and 383 are women. According to the aforementioned document, this university has 37 academic units that attend around 61 educational programs at the undergraduate level and has several locations in the state of Guerrero; In Acapulco there are 16 units and among them its staff of academics amounts to 590. Following these data, the sample was represented as follows. The academic staff at the School of Sociology is 15, in the School of Economics it is 15 and in the School of Social Sciences (Law) it is 48. Thus, the total number of teachers is 78. It was intended to carry out this study with the total of teachers who contemplate said educational programs, however, within this number, only those teachers who were interested in participating in the activities that were implemented at this stage of the project were considered. The methodology to select the sample was based on the qualitative approach, that is, for convenience, also considering the times of the target population. Table 1 shows the sample broken down by educational program.

**Tabla 1.**Muestra seleccionada

Programa educativo	Planta académica	Atendieron el programa y entregaron actividades
Sociología	15	8
Economía	15	3
Derecho	48	9
Total	78	20

Fuente: Elaboración propia con base en el UAGro (2014)

As commented in previous lines, this study proposed the purpose of promoting environmental competencies in teachers of three educational programs at the undergraduate level (Sociology, Economics and Law). And to achieve this, the following techniques or procedures and instruments were used:



- A strategic method was designed and elaborated to incorporate the environment axis in the curriculum (study plan, learning unit program, didactic sequences, competences).
- A non-formal environmental education program was applied aimed at the teacher facilitators of the academic units sample of this study on the strategic incorporation of the environment axis in the curriculum with orientations of environmental education and a constructivist perspective with the aim of generating environmental competencies and introduce environmental education across the curriculum.
- The activities carried out in the course were evaluated through a qualitative-quantitative rubric to identify the learning acquired by the teachers.

## Results

### **Design and elaboration of the strategic method to incorporate the environment axis in the curriculum**

From November 2015 to July 2016, the non-formal environmental education program was designed. The program, the didactic sequence and the didactic material (Methodological guide to implement environmental education transversally) were developed and organized. The official format was used to develop UAGro undergraduate learning unit programs. This format includes a constructivist and competency scheme to develop an educational program. Although this format was used, adaptations were made in such a way as to be consistent with the present in relation to their competencies. Regarding the didactic sequence, it was the same situation: its design and elaboration took into account the official format with which a didactic planning is elaborated at the university degree level. It is worth mentioning that the activities that were planned correspond to what is stipulated in the program and all had to do with the connection of the environment in the curriculum. The didactic sequence established the evaluation that had to be carried out to identify the skills or learning acquired. The program of the course gave rise to the development of a didactic material that helps to form the competences established in teachers. The didactic material was called Methodological Guide to implement environmental education transversally; It contemplated issues related to the environment, environmental education with a development approach and its transversal application in the curriculum. The objective of this material was to promote the environmental dimension or environmental education in the curriculum, in the programs of

learning units, in the didactic sequence and in the training of teachers and students. This guide was developed especially for teachers who contributed to the program.

### **Methodological Guide to Transversally Implement Environmental Education**

This material included a cover, an introduction, where, in a general way, the content and purposes were expressed, it included two chapters, one where the implementation of environmental education in the educational field is based and the second where the methodology to integrate it. Both the first and second chapters contemplate activities that must be carried out. Finally, the bibliography is included. This material contemplates a wide state of the art. The guide was designed with constructivist pedagogical guidelines and competencies, which guarantees to achieve the proposed competencies in accordance with the objectives of stage two of this project.

### **Result of the application of the non-formal environmental education program aimed at facilitating teachers**

Between the months of September-October 2016, the non-formal environmental education program was implemented, with the title "The incorporation of environmental education with a transversal approach in the curriculum." 38 teachers from the three educational programs (Sociology, Economics and Law) were registered. The teaching material to be used was given to all of them. However, only 20 teachers attended the program, presented activities and evidence of learning, as shown in Table 2.

**Tabla 2.** Profesores que se registraron para participar en el programa “La incorporación de la educación ambiental con enfoque transversal en el currículo”

Programa educativo	Número de profesores a quien se le entregó la guía metodológica	Total de guías entregadas	Atendieron el programa y entregaron actividades
Sociología	8	8	8
Economía	8	8	3
Derecho	22	22	9
Total	38	38	20

Fuente: Elaboración propia

### **Teachers, the educational program and the didactic sequence**

The educational program and the didactic sequence were presented in an informal way to the teachers, that is, they went to their cubicles, or where they were gathered, and they were exposed in broad terms of what the course was about; Of course, the environmental crisis and the urgent need to take action to counter it were emphasized. Likewise, an allusion was made to the educational model of UAGro, making it known that its principles and transversal axes establish the mainstreaming of the environment theme in the curriculum and, therefore, the integration of this theme in the tasks carried out by the teacher. The teachers were also told that the modality of this program was non-formal, that is, that the facilitator would give them a material where they would carry out the activities: some of these would be carried out in a self-taught way and others with the support of a facilitator, if necessary. if necessary. The facilitator would contact them personally or through a social network.

### **The non-formal environmental education educational program**

It was made up of two parts. The first part of the program in question was called Fundamentals and elements of mainstreaming and included around 11 activities. The second part was called Environmentalize your study plan and had five activities. These activities were established in the didactic sequence. The non-formal environmental educational program that was designed and the didactic sequence included knowledge, skills and attitudes and values to be developed (see table 3).

**Tabla 3.** Competencia y elementos de competencia del programa educativo ambiental no formal

Competencia	Elementos de competencia		
	Conocimientos	Habilidades	Actitudes y valores
Promueve competencias ambientales didáctico-pedagógicas, a través de la comprensión y elaboración de actividades que propician aprendizajes significativos para transversalizar el elemento medio ambiente en el plan de estudio, programa de unidad de aprendizaje, la secuencia didáctica y las actividades que realiza el profesor en la UAGro con sentido responsable.	Comprende los fundamentos y elementos de transversalización ambiental en el campo educativo y en el currículo universitario.	Analiza los fundamentos de la educación ambiental y, por ende, de su implementación en el currículo para contar con el sustento teórico y metodológico.	Genera competencias que contribuyen al desarrollo sustentable.

Fuente: Elaboración propia

The educational programs that are designed and based on the focus of competence-based education make explicit a competence and its elements of competence (knowledge, skills, attitudes and values) so that the facilitator or teacher who applies it takes into account what is intended to be achieved. . The topics seen were attached to the competition and its elements of competition.

In the following section, which concerns the evaluation of learning and acquired competences, the application of the program is complemented, since the themes, activities, evidence and evaluation carried out are specified.

## **Results on the evaluation of the activities carried out in the course to identify the learning and skills acquired by teachers**

Regarding the evaluation of the learning of the teachers in the implemented program, the delivery of the didactic guide with solved exercises was the learning evidence that allowed to judge the level of understanding on the environmental issue and of skills and learning in this matter. Each part or theme of the material had activities (conceptual, procedural and attitudinal) that the teacher had to solve. Most of the activities were exercises with open questions (questionnaires, identification of relevant concepts, understanding of environmental issues, practical activities to implement the environment element in the curriculum, development of competencies and teaching strategies that teachers had to solve). To evaluate the responses, the activities and, therefore, the learning, rubrics were designed. The values described in the rubric were established quantitatively and qualitatively (3 = Much, 2 = Partially, 1 = Little, 0 = Not at all). The responses and the degree of acceptance were analyzed as follows:

- MU = 3, refers to the total number of teachers who answered or carried out a questionnaire or exercise correctly.
- PA = 2, refers to the total number of teachers who answered a questionnaire or activities with few deficiencies.
- PO = 1, refers to the teachers who presented many deficiencies in the answers they gave to the questionnaires or activities they presented.
- NA = 0, refers to the teachers who definitely did not answer or presented significant errors in the answers or activities.

In this way, it was possible to know the level of previous knowledge and skills or learning obtained from the teachers that make up the sample of this study. As already mentioned, the guide or didactic material that was used in the program and that was the significant evidence of this program consisted of two parts (“Fundamentals and elements of mainstreaming” and “Environmentalize your study plan”). In total, there were 14 rubrics or tables that were used to present the results. The last activity of the second part was evaluated through an analysis. The following lines show the rubrics and the results of each of the activities.

### First activity

In this first activity of the didactic material, a diagnostic evaluation was carried out on the inclusion of the environmental element in the curriculum, in the learning unit program, the didactic sequence and the environmental competences of the teacher. It was an open questionnaire that was applied with the purpose of knowing information from the teacher about the incorporation of the environmental element in the curriculum and about the environmental competencies that he or she possesses and that are fundamental to generate competences of this nature in students, as shown presented in Table 4.

**Tabla 4.** Resultado de la evaluación diagnóstica sobre la inclusión del elemento medio ambiente en el currículo, en el programa de unidad de aprendizaje, la secuencia didáctica y las competencias ambientales del docente

Objetivo de la entrevista: comprender si los docentes del programa educativo de Sociología, Economía y Derecho implementan el elemento ambiental transversalmente.												
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (1), NA = Nada (0).												
Preguntas	Programas educativos											
	Sociología				Economía				Derecho			
	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0
¿Sabe cuáles son las problemáticas que afectan a nuestra sociedad y al mundo entero?	XX XX X	X		X X	XX		X		XX XX XX X		XX	
¿Sabe cuál es el procedimiento para que una problemática pueda ser considerada en el currículo	XX		XX	XX X X	XX			X	XX	XX	XX	XX X



universitario? Comente por favor.												
¿El elemento medio ambiente está incluido en el currículo o plan de estudio en el que labora? Diga cómo.	X			XX XX X XX			XX X	X		XX XX X	XX	XX
¿La materia que imparte tiene implícito el elemento medio ambiente transversalmente? Comente por favor.	XX			XX XX X X			XX X		XX		XX	XX XX X
¿Usted cuenta con competencias ambientales (conocimientos, habilidades y valores)? Comente por favor.	XX	XX	X	XX X			XX	X	XX		XX XX XX	X
¿Usted implementa estrategias y técnicas de educación ambiental en la materia que imparte? Diga un ejemplo.	XX		XX X	XX X				XX X		XX X XX X	XX XX XX	X

Fuente: Elaboración propia

The result in table 4 reflects in a general way that teachers of the three programs know, understand and partially implement the environmental dimension in the tasks of the curriculum; however, the NA = 0 value is significant: many teachers are unaware of this part.

### Second activity

Continuing with the activities contemplated in the guide, and as part of chapter one, this activity focused on the teachers reading and understanding the point "UAGro educational models 2004 and 2013 and the transversal axes (environment)". After having read and understood this topic, the teachers answered a questionnaire with open questions related to the objectives of said point. The results are observed in table 5.

**Tabla 5.** Resultado de la comprensión del elemento ambiente con enfoque transversal de acuerdo con el modelo educativo de la UAGro

Objetivo del cuestionario: comprende que el modelo educativo de la UAGro sugiere la implementación del elemento medio ambiente en el currículo.												
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (1), NA = Nada (0).												
Preguntas	Programas educativos											
	Sociología				Economía				Derecho			
	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0
¿Qué documentos en la UAGro establecen que el elemento medio ambiente tiene que ser implementado como tema transversal en el currículo?	XX XX XX			XX	XX			X	XX XX XX X			
¿Considera urgente la inclusión del elemento medio	XX XX		X		XX		X		XX XX	X		

ambiente en el plan de estudio de la institución donde labora? ¿Por qué?	XX X								XX XX			
De acuerdo con el modelo educativo, ¿cómo se comprende la incorporación del tema ambiental en el currículo?	XX XX XX XX				XX			X	XX XX XX X	XX		
¿Considera que la implementación del tema ambiental en el currículo coadyuva en la sustentabilidad que nuestra región y país necesita? ¿Por qué?	XX XX XX	XX			XX	X			XX XX XX XX	X		

Fuente: Elaboración propia

The MU = 3 value was significant in the three programs; This indicates that there are several teachers who know that the educational model of UAGro establishes the integration of the environment axis as a cross-cutting theme and that it influences sustainability.

### Third activity

The teachers read the point “Environmental problems”. Then, they answered a questionnaire with open questions in order to identify the perception that teachers have about the environmental crisis. The results are shown in table 6.

**Tabla 6.** Resultado de la percepción de la percepción sobre la crisis ambiental

Objetivo del cuestionario: percibe la problemática ambiental para actuar responsablemente en el cuidado del medio.												
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (1), NA = Nada (0).												
Preguntas	Programas educativos											
	Sociología				Economía				Derecho			
	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0
¿Percibe de manera preocupante la problemática ambiental? ¿Por qué?	XX XX X	XX XX	X		XX		X		XX XX X	XX XX		
De acuerdo con lo que se expone, ¿quién es el principal responsable de las problemáticas ambientales?	XX XX XX XX				XX X				XX XX XX XX X			
¿Considera usted que un problema ambiental que sucede en una zona, o en un país, se refleja en otras zonas o países? ¿Por qué?	XX XX XX		XX		XX		X		XX XX XX XX X			
¿Considera usted que la problemática ambiental impacta	XX XX X	XX X			XX		X		XX XX XX			

en lo social, cultural y económico? ¿Por qué?									XX			
									X			

Fuente: Elaboración propia

The results of this activity have a tendency to MU = 3, which indicates that teachers responsibly perceive environmental problems.

#### Fourth activity

The teachers read the point "Environmental education and education for sustainable development." As in the previous activities, they answered a questionnaire with open questions in order to understand the conceptualization of environmental education with mercantilist and development approaches (see table 7).

**Tabla 7.** Resultado de educación ambiental y educación para el desarrollo sostenible

Objetivo del cuestionario: Comprende la educación ambiental y la educación para el desarrollo sostenible y su implicación contemporánea en el currículo.												
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (1), NA = Nada (0).												
Preguntas	Programas educativos											
	Sociología				Economía				Derecho			
	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0
¿Cómo se comprende el desarrollo de la educación ambiental hasta los 80, o bien hasta los 90?	XX XX X	XX X			XX			X	XX XX XX X	X		X
¿Cómo se comprende el desarrollo de la	XX XX	X			XX		X		XX XX			X

educación ambiental después de los 90 con el enfoque del desarrollo sostenible?	XX X								XX XX			
¿Se sugiere que la educación ambiental sea integrada en el currículo como una disciplina o como un proceso? Explique.	XX XX XX	XX		XX		X		XX XX XX	X			X
¿Cuál es el enfoque que debe implementar el proceso de la educación ambiental en el currículo?	XX XX XX	XX		XX			X	XX XX XX X	X			X

Fuente: Elaboración propia

In Table 7 it is possible to observe that the answers were aligned to the MU = 3 value, which indicates that almost the majority of the teachers of the three educational programs understand that environmental education in the curriculum must be inserted with a sustainable development approach.

### Fifth activity

The teachers read and understood the point “Sustainable development. General principles of the 2013 Educational Model of UAGro (sustainability)”. Here they also answered a questionnaire with open questions. The purpose of this instrument was to analyze



the concept of sustainable development and its synonyms. The results are detailed in Table 8.

**Tabla 8.** Resultado del análisis del desarrollo sustentable y los principios generales del Modelo Educativo 2013 UAGro (sustentabilidad)

Objetivo del cuestionario: analiza el desarrollo sustentable y su inclusión como principio general del modelo educativo de la UAGro.												
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (1), NA = Nada (0).												
Preguntas	Programas educativos											
	Sociología				Economía				Derecho			
	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0
Tomando como referencia lo concerniente al desarrollo sustentable en este apartado, con sus palabras elabore una definición del concepto de <i>desarrollo sustentable</i> .	XX XX X	X		X X	XX			X	XX XX XX			XX X
¿Cómo comprende el enfoque conservador de la educación ambiental que no contribuye al desarrollo sustentable?	XX XX X	X		X X	XX		X		XX XX XX XX			X

¿Cómo comprende el enfoque de la educación ambiental que contribuye al desarrollo sustentable?	XX			X					XX			
	XX	X		X	XX		X		XX	X		X
	X			X					XX			
									X			

Fuente: Elaboración propia

In this section, most of the answers are oriented to MU = 3, which indicates that the teachers of the three educational programs understood the term sustainable development and the importance of being included as a principle of the UAGro educational model, although there are teachers who presented deficiencies in their understanding.

### Sixth activity

The teachers read the material from the point "Environmental education as a transversal theme in the curriculum." In addition to this, they answered a questionnaire. The purpose of this instrument was to analyze and understand the focus of environmental education in the curriculum. (See table 9).

**Tabla 9.** Resultado del análisis y comprensión la educación ambiental como tema transversal en el currículo

Objetivo del cuestionario: analiza y comprende el enfoque transversal de la educación ambiental en el currículo (plan de estudio, programas de unidades de aprendizaje y la secuencia didáctica).												
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (1), NA = Nada (0).												
Preguntas	Programas educativos											
	Sociología				Economía				Derecho			
	MU	PA	PO	NA	MU	PA	PO	NA	MU	PA	PO	NA
	3	2	1	0	3	2	1	0	3	2	1	0
Teniendo en cuenta la información de este apartado,	XX	XX		X					XX			
	X	X		X	XX			X	XX	X		X

menciona cómo se comprende la educación ambiental como tema transversal.									XX X			
Teniendo en cuenta la información de este apartado, menciona cómo se comprende la transversalización de la educación ambiental en el currículo o plan de estudio.	XX X	XX X		X X	XX		X		XX XX XX	XX		X
Teniendo en cuenta la información de este apartado, menciona cómo se comprende la transversalización de la educación ambiental en una unidad de aprendizaje.	XX XX	XX		X X	XX		X		XX XX XX X	X		X

Fuente: Elaboración propia

Following table 9, the MU = 3 value was significant in the three programs, however, the PA and PO values showed considerable results. This shows that the implementation of the transversal approach to environmental education is not fully understood by teachers and that it is necessary to strengthen it. Finally, there were also responses with the value NA.

### Seventh activity

The teachers gave a reading related to the point "Competences of the UAGro professor and environmental competences". Next, they answered a questionnaire with open questions. The purpose of this instrument was to know if teachers know and have the teaching competencies suggested by UAGro and the environmental ones. The results are presented in Table 10.

**Tabla 10.** Resultado de comprensión de competencias del profesor de la UAGro y competencias ambientales

Objetivo del cuestionario: Conoce las competencias docentes que sugiere la UAGro y las ambientales.												
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (1) , NA = Nada (0).												
Preguntas	Programas educativos											
	Sociología				Economía				Derecho			
	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0
Considerando las aportaciones de las citas en este apartado, defina con sus propias palabras el término de <i>competencias</i> .	XX									XX		
	XX			X	XX	X				XX		X
	XX			X						XX		
				X						XX		
¿Cómo comprende las competencias ambientales?	XX	XX		X	XX	X				XX	XX	X
				X						XX		
				X						XX		
				X						XX		
¿Sabía usted cuáles son las competencias que debe promover un	XX	X	X	X		XX				XX	XX	
				X		X				XX	X	XX
				X								

docente en la UAGro?												
¿Está de acuerdo con que a las competencias descritas en la tabla se le agreguen las ambientales?	XX		X		XX				XX			XX
	XX		X		X				XX			
			X						X			

Fuente: Elaboración propia

Table 10 shows that there are many teachers who understand skills in education and environmental skills, as well as the importance of a teacher at UAGro acquiring them to apply them in their work. However, there were professors from the Sociology and Law programs who had a different opinion, this was confirmed in their answers grouped in the NA value.

### **Eighth activity**

The teachers read the material related to the topic “The elements of a curriculum or study plan at the undergraduate level, of a learning unit program, of a didactic sequence in its official format and its relationship with environmental mainstreaming”. After reading, they answered a questionnaire with open questions. The purpose of this instrument was to present and make teachers understand the structure that includes a study plan, a learning unit program and a didactic sequence; likewise, present the official formats approved by UAGro to prepare them, without losing sight of the methodology to introduce the environmental element in a transversal manner. (See table 11).

**Tabla 11.** Resultado de la comprensión de los elementos que conforman un currículo o plan de estudio de nivel licenciatura, de un programa de unidad de aprendizaje, de una secuencia didáctica, el formato oficial UAGro en donde se plasman y su relación con la transversalización ambiental

Objetivo del cuestionario: comprende los elementos y formatos de un plan de estudio, un programa de unidad de aprendizaje y secuencia didáctica para introducir el elemento medio ambiente transversalmente.												
Las claves MU = Mucho (3), PA = Parcialmente (2), PO = Poco (1), NA = Nada (0)												
Preguntas	Programas educativos											
	Sociología				Economía				Derecho			
	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0
¿Sabes cuáles son los elementos que debe contemplar un currículo o plan de estudio de licenciatura en la UAGro? Ya sea que la respuesta sea afirmativa o negativa, comente la razón.	X	X	X	XX X X X	XX			X	XX XX XX	XX		X
¿Sabías que el diseño y elaboración de un currículo de licenciatura debe integrar el elemento medio ambiente como tema transversal? Ya sea que la respuesta sea afirmativa o negativa, comente la razón.	XX	X		XX X X X	XX		X		XX XX X	XX		XX



<p>¿Sabes cuál es el formato oficial para elaborar un programa educativo de unidad de aprendizaje o materia de licenciatura en la UAGro? Ya sea que la respuesta sea afirmativa o negativa, comente la razón.</p>	<p>XX X</p>			<p>XX X X X</p>	<p>XX</p>		<p>X</p>		<p>XX XX XX XX</p>			<p>X</p>
<p>¿Sabías que el diseño y elaboración de un programa educativo de unidad de aprendizaje o materia de licenciatura debe integrar el elemento medio ambiente como tema transversal? Ya sea que la respuesta sea afirmativa o negativa, comente la razón.</p>	<p>XX</p>	<p>X</p>		<p>XX X X X</p>	<p>XX</p>		<p>X</p>		<p>XX XX XX X</p>			<p>XX</p>
<p>¿Sabes cuál es el formato oficial para elaborar una secuencia didáctica o planeación de actividades en el nivel licenciatura en la UAGro? Ya sea que la respuesta sea afirmativa o negativa, comente la razón.</p>	<p>XX X</p>			<p>XX XX X</p>	<p>XX</p>		<p>X</p>		<p>XX XX XX XX</p>			<p>X</p>

¿Sabías que, en el diseño y elaboración de una secuencia didáctica o planeación de actividades, estas deben de relacionarse con el elemento medio ambiente como tema transversal? Ya sea que la respuesta sea afirmativa o negativa, comente la razón.	XX	X		XX X X X	XX			X	XX XX XX X			XX
--	----	---	--	-------------------	----	--	--	---	---------------------	--	--	----

Fuente: Elaboración propia

Table 11 shows that the teachers of the three educational programs understand and know what curricular elements make up a study plan, a learning unit program, the didactic sequence and the formats used at the time of elaboration. They also know that the environment must permeate transversely. It should also be clarified that there are teachers in the three programs who did not have knowledge about it.

### Activity nine

Faced with the question "How to know if the learning unit that I teach and that corresponds to the study plan of the institution where I work implements the environmental element?", The teachers carried out an evaluation (qualitative-quantitative) through a rubric to find out if the learning unit program is environmentalized or not. The dynamics of this instrument was that teachers had to mark the components of the environment element (water, air, soil, energy), translate them into competencies (knowledge, skills, attitudes and values) and indicate the degree to which they are linked to the environment. graduation profile or competencies. The results are presented in Table 12.

**Tabla 12.** Resultado de la evaluación que se enfocó en conocer sobre el elemento medio ambiente de manera transversal en el programa de estudio que labora el profesor

Objetivo del cuestionario: identifica la dimensión ambiental con enfoque transversal en el programa de unidad de aprendizaje.											
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (3), NA = Nada (0).											
Programas educativos											
Sociología				Economía				Derecho			
MU	PA	PO	NA	MU	PA	PO	NA	MU	PA	PO	NA
3	2	1	0	3	2	1	0	3	2	1	0
XX	X	X	XX X X		XX		X		XX	XX	XXXXX

Fuente: Elaboración propia

Table 12 shows that the results were almost even. There are teachers in the three educational programs that use learning unit programs that include the environmental axis in a transversal way. However, it is also appreciated that there are teachers in the three programs who do not implement the environmental dimension.

### Tenth activity

The teachers read and understood the point “Pedagogical foundations of the study plan, of the programs of learning units and the didactic sequences at UAGro (constructivism, meaningful learning, and the focus of competences in relation to learning, role of the teacher and student) and its link with environmental education ”. Also here they answered a questionnaire. The purpose of this section was for teachers to understand the didactic-pedagogical foundations that support educational practice at UAGro. The result is presented in Table 13.

**Tabla 13.** Resultado de la comprensión de los fundamentos pedagógicos del plan de estudio, de los programas de unidades de aprendizaje y las secuencias didácticas en la UAGro (constructivismo, aprendizaje significativo y el enfoque de competencias en relación con el aprendizaje, rol del profesor y estudiante) y su vinculación con la dimensión ambiental

Objetivo del cuestionario: comprende el fundamento didáctico-pedagógico de la práctica educativa en la UAGro													
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (3), NA = Nada (0).													
Preguntas	Programas educativos												
	Sociología				Economía				Derecho				
	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0	MU 3	PA 2	PO 1	NA 0	
¿Cómo comprende el enfoque pedagógico, constructivista, aprendizaje significativo y competencias?	XX X	X		X X X X	XX		X		XX XX XX	XX			X
¿Sabías cuáles eran los fundamentos pedagógicos que sugiere el Modelo Educativo 2013 de la UAGro? Ya sea que la respuesta sea afirmativa o negativa, comente la razón.	XX X			XX X X X	XX		X		XX X	XX XX			XX
¿El plan de estudio de la institución donde labora considera los fundamentos pedagógicos que plantea el modelo educativo de la universidad? Ya sea que	XX			XX X X X X	XX		X		XX XX XX XX				X

la respuesta sea afirmativa o negativa, comente la razón.												
¿El programa de unidad de aprendizaje contempla el fundamento pedagógico que plantea el modelo educativo de la UAGro? Ya sea que la respuesta sea afirmativa o negativa, comente la razón.	XX X			XX X X X	XX		X	XX	XX XX			XX X
¿Las actividades educativas que planea por su materia y que están plasmadas en la secuencia didáctica las desarrolla e implementa bajo el enfoque de la pedagogía y competencias?	XX	X	X	X X X X	XX			X	XX XX X			X X X X
¿Considera necesario que la educación ambiental con enfoque transversal que desarrolle en la unidad de aprendizaje que imparte implemente enfoques constructivistas, de aprendizajes significativos y de competencias? Ya sea que la respuesta sea	XX X	X		X X X X	XX X				XX XX XX XX			X

afirmativa o negativa, comente la razón.												
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Fuente: Elaboración propia

Table 13 shows that the teachers of the three educational programs understand the pedagogical-didactic approaches of their teaching practice and it is the foundation of study plans, learning unit programs and didactic sequences; They also understand that these approaches would permeate the inclusion of environmental education as a cross-cutting theme. Finally, there are teachers whose answers were located in NA.

### Eleventh activity

The teachers read and understood the point “Teaching strategies and techniques in environmental education”. In addition to this, they developed a didactic strategy and technique on a content to be developed. The purpose of this section was for teachers to understand how to design strategies that incorporate a method, an educational strategy, didactic technique, activities and resources to develop a theme attached to the program of their subject and linked to the environment. (See table 14).

**Tabla 14.** Resultado de la elaboración de una estrategia y técnica didáctica en educación ambiental sobre un contenido de su programa de unidades de aprendizaje

Objetivo: comprende la elaboración de una estrategia educativa o didáctica y se vincula con la educación ambiental.											
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (3), NA = Nada (0).											
Programas educativos											
Sociología				Economía				Derecho			
MU	PA	PO	NA	MU	PA	PO	NA	MU	PA	PO	NA
3	2	1	0	3	2	1	0	3	2	1	0
XX			XX	XX			X	XX			XX XX
XX			XX					X			

Fuente: Elaboración propia

Table 14 shows that, with the help of the didactic material, some teachers were able to develop a strategy and use a technique attached to the environmental dimension with a transversal approach and link it with the learning unit or subject that they work on, although it is also observed that there was teachers who did not do the activity.

### Evaluation of the activities of the second chapter of the didactic guide

To evaluate the results of the activities of the second chapter of the guide or didactic material, the methodology used in chapter one was considered.

#### First activity of chapter two

The teachers analyzed in a practical way the section “Curriculum or study plan green and with little green”. They then carried out an activity that consisted of identifying two curricula or study plans, one green and the other not green. The purpose was for teachers to symbolically distinguish curricula that include and do not include the environmental dimension. The results are seen in table 15.

**Tabla 15.** Resultado de la actividad “Distingue un currículo o plan de estudio ambientalizado y con escasa ambientalización”

Objetivo: distingue un currículo ambientalizado y sin ambientalizar o con escasa ambientalización.											
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (3), NA = Nada (0).											
Programas educativos											
Sociología				Economía				Derecho			
MU	PA	PO	NA	MU	PA	PO	NA	MU	PA	PO	NA
3	2	1	0	3	2	1	0	3	2	1	0
XX			XX XX XX	XX			X	XX XX XX X			XX

Fuente: Elaboración propia



Table 15 shows that in the three educational programs, more teachers were those who carried out the activity than those who did not, that is, they identified the level of greening that exists in one curriculum and another; This made it possible to understand how the environment permeates in green curricula and also to know what is the level of greening of the study plan of your institution.

### Second activity of chapter two

The teachers practically analyzed the section "Environmentalize your study plan" (implement the environmental element in the elements of the study plan), and carried out an activity that consisted of reviewing the study plan of the institution where they work (the elements that make it up) in order to introduce the environment element in the graduation profile. To do this activity, the guide had examples. The purpose was for teachers to environmentalize at least one element of said curriculum to have support from the incorporation of environmental education with a transversal approach. (See results in table 16).

**Tabla 16.** Resultado de la actividad “Ambientaliza tu plan de estudio (implementa el elemento ambiental en los elementos del plan de estudio)”

Objetivo: ambientaliza el perfil de egreso del plan de estudio de la institución donde labora.											
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (3), NA = Nada (0).											
Programas educativos											
Sociología				Economía				Derecho			
MU	PA	PO	NA	MU	PA	PO	NA	MU	PA	PO	NA
3	2	1	0	3	2	1	0	3	2	1	0
XX	X		XX XX X	XX			X	XX	X		XX XX XX

Fuente: Elaboración propia

In general, there were more teachers who did not carry out this activity than those who did, although it is worth mentioning that those who carried out the exercise or activity environmentalized the graduation profile of the institution or study program where they work,

for which the guide considered an example of the methodology to follow. It was found that there were learnings about greening the graduation profile of a study plan.

### Third activity of chapter two

The teachers practically analyzed the section "Environmentalize your learning unit program (implement the environmental element in the elements of the learning unit program)". Next, they carried out an activity that consisted of reviewing the program of the learning unit or subject that it teaches (the elements that make it up). The purpose of this exercise was to introduce the environmental element in its competence. To do this activity, the guide had examples. The purpose was for teachers to environmentalize the general competence of said program to have sustenance from the incorporation of environmental education with a transversal approach. The results are shown in table 17.

**Tabla 17.** Resultado de “Ambientaliza tu programa de unidad de aprendizaje (implementa transversalmente el elemento ambiental en los elementos del programa de tu unidad de aprendizaje)”

Objetivo: ambientaliza el Programa de Unidad de Aprendizaje con enfoque transversal.											
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (3), NA = Nada (0).											
Programas educativos											
Sociología				Economía				Derecho			
MU	PA	PO	NA	MU	PA	PO	NA	MU	PA	PO	NA
3	2	1	0	3	2	1	0	3	2	1	0
XX			X X				X	XX	XX		XX X
X			X X	XX				X			X
			X								

Fuente: Elaboración propia

What is presented in the table above shows that the teachers, for the most part, carried out the activity, although some partially; there were also several who did not perform this task. Those who carried out this activity managed to include the environmental dimension in a transversal way in the learning unit program in which they work. In relation to what is mentioned, it was possible to understand that there were lessons learned and acquired

competencies about the inclusion of education or environmental dimension in a learning unit program.

#### Fourth activity of chapter two

The teachers practically analyzed the section "Environmentalize your didactic sequence (implement the environmental element in the elements of the didactic sequence)" and carried out an activity that consisted of reviewing the elements that make up the planning or didactic sequence. The purpose of this exercise was to introduce the environment element in a session or class. To do this activity, the guide had examples. The purpose was for teachers to environmentalize at least one session or class so that they realized how to link activities that are specific to the subject they are taught with socio-environmental aspects. The results are seen in table 18.

**Tabla 18.** Resultado de la actividad “Ambientaliza tu secuencia didáctica (implementa el elemento ambiental en los elementos de la secuencia didáctica)”

Objetivo: ambientaliza la planeación o secuencia didáctica con enfoque transversal.											
Las claves: MU = Mucho (3), PA = Parcialmente (2), PO = Poco (3), NA = Nada (0).											
Programas educativos											
Sociología				Economía				Derecho			
MU	PA	PO	NA	MU	PA	PO	NA	MU	PA	PO	NA
3	2	1	0	3	2	1	0	3	2	1	0
XX			XX				XX	XX			XX
XX			XX				X	X			XX

Fuente: Elaboración propia

Table 18 shows that in the Law and Sociology study programs there were fewer teachers who carried out the activity and more those who did not. However, those who carried out this task realized how to include the environmental dimension transversally in the design of their didactic sequence. Thus, it was perceived that they environmentalized a session of one of their didactic sequences.

### **Fifth activity of chapter two**

The last activity of the guide did not contemplate carrying out an activity, it only focused on presenting the teachers with a scheme that allowed them to visualize that the context, the educational model, the curriculum or study plan, the learning unit programs and the didactic sequence they are interconnected; that is, educational models should not be separated or unrelated to what happens around us (context). An environmental problem, like any other, has to be valued and, therefore, be taken into account in the education that a country provides to its society. Universities, in this case, should not be disconnected from social reality or what happens around them. For this reason, the curricula or study plans have to retake and state in their designs the needs or demands of what is happening. Currently, the environmental crisis is an emergent and urgent issue to attend to, so it has to be included in the study plans, preferably in a transversal way, although it can be implemented in other ways. The implementation in the study plan in a transversal way means that the learning unit programs, and therefore the didactic plans or sequences, have to integrate socio-environmental competencies or activities.

### **Discussion**

Many teachers of the academic unit of Sociology perceive environmental problems; although there are some who do not know the methodology to implement this need in the curriculum. Very few teachers have environmental competencies and implement them in their teaching practice. Many teachers of the academic unit of Economics perceive environmental problems and know the methodology to meet this need in the curriculum; however, this has not been done because the environment element is little included in the curriculum. All the interviewees affirm that the environmental element is contemplated in the learning unit in which they work. Almost the majority affirm that they lack environmental competencies and, therefore, do not apply environmental education strategies in the subject they teach. In the Law program, almost all the teachers interviewed perceive environmental problems, but very few know how to add this element to the curriculum. Almost all affirm that the environment is very little included in the study plan and, in the same way, almost all affirm that the environment element does not appear as such in the learning unit program in which they work; very few say a little. Finally, almost all of them state that they do not have

environmental competencies and, consequently, environmental education strategies in their educational practice.

Now, most of the Sociology teachers interviewed understood that the educational model of UAGro establishes, in its principles and transversal axes, the environmental element to be implemented transversally and almost all agree that it includes environmental education in the study plan where they work. Similarly, almost everyone understood that the educational model refers to the fact that the environmental dimension in the curriculum must be transversal. In Economics, almost all those interviewed understood that the inclusion of the environment in a transversal way contributes to the sustainability that our world requires. In Law, almost all teachers understood that the educational model of UAGro establishes in its principles and transversal axes the environmental element to be implemented transversally; Almost everyone also agrees that the environmental element includes environmental education transversally in the study plan where they work.

Most of the interviewees from Sociology, Economics and Law perceive the problem as a worrying issue, and all agree that human beings are responsible for this crisis; Almost everyone perceived that a problem of this nature not only affects one area, but extends to others, and they all agree that the environmental crisis is reflected in the social, cultural, economic and other aspects of society.

Almost all of the interviewed teachers of the Sociology degree understood that between the 1980s environmental education focused on addressing problems of nature only. In this same vein, almost everyone understood that after the 90's this education began to be understood as a process that links the environmental with the social, the economic and the cultural. Also, if it is implemented in the curriculum, it must be included as part of a process and not as a subject. And almost everyone understood that this education must be integrated into the curriculum with an environmental approach because it is more inclusive. The Economics and Law professors gave the same answer.

With regard to sustainable development, almost all the teachers interviewed in the three educational programs alluded to the fact that sustainability implies implementing environmental education because having a healthy environment contributes to a social and economic balance.

There were very few teachers in Sociology who understood environmental education as a transversal theme in the curriculum, as well as the methodology to be incorporated into the study plan. However, almost more than half understood how it is incorporated into the

unit learning program. Almost all economics teachers who carried out this activity viewed environmental education as a cross-cutting theme in the curriculum. Almost all the Law teachers who carried out this activity understood environmental education as a transversal theme in the curriculum and discovered how it can be introduced transversally in the curriculum or study plan and in the learning unit.

All the teachers interviewed in Sociology understood what competencies are, however, there are deficiencies in some in understanding what environmental competencies are. Very few are aware that at UAGro there are competencies described for undergraduate teachers. Everyone agrees that among the competencies that have been described in the UAGro for its teachers include the environmental ones, because they are not mentioned as such. Almost all economics teachers understand what competencies are and by extension understand environmental competencies. Everyone understands which are the teaching competencies described in the UAGro and they all agree that environmental competencies be annexed. All law teachers understand what competencies are in a general way, however, most understand little of the competencies that focus on the environment. Less than half knew which competencies UAGro had described for its teachers and the majority that environmental competencies should be considered as another teaching competency due to the urgency of the subject.

Very few sociology teachers knew the elements to develop a study plan; Similarly, very few knew that a study plan at UAGro must be green. Half of the teachers knew the format for developing a learning unit program. Very few knew that a learning unit program and the didactic sequence should be environmentalized or implement the environmental element transversally, however, based on the information, this deficiency was partially solved. Most economics teachers are familiar with the elements included in a bachelor's study plan at UAGro. In the same way, that a study plan at UAGro must be environmentalized. They knew the format to develop a learning unit program and they knew that a learning unit program and the didactic sequence must be environmentalized or implement the environmental element transversally. This reflects that the majority now understand that this element must permeate the curriculum (study plan, learning unit program and didactic sequence). Most law teachers are familiar with the elements included in a bachelor's study plan at UAGro. They also knew that a study plan at UAGro must be green. They knew the format to develop a learning unit program and knew that a learning unit program and the didactic sequence must be environmentalized or implement the environmental element



transversely. This activity reinforced learning so that most teachers now understand that this element must permeate the curriculum (study plan, learning unit program and didactic sequence).

Some teachers of the academic unit of Sociology realized that the program of the learning unit that they work is not completely environmentalized. Most economics teachers identified that their learning unit programs are partially linked to environmental elements. Law teachers understood that the learning unit programs are partially and little linked to the environment.

Half of the sociology teachers now understand the pedagogical approaches (constructivism, meaningful learning and competences) suggested by the UAGro educational model; however, very few confirm that the institution's plan does not include such approaches. Very few also comment that the activities carried out in the classroom do not integrate the suggested approaches. Almost everyone understood the need for the introduction of environmental education in the curriculum under such approaches. Half of the economics teachers now understand the pedagogical approaches (constructivism, meaningful learning and competences) suggested by the UAGro educational model, however, half express that the institution's plan does not include such approaches. Half also comment that the activities carried out in the classroom do not integrate the suggested approaches. Almost everyone understood the need for the introduction of environmental education in the curriculum under such approaches. Almost all law teachers now understand the pedagogical approaches (constructivism, meaningful learning and competencies) suggested by the UAGro educational model, almost all also express that the institution's plan does not include such approaches. Almost all also comment that the activities carried out in the classroom do not integrate the suggested approaches. Almost everyone understood the need for the introduction of environmental education in the curriculum under such approaches.

Almost all Sociology teachers understood the development of a didactic strategy that integrates environmental education transversally; in Economics and Law it was the same case. Regarding the activity where they identified an environmentalized curriculum and one that is not, almost all the teachers interviewed in the three programs that carried out this activity realized what an environmentalized curriculum is and one that is not.



Some Sociology teachers linked the environmental element with the graduation profile of the study plan. In addition to this, they understood that the environmental element has to be implicit transversally in the institution's study plan. The teachers of the academic unit of Economics related the environment axis with the graduation profile as well. In Law, some teachers also developed the activity and understood that the environmental element has to be implicit transversally in the institution's study plan.

The teachers of the academic unit of Sociology carried out and understood the activity of how the environmental element should be implemented transversally in a learning unit program. The teachers of the academic unit of Economics who carried out this activity now understand how the environmental element should be implemented transversally in a learning unit program, also the teachers of the academic unit of Law who carried out this activity understood how the environmental element should be implemented transversely in a unit learning program.

The teachers of the academic unit of the three programs carried out an activity on how the environmental element should be implemented transversally in a didactic sequence. When reviewing the activity, excellent results were displayed.

Through the evaluation carried out, it was identified that the teachers of the three programs that participated managed to understand important information in relation to pedagogical and environmental education aspects so that they implement what was acquired in the curriculum and in the tasks that they have to carry out in University.

The results of this study coincide with strategies that have been designed based on educational programs and course-workshops on the integration of the environmental dimension in plans, study programs, didactic sequences and the environmental training of teachers, such as, for example. The study carried out by de Souza, Bueno, Duarte and Da Silva (2015) stated that the results of a course that aimed to promote pedagogical training in environmental education carried out with seventeen students in 2014 from a public university in the State of Paraná (Brazil), all graduates and working as teachers, concluded that the course brought contributions to the participants that showed, among other things, an improvement in the understanding of the issues addressed in a clearer stance regarding their daily actions and the environmental perspective. Likewise, Súcar (2003) mentions that the Institutional Environmental Program, at the University of Guanajuato (Pimaug), in February 2001, had as one of its objectives the incorporation of the environmental dimension in educational plans and programs at the secondary level. superior and superior. The first of the

formal actions carried out in order to initiate a process of "greening" as a fundamental part of university training was a course-workshop attended by 20 professors. The realization of this event allowed an awareness, and aroused a genuine interest in the attendees, who began their own analysis of their teaching activities and the way in which they could incorporate the environmental dimension. In relation to the course-workshop, the professors also presented different perceptions they had on the environmental situation and on the implications of incorporating this dimension in courses in different areas of knowledge.

Another study that focuses on teacher training in environmental knowledge is the one presented by Miranda, Bedolla and Sampedro (2020). This is an investigation that was developed in 2017 in the Academic Unit of Information Sciences and Technologies (UACyTI), dependent on the UAGro, in the city of Acapulco, Guerrero, Mexico, whose purpose was to mainstream the environment axis on the upper level. One of its stages raised a proposal for teacher training in environmental knowledge, curricular design and mainstreaming. Consequently, a course-workshop was designed and applied that promoted new knowledge in environmental matters in teachers; A methodology was also unveiled to integrate content related to the mainstreaming of the environment axis in the program and the didactic sequence necessary to develop environmental competencies in students.

With the studies presented in previous paragraphs, it is verified that both in Mexico and in other parts of the world the "strategy" of the design and application of programs or courses-workshops is used when it is intended to train teachers environmentally.

## Conclusions

The method applied to develop environmental competencies with the teachers of the three study programs mentioned in the content of this work gave favorable results since it managed to publicize, understand and promote skills related to the environmental dimension. Likewise, it allowed to form a prospective vision by giving guidelines on how to apply it in the school activities carried out, this was verified in the evaluation of the activities and therefore, the evidence provided. Teachers are the main actors in the educational process and for this reason, it is essential that they know the curricular guidelines or guidelines regarding what is contemplated or integrated into the curriculum of the institution where they work. In this case, the environmental dimension, as environmental issues are an emerging and

worrying issue, has been responsibly integrated into the university's curriculum. And so through college. it contributes to the sustainability that the world requires. This will be achieved as long as you take care of yourself and stop affecting the environment.

Teachers are a key part of the university. It is important that they have environmental competencies to implement them in the activities or educational tasks that they carry out. A teacher must know their study plan, know which are the transversal themes that must be carried out, must know how to environmentalize their study program or the subject they work on and how to integrate the environmental dimension in the didactic sequence, as well as apply strategies, design evidence, evaluate learning attached to the environment axis with a transversal approach. Universities, in some cases, integrate some projects or transversal themes in the curriculum; However, the teacher is not trained on its application, so teachers reflect that lack of knowledge on how to implement what is entrusted. What is exposed in this work projects the current need to continue in the management of the environmental dimension (transversal) in the curriculum and in the environmental training of teachers so that they contribute to the work they carry out and thereby contribute to the sustainability that the world requires.

### **Future lines of research**

This study is framed in the educational field, environmental sciences and in the research lines of environmental education for sustainability. It is a theoretical reference for studies or research carried out within the educational field and environmental sciences. It focuses on the role of the teacher in the work that they have to do, considering the theoretical and methodological, pedagogical and didactic approaches such as the competence approach and social constructivism. Due to this fact, the inclusion of the environmental dimension with a transversal approach not only permeates the curriculum, programs of learning units and the didactic sequence, but also the environmental competencies of the teacher that are necessary for their performance. The curricula of universities around the world are obliged to include the environmental dimension transversally because environmental and socio-environmental problems affect everyone equally. In this order of ideas, a curriculum must incorporate the demands of the context. Curricular greening, then, includes several aspects to reconsider in the curricular task; one of them is updating their teachers, because they must be prepared with the necessary environmental competencies to apply learning strategies and techniques

in the work they do. Thus, these competencies will contribute to the formation of environmental and transversal competences in students to face challenges of this nature in the present and in the future.

## References

- Aparicio, J. L., Rodríguez, C. y Beltrán, J. (2014). Metodología para la transversalidad del eje medio ambiente. *Iberoamericana de las Ciencias Sociales y Humanísticas*, 3(6).
- Casaña, S. (19 de noviembre de 2015). Competencias didácticas para la educación ambiental. *Revista Vinculando*. Recuperado de <http://vinculando.org/educacion/competencias-didacticas-educacion-ambiental.html>.
- Colmenares, A. M. y Piñero, M. L. (2008). La investigación acción. Una herramienta metodológica heurística para la comprensión y transformación de realidades y prácticas socio-educativas. *Laurus*, 14(27), 96-114.
- Cortés, B., Aragonés, J. I., Américo, M. y Sevillano, V. (2002). Los problemas ambientales como objeto de conocimiento científico y escenarios de intervención psicosocial. *Psychosocial Intervention*, 11(3), 277-287.
- Del Canto, E. y Silva, S. A. (2013). Metodología cuantitativa: abordaje desde la complementariedad en ciencias sociales. *Revista de Ciencias Sociales*, 3(141), 25-34.
- de Souza, P. R., Bueno, L. L., Duarte, P. D. y Da Silva, W. C. (2015). Una propuesta de educación ambiental para la formación continua de profesores. Ponencia presentada en el VIII Encuentro Nacional de Experiencias en Enseñanza de la Biología y la Educación Ambiental. III Congreso Nacional de Investigación en Enseñanza de la Biología.
- Gatica, L. F. y Uribarren, B.T. (2013). ¿Cómo elaborar una rúbrica? *Inv. Ed. Med.* 2(1), 61-65.
- García, A. (coord.) (2009). *Guía para transversalizar el eje ambiental en las carreras del nivel de educación superior de Honduras*. Tegucigalpa, Honduras: República de Honduras.
- Hopwood, B., Mellor, M. and O'Brien, G. (2005). Sustainable development: mapping different approaches. *Sustainable Development*, 13(1), 38-52.
- Kong, L. F. y Junyent, P. M. (2013). La construcción de escenarios de futuro (CEF) como aportación didáctica y metodológica para una educación (ambiental) creativa, global

- y sostenible. Ponencia presentada en el IX Congreso Internacional sobre investigación en didáctica de las ciencias. Girona, del 9 al 12 de septiembre de 2013.
- Martínez M. Miguel (2006). La investigación cualitativa (síntesis conceptual). *Revista IIPSE*, 9(1), 123-146.
- Miranda, E. A., Bedolla, S. R. y Sampedro, R. M.L. (2020). Formación docente para integrar el eje medio ambiente en el proceso de enseñanza-aprendizaje en el nivel superior en la universidad autónoma de Guerrero México. *Revista Pedagógica, Chapecó*, 22, 1-13.
- Moscoso, J. (2017). Los métodos mixtos en la investigación en educación: Hacia un uso reflexivo. *Cadernos de Persquisa*, 47(16), 632-649.
- Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura [Unesco]. (s. f.). ¿Qué hace la Unesco en relación con la educación para el desarrollo sostenible? Recuperado de <https://es.unesco.org/themes/educacion-desarrollo-sostenible/acciones-unesco>.
- Osses B. Sonia, Sánchez t. Ingrid; Ibáñez F. Flor (2006). Investigación cualitativa en educación. Hacia la generación de teoría a través del proceso analítico. *Estudios pedagógicos*, 32 (1), 119-133.
- Quiroz, B. I., S. Del Amo R., y J. M. Ramos, P. (2011). Desarrollo sustentable, ¿discurso político o necesidad urgente? *La Ciencia y el Hombre*, 34(3), 11-16.
- Serrano, J. M., y Pons, R. M. (2011). El constructivismo hoy: enfoques constructivistas en educación. *Revista Electrónica de Investigación Educativa*, 13(1), 1-27.
- Súcar, S. S. (2003). La formación de los profesores: proceso fundamental para una educación ambiental. La experiencia de la Universidad de Guanajuato. Programa Institucional de Medio Ambiente de la Universidad de Guanajuato, PIMAUG. Ponencia presentada en el Primer Foro Nacional sobre la Incorporación de la Perspectiva Ambiental en la Formación Técnica y Profesional. San Luis Potosí, del 9 al 13 de junio de 2003.
- Universidad Autónoma de Guerrero [UAGro]. (2004). *Modelo Educativo y Académico 2004*. Chilpancingo, México: Universidad Autónoma de Guerrero.
- Universidad Autónoma de Guerrero [UAGro]. (2013). *Modelo Educativo. Hacia una educación de calidad con inclusión social*. Chilpancingo, México: Universidad Autónoma de Guerrero.

Universidad Autónoma de Guerrero [UAGro]. (2014). *Anuario Estadístico 2013-2014*.  
Chilpancingo, Guerrero: Universidad Autónoma de Guerrero.

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