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*Artículos Científicos*

# Análisis comparativo de la implementación de la educación ambiental en programas de licenciatura de tres universidades

## *Comparative Analysis of the Implementation of Environmental Education in Degree Programs of Three Universities*

## *Análise comparativa da implementação da educação ambiental em programas de graduação de três universidades*

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## Resumen

La educación ambiental (EA) surge a partir de la gran preocupación en todo el mundo ante la crisis ambiental y es parte de un proceso que promueve competencias socioambientales. La universidad representa un espacio adecuado para introducir saberes ambientales en el currículo; de tal manera que las competencias específicas y de egreso del proyecto educativo sean complementadas ambientalmente. El objetivo de esta investigación fue realizar un análisis comparativo sobre la integración de la EA en programas de licenciatura de tres universidades: Universidad Autónoma de Guerrero (México), Universidad Regional de Blumenau (Brasil) y Universidad Metropolitana Nelson Mandela (Sudáfrica).

Es una investigación mixta con enfoque comparativo y descriptivo. Se realizó en el periodo 2015-2017. Se aplicó una encuesta a profesores y a estudiantes de los programas objeto de estudio, una entrevista a integrantes de los programas de México y Sudáfrica y cuestionarios de opinión a informantes clave del currículo de los programas de la universidad de Brasil, y se revisaron algunos documentos oficiales. Las dimensiones consideradas en los instrumentos y técnicas fueron con base en los siguientes elementos: percepción de la problemática ambiental, la relación que existe entre la EA y el currículo, las competencias ambientales que promueven docentes y forman estudiantes y la revisión de reglamentos que establecen la integración de la EA en el plan de estudio.

El resultado de la encuesta evidenció, entre otras cosas, que estudiantes y profesores de los programas educativos de México cuentan con un menor grado de percepción de la problemática ambiental en comparación con los profesores de los programas de las otras dos universidades. De la información proporcionada por informantes claves se dedujo que dos programas de la universidad de México y los dos de Brasil contemplan de alguna forma la EA. Sin embargo, en la primera es en menor proporción y de manera disciplinar; en la segunda es en mayor proporción: su integración es de manera transversal y está en proceso. En el programa de Sudáfrica, la EA no figura. En cuanto a los documentos oficiales, los programas de México y Brasil cuentan con un sustento que respalda la integración de la EA; en el caso de Sudáfrica no se cuenta con un documento oficial.

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La incorporación de la EA en los programas de las universidades se vislumbra cuando se inmiscuye la dimensión ambiental en el currículo de manera disciplinar, transversal o de otro modo. En consecuencia, se desarrollan diversas tareas para preservar el medio y buscar la sustentabilidad.

**Palabras clave:** competencias ambientales, crisis ambiental, currículo, universidades.

## Abstract

The environmental crisis is of great concern throughout the world. In the face of this, environmental education (EE) arises as a process that promotes socio-environmental competences. Educational institutions such as the university represent an adequate space to introduce environmental knowledge into the curriculum, in such a way that the specific competencies and graduation of the educational project are complemented environmentally. The objective of this research was to perform a comparative analysis on the integration of EE in degree programs of three universities: Autonomous University of Guerrero (Mexico), Regional University of Blumenau (Brazil) and Nelson Mandela Metropolitan University (South Africa).

It is a mixed research with a comparative and descriptive approach. It was carried out in the period 2015-2017. A survey was applied to professors and students in the programs under study, an interview in the programs of Mexico and South Africa and questionnaires of opinion to key informants of the curriculum in the programs of the university of Brazil, and some official documents were reviewed. The dimensions considered in the instruments and techniques were based on the following elements: perception of environmental issues, the relationship between EE and the curriculum, environmental competencies promoted by teachers and students, the revision of regulations that establish the integration of the EE in the study plan.

The result of the survey showed, among other things, that students and professors of educational programs in Mexico have a lower degree of perception of environmental problems compared to the professors of the programs of the other two universities. From the information provided by key informants it was deduced that two programs of the university of Mexico and the two of Brazil contemplate EE in some way. However, in the first, it is in a lesser proportion and in a disciplined way; in the second it is in greater proportion: its integration is transverse and is in process. In the program of South Africa, the EE does not appear. Regarding the official documents,

the programs of Mexico and Brazil have a support that supports the integration of the EE; South Africa does not have an official document.

The incorporation of the EE in the educational programs of the universities is glimpsed when the environmental dimension curricularly intervenes in a disciplinary, transversal or other way. Consequently, diverse tasks are developed to preserve the environment and seek sustainability.

**Keywords:** environmental competences, environmental crisis, curriculum, universities.

## Resumo

A educação ambiental (EA) surge de grande preocupação em todo o mundo diante da crise ambiental e faz parte de um processo que promove competências socioambientais. A universidade representa um espaço adequado para introduzir conhecimento ambiental no currículo; de tal maneira que as competências específicas e de graduação do projeto educacional sejam complementadas ambientalmente. O objetivo desta pesquisa foi realizar uma análise comparativa da integração da EA em programas de graduação de três universidades: Universidade Autônoma de Guerrero (México), Universidade Regional de Blumenau (Brasil) e Universidade Metropolitana Nelson Mandela (África do Sul). Trata-se de uma pesquisa mista, com abordagem comparativa e descritiva. Foi realizado no período 2015-2017. Foi aplicada uma pesquisa aos professores e alunos dos programas em estudo, uma entrevista com membros dos programas do México e da África do Sul e questionários de opinião aos principais informantes do currículo dos programas da Universidade do Brasil, e alguns documentos oficiais foram revisados . As dimensões consideradas nos instrumentos e técnicas foram baseadas nos seguintes elementos: percepção do problema ambiental, relação entre a AE e o currículo, competências ambientais promovidas por professores e alunos e revisão de regulamentos que estabelecem a integração da EA no currículo. O resultado da pesquisa mostrou, entre outras coisas, que estudantes e professores dos programas educacionais do México têm um menor grau de percepção do problema ambiental em comparação com os professores dos programas das outras duas universidades. A partir das informações fornecidas pelos informantes-chave, deduziu-se que dois programas da Universidade do México e os dois do Brasil contemplam, de alguma forma, o EA. No entanto, no primeiro, é em menor proporção e de

maneira disciplinar; no segundo está em maior proporção: sua integração é transversal e está em processo. No programa da África do Sul, a EA não figura. Quanto aos documentos oficiais, os programas do México e do Brasil contam com um suporte que apóia a integração da EA; No caso da África do Sul, não há documento oficial. A incorporação da EA nos programas universitários é prevista quando a dimensão ambiental no currículo interfere de maneira disciplinar, transversal ou outra. Consequentemente, várias tarefas são desenvolvidas para preservar o meio ambiente e buscar a sustentabilidade.

**Palavras-chave:** competências ambientais, crise ambiental, currículo, universidades.

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# Introduction

What led to the development of this research was the following question: Is it possible that the world's universities incorporate the environmental dimension or environmental education (EA) in their curricula and, consequently, strengthen the teaching-learning processes for your promotion? This refers to the resolution of events organized by international organizations, specifically the First United Nations Environment Assembly (UNEA), since 1972 to the EA as an alternative for societies in the world, including educational institutions, promote the care and conservation of nature. The EA seeks development and stability of the environment at a local and global scale. It originates from the Stockholm Conference in 1972. According to Quiva and Vera (2010): “In the declaration of principles the EA is proposed as an alternative for international societies to promote the care and conservation of nature” (p. 381). This statement is confirmed by Molero (1998) by establishing that in 1972 it is recommended that this type of education be applied at all levels; The university was obviously included here.

Although the perception that was had on the problematic that faced the means in those years already worried, the actions to take care of the means were not own of the education. However, the statements issued by international institutions or organizations suggested that schools from the basic to the higher levels should already integrate this theme as a global measure to intervene with what was happening in the environment. In the 60s and 70s, a great interest in global environmental protection began worldwide. The United Nations Educational, Scientific and Cultural Organization (Unesco), in the late 1970s, made an effort to study ways to include environmental issues as an

educational resource. Therefore, he asked the International Bureau of Education (OIE) for a comparative study on how to address environmental issues at school (Macedo and Salgado, 2007). At present there is an imbalance between the development of the increasingly globalized world and the environment. This problem must be addressed by universities, which must assume responsibility and be committed through teaching, research and extension, with the aim of designing the future of both themselves and the society in which they are immersed (Quiva y Vera, 2010).

This research realizes the importance given to AD. And in that line it establishes a comparison about its implementation. For this reason, three educational programs were considered, namely: the sociology, economics and law programs of the Autonomous University of Guerrero (UAGro), based in Acapulco, Mexico; the program of the Faculty of Education of the Nelson Mandela Metropolitan University (UMNM) in Port Elizabeth, South Africa, and the programs of the Degree in Biology and Architecture and Urbanism of the Regional University of Blumenau (FURB), in Brazil.

It is a mixed research with a comparative and descriptive approach. It was carried out in the 2015-2017 period. Between the years 2015-2016 we worked with the educational programs of the UAGro. In 2015, at the end, with the South Africa program. During the month of November 2017, the FURB programs were worked on. A survey was applied to professors and students in these objects of study; an interview with key informants of the curriculum in the programs of Mexico and South Africa, and opinion questionnaires also with key informants of the curriculum in the programs of the University of Brazil. Some official documents such as regulations, curricula and educational model were reviewed. These instruments and techniques were based on the environmental-environmental issues, EA and curriculum, environmental competencies, official documents that establish the incorporation of EA. In themselves, they focused on understanding the perception of the environmental problem, the relationship between the EA and the curriculum, the environmental competencies that promote teachers and students, the revision of regulations that establish the integration of this approach into the plan of study, in order to fulfill the purposes of the study.

The result of the survey showed that students and professors of the educational programs of Mexico have a lower degree of perception of the environmental problem compared to the

professors of the programs of the other two universities. Regarding the relationship between the EA and the curriculum, students and professors from South Africa indicated that the curriculum is not linked to it, those from Mexico indicated that very little and those from Brazil that are integrated but their inclusion is in process. While, with respect to environmental competencies, students and teachers of the South African program do not promote them; on the other hand, in the programs of Mexico and Brazil they mention yes, although they need strengthening. From the information provided by key informants it was deduced that two programs of the University of Mexico and the two of Brazil contemplate in some way the EA. However, in those it is to a lesser extent and in a disciplinary manner; and in the latter it is in greater proportion: its integration is transversal and is in process. In the South Africa program, EA does not figure. Regarding official documents, the programs in Mexico and Brazil have a support that supports the integration of the EA. In South Africa, meanwhile, there is no official document. The environmental problem is increasing and impacts on different aspects. Currently it is not only a matter of educating for "nature", that is, do not confuse AD with biology or ecology, it goes further, it has to do with nature, society and economy, among others. Universities throughout the world must acquire the responsibility of integrating this education into their curricula, in their different educational programs. In this way, the indications that international organizations suggest to contribute in a sustainable world would be adhered to.

## Environmental, socio-environmental problems and their relationship with the educational context

In relation to environmental and socio-environmental problems, some authors make distinctions, and make reference, in the first case, to issues related to the wear and tear that natural resources are suffering; in the second case, to the incorporation of these same issues to the communities directly affected by the impacts derived from a given project (Moreno-Crespo and Moreno Fernández, 2015, p. 76). The properly ecological problems impact on the social. An example of this is the felling of trees, water pollution, high temperatures, which are associated with health problems, water scarcity in communities, low crop yields, fertile lands are scarce among others. In many cases, this has its origin in human activities that are carried out irrationally.

The United Nations Environment Program [Pnuma] (2019), in its Summary for Policymakers, stated that the socio-environmental problems that are visible in the world come from anthropogenic emissions that continue to alter the composition of the atmosphere , which results in air pollution, climate change. Air pollution is the main environmental factor that contributes to the global burden of morbidity, and causes between 6 and 7 million premature deaths. An important process of species extinction, warming and rising oceans, population growth, urbanization, water pollution, land degradation and desertification is being unleashed. The theme of environmental deterioration is one of the issues that focuses most attention on the concerns that affect humanity today. From the usual conversations of the common citizen to the debates between versed experts in this field of knowledge, the situation of the environment is the object of diverse points of view, approaches and theoretical frameworks in many regions of the planet (Santiago, 2009). "Numerous authors highlight the importance of socio-scientific problems as a learning context (Oulton, Dillon and Grace, 2004; Sadler, 2009; Zeidler et al., 2002), which include real problems, in many cases close, complex and controversial given its involvement or local-global impact without unique solutions "(Moreno-Crespo and Moreno-Fernández, 2015, p. 76). When dealing with socio-environmental problems in schools, we find that they end up "invisible" in the school curriculum, bypassing or even disappearing completely despite being present in our daily reality.

## Integration of education in the university curriculum

In this regard, Nieto and Buendía (2008) state that the educational project is not isolated from the reality in which it seeks to influence. This should propose a way of interpreting the relationship between education and social reality. Curriculum contextualization is presented here as the action of placing it in a socially complex multicultural intervention space (Mallarino, 2007). "To consider this thematic of curricular contextualization requires, first of all, an effort of conceptual clarification because the idea of linking curriculum, school and contexts generates a dense network of semantic ties and not always coincident meanings" (Zabalza, 2012, p. 8 ). The emergence and manifestations of an environmental crisis force society to analyze the origin of the environmental deterioration and propose actions to curb the environmental deterioration. The curricular environmentalization is positioned as the response of educational institutions to the commitment to sustainability. University environmentalization strategies are basically established

in three areas: 1) curricular environmentalization, 2) sustainable environmental management and 3) environmental education and participation. The curricular environmentalization consists of introducing environmental contents in the curriculum (Herrera, 2013).

## Environmental education as a disciplinary and transversal issue

The EA as a disciplinary and transversal issue considers integrating environmental contents. However, to be considered as a cross-cutting theme in a curriculum, it must be present in all educational activities carried out by an institution and involve all its members (Rengifo, Quitiaquez and Mora, 2012). Thus, it must be present in all learning units and be reflected in the teaching-learning process and not integrate it only as a subject with environmental issues of a discipline. It should not be considered as "isolated didactic units, but as clear axes of objectives, contents and procedural principles that must give coherence and solidity to the subjects and safeguard their interconnections as far as possible" (Conde, 2004, p. 59).

## Environmental education for sustainability

As already mentioned, it is at the end of the 60s that the environment becomes the center of attention and it is in the 70s that several important events take place, such as the Stockholm Conference in 1972, the Charter Belgrade in 1975 and, among others, the Tbilisi Declaration in 1977. These events represent a great contribution and the emergence of EA (Alonso, 2010; García and Prioto, 2009; Moreno, 2008; Zabala and García, 2008). However, environmental education for sustainability (EAS) "provides ideas to build a society with a better quality of life, according to their needs" (Batllori, 2008, p.59). Educational institutions must promote education aimed at sustainable development. The EAS must impact on different dimensions, as Maldonado (2009) puts it: political, ecological, epistemological and scientific, pedagogical, ethical, economic and cultural dimension. It has the mission of contributing to train responsible people in the care of the environment. The EA and the educational spaces, following Cantú-Martínez (2014), are a fundamental way to achieve sustainable development.

## Context where the research was conducted (Mexico, South Africa, Brazil)

Socio-environmental conflicts in Mexico have multiplied in the last two decades. These revolve around industrial pollution, mining activities, land use change, deforestation, dam construction, the introduction of genetically modified seeds, the misuse of solid waste and the privatization of land, water and biodiversity , among others. Poor communities tend to be the most affected in this type of ecologically destructive activities, and they face private and state promoters who hold power (Tetreault, Ochoa, and Hernández, 2012). In 1992, the Ibero-American Congress of Environmental Education was held in Mexico, where it was established that the EA "is eminently political and a very important instrument to achieve environmental and social sustainability," not only referring to the issue ecology, but also to other dimensions of reality (Galindo, 2015).

In South Africa, in 2002, in Johannesburg, the World Summit on Sustainable Development was held, convened by the United Nations Organization (UN). At this summit, as the name implies, it no longer seems to interest the environment as a primary issue, but rather sustainable development, making only a few marginal mentions of the specifically environmental (Eschenhagen, 2007). An overview of some of the significant environmental problems in the southern African region are global warming and climate variability, loss of biodiversity, deforestation, desertification, land degradation, waste and garbage, Population growth, urbanization, pollution, poverty and health risks. These problems represent a challenge for governments and other actors inside and outside of South Africa (Kwesi, 2009).

Brazil implies a history of environmental problems. These range from deforestation and natural disasters, through policies on natural resources and the minimization of pollution, to ecological studies that involve questions about the well-being of present and future human generations (Nascimento, 2010). In the matter of EA, Zabala and García (2008) establish that, in 1992, in Rio de Janeiro, the conference known as the Earth Summit was held, in which legal agreements and instruments were raised that had to do with the environmental protection In relation to the EA, one of the agreements (Program 21) makes special reference to the EA as an ideal means to achieve the objectives set; in chapters 35 and 36 he points out the need to reorient education: position science with a view to achieving sustainable development, by promoting training and raising awareness in the population.

# Method

The research was developed through a mixed methodology with a comparative and descriptive approach. As already mentioned, it was carried out in educational programs of three universities: the UAGro, the UMNM and the FURB.

## Population and sample

Table 1 describes the population and sample considered in this research process.

**Tabla 1.** Población y muestra seleccionada de las tres universidades

| **Población** | | **Programas seleccionados** | **Población de los programas seleccionados para la investigación y edad** | **Muestra** | **Enfoque de selección de la muestra y edad de los participantes** | **Otros sujetos considerados en el estudio** |
|---|---|---|---|---|---|---|
| UAGro | *Profesores: 1162: 383 mujeres y 779 hombres<br><br>Estudiantes: 83 770<br><br>39 302 hombres y 43 468 mujeres | Facultad de Sociología<br><br>Facultad de Economía<br><br>Facultad de Derecho | 15 profesores y 287 estudiantes de sociología<br><br>15 profesores y 259 estudiantes de economía<br><br>48 profesores y 2044 estudiantes de derecho | 4 profesores y 5 estudiantes<br><br>11 profesores y 91 estudiantes<br>44 profesores y 318 estudiantes de diferentes grados de la licenciatura. | Cualitativo<br><br>La edad de los estudiantes oscila entre 18-23 años. | Profesores informante clave del programa educativo |

| | | | | | | |
|---|---|---|---|---|---|---|
| NMMU | **Profesores permanentes 223 y temporales 1029<br><br>Estudiantes: 26 347<br><br>39 302 hombres y 43 468 mujeres | Facultad de Educación | 85 profesores: 44 son permanentes y 41 son temporales<br><br>1779 estudiantes: 548 son hombres y 1231 son mujeres | 10 profesores: 5 hombres y 5 mujeres.<br><br>46 estudiantes: 12 hombres y 34 mujeres. De diferentes grados de la licenciatura | Cualitativo<br><br>La edad de los estudiantes oscila entre 18-23 años. | Profesores informante clave del programa educativo |
| FURB | ***Profesores entre 862 hombres y mujeres<br><br>Estudiantes (no se cuenta con el número total de la población estudiantil) | Cursos de Ciencias Biológicas<br><br>Curso de Arquitectura y Urbanismo | 38 profesores y 86 estudiantes<br><br>41 profesores, no hay datos de la matrícula de estudiantes | 10 Profesores (6) hombres (4) mujeres. 37 Estudiantes (17) hombres, (20) mujeres. Profesores: 11: 7 hombres y 4 mujeres Estudiantes: 36: 2 hombres y 34 mujeres Diferentes grados | Cualitativo<br><br>La edad de los estudiantes oscila entre 18-23 años | Conversaciones con informantes claves del programa |

** Dr. Logamurthie Athiemoolam, profesor de la Facultad de Educación de la NMMU.

*** Profesor de la FURB.

Fuente: Elaboración propia con base en *Anuario Estadístico 2013-2014* y *Anuario Estadístico 2014-2015* de la UAGro (2014a, 2015)

## Techniques and instruments used

Techniques and instruments were applied with a quantitative and qualitative approach to the different programs of the three universities. For the educational programs of sociology, economics and law belonging to the UAGro, the quantitative technique was implemented through the student survey that contemplated the variables: perception of the problem, components of the environmental element, curriculum and competencies. The objective of the instrument was to identify the environmental dimension in educational programs. A survey was also applied to teachers with the variables: perception of the problem, components of the environmental element, curriculum and competencies. The objective of this was to identify the environmental dimension in educational programs.

Another qualitative technique considered was the interview with key informants of the curriculum, with the variables: environmental components, skills and curriculum; with the objective of knowing the opinion of the directors of the educational programs on the integration of the environmental dimension.

Official documents such as the UAGro Educational Model (2004) were analyzed with the objective of carrying out an analysis on the incorporation of the environment element in university curricula.

For the NMMU Faculty of Education, in South Africa, a survey of students was carried out with the variables: perception of the problem, components of the environmental element, curriculum and competencies, with the objective of identifying the environmental dimension in educational programs. Likewise, a survey was applied to professors with the variables: environmental problems, the curriculum and the environment, the role of the teacher, the student and the environmental competencies. The objective of the instrument was to identify the environmental dimension in the educational program.

And an interview was also conducted with key informants of the curriculum. For this, the variables were considered: environmental components, competencies and curriculum; with the objective of knowing the opinion of the directors of the educational programs on the integration of the environmental dimension. In this case, the official university document was not analyzed.

In the FURB we worked with two programs, the Biological Sciences and Architecture and Urban Planning. For the first one, an opinion questionnaire was considered for teachers and students with the objective of understanding the incorporation of AD in the study plan; for the second course an opinion questionnaire was applied to teachers and students. Qualitative cutting techniques are also considered: conversation with key informants of the Biology specialty, with the aim of analyzing the environmental dimension of the curriculum. In the course of Architecture and Urbanism, conversations were also held with teachers.

The official document "Resolution No. 2, June 15, 2012. The National Curricular Guidelines for Environmental Education of the Ministry of Education, the National Education Council of Brazil and Resolution 053/2014 / Rectory, Blumenau Regional University", was analyzed. which establishes the national guidelines for the EA in said institution, as well as the curricula of the Bachelor's degrees in Biology and Architecture and Urbanism. This with the objective of carrying out an analysis on the incorporation of the environment element in university study programs.

# Results

The techniques and instruments applied in the university educational programs for this research allowed us to understand to what extent the EA is included in the curriculum.

## Educational programs at the UAGro

### Results of the survey of students and teachers

A survey of students and teachers was applied, which was framed in the variables perception of the problem, components of the environmental element, curriculum and competences, and related to the elements of the environment (water, air, soil and energy). The questions considered the following parameters: "Poor", "Barely acceptable", "Good", "Very good", "Excellent" and "Not applicable". The results could be grouped into "Poor", "Barely acceptable", "Good", "Very good" and "Excellent". Table 2 shows the results obtained in the three educational programs under study corresponding to the UAGro.

**Tabla 2.** Resultados de los programas de sociología, economía y derecho

| **Variables** | **Escuela de Sociología** | **Escuela de Economía** | **Escuela de Derecho** | **Observación** |
|---|---|---|---|---|
| Percepción del problema | Deficiente | Bien | Apenas aceptable | Apenas conciben el problema ambiental. |
| Currículo | Deficiente | Bien | Apenas aceptable | Apenas contempla el currículo el elemento medio ambiente y por ende la EA. Los programas de unidades de aprendizaje y las actividades educativas en su mayoría no integran la EA. |
| Competencias en los alumnos | Apenas aceptable | Bien | Deficiente | Apenas desarrollan competencias ambientales. Los profesores no implementan estrategias de la EA. |

Fuente: Elaboración propia

Table 3 shows the results of the survey applied to professors of the three UAGro study programs.

**Tabla 3.** Resultados de los programas de sociología, economía y derecho

| **Variables** | **Facultad de Sociología** | **Facultad de Economía** | **Facultad de Derecho** | **Observación** |
|---|---|---|---|---|
| Percepción del problema | Deficiente | Apenas aceptable | Apenas aceptable | Apenas comprenden la problemática ambiental. |
| Currículo | Apenas aceptable | Deficiente | Apenas aceptable | Apenas contempla el elemento ambiental y por ende la EA en el currículo. Los planes de estudio, los programas de unidades de aprendizaje y la secuencia didáctica están escasamente vinculados con la EA. |
| Competencias ambientales de los docentes | Apenas aceptable | Bien | Deficiente | Se concibe actualizar a los docentes en aspectos ambientales. Muchos docentes no cuentan con formación en EA, por lo tanto, difícilmente implementan estrategias didácticas de esta especialidad en el proceso de aprendizaje. Los estudiantes no promueven competencias ambientales. |

Fuente: Elaboración propia

## Interview with key informants of the UAGro programs

An interview was conducted with the management staff of the Faculty of Sociology (director), Law (deputy director) and Economy (deputy director), under the UAGro, located in Acapulco, Guerrero, Mexico. These were developed during the period from March to October 2015. The objective was to know if the environment element is incorporated in these curricula, raised as a hypothesis at any time. Table 4 shows the opinion of the management staff of the three programs.

**Tabla 4.** Opinión de informantes clave de los programas de Sociología, Economía y Derecho

| **Programas educativos de la UAGro** | | | |
|---|---|---|---|
| Pregunta | Respuesta del directivo de la Facultada de Sociología | Respuesta del directivo de la Facultada de Economía | Respuesta del directivo de la Facultada de Derecho |
| ¿El currículo de la institución tiene integrado el elemento medio ambiente? | No, definitivamente, no. Porque no tenemos materias que se relacionen con el medio ambiente. | Sí, porque hay unas materias que sí se refieren al medio ambiente. | Creo que sí, porque hay unas materias que llevan medio ambiente. |
| ¿Las competencias que contempla el plan de estudio en su perfil de egreso se vinculan con los componentes medio ambientales, con enfoque de desarrollo sustentable? | El plan de estudio no contempla materias que incluya el elemento ambiental. | Solo conoce que el plan de estudio integra unidades de aprendizaje que se relacionan con el medio ambiente; no son muchas. | Solo conoce que el plan de estudio integra unidades de aprendizaje que se relacionan con el medio ambiente; no son muchas. |
| Resultado | Se concibe la necesidad de atender la problemática ambiental en los currículos escolares; se orienta a que el elemento ambiental se incorpore como un eje que impregne todo el proyecto educativo, es decir, no es suficiente incorporar una o dos unidades de aprendizajes. | | |

Fuente: Elaboración propia

## Analysis of official documents in the UAGro to identify the environment element

In the Educational Model document (UAGro, 2004), the element in question is present in the transversal axes of training. In addition to this, it raises "transversality" as a method to develop emerging issues, as is the environment. Transversality as “a new way of seeing reality and living social relations from a holistic or total vision” (UAGro, 2004, p.45). In this context, the transversal contents (themes and / or transversal topics) that refer, preferably, to emerging and integrating contents are also expressed. Among these issues are human rights, poverty and the environment, to name a few. This document underwent a reform in 2013 and passed from the previous name to Educational Model: Towards a quality education with social inclusion (UAGro, 2003). This continues to maintain the environmental element in the transversal axes and considers it as a cross-

cutting issue, as well as others, and with this it also states that these are “globalizing instruments of an interdisciplinary nature that cover the entire curriculum; they are favorable conditions to provide students with more training in social, environmental or health aspects ”Botero (cited in UAGro, 2013, p.102). On the other hand, a guiding principle of this model is sustainability (UAGro, 2013). These assertions suggest that at all levels taught by the institution in question, the environmental element is incorporated, with a transversal approach to contribute to sustainable development.

## Results of the educational program at the UMNM Faculty of Education

### Results of the survey of students and teachers

The survey that was applied to students and teachers and was framed in the following variables: perception of the environmental problem, curriculum and environment, environmental competencies of the teacher and student; It was also related to the elements of the environment (water, air, soil and energy). The questions considered the parameters "Poor", "Barely acceptable", "Good", "Very good", "Excellent" and "Not applicable". The results could be grouped in percentages. Both surveys aimed to identify the environmental dimension in the educational program selected in the UMNM. Table 5 shows the results obtained from the survey applied to students. The instrument was applied to 46 students (12 men, 34 women). Table 6, for its part, corresponds to the results of the teachers; data provided by 10 teachers (five men and five women).

**Tabla 5.** Resultados de la encuesta a estudiantes UMNM

| **Dimensiones** | **Ítems** | **Porcentaje alcanzado** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Las preguntas realizadas tuvieron relación con las dimensiones establecidas. | 0 % | 10 % | 20 % | 30 % | 40 % | 50 % | 60 % | 70 % | 80 % | 90 % | 100 % |
| 1. Percepción de la problemática ambiental | Perciben la crisis ambiental en un contexto general y local, sin embargo, esta percepción no se originó en el desarrollo del currículo. | | | | | | | | | | **X** | |
| 2. La integración del elemento ambiental en el currículo | El currículo de la Facultad de Educación de la NMMU integra la EA. | **X** | | | | | | | | | | |
| 3. La comprensión de saberes ambientales en estudiantes | Los estudiantes desarrollan competencias ambientales. | **X** | | | | | | | | | | |
| | Competencias ambientales de docentes. | **X** | | | | | | | | | | |

Fuente: Elaboración propia

**Tabla 6.** Resultados de la encuesta a profesores UMNM

| **Dimensiones** | **Items** | **Porcentaje alcanzado** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Las preguntas realizadas tuvieron relación con las dimensiones establecidas. | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 1. Percepción de la problemática ambiental | Comprenden la problemática ambiental y están de acuerdo con que el currículo integre esta dimensión. | | | | | | | | | | | **X** |
| 2. La integración del elemento ambiental en el currículo | El currículo de la Facultad de Educación de la NMMU integra la EA. | **X** | | | | | | | | | | |
| 3. La comprensión de saberes ambientales en estudiantes | Competencias ambientales de estudiantes. | **X** | | | | | | | | | | |
| | Competencias ambientales de docentes. | **X** | | | | | | | | | | |

Fuente: Elaboración propia

### Results of the interview with key informant of the curriculum

An interview was conducted with a key informant professor at the UMNM Faculty of Education in South Africa. He commented that the environmental dimension is not established in the curriculum.

## Educational Programs at the FURB

### Results of the opinion questionnaire for professors and students of the Degree in Biology and Architecture and Urbanism

The opinion questionnaire contained 32 statements grouped into five dimensions: 1) General knowledge of the environmental problem, 2) Environmental perception in the curriculum, 3) Environmental pedagogical didactic implementation, 4) Environmental competences of teachers and 5) Environmental competences of students. It was developed for teachers and students.

Responses were answered with Strongly agree (5), Agree (4), Moderately agree (3), Disagree (2) and Strongly disagree (1). The responses obtained were organized by dimensions and presented on scales from 0 to 100%. Table 7 describes the results of teachers and students of both programs; They appear as follows: Students of the Biology Degree (ECB) and teachers of this same program (PCB). Students of the Lic. Of Architecture and Urbanism (EAU) and the professors (PAU).

**Tabla 7.** Resultados de los programas de Biología y Arquitectura y Urbanismo

| **Dimensiones** | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Conocimiento general de la problemática ambiental | | | | | | | | | | ECB EAU | PCB PAU |
| Percepción ambiental en el currículo | | | | | | | | | | ECB EAU | PCB PAU |
| Implementación didáctico-pedagógica ambiental | | | | | | | | EAU | ECB | PCB PAU | |
| Competencias ambientales docentes | | | | | | | | | ECB EAU | PCB PAU | |
| Competencias ambientales de estudiantes | | | | | | | | ECB EAU PCB PAU | | | |

Fuente: Elaboración propia

## Conversation with key informants of Biology and Architecture and Urbanism

According to the conversation with key informants of the Biology Degree, it was perceived that the EA is integrated as a discipline and its mainstreaming is in process. The conversation with the professors of Biology and also those of Architecture and Urbanism showed that the EA is present because several disciplines are related to the environment at the time projects are developed.

## Result of official documents to identify the environmental dimension in the programs studied

"Resolution Nº. 2, June 15, 2012. National Curriculum Guidelines for Environmental Education "is the legal basis for any institution that provides education in Brazil to implement the EA curricularly. Based on this document and according to an analysis carried out, it is affirmed that the curriculum of the Bachelor of Biological Sciences and that of Architecture and Urbanism of the FURB is related to what is established in said resolution, and the element is highlighted environment with a sustainable focus on its curricular elements of the programs.

The "Resolution 053/2014 / Rectory, FURB" coincides with the stipulation, which establishes the national curricular guidelines for environmental education of the Brazilian Ministry of Education.

According to an analysis carried out in the curricular elements of the FURB Degree in Biology and Architecture and Urbanism, it was evidenced that the environmental element with a sustainable approach is present in both programs, although its mainstreaming is still in process. This leads to the understanding that there is a relationship between the curriculum and normative documents.

# Discussion

A comparative analysis of the programs of the three universities was carried out to identify | the incorporation of the EA by students and teachers. From this it was evident that the students of the three programs of Mexico perceive at a low level the problem that is experienced in the world, in its social and educational context. While in the programs of the other two universities their perception is greater. Regarding teachers, it is the same case: those in Mexico remain at levels below the programs with which they are compared. Regarding the relationship between the EA and the curriculum, students of the University of South Africa program point out that the curriculum is not linked to the EA. In the case of students from Mexico, they established that this education does figure, but it is not enough. And the students and teachers of the programs of Brazil in both programs indicated that this does develop.

In relation to the environmental competencies of students and teachers, the students of the educational program of South Africa do not promote competencies, and those of Mexico and Brazil are almost in the same situation, that is, they need to strengthen their competences in this regard. Because they state that, although there are environmental issues in the programs, they are not enough. In this order of ideas, the teachers of the South African program stated that they did not have competences in this field, those of Mexico consider that they are not sufficient and those of Brazil stipulate that they have them. In reference to the comparative analysis of the information provided by key informants, referring to understanding the presence of AD in the curriculum of educational programs, it was evidenced that only two programs of the University of Mexico and the two of Brazil contemplate in some way the EA. However, the presence of this education in that is to a lesser extent and in a disciplinary manner; while, in this, in Brazil, its incorporation is in large proportion, although its integration in a transversal way is still in process. In the South African program, EA is not included in the program curriculum.

The competences of some learning units or subjects in the programs of Mexico where the EA appears are related to the specific competences of the curriculum, that is, if the law program is taught environmental legislation, it only focuses on the environment and its insertion in the legal. To be implemented with a sustainable approach, it must be linked to social, economic, environmental and natural aspects. In the case of the Brazil program, the environmental competencies that are promoted adhere to sustainability.

In the comparative analysis of the institutional or legal basis, in relation to the establishment of the EA in the curriculum of the educational programs, it was found that the educational programs of the UAGro are based on the Educational Model (UAGro, 2004) of the same university, which is the document that establishes curricular guidelines on the education provided. This establishes that in all the educational programs of the university the EA is implemented as a transversal axis. The educational model of the UAGro considers sustainability as a fundamental principle and, therefore, the environmental problems that are experienced in the world, in Mexico and in the state where the university is immersed. Given this situation, it is established as a curricular guideline in the transversal axes to the environment. In the educational program of the University of South Africa, there was no access to any document, however, the key informant assured that the environmental dimension is not contemplated in the program. On the other hand, the educational programs of Brazil are based on "Resolution No. 2, June 15, 2012. National Curriculum Guidelines for Environmental Education of the Ministry of Education, of the National Education Council of Brazil, Resolution 053/2014 / Rectory, Regional University of Blumenau ", which establishes the need to incorporate the EA curricularly, and, therefore, the curricula of the Bachelor's degrees in Biology and Architecture and Urbanism establish in its curricular structure the dimension of this and of sustainability.

Comparing this study with that developed by Pérez (2015), who investigated the incorporation of the environmental into the Biology program of the University of Tolima in Colombia and who concluded that the environmental component is not included there; in comparison with this work, as it was said, in the case of the educational programs of the University of Mexico and the University of Brazil it is present in some way, while in the case of the program of the University of South Africa it is scarce . As already stipulated with the study by Pérez (2015), there are universities that do not integrate the environmental dimension or implement the EA, despite the global suggestions that refer to the environmental crisis, which undoubtedly merits that the institutions University students in the world contribute to the incorporation and propagation of environmental knowledge, either through disciplines or across their curricula.

# Conclusions

University curricula should not be disconnected from the context, since that is where the different problems that will be considered later as needs to be integrated into the educational project to be started are identified. The environmental problem or crisis is local and global and, therefore, it is important to include this dimension. The EA emerged as a tool that makes human beings aware to care for and preserve the resources that nature offers. However, in recent years, it has focused on raising awareness by promoting knowledge, skills, attitudes and values with a focus not only natural but social, which implies linking these issues with economic and political aspects, among others, so that being Human contribute with proposals and actions to what happens with the environment. This is how educational programs in universities must integrate and implement this education. However, there are methods for curricular inclusion that range from disciplinary to transversal. Some authors in this area recommend the transversal ones, because in this way the entire educational project is impregnated and not just a part.

The EA is a viable strategy for educational institutions worldwide from the basic level to the higher level to promote environmental care and, thereby, contribute to sustainability. It is perceived that the educational programs that incorporate the EA are those of the FURB, with a disciplinary approach and its transversal inclusion is in process; Mexico's programs, although they integrate this education to a lesser extent and in a disciplinary manner, need to be strengthened in this field. In the case of the South African program, environmentalization is definitely required, either through a discipline or with a transversal approach, because it was the program that does not contemplate the environmental dimension. As for the educational programs of Mexico and Brazil, its strength to implement the EA is in its institutional and official documents, since its incorporation is established there. Regarding the educational program in South Africa, although there was no access to an institutional document establishing the incorporation of the EA, the key informant confirms it. A support to incorporate the environmental dimension would be the resolutions of international meetings such as those of the UN or the Pnuma, because since the middle of the last century they make reference to the fact that environmental problems are aggravated and extended in the world and, for that reason, EA must be inserted in education.

## References

Alonso, M. (2010). *Historia de la educación ambiental: La educación ambiental en el siglo XX*. España: Asociación Española de Educación Ambiental.

Batllori, G. A. (2008). *La educación ambiental para la sustentabilidad: un reto para las universidades*. Cuernavaca, México: Universidad Nacional Autónoma de México-Centro Regional de Investigaciones Multidisciplinarias. Recuperado de https://www.crim.unam.mx/web/sites/default/files/La%20educaci%C3%B3n%20ambiental%20para%20la%20sustentabilidad.pdf.

Cantú-Martínez, P. (2014). Educación ambiental y la escuela como espacio educativo para la promoción de la sustentabilidad. *Revista Electrónica Educare*, *18*(3), 39-52.

Conde, N. (2004). *Integración de la educación ambiental en los centros educativos. Ecocentros de Extremadura: análisis de una experiencia de investigación-acción*. (memoria de tesis doctoral). Universidad de Extremadura, Cáceres. Recuperado de https://dialnet.unirioja.es/descarga/tesis/176.pdf.

Eschenhagen, M.L. (2007). Las cumbres ambientales internacionales y la educación ambiental, *OASIS*, (12), 39-76. Recuperado de https://revistas.uexternado.edu.co/index.php/oasis/article/view/2412.

Galindo, G. L. (2015). La educación ambiental en la virtualidad: un acercamiento al estado del arte. *RIDE Revista Iberoamericana para la Investigación y el Desarrollo Educativo*, *5*(10), 1-43. Recuperado de https://www.ride.org.mx/index.php/RIDE/article/view/195/860.

García, D. y Priotto, G. (2009). *Educación ambiental: Aportes políticos y pedagógicos en la construcción del campo de la educación ambiental*. Buenos Aires, Argentina: Secretaría de Ambiente y Desarrollo Sustentable.

Herrera, A. R. (2013). De la crisis a la ambientalización curricular. La trayectoria de la sustentabilidad. *Revista Visión Educativa IUNAES*, *7*(15), 47-56. Recuperado de http://iunaes.mx/wp-content/uploads/2013/04/15-Abril-de-2013.pdf.

Kwesi, M. B. (2009). An overview of environmental issues in Southern Africa. *African Journal of Ecology*, *47*(1), 93-98.

Macedo, B. y Salgado, C. (2007). Educación ambiental y educación para el desarrollo sostenible en América Latina. *Revista de la Cátedra Unesco sobre desarrollo sostenible*, (1), 29-37. Recuperado de http://www.ehu.eus/cdsea/web/wp-content/uploads/2016/12/Revista1.pdf.

Maldonado, S. T. (2009). Educación ambiental para la sustentabilidad. *Horizonte Sanitario, 8*(2), 4-7.

Mallarino, F. C. (2007). La contextualización del currículo: cognición y no verbalidad. *Revista Científica Guillermo de Ockham, 5*(1), 73-84. Recuperado de http://www.redalyc.org/pdf/1053/105316864006.pdf.

Molero, M. F. (1998). Análisis de la educación ambiental en la universidad. *Observatorio medioambiental*, (1), 105-126.

Moreno-Crespo, P. y Moreno-Fernández, O. (2015). Problemas sociambientales: concepciones del profesorado en formación inicial. *Andamios, 12*(29), 73-96. Recuperado de http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1870-00632015000300073.

Moreno, N. F. (2008). Origen, concepto y evolución de la educación ambiental. *Revista Digital Innovación y Experiencias Educativas,* (13), 1-9. Recuperado de https://www.researchgate.net/profile/Luisa_Paz_Montes/publication/273476017_.

Nascimento, A. (2010). ¿Filosofía ambiental en Brasil? Reflexiones teóricas y prácticas sobre una cuestión sudamericana. *ISEE Publicación Ocasional*, (8), 2-18.

Nieto, L. M. y Buendía, O. M. (2008). *Guía para el análisis de contexto de un proyecto de educación ambiental.* (documento interno de trabajo para el diplomado). Universidad Autónoma de San Luis Potosí, México.

Pérez, C. A. (2015). *La inclusión de la dimensión ambiental en el currículo del programa de Biología de la Universidad del Tolima.* (tesis de maestría). Universidad Militar Nueva Granada, Bogotá. Recuperado de https://repository.unimilitar.edu.co/bitstream/handle/10654/7457/INCLUSION%20DE%20LA%20DIMENSION%20AMBIENTAL%20EN%20EL%20PROGRAMA%20DE%20BIOLOGIA.pdf?sequence=1.

Programa de las Naciones Unidas para el Medio Ambiente [Pnuma]. (2019). *Perspectiva del Medio Ambiente Mundial GEO 6, Resumen para responsables de formular políticas.* Programa de

las Naciones Unidas para el Medio Ambiente. Recuperado de https://wedocs.unep.org/bitstream/handle/20.500.11822/27652/GEO6SPM_SP.pdf?sequence=6&isAllowed=y.

Quiva, D. y Vera, L. (2010). La educación ambiental como herramienta para promover el desarrollo sostenible. *Telos. Revista de Estudios Interdisciplinarios en Ciencias Sociales, 12*(3), 378-394. Recuperado de www.redalyc.org/pdf/993/99317168008.pdf.

Rengifo, B., Quitiaquez, L. y Mora, F. (2012). La educación ambiental una estrategia pedagógica que contribuye a la solución de la problemática ambiental en Colombia. Ponencia presentada en el XII Coloquio de Geocrítica. Bogotá, del 7 al 11 de mayo de 2012.

Santiago, A. (2009). La globalización del deterioro ambiental. *Aldea Mundo, 4*(27), 63-72.

Tetreault, D., Ochoa, H. y Hernández, E. (coords.) (2012). *Conflictos socioambientales y alternativas de la sociedad civil.* Guadalajara, México: Iteso. Recuperado de https://rei.iteso.mx/bitstream/handle/11117/425/Conflictos%5B1%5D.pdf?sequence=2.

Universidad Autónoma de Guerrero [UAGro]. (2013). *Modelo educativo. Hacia una educación de calidad con inclusión social.* México: Universidad Autónoma de Guerrero. Recuperado de http://ingenieria.uagro.mx/inicio/files/normativa/Modelo_Educativo_de_la_UA Gro.pdf

Universidad Autónoma de Guerrero [UAGro]. (2014a). *Anuario Estadístico UAGro 2013-2014.* México: Universidad Autónoma de Guerrero. Recuperado de informacionestadistica.uagro.mx/anuarios/Anuario_Estadistico_UAGro_2013-2014.pdf

Universidad Autónoma de Guerrero [UAGro]. (2004b). *Modelo Educativo.* Chilpancingo, México: Universidad Autónoma de Guerrero.

Universidad Autónoma de Guerrero [UAGro]. (2015). *Anuario Estadístico UAGro 2014-2015*. México: Universidad Autónoma de Guerrero. Recuperado de informacionestadistica.uagro.mx/anuarios/Anuario_Estadistico_UAGro_2014-2015.pdf.

Universidad Regional de Blumenau [FURB]. (2012b). Resolución Nº. 2, 15 de junio de 2012. Brasil: Universidad Regional de Blumenau.

Universidad Regional de Blumenau (2014). Resolución 053/2014/Rectoría. Brasil: Universidad Regional de Blumenau.

Zabalza, B. M. (2012). Territorio, cultura y civilización. *Interacções*, (22), 6-33. Recuperado de https://revistas.rcaap.pt/interaccoes/article/view/1534/1225.

Zabala, G. I. y García, M. (2008). Historia de la Educación Ambiental desde su discusión y análisis en los congresos internacionales. *Revista de Investigación*, (63), 201-218. Recuperado de https://dialnet.unirioja.es/descarga/articulo/2547197.pdf.

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