An Experience in Environmental Education with University Students

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Abstract: The educational experience described in this article was developed in the course "Social and Cultural Contexts of Teaching" for the Sociology of Education bachelor's degree at the National Pedagogical University, Mexico. In this course, students are expected to develop favorable attitudes toward the environment. The student's defined environmental problems made a diagnosis and elaborated a case study, to discuss concrete solutions in their community. The educational experience included several moments: framing, joint planning of individual and group activities, and development of the case study. The balance of the results of the course was favorable; the group learned to work cooperatively, mutual trust prevailed within the teams, group agreements were respected, the group goal was clearly defined, and a case study was delineated and developed.

Keywords: University, environmental education, teaching, learners
Introduction

In recent years, it has become evident that the health of the biosphere is perishable due to its high fragility and it runs the risk of disappearing, affecting each of the living beings that coexist on planet Earth. Among the effects caused by environmental problems are environmental pollution in the atmosphere, hydrosphere and lithosphere; and the loss of ecosystems with the consequent extinction of species. All these problems are related to the human species: the loss of life quality and the harmful effects on human health; the vast social inequalities, poverty, and undernourishment, among other aspects. The environmental impact can be severe, moderate or mild. Particular attention is paid to environmental changes that are irreversible, such as severe disturbances in soils, groundwater contamination or climate change.

How do we train university students to face these and other environmental problems? The answer is not simple, and in the educational field, it is necessary to review pedagogy and environmental education, with a sustainable orientation.

In this article, educational experience is described, carried out with a group of students of the Sociology of Education bachelor's degree from the National Pedagogical University, Mexico.

1. Background

The National Pedagogical University is a public university that focuses on educational research throughout Mexico. The research was carried out in the Ajuisco unit, located in the south of Mexico City within a protected area “The Oaks.” This natural area includes 25.01 hectares of geological, ecological, hydrological and landscaping importance because it shelters a great variety of endemic plants of this zone of the stony ground; even, some of these can be seen on the grounds of the university itself. On the other hand, with the increase of the vehicular traffic on the road to the Ajuisco, the problem of the noise and air pollution has increased in this area of Mexico City.

The students of this university have not studied any subject related to environmental education; however, they possess a set of knowledge related to the problems of the environment, derived mainly from information transmitted by the media and comments from their teachers.

The educational experience was developed in the “Social and Cultural Contexts of Teaching” course of the Sociology of Education degree. In this course, it is expected to contribute to the development of favorable attitudes to the environment. The course was designed taking the environmental problems that affect the students in their daily lives as a point of reference.

2. Theoretical referents

Sustainable development implies a new worldview, new ways to relate to nature, which involves transformations in the scientific, technological, social, political, economic, cultural and educational areas. Based on Rio de Janeiro Earth Summit agreements (UNEP, 1992), sustainable development has seen strong growth in education. The perspective of sustainability in environmental education entails the understanding of environmental behaviors, to generate educational proposals that affect the construction of an environmental citizenship, in which, knowledge, attitudes and sustainable values are prioritized.
Education is crucial in fostering the ideals of sustainability. Education for Sustainability (ESD) is a process of learning how to make decisions that consider the long-term futures of the economy, ecology, the equitable development of all communities as well as the promotion of their cultures (Besong and Holland, 2015, p.8).

Since the nineteen seventies, in Mexico, there were several actions to incorporate the environmental dimension in some university careers. In the search for educational alternatives to achieve training by the requirements of 21st-century societies, environmental pedagogy and environmental education are used.

The environmental pedagogy (Sureda y Colomb, 1989) is part of an educational movement linked to the recovery of human rights by living in a healthy and safe environment. This pedagogy makes evident that there is a manifest imbalance in the environmental problem, a product of a commercial vision, which has given rise to what some authors, like Leff (1998) call “crisis of civilization”.

Teaching strategies for environmental education must provide learners with learning experiences and opportunities to confront their views and values related to the environmental issues for them to address the environmental issues (Sanera, 1998). Environmental education is oriented towards the holistic understanding of the environment, based on environmental pedagogy. “Environmental education entails a new pedagogy, which arises from the need to orient education within the social context and in the ecological and cultural reality where the subjects and actors of educational process are located” (Leff, 1998, p. 218).

There is a theoretical-methodological dialogue between those who are part of the field of environmental education; dialogue that propitiates the construction of new objects of study and the reflection on new practices (Calixto, 2013).

Environmental education proposes the analysis of the future societies in their multiple relationships with the environment. The environment is full of subjective meanings, from which human beings develop their actions, generating educational proposals that affect the construction of environmental citizenship.

Environmental education questions the processes of modernization, which reify the subject and mold a type personality, where it does not go deeper than its productive, consumerist and pragmatic values, identifying the human being by its consumption power. One of the strategies that can be developed in the training of university students is the case study because the training requires the “close examination of people, topics, issues, or programs” (Hays, 2004, p. 218).

At the Technological Institute of Higher Studies of Mexico (ITESM, 2011) case studies are classified as strategies and didactic techniques of values, incident, reasoned solution, mentalization, thematic and real search.

Yin (2002) defines case as a contemporary phenomenon within its real-life context, especially when the boundaries between a phenomenon and context are not clear and the researcher has little control over the phenomenon and context (p. 13)
In the educational experience described in this article, the group worked with the "real-life search case," in which the students delimited real situations, made a diagnosis and elaborated the case study, to discuss concrete solutions, based on environmental pedagogy (Sureda and Colomb, 1989) and on sustainable rationality (Leff, 1998), in which the formation of an ethical commitment to the environment stands out.

3. Process of systematization of the educational experience
Through a field diary, the work carried out in the course was recorded, writing the main activities and results obtained in a digital folder, which allowed the student's educational experience to be recovered around local environmental problems.

From the recognition of the environmental crisis and a specific environmental problem (nature-society), students are offered to do the development of case studies of the environmental problems of their community. The educational practice comprises various moments: framing, joint planning of individual, team and group activities, development of the case study.

3.1 Frame. The framing is a pedagogical agreement in which the activities that correspond to the teacher and the students are delimited; a participative work environment is promoted, to influence the interest and commitment of the students.

The teacher has the role of mediator, to foster the interest and commitment of the students. That is, activities are oriented to encourage the capacity to learn. In mediation, it is necessary to listen, understand, communicate and respect the different ways to learn and these means are individual, team and group activities.

Teaching mediation encourages students to work together in a climate of empathy, tolerance, trust, and commitment to achieve the proposed goals. It is not easy to achieve this, there are several resistances in the students, as well as institutional conditions that limit the cooperative work. Among the students' resistance is the difficulty of effective communication, indecision in decision making, relationships based only on empathy and not on the development of tasks; among the limiting conditions are the rigid hours of sessions, the large group, and situation of irregular students who do not finish the course.

3.2 Joint planning of individual, team and group activities. Individual activities involve students reviewing their prior knowledge of course subjects (environmental education, environment, civilizatory crisis, environmental crisis, environmental problems: culture, society, economy, nature); the teacher makes an exploration of this knowledge and revises what knowledge is useful for the elaboration of conceptual maps, argumentative essays and critical analyses (individual work).

Some teams of four or five are formed. The students make conceptual maps and are presented inside each team; they draw up a series of conclusions that are exposed to the group. Teams change members in each of the sessions to work with different materials (teamwork).

The students integrate to different teams, according to the environmental problem that seems most interesting and essential to diagnose and work the case study. The members of each team decide
the environmental problem, and the diagnostic techniques they will use, exposing their questions and progress to the whole group (group work).

3.3 Development of the case study. The stages of the case study are diagnosis, delimitation, and characterization.

The first stage of the case study corresponds to the design of diagnostic techniques; it entails a plan, a set of operations to be carried out to obtain strategies of application and construction of instruments. The plan can be more or less structured according to the technique or techniques selected. Students choose the techniques (quantitative, qualitative, mixed or projective) from two conditions: isomorphism and the objectivity of the data. The first condition refers to the requirement to adopt the techniques of analysis to the type of theoretical propositions. Then, the students take into account the most relevant aspects that they must diagnose. These aspects can be denominated as factors, variables or indicators, according to the theoretical position that they assume.

The process of methodological design depends first on the epistemological perspective with which the diagnosis is to be carried out and its purposes approached. Their epistemological bent, in brief, underlie the inquiry project they conceptualize and operate (Yazan, 2015).

The epistemological perspective that the students assume is positivist, interpretative or critical. In the first perspective, the obtaining of the data starts from the perception and speaks precisely of the information, that is, of what is given directly by the experience. Carefully crafted instruments collect data. In the second perspective, students assume that there is no given, but there must always be a certain interpretation or construction. One cannot simply collect the data; these are built based on a process of interpretation, with qualitative tools. And in the third perspective, students take as a reference that knowledge is obtained by a social construction, in which the subjects involved in the problem to be diagnosed, establish a dialectical relationship with reality. This practice involves a process of reflection and analysis to influence as far as possible with the implementation of actions. This last perspective is the most congruent with popular environmental education and is promoted in teacher mediation.

All techniques chosen by students are tested in the group; the process of elaborating and designing the diagnostic techniques does not culminate with their choice, but it must be verified that they are well designed; the revision of the instruments and its “piloting” is with students from other groups. All these activities are done so that the results obtained are as close as possible to reality. Methodological design leads to define how the information can be obtained. The information types can be: numeric or textual. The sources, origin or forms in which such data are produced are primary (such as survey, interview, observation, testing and projective techniques, discussion group, etc.) or secondary: quantitative data (statistics or censuses) or qualitative data (minutes, journals, records, memoirs, documents, among others).

Once the way in which the information is obtained is defined, the application strategy is determined. A proper diagnosis includes not only a technique, but it is convenient to design and perform several tests or use different techniques, to achieve a diagnosis as reliable as possible. Objectivity must be sought, for this in the design of the instruments, their validation, reliability, and significance are sought.
In the second stage, the delimitation of the "case", the review, organization, and analysis of the information collected has proceeded. Thus, according to the techniques and instruments used, a descriptive, interpretative or critical analysis is carried out, tending to find the relevant aspects of the case. In this way, particularizes in the case's characteristics in order to have more elements to define its components, find its causes, establish networks of consequences and propose possible forms of action.

In the third stage, we move on to the process of organization, systematization, and presentation of the case, activities that involve a process of dialogic construction, to articulate the components of the case and be able to present them to the group. The construction of a case involves putting into practice the lessons learned; it is suggested that the "case" be precise, congruent and real. That is to say, only include the information that is necessary and corresponds to the situation, illustrated with diagrams, charts, figures, maps, tables, graphs, images, photographs, among other resources that give the possibility of having a clear vision of the problem. In the case studies, the anonymity of the informants was taken care of as the institutions involved, unless the participants expressed a contrary desire.

The case study, in addition to developing reporting experience, project and proposal writing skills, fosters collaborative work, contributes to joint decision-making, and recognizes the feelings and emotions that are part of their values and attitudes.

The teams conform according to the development of the course; these are dynamic and formed through the free choice of students. Tasks and responsibilities are distributed to each team member. The members of each team commit to the application of the instruments of the techniques they have chosen. Additional aspects of methodological design are given by external restrictions: budget, time, a social, political and cultural moment of diagnosis.

The form of the organization of each team determined how to solve doubts and possible conflicts that may arise. The team was also responsible for keeping track and feeding back the contents. Each student performs an individual work that joins the work of others, to constitute teamwork.

Participatory work requires more effort; it is achieved with the sum of the activities of each student individually and as a team and group activities; this is possible when personal involvement occurs and contributes to the experience of belonging to a group. Participatory work occurs when students share goals, and the group goal establishes a certain degree of organization to achieve cooperation and an attitude of mutual help.

The promotion of participatory work results from the addition and integration of individual, team and group work, facilitated by the teacher's meditation. This mediation implies, among other things, constant feedback, which facilitates the identification of problems and overcoming resistance to cooperative work.

"The results propitiated dialogue and shared learning, it is the result of the meeting of students, who seek the meaning of meanings" (Freire, 1984).
In methodological design, the process of analysis of results must be foreseen. This process of analysis forms the basis of the presentation of the "case" that each team presents to the group.

4. Results
In work carried out, several results were obtained, mainly in three areas of learning: attitudinal, conceptual and methodological.

4.1 The attitudinal area. It refers to how the students express themselves to the different situations posed, in which the attitudes they have about the environment are revealed.

The students at the beginning had a series of hostile attitudes regarding the integration of the team, and the development of a practical work outside the University; among other attitudes that were observed:

- Apathy to intervene in the analysis and discussion
- Disinterest in listening to the opinions and proposals of the other students
- Without motivation to carry out the activities
- Little interest in making agreements in a consensual manner
- Resistance to integrating into different teams

These attitudes were gradually changing, when a participatory learning climate was favored, in which the students planned the activities and had a horizontal communication for the choice of the method, contents, and context of the case study.

4.2 The conceptual area. It includes the incorporation of new attributes to the concepts that students already possess, in such a way that they improve or enrich their knowledge, with new data, facts, concepts, theories, and arguments.

In the conceptual area, the students had little knowledge of environmental education and did not know the perspective of environmental sociology. At the beginning of the course most of the students manifested a series of doubts that persisted for several classes. These doubts were resolved as the planned tasks were developed. For example, regarding the conceptual area, the following questions were identified among others:

- What are the origins of environmental problems?
- What is an environmental problem?
- What is environmental education?
- What do ideological and political actors have to do with environmental problems?
- What proposal does environmental education have regarding environmental problems?

These doubts were resolved gradually, as a result of working in teams and the group; a primary reading for the analysis and discussion of the role of environmental sociology was that of José Luis Lezama (2004) in "The social and political construction of the environment." In this work the author argues that the social construction of environmental problems derives from values, influenced by political and ideological factors, that have to do with specific ways of living and
perceiving problems. Another book consulted was of Ulrich Beck (1992) "Society at risk: Towards a new modernity", to point out that to analyze environmental problems it is necessary to mediate tangible symbols, such as those that are experienced daily in the city from Mexico.

4.3 The methodological area. It refers to the learning of procedures, methods, strategies, techniques, instruments, and skills applied in the development of the case study. The students had diverse concerns because they were not sure of being able to carry out the case study; this is how several resistances were presented, among others:

- The initial exercises were not completed in time, in which an environmental problem was selected and then problematized in a specific context.
- They expressed the ignorance of the basic techniques of investigation, proving later that if they knew and handled them.
- They manifested a series of difficulties in carrying out fieldwork; most of these difficulties were quickly resolved.

These resistances were gradually overcome, except for two difficulties, which constituted challenging obstacles to overcome:

- Difficulties in understanding information of the proposed readings.
- Difficulties in writing texts.

However, the students were enthusiastic about the task of developing practical work, which involved consensus decision-making and collaborative learning. The realization of the case study in a context that they knew facilitated them to identify the characteristics and conditions of the community.

The students gradually became aware that we are all part of the environmental problems, but we are also part of the solution. They considered that in their professional training it is necessary to learn to work collaboratively, know how to generate proposals, provide ideas for the members of society to be informed, or have the elements to know the real causes of environmental problems and take actions to improve the conditions of the environment. For this, integrative environmental education provides the theoretical and conceptual tools to develop a holistic vision of the environment in which the interactions of the different components that favor the permanence of environmental problems are observed; a critical analysis of environmental problems is encouraged by stating that they have a social, political and economic dimension, which goes beyond physical facts.

The students were organized into various teams to review the course materials and the development of conceptual maps, argumentative essays, and critical analyses. Other teams were set up for the design and development of diagnostic techniques. These last teams were formed of three, four and five students. The balance of the results of the course was favorable; the group learned to work cooperatively, mutual trust prevailed within the teams, group agreements were respected, the group goal was defined, and a case study was delineated and developed.
The results of the course are interpreted from the observation of student activities in a checklist with different features of cooperative work, in which three levels are identified: 1 minimum 2 regular and 3 high.

**Table 1. Checklist used to monitor activities.**

<table>
<thead>
<tr>
<th>Team: Feature</th>
<th>Individual activities</th>
<th>Team activities</th>
<th>Group activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptance and identification with the goal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disposition for activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accomplishment of activities</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Apprehension of the subject and contents. Fluid communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team and inter-team support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stewardship in the processes of learning</td>
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<tr>
<td>Stewardship in the processes of learning</td>
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</tbody>
</table>

Based on the analysis of these traits, the assessment of the cooperative work achieved in the group is made. A checklist is a tool, which allows recording the set of observations made in the course. Although great cooperative work was not achieved in all cases, there was usually a predisposition and favorable attitude to share and develop the activities proposed in the course. Table 2 shows the "cases" delimited and defined by the students. Each team is identified with a letter (A-J).

**Table 2. Case studies**

<table>
<thead>
<tr>
<th>Team</th>
<th>Case study.</th>
<th>AI</th>
<th>AE</th>
<th>AG</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Atmospheric pollution. A case of Environmental Ethics seen from the Sociology of Education in the Historic Center of Mexico City</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>B</td>
<td>The water supply in the Federal District. (Tlahuac Delegation)</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>C</td>
<td>Recycling, an alternative to solid waste accumulation</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>D</td>
<td>Air pollution at global and local level.</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>E</th>
<th>The urban landscape in the Iztapalapa Delegation, Federal District</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Model of compound application in Xochimilco</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>G</td>
<td>Auditory contamination in the subway cars of Mexico City</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>H</td>
<td>Loss of cultivated soils due to the growth of irregular settlements in the Xochimilco Delegation</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>I</td>
<td>Water supply in the metropolitan area of the Mexico Valley</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>J</td>
<td>Health and Styrofoam</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

In Table 2, "AI" corresponds to the individual activities; "AE" to team activities; and "AG" to group activities. Students in teams that scored eight and nine can be considered to have achieved cooperative work. The students integrated into teams that obtained a score of seven and six can be said that they managed to carry out most of their activities in a cooperative way. And students of teams with a score of five or less than five prevailed another type of work, which is usually individual. In reviewing Table 2, the predominance of cooperative work is observed.

In the group, it was possible to determine a common goal in which all the students in different degrees were involved. Also, a higher degree of commitment was achieved since selfless mutual help relationships were established.

The primary learning that was obtained referred to attitudinal areas (cooperative work), conceptual (environmental education) and methodological (investigative skills). To achieve that, students must have a common goal; one the teacher also has to favor, among other issues: autonomy and solidarity; stimulate initiative and creativity; achieve the disposition towards the tasks, until attaining a group identity and obtain a fluid communication between all the members of the group.

The delimitation and definition of the "case" generated an awareness in students about the importance of teaching to spread the causes, consequences and ways of solving environmental problems.

Some teams focused on:
- the causes of environmental problems, equipments: the teams A and B;
- the consequences: the teams: D, G, H and I; and
- the solutions, the teams: C, E, F and J.

In all cases, the work of the students involved the reading of various materials, the interviews of various social actors and the application of various diagnostic instruments; the two processes with the highest difficulty for the students corresponded to the analytical reading and the writing of texts.
This document briefly describes some of the activities carried out by the members of the "H" team, who developed the case study: "Loss of crop soils due to the growth of irregular settlements in the Xochimilco Delegation."

One of the members of this team is originally from a village in Xochimilco, proposed addressing the problem of the loss of cultivation soils. The soils of Xochimilco are lacustrine and marshy, with a diversity of composition, according to the area where they are located; the area chosen to carry out the case study is a transition zone, close to the chinampas, with alluvial soils, dark, suitable for agriculture.

The students went to the chosen community, and the following questions were addressed: Why are the human settlements in the cultivation areas? Why has local and federal government allowed people to live in these areas? Based on these questions, the students made other visits to the place to carry out the case study, using qualitative observation and interviews of open questions, with the intention of knowing the concerns of the community's inhabitants. Since they found that most people do not want to talk about the growth of irregular settlements and are distrustful, so they refuse to be interviewed.

The students managed to interview five people, four of them from the community and one who was living in what used to be an irregular settlement. According to the inhabitants of the community, the growth of irregular settlements occurred due to the permissiveness of the authorities, and the need for people to have a roof to live under, despite knowing perfectly the risks involved in being established in these areas.

The most alarming for the inhabitants is the lack of vigilance on the part of the authorities. In the irregular settlements, there is no surveillance, and crime is present in the area.

The students found that among the neighbors there is no social "organization;" they did not detect functional interrelations among the neighbors.

The individual who is living in the cultivation area expresses that he paid to obtain permission to live there and to build his house (with boards and sheets of asbestos and plastic).

Armed with this data, the students went to the municipal delegation, and obtained information, that the land is in process of regularization, and that the families will pay for their land as well as the services of water, drainage electricity when these services are installed. Other people from the Delegation's offices told them that the ejidal lands have been transformed into private lands.

The students report that it is regrettable that the federal and local authorities allow the population to occupy these places since they do not have the infrastructure access to their homes. Even in the rainy season, they are in danger due to a significant amount of water that accumulates in their homes.

The students followed the necessary procedures in the Delegation, to know the official version of this problem. However, the authorization to conduct interviews with the officials was not obtained.
In the conclusions of the case study, the students note that the problem of irregular settlements in areas not following proper regulations for the construction of houses has been allowed by the authority administrators of the Delegation. As a result, the deterioration of the soil has originated, and the loss of biodiversity; and that, regrettably, the regularization of soils will put at risk the integrity of the people who inhabit that area.

For students, it is regrettable to see that there is no culture of prevention between the authorities and the inhabitants, who are not fully aware of what it means to live in those areas. An alternative solution for the students is to promote a neighborhood organization that generates preventive measures against the inherent risks of living in a humid area when it is used for cultivation, as well as proposing environmental education as the appropriate means to foster a culture of prevention.

**Recommendations**

Students agree that an environmental education program should stimulate critical and creative thinking through a definite diagnosis of environmental problems. Also, students make it imperative that the Sociology of Education require other discourses, such as pedagogy and philosophy, to try to answer what kind of historical-social human being is intended to form and what conditions are needed to transform the relationship of society to nature. From experiences developed there are some recommendations for the development of the case study in environmental education.

The systematization of the experience in environmental education with university students facilitates the understanding of the internal logic of the process and generates a series of recommendations.

A) First sessions.
   - Generate a critical reflection on the practice through concrete questions, involving experiences of daily life (food, transportation, services, work, and health, among others).
   - Recognize the previous knowledge and learning, as well as the different skills and abilities, which make a better group integration possible.
   - Discuss examples of diagnoses performed by other students, identifying the results of cooperative work.
   - List the agreements of the group setting.
   - Build the group goal, which will guide the actions of the group.

B) Development of the course.
   - Establish fluid communication networks by all means available to students, which include e-mail, Facebook, and Twitter.
   - Construct a standart referential scheme, which is enriched as the course progresses.
   - Foster the co-responsibility of learning, through the co-evaluation and monitoring of the various activities that have been planned in the course.
   - Continually motivate students to participate in group activities.
   - Detect problems of integration in the group, helping to overcome them through a feedback of the process.
C) Closure.
- Contribute to the students to establish the forms of organization in the group to identify the lessons learned.
- Promote the link between the results of the course and the thesis topics of the students.
- Encourage listening to different opinions and reflections derived from the work done.
- Make public the evaluations carried out by the teacher, compared with those made by the students themselves (self-evaluation) and the co-evaluation.

Conclusions

As a conclusion, we share a set of reflections about the processes generated in students by participating in the construction of a case study.

The skills understood as the action patterns that each person is bound to face new situations. So, in practice, they are expressed as the capacity to understand an environmental problem. The skills understood as the capacity to face new situations. So in practice, they are expressed as the ability to understand an environmental problem. In general terms, if students are interested and motivated to identify and know more about an environmental problem, they test their investigative skills. These skills as they are exercised, translate into more and more complete, reliable and successful methods in relation to the time and observable successes. This development is because the skills are susceptible to a development that is based on the practice, in the usual management of principles, codes, and algorithms, which makes possible a more extensive and consistent appropriation of them and, consequently, in obtaining more effective solution methods.

Developing the skills implies a greater involvement of the students, beyond what they can represent in credits or grades in the course, creating an interest in contents and activities related to environmental education. The majority of the adult population agrees to care for the environment, to preserve the rich biological and cultural diversity, which has definitive importance for the life of planet Earth. However, few people are interested in developing activities in favor of the environment. Besides, when students become aware of the biological, social and cultural implications of environmental problems, and recognize them as part of the environment, they also recognize and practice values associated with respect for the environment.

On the other hand, environmental education, besides promoting these values, can generate and maintain uses and beliefs that foster the development of an environmental culture, and consequently allow the achievement of new relationships between human beings, and of these with the environment. Students, as social actors, have a set of representations, knowledge, and skills that can influence the environment, with the lessons learned, they can act for their transformation into an ethical and political framework. The behaviors are not explained in themselves but within the sociocultural context in which they occur.

Thus, it is possible to identify the opportunities offered by interaction and work in institutions of higher education, as well as the types of restrictions that it imposes, with its classification and school social rank.
From the experience developed, it's considered that to achieve the expected results in the formation of the students, it's necessary to promote good communication relations; learn to seek the theoretical and methodological supports; achieve the agreements taken in a group and in each team; and develop a critical analysis of the causes of environmental problems.

References


