

# THE ENVIRONMENTAL DIMENSION IN THE AQUACULTURE PRODUCTION ENGINEERING PROGRAM AT THE UNIVERSITY OF NARIÑO.

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## Abstract

The role of the university is to generate spaces for ongoing discussion and understanding. Therefore, it is necessary to propose changes in the approaches, contents, and practices linked to each of the academic programs offered by the different Higher Education Institutions from their own territory; likewise, teachers acquire a commitment to students and society, since it is they who, through their pedagogical actions, are responsible for giving life to the curriculum, which must be designed according to the needs of their context. The purpose of this document is to identify the Environmental Dimension (ED) in the curricular approach of the Aquaculture Production Engineering (APE) program at the University of Nariño; to this end, a documentary analysis, interviews, and a knowledge test were conducted with teachers and students of the APE program. This research was developed as a case study, under a qualitative paradigm, with an interpretive approach. The findings show that the program's documents direct both its vision and mission towards aspects related to sustainable development, however, this is not reflected in its competencies or micro-curricula; on the other hand, teachers and students express their conception of the environment as surroundings, everything that surrounds us, and as biotic and abiotic aspects. It is concluded that there is a disarticulation and incoherence between the educational proposal and its development with respect to the ED; likewise, both teachers and students frame their knowledge from a naturalistic vision of the environment.

**Keywords:** Higher education, curriculum, environment, context.

## Resumen

El papel de la universidad es generar espacios de discusión y entendimiento permanente. Por ello, es preciso plantear cambios en los enfoques, contenidos y prácticas vinculadas a cada uno de los programas académicos ofertados por las diferentes Instituciones de Educación Superior desde su propio territorio; así mismo, los docentes adquieren un compromiso con los estudiantes y la sociedad, por cuanto, son ellos a través de sus actos pedagógicos los encargados de dar vida al currículo, que ha de ser diseñado según las necesidades de su contexto. La finalidad de este documento, se enmarca en identificar la Dimensión Ambiental (DA) en el enfoque curricular del programa de Ingeniería en Producción Acuícola (IPA) de la universidad de Nariño; para ello, se realizó análisis documental, entrevistas y

## LA DIMENSIÓN AMBIENTAL EN EL PROGRAMA DE INGENIERÍA EN PRODUCCIÓN ACUÍCOLA, UNIVERSIDAD DE NARIÑO.

prueba de conocimiento a docentes y estudiantes del programa IPA. La presente investigación se desarrolló como un estudio de caso, bajo el paradigma cualitativo, con un enfoque interpretativo. Los hallazgos encontrados muestran que los documentos del programa encaminan tanto en su visión y misión aspectos relacionados al desarrollo sostenible, sin embargo, no se ve reflejado en sus competencias ni micro currículos; por otra parte, los docentes y estudiantes manifiestan su concepción de ambiente como entorno, todo lo que nos rodea y como aspectos bióticos y abióticos. Se concluye que existe una desarticulación e incoherencia entre la propuesta educativa y su desarrollo con respecto a la DA; así mismo, tanto docentes como estudiantes enmarcan sus conocimientos desde una visión naturalista del ambiente.

**Palabras Clave:** Educación superior, currículo, ambiente, contexto.

## I. INTRODUCTION

The environmental problems evident today stem from the adoption of Western development models, leading to a fragmented view of the environment and one focused solely on meeting human needs (Iguarán et al., 2021; Sauv e, 2006).

In this sense, education plays a fundamental role in the accumulation and dissemination of these types of preconceived thoughts and models; therefore, from academia, the role of the teacher must be transformed, linking their training to critical pedagogy, understanding the different components that make up the environment applied to contexts and that allow them to strengthen their competencies and those of their students (Avenda o y Guacaneme, 2016).

Likewise, the environmental training of teachers is directly related to culture, in the way humans interact with nature and their territory within the teaching-learning

process (Quintana, 2017). In this sense, the diversity of environmental, social, and cultural contexts must be taken into account, with the aim of fostering in individuals a change in attitude with critical thinking, assuming their own responsibility in solving socio-environmental problems (Márquez et al., 2021).

On the other hand, authors such as Almarza et al. (2019) and Rodríguez (2020) state that, worldwide, there are different higher education institutions that are incorporating the environmental dimension transversally into the curricula of different academic programs; in such a way that they lead to the training of professionals who, from a holistic perspective, contribute to the solution of environmental problems, in accordance with Colombian regulations; however, its application has not transcended this component, as there is a disconnect between the different sectors of education (Vélez y Londoño, 2016).

In this sense, the curriculum in Educational Institutions - IEs, aims to train people by using different contextualized strategies and resources, providing the possibility of spaces for continuous reflection along with the development of knowledge being, and doing (Velásquez, 2009). Therefore, the importance of addressing environmental issues within the curriculum is emphasized, as it represents an opportunity for its integration across different educational levels and areas of knowledge (Miranda et al., 2019).

Therefore, this article aimed to identify the environmental dimension in the curricular approach of the Aquaculture Production Engineering program at the University of Nariño.

## II. METHODOLOGY

This study is framed as a case study, which consists of a detailed description and analysis of unique social units or educational entities, identifying the interactive processes that shape them (Arnal et al., 1992; Bisquerra et al., 2009; Ortiz, 2015). The research is situated within the qualitative paradigm; therefore, to achieve the objectives, it aims to understand reality, which is dynamic, multifaceted, and holistic, as well as to interpret educational and social phenomena, transform practices, make decisions, and develop knowledge; finally, a triangulation of the results was carried out, considering the degree of integration among them (Bisquerra et al., 2009; Sampieri et al., 2020). An interpretive approach was adopted as it develops the understanding, analysis, and interpretation of content; furthermore, it is grounded in the construction and reconstruction of sociocultural identities as present in

educational settings (Arnal et al., 1992; Ortiz, 2015).

### A. Unit of Analysis and Work.

The study population consisted of 57 individuals: 46 students enrolled in the Aquaculture Production Engineering (APE) program at the University of Nariño in the A-2023 semester, and 11 faculty members with full-time, part-time, and administrative appointments in the same program, totaling 57 individuals.

To determine the unit of analysis, a stratified random sampling with proportional allocation (SRS) was conducted, using the formula for calculating finite populations (López-Roldán and Fachelli, 2015; Segoviano and Tamez, 2014).

$$n = \frac{N * Z^2 * p * q}{(N - 1) * e^2 + Z^2 * p * q} \quad (1)$$

Where,

n: Sample size

N: Population size

Z: Confidence level of 90% (1.96)

e: Margin of error of 10% (0.10)

p: Probability of success (0.5)

q: Probability of failure (0.5)

For the distribution of the total sample (1), proportional allocation of the sample was used based on the population size of each stratum (López-Roldán and Fachelli, 2015).

$$n_h = \frac{N_h}{N} * n \quad (2)$$

Where,

N: Population size

Ni: Size of each population stratum

ni: Sample size in each stratum

n: Total sample size in (1)

The strata were composed of faculty members affiliated with the APE program, regardless of their employment status (contractual, hourly, full-time), and students enrolled in the fourth, sixth, and eighth semesters. These students were required to be currently enrolled in at least one course within the APE curriculum. Second-semester students were excluded as they had not yet undertaken courses in the field of sustainable development. Similarly, tenth-semester students were excluded because their academic formation was based on a curriculum different from the one being analyzed in this study. The sample size

for each stratum is presented in Tables I and II

Table I. Proportional Sample of Professors and Students APE-2023

Stratum	$N_h$	Proportional Weight	Proportional Allocation
Professors	11	18%	6
Students	46	82%	25
<b><math>N</math></b>	57	<b><math>n</math></b>	31

Table II. Stratified proportional sample of students APE-2023

Estrato	$N_h$	Proportional Weight	Proportional Allocation
Semester IV	19	41,3%	10
Semester VI	17	36,9%	9
Semester VIII	10	21,8%	6
<b><math>N</math></b>	46	<b><math>n</math></b>	25

The values presented in Tables I and II were used to develop interviews and administer a knowledge test

#### B. Data Collection Instrument.

To analyze the curricular approach of the APE program towards Sustainable Development (SD), matrices were used for a documentary review of the Program Educational Plan (PEP) and micro-curricula in the field of sustainable production, based on Narváez et al. (2022). A structured interview was conducted with program faculty and students to determine their conceptions of the environmental dimension and its incorporation into the curriculum. The interview was validated by experts who considered aspects such as: appropriate language for the informant's level, inducement to respond, clarity of writing, internal coherence, and whether the question aimed at a defined objective. For the application of the interview, it was necessary to obtain the participants' approval through the signing of an informed consent form.

To describe the conceptions of the environment, a test was administered to faculty and students in the fourth, sixth, and eighth semesters of the program. Finally, a cross-analysis of these was conducted, obtaining the key or most influential categories for their articulation from the PEP.

#### C. Systematization and Data Analysis.

For the documentary analysis, the information contained in the PEP and the micro-curricula of the APE program was extracted using the following formats: completed instrument for the documentary review of the Program Educational Project – PEP and instrument for the documentary review of the field of sustainable production. For the categorization of information, the guidelines established by Strauss and Corbin (2002) were followed, using a color code according to the different conceptions of the environment. Likewise, a participation code was assigned according to the role represented (faculty or student). The foregoing allowed for an analysis of the program's curricular approach and its relationship to the SD it presents, establishing the recurrences for each of the established categories, which were tabulated and graphed for interpretation.

## III. RESULTS

#### A. Documentary Review of the Program Educational Project.

The PEP for Engineering in Aquaculture presents, both in its definition of the career and in its vision and mission, a conception of the environment based on sustainable development and the sustainability of resource use; however, a theoretical definition of its stance is not evident among these.

Regarding the development of the teaching-learning process, the PEP presents a "Curricular Model: Project-Based Learning (PBL)" (p. 74); which is carried out from the fourth to the ninth semester, where the subjects have a direct link to the elaboration and development of this project; its purpose is to contribute to acquiring the competencies to identify and solve problems autonomously, according to the context in which they act, based on the dimensions of knowing, doing, and being.

On the other hand, the program, among its specific competencies, alludes to SD by mentioning in the Knowing aspects related to the studies of the repercussions of aquaculture systems on the environment, establishing a recursive and anthropocentric vision; likewise, in the Doing, it focuses on the management of production supported by the physical, biological, and economic components for obtaining quality products and in the Being, it involves the vision of sustainable development of aquaculture from ethical behavior.

### B. Documentary Review of Subject Micro-Curricula

In the field of training in sustainable production, the micro-curricula or Subject Educational Project - SEPs as they are called in the PEP, show recurrences regarding the pedagogical approach of the subjects; thus, most of the documents (74%) do not refer to how the subject is developed and when it is done. The carrying out of theoretical classes with the help of slides under a concept of transmissibility of knowledge is mentioned, probably this is due to the scarce teacher training in pedagogy and didactic strategies to address emerging issues, SD. Regarding the analysis of the general competencies of the units, as well as the topics included in these documents, different approaches to SD are evident as shown in Figure 1.

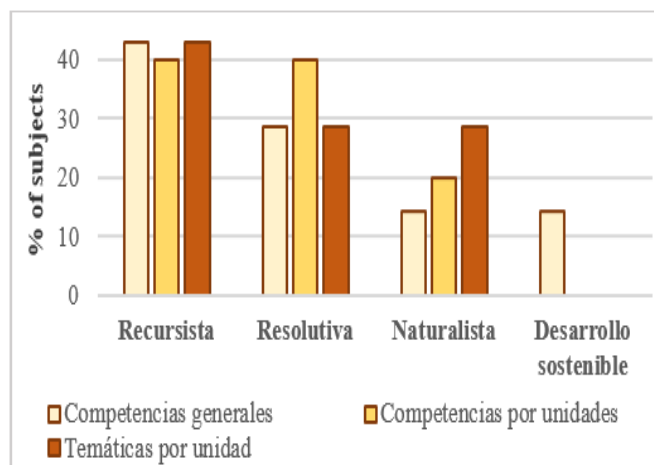


Fig. 1. Enfoque ambiental de las asignaturas del campo de formación en producción sostenible.

As evidenced in Figure 1, the SEPs exhibit diverse approaches to the environment, primarily characterized by a recursive perspective in both their competencies and thematic content. This recursive perspective involves the utilization of environmental elements for economic development, with a particular focus on production systems and the methodological and functional processes of aquaculture. Consequently, the concept of environmental sustainable development—proposed as a means to integrate SD into the program’s career definition, vision, and mission—occupies the lowest position in the development of subjects within this field of study. It is only established in the general competency of the subject, rather than in the competencies of the units or their specific themes.

### C. Interview with Faculty and Students of the APE Program.

Figure 2 presents the perceptions of faculty and students regarding the curricular approach developed in the APE program.

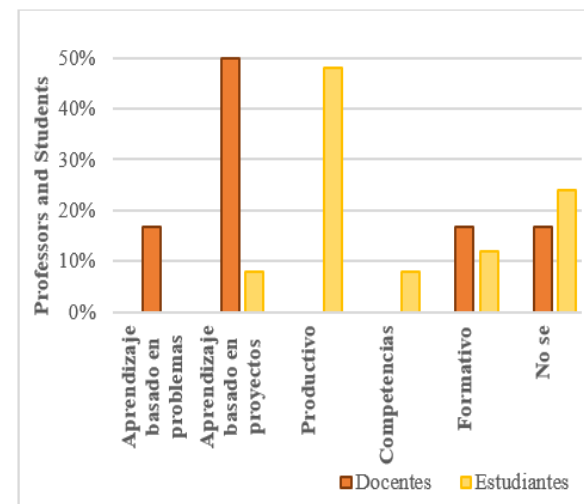


Fig. 2. Percepción del enfoque curricular de docentes y estudiantes del programa de APE - 2023.

As observed in Figure 2, faculty members do not mention competency-based learning at all, indicating a complete disconnect. Most faculty members recognize PBL as the program’s curricular approach, which aligns with the model proposed in the PEP. However, when asked how they integrate the curricular approach into the development of their courses, faculty members mentioned responses such as, “reusing materials that would normally be discarded” (DOC1-9), “through case studies and simple experiments” (DOC4-9), and “acquiring the competencies that students need to perform” (DOC6-9). This indicates an inconsistency when it comes to implementing the educational proposal established in the PEP, and there is no evidence that these approaches are oriented towards a specific context or problem-based learning, a situation that has been previously highlighted when faculty members fail to reflect the PEP’s proposals in their course plans.

As can be observed in Figure 4, the general trend among APE program faculty regarding the concept of the environment allows for the identification of four conceptions, with a naturalist orientation being the most prevalent at 70%. This perspective is characterized by statements such as: “The environment is the set of biotic and abiotic elements that share a space” (Doc1-1); “The environment is the setting in which life manifests itself, including all living things on Earth and the biosphere” (Doc3-1); “The physical space that brings the biosphere into action” (Doc5-1); “The environmental conditions, physical, chemical, and biological characteristics of the environment where the production system is located” (Doc1-3).

Similarly, the general conception of students tends to identify the environment from a naturalist perspective.

They are able to identify the biotic and abiotic elements of their surroundings and the ecosystems that are the subject of work in aquaculture production, with statements such as: "The environment is the environment in which we live, which includes all living things" (Sem8-Est4-1); "It consists of animals, plants, bacteria, and more that make life develop" (Sem4-Est3-1); "It is the set of ecosystems that surround us" (Sem6-Est1-1); "Everything biotic and abiotic" (Sem4-Est6-2).

## IV. DISCUSSION

Documentary Review of the Program Educational Project According to Sudar and Peralta (2020), despite the inclusion of SD in the curricular structure of the programs they studied, its presence is low in their components. Similarly, Pérez (2015) argues that academic programs, although mentioning environmental aspects in the program project, do not develop them, and most establish the environment from its basic components from a recursive or naturalist perspective. Likewise, Aparicio and Rodríguez (2019) and Bravo (2021) highlight the inadequate handling of environmental concepts that university professors may have.

On the other hand, Jiménez (2021), Tapia et al. (2019), and Villamandos et al. (2019) report that among the various problems when incorporating SD into university curricula is the training and knowledge of teachers on environmental issues, as well as their implementation from the curricular proposal. In this sense, authors such as García et al. (2019), Tapia et al. (2019), and Valero-Avenidaño and Cordero-Briceño (2019) mention that educators must understand the foundations and trends in environmental matters, especially considering the diversity of existing positions and perspectives. Thus, these debates must lead to significant proposals, even more so if one wants to develop these elements in pedagogical models and have them reflected and developed in both institutional documents and educational practice itself, in order to integrate what to teach, how to teach it, and how to evaluate it, and facilitate the change of mentality and behavior of future professionals and in their field of action (García et al., 2019).

Thus, it is necessary for teachers and students to engage in a discussion that allows them to understand the concept they seek to instill in future professionals and to clearly reflect the theoretical foundation of the concept of the environment in the document, criteria that will serve as a basis for the development of the curriculum.

On the other hand, PBL is a coherent strategy that has been implemented in various undergraduate and graduate programs in aquaculture, considering that the student plans and manages their project, develop critical thinking, and thus obtains an observable product, in addition to developing the competencies acquired in the classroom through the resolution of real problems such as those found in aquaculture production; for its part, the teacher is committed to modifying their role to achieve the purpose of PBL, leaving aside the conventional and transmissive way of knowledge to that of a guide (Creada-Garrido et al., 2019; García-Planas and Taberna, 2019; Martínez-Llorens et al., 2020; Peñaranda et al., 2021).

Likewise, the curricular construction focused on competency-based training is coherent and obeys the normative requirement reflected in decrees and laws for Colombia, following the trend that exists worldwide (Guerrero, 2010). However, the proposal of sustainable development becomes incoherent, since it is not clearly evidenced in the specific competencies of the program. In this sense, Tobón (2005) mentions that one of the fundamental activities of the curricular design process requires that this knowledge be managed integrally; moreover, it must be taken into account that from the complex concept of competencies, these are an "unfinished and constantly constructing-deconstructing-reconstructing approach-continuously requiring critical analysis and self-reflection to understand and use it" (p. 66).

Thus, the APE Program shows a series of challenging aspects in relation to the incorporation of SD into its curricular approach, although the program intends to promote sustainable development, there is no coherence in the definition and application of sustainability, which in turn reflects a low solidity in the theoretical definitions that are handled in the different documents of the program, which can generate confusion among teachers and students, and in turn make it difficult to integrate SD into the aforementioned curriculum effectively; on the other hand, the PBL strategy implemented in the program can be an effective way to address SD by connecting learning with real problems of aquaculture production. However, it is essential that teachers have a solid understanding of environmental fundamentals to adequately guide students in solving these problems.

### A. Documentary Review of Subject Micro-Curricula.

Luna and López (2011) mention that subjects taught through mechanics, transmissibility, and content repetition, where theory dictates practice, fall under

the theoretical framework proposed by authors such as Joseph Schwab, Franklin Bobbit, and Ralph Tyler, among others. This highlights the inconsistency between what is proposed in the curricular model and what is developed in the subjects. Similarly, Alcántara-Rubio et al. (2022) mention that, to date, transmissive and instrumental pedagogies are still used in higher education, emphasizing the need for teacher training on environmental issues through critical thinking and reflection.

Regarding the environmental approach presented in the APE program, these findings correlate with those found by Tapia et al. (2019), who mention that there is a low presence of the competency with an emphasis on sustainable development, representing only 20% of the total curriculum of different programs at the Autonomous University of Guerrero. Likewise, despite the fact that SD is planned at the curricular level in some academic programs at the National University of the Northeast, a strong naturalism-based conceptual predominance still exists (Sudar and Peralta, 2020). Pérez (2015) indicates that, within the subjects analyzed in the biology program at the University of Tolima, the concept of the environment is not taken from a complex and integrated conception of its different components. Moreover, he mentions that what is proposed in the training plan is disconnected from the micro-curricula of this program. In this sense, it is evident that one of the possible problems is the fragmentation of knowledge and disciplines, a situation that is contrary to the integrative and structuring approach necessary for understanding the environment (Bravo, 2021; Sudar and Peralta, 2020). Thus, the sustainable development proposed in the APE PEP is lagging behind, evidencing a low coherence and articulation with the PEAs of this field of training; possibly due to the limited dissemination of the PEP, few spaces for reflection by the educational community to reach consensus on the concept of the environment that is intended to be developed in the program. In this way, the role of the curriculum in the training of professionals and the relevance and importance of addressing environmental issues in the face of the socio-environmental problems that have been faced for some time on our planet becomes meaningful.

In this regard, Alcántara-Rubio et al. (2022), Bravo (2021), Jiménez (2021), Ramírez and González (2014), and Villamandos et al. (2019) mention that the educational community is an integral part as a socializing agent and generator of changes in the face of socio-environmental problems. They also mention that the curriculum, through its study plan, is positioned as one of the main

points or axes for carrying out the incorporation of SD in education, leaving it to all its students, who will make their contribution within their own context through the academic and human competencies acquired; on the other hand, teachers are key agents for achieving the incorporation of SD. However, a great commitment is required to the traditional pedagogical changes that have been applied in the development of their courses, as well as the acquisition of competencies in the environmental component; therefore, the absence of environmental content in educational projects leads to the non-development of competencies by future professionals (Piza et al., 2018).

#### B. Interviews with Faculty and Students of the APE Program.

**Curricular Approach:** Given the lack of clarity among faculty regarding the methodological proposal outlined in the PEP, they have failed to fully immerse students in Project-Based Learning. This approach involves contributing to learning through the construction of knowledge and self-education, providing solutions to real-world problems, and fostering curiosity among students. In this way, content responds to students' interests, as their curiosity initiates inquiry. Therefore, the project must address a real problem that is relevant to the student's context (Regalado, 2019).

In this regard, Kilpatrick (1918), as cited by Fernández (2017), emphasizes the importance of guiding students in choosing the problem and ensuring their active engagement in the teaching-learning process. Furthermore, he argues that when students have the opportunity to propose a project spontaneously, it will benefit them as they will feel involved in its development. According to García-Planas and Taberna (2019) and Perazzo (2009), PBL aims to foster advanced cognitive skills so that students can adopt and strengthen their own methodology in effectively solving problems related to their social environment. Therefore, this educational approach promotes active learning, where the process of research on a topic proposed by the students, the teacher, or in a participatory manner, generates solutions that foster the creation of new knowledge.

Considering that one of the functions of the teacher is to train future professionals by applying what is stipulated in both the PEP and the PEAs, it is necessary to bear in mind that these documents must be coherent with each other and allow for participatory construction with the support of the academic community. Moreover, socio-environmental problems must be addressed from

different components; in this sense, the incorporation of SD requires that teachers have comprehensive training in both pedagogical and environmental aspects, and in this way be able to generate a change in attitude towards the solution of problems, providing students with knowledge aimed at modifying their habits and behaviors not only related to their profession but also to the environment (Almarza, et al., 2019; Bravo, 2013; Cárdenas, 2013; Covas, 2004; Mora, 2012; Ramos and Sánchez, 2019).

This situation becomes more evident when analyzing the results obtained from students in different semesters, where they opt predominantly for a productive approach. As Molina (2016) points out, productive training is a teaching strategy aimed at developing specific skills and competencies required for a particular task or job. Instead of providing broad and general training, it focuses on providing students with the practical skills necessary to carry out a specific function in the workplace efficiently and effectively. The foundation of this educational approach, as mentioned by Guillermo et al. (2018), lies in the concept of direct utility, meaning that the knowledge acquired by students during the training process is immediately and practically applicable in the workplace. This again evidences a total disconnect between what is stated in the PEP, what is interpreted and taught by teachers, and finally, what is understood by students in their subjects. The disparity in results is clear and may be due to the increasing pressure to achieve measurable and tangible results in terms of grades and academic performance. Students, unlike teachers, perceive teaching as an opportunity to excel and gain recognition through their achievements, leading them to view teaching as an opportunity for productivity in their professional roles (Guillermo et al., 2018).

**Environmental Dimension:** The predominant findings of both teachers and students related to SD within the curricular approach of the APE program are inscribed under the considerations presented by Sauv e (2005), who mentions that the conservationist/naturalist current focuses on the conservation and proper management of resources. On the other hand, Sudar and Peralta (2020) conclude that careers that have been incorporating environmental issues into their PEPs, and especially within micro-curricula, have an evident predominance of a naturalist perspective on SD.

Thus, these results can be considered because education in the country has been geared since the 1970s towards the management and conservation of natural resources, in compliance with the current regulations of the time, whose objective focused on environmental preservation

and the conservationist perspective through courses and the incorporation of these concepts in formal education (Eschenhagen, 2009; National Environmental Education Policy, 2002). About this, a naturalist reductionist conception leads to a teaching model, along with its thematic content, towards ecology and the conservation and protection of nature, thus leaving aside the sociocultural, political, and economic aspects that need to be addressed to achieve cognitive and behavioral changes in students regarding the concept of the environment (Morales, 2016; Quintero and Solarte, 2019).

In this sense, it is important to consider the training of teachers in understanding this dimension, as it is they who construct and execute the curricula and micro-curricula of the different subjects. Moreover, they are responsible for conveying this knowledge to students; therefore, teacher training becomes relevant in the reflective construction of the academic work of universities in the integral training of students as future decision-makers. Thus, a proposal lacking a methodological orientation does not ensure its adequate implementation (Almarza et al., 2019; Ezquerro et al, 2015; Holgu n, 2017; P rez, 2015; Tapia et al., 2019).

### C. Knowledge Test of APE Faculty and Students.

One reason why both faculty and students in the APE program tend to have a naturalist perception of the environmental dimension may be due to the fact that the SEPs, linked to the field of sustainable production, have unit-specific themes that refer only to naturalist topics. In these, the relationship between this conception and contextual problems or the link to the sustainable development proposed in the PEP cannot be evidenced. On the contrary, a review of the topics reveals that they are aimed at using nature as a means of teaching and at perceiving the environment as an ecosystem and understanding the ecological phenomena that occur within it (Sauv e, 2006).

In this sense, it can also be argued that the relationship between teacher and student is fundamental in the educational process. Teachers not only impart knowledge but also have the ability to influence the adoption of conceptions and criteria among students. Bandura (1977) mentions that students tend to imitate the behavior of the models they are exposed to, and teachers are one of the most influential models in the educational context. Students replicate concepts from teachers because they see them as authorities and experts in the subject.

Thus, teacher training in environmental issues is



important because it allows them to recognize the elements that comprise it and the permanent interaction that exists between them, avoiding the fragmentation of this concept in the exercise of teaching, giving the possibility of developing it outside of conventional areas such as natural sciences (Ezquerro et al., 2015).

The results obtained show a direct relationship with those obtained in the micro-curricula of the different subjects in the field of sustainable production, which indicates a clear inconsistency between what is proposed in the APE program's base document, such as the PEP. Although the mission, vision, and competencies propose a concept of the environment related to sustainable development, it is evident that the topics taught do not relate to this dimension. Moreover, when identifying the elements that compose it, it is observed that they are not taken into account for the elaboration of production processes, and the environmental theme has simply been addressed superficially, which has not allowed students to develop a critical and reflective attitude towards regional problems.

## V. CONCLUSIONS

There is a disconnect and incoherence between the educational proposal of the Aquaculture Production Engineering program and SD, as it is proposed from a sustainable perspective but is developed under a naturalist-recursive vision of the environment. One of the possible causes is the fragmentation of knowledge and disciplines, a situation that is contrary to the integrative and structuring approach necessary for understanding the environment.

The Subject Educational Projects (SEPs) contemplate different approaches to the environment, where a recursive vision, oriented towards economic growth, prevails in both their competencies and their thematic content. This vision links aspects such as production systems, methodological and functional processes of aquaculture activity, which are mostly disconnected from their context, considering that political, social, and cultural aspects are left aside as constitutive elements of SD.

It was determined that there is a divergence between the curricular approach of the Aquaculture Production Engineering program proposed in the PEP and that recognized by students and teachers, considering that recurrences are proposed in project-based or problem-based learning and the formative approach by teachers; but in students, it is reiterated

in the productive approach, demonstrating limited dissemination and appropriation of the productive project.

It was evident that there are different conceptions of the environment among teachers and students, where, for both groups, the naturalist trend is the most prevalent. In this sense, the conceptions of the environment held by teachers are related to the natural environment and, consequently, they are methodologically used to educate, which are assimilated by their students. The lack of knowledge of the sociocultural relations of the environment can be considered aggravating factors of the environmental problem; however, with respect to the way in which the environmental dimension is addressed in the program's approach, there is a tendency towards the conservationist and conservationist-naturalist perspective, which is due to the pedagogical strategies implemented as alternatives to provide immediate solutions to the problems of the sector, leaving aside other constitutive elements of the environment such as the political, cultural, and social.

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