

Key factors in the training process of legal professionals in the face of the environmental challenges of the 21st century

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Abstract: The objective of this article is to present the analysis we conducted regarding interdisciplinarity in the training of legal professionals in the Law program at UNAD, focusing on emerging anthropocentric and biocentric perspectives that offer a different view in the training process from territorial and environmental approaches. The program, which has been in existence for three years and being the first virtual modality program authorized in Colombia, is a pioneer in its field. In consequence, we ask ourselves: What are the relevant aspects in the training of legal professionals in the face of the environmental challenges of the 21st century? For this purpose, we used a qualitative methodology with semi-structured interviews, surveys and literature review, highlighting the holistic and hermeneutic methods. We found five key aspects: a) interdisciplinary perspective in legal training; b) development of skills and competencies; c) paradigmatic changes from anthropocentrism to biocentrism from a pedagogical perspective in law; d) training of legal professionals with an environmental humanistic sense; and e) the territorial and environmental approach of the UNAD Law program. Furthermore, in the discussion, we analyzed the aspects identified above, based on complex thinking, professional skills and competences, environmental humanism and ethics in the exercise of the legal profession from a formative approach. We conclude by highlighting the importance of interdisciplinarity, critical thinking and the territorial approach as positive aspects with an opportunity for strengthening, particularly related with emerging paradigms and environmental humanism in law.

Keywords: complex thinking; critical perspectives; environmental humanism; interdisciplinarity; training of legal professionals

1. Introduction

The objective of this article is to present an analysis of the interdisciplinary relationship in the training of legal professionals in the Law program at the School of Legal and Political Sciences of UNAD, based on critical approaches and emerging anthropocentric and biocentric perspectives from a pedagogical perspective in law, which provide a different approach regarding the practice of the profession from territorial and environmental viewpoints.

In this context, and taking into account that the Law program has been offered for three years and is the first virtual modality program authorized by the Ministry of National Education of Colombia, positioning it as a pioneering program, we have posed the following research question: What are the relevant aspects in the training of legal professionals in the face of the environmental challenges of the 21st century? To address the objective and the formulated question, we proposed a qualitative

methodology, and in its development, we carried out various methodological techniques, including semi-structured interviews, surveys, and document review of literature related to the purpose of the research. We also primarily highlight the holistic and hermeneutic methods used.

In conjunction with the results, we identified five aspects that reflected interest in the study, namely: a) interdisciplinary perspective in the training of legal professionals; b) development of skills and competencies in the legal training process; c) paradigm shifts in law: From anthropocentrism to biocentrism; d) legal professionals with an environmental humanistic sense; and e) the UNAD Law program and its commitment to a territorial and environmental approach.

We also point out the relationship established in the discussion with the identified aspects, mainly because of what is understood about complex thinking (Morin, 2007), interdisciplinary legal education as a complement to traditional views of law (Arnouil, 2018; Bosch, 2020; Flores, 2020; Max-Neef, 2004, 2009; Ramírez et al., 2015; Serna Ramírez, 2007) professional capabilities and competencies (Suárez-Rodríguez et al., 2007), paradigm shifts in law: From anthropocentrism to biocentrism (Bykov, 2023; Koval et al., 2023), and environmental humanism (Albelda et al., 2018; Beilín, 2022; Marcone, 2022; Nye et al., 2013; Ponce de León et al., 2022; Rosa et al., 2023), in order to highlight the importance we identified in the study regarding interdisciplinarity and the environmental approach, among other topics, which become key aspects for the training of legal professionals at the School of Legal and Political Sciences of UNAD.

2. Methodology

This article has been produced as a result of a research project following a qualitative methodology that includes document review, surveys, and semi-structured interviews with students from the virtual Law program at the School of Legal and Political Sciences (ECJP) of the National Open and Distance University (UNAD).

2.1. Materials and methods

Case study

We chose to conduct this study at the ECJP of UNAD, considering two important scenarios: one, because UNAD has been the first university in Colombia to obtain qualified registration to offer a Law program in virtual modality; and secondly, because the pedagogical model of UNAD is related to the territorial and environmental approach of the Law program at ECJP, which seeks to respond to an urgent need in the development of competencies and capacities that future legal professionals must face in light of the challenges and issues we experience as humanity.

2.2. Methods

Furthermore, the case study was based on a qualitative methodology (Ruíz, 2012), and to carry it out, we employed various methodological techniques, including semi-structured interviews, surveys, and document review of literature related to the research objective. We primarily highlight the holistic and hermeneutic methods used. We also primarily highlight the holistic and hermeneutic methods used.

In particular, for this study, we utilized data collected from reliable, descriptive, multiple sources that were contrasted with the different instruments applied during the fieldwork conducted in the first semester of 2024 with students from the Law program at the ECJP of UNAD.

During the fieldwork, we used the semi-structured interview technique with two (2) students from the Law program, one male and one female, with the following inclusion criteria: a) being an active student who had completed 50% of the academic credits in the Law program at ECJP; b) having entered in the first cohort that led to the opening of the program; c) being linked to a research group affiliated with ECJP; and d) having a cumulative academic average of 4.0 or higher. Through these interviews, we were able to identify positive aspects and areas for improvement from the perspective and academic experience of active students in the Law program pursuing this university degree in virtual modality.

We also proceeded to apply a virtual survey using Google Forms, which consisted of 19 questions, with the selection criteria being all active students in the Law program at ECJP. With this instrument, we were able to identify variables related to interdisciplinarity in legal training, the development of capacities and competencies, the anthropocentric and/or biocentric paradigm in law, the environmental humanistic sense, and the commitment to territorial and environmental approaches in the Law program.

Data collection, systematization, processing, comparison, contrast, and analysis were conducted with the two (2) semi-structured interviews (virtual format) and with 48 surveys that were carried out telemetrically through the completion of an online form across Colombia. Both activities were conducted during the first semester of 2024.

On the other hand, for the document review, we considered the main bibliographic sources related to complex thinking and pedagogy in the training of legal professionals from critical perspectives and environmental humanism, as well as the PAPS of UNAD and the master document of the Law program at ECJP. We also consulted academic articles and scientific indexed journals in the field, as well as digital media (e.g., searching for electronic material on the Internet and accessing a variety of current databases).

All of the above was done with the purpose of answering the research question: What are the relevant aspects in the training of legal professionals in the face of the environmental challenges of the 21st century? This also aimed to fulfill the research objective: to analyze the interdisciplinary relationship in their training process from critical approaches and emerging anthropocentric and biocentric from a pedagogical perspective, which provide a different sense to the practice of the profession from territorial and environmental viewpoints.

Finally, the authors declare that there is no conflict of interest between the researchers and other parties, nor financial support, and that all ethical guidelines and precautions for research were followed according to the methodology developed in the fieldwork.

3. Results

Next, we will present the results of the fieldwork concerning the surveys and semi-structured interviews, followed by the document review.

It is worth noting that with the three information collection techniques (the first two being primary sources and the last being a secondary source), based on the findings, we organized the information and data collected into five aspects, namely: a) interdisciplinary perspective in the training of legal professionals; b) development of capacities and competencies in the legal training process; c) paradigm shifts in law: From anthropocentrism to biocentrism; d) legal professionals with an environmental humanistic sense; and e) the UNAD Law program and its commitment to a territorial and environmental approach.

To begin with, we must state that the survey was answered by forty-eight (48) active students from the Law program at the School of Legal and Political Sciences of UNAD, located in the eight (8) regions that the University has nationwide. **Figure 1.**

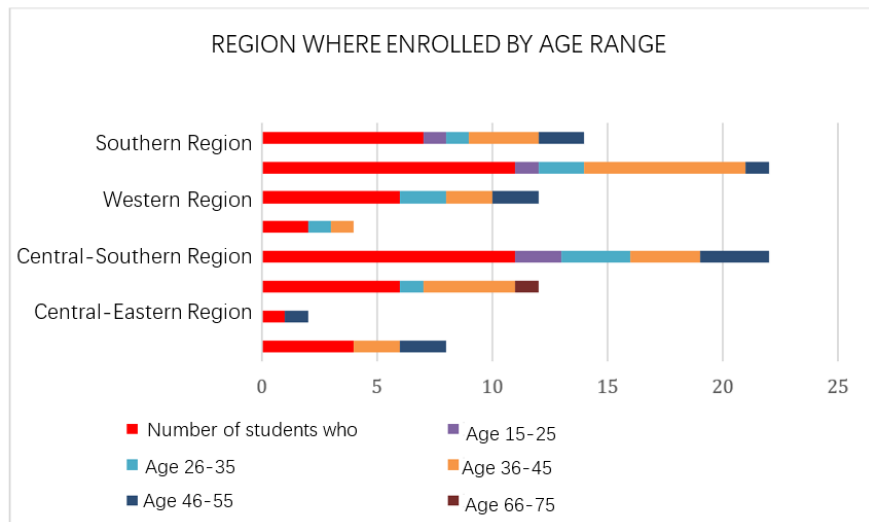


Figure 1. Region where enrolled by age range.

Source: Own elaboration based on the applied instrument, 2024.

According to the above, among the students who responded to the survey, the highest number of responses came from the Central-Bogotá and Western Regions, both with 22.9% of the respondents, followed by the Southern Region with 14.6%, the Caribbean Region and the Central-Southern Region, both with 12.5%, the Amazon-Orinoquía Region with 8.3%, and the regions with the least participation were the Central-Eastern Region with 4.2% and the Boyacá Region with 2.1%. **Figure 1.**

Additionally, by age range, we also found that among the surveyed students, the largest number is in the range of 36 to 45 years, followed by those aged 46 to 55 years, then those aged 26 to 35 years, continuing with the ranges of 15 to 25 years, and finally, those aged 66 to 75 years. **Figure 1.**

On the other hand, it should be noted that 58% of the respondents have studied an academic program in a virtual and distance modality, while the other 42% stated that they had not previously studied in this modality. **Figure 2.**

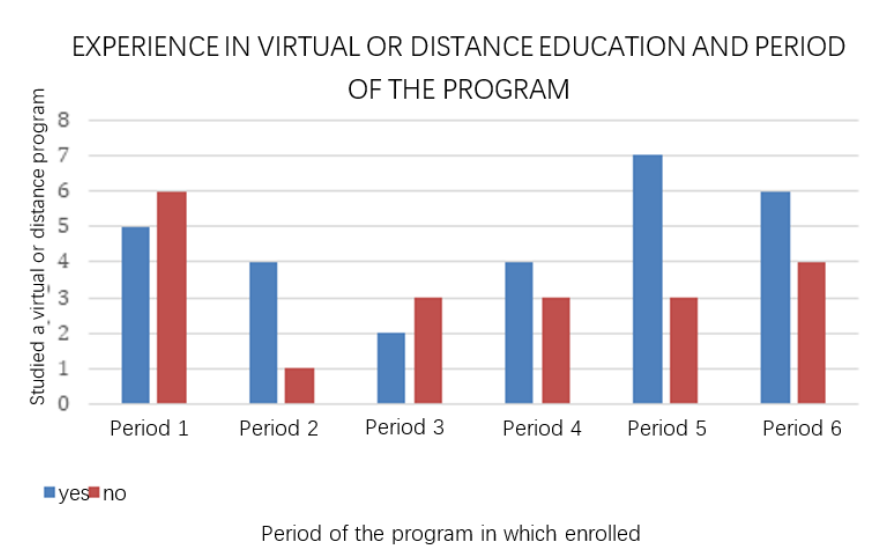


Figure 2. Experience in virtual or distance education and period of the program in which enrolled.

Source: Own elaboration based on the applied instrument, 2024.

From the above, the largest number of respondents who reported having prior experience in studying an academic program virtually or at distance are currently studying in Period 5, followed by Periods 6 and 1, in that order. Additionally, we identified that newly admitted students, that is, from Period 1, indicated a greater increase compared to Periods 2, 3, 4, 5, and 6 of the surveyed students regarding having no prior experience in this study methodology, which evidently contrasts with Period 2, the immediately preceding one. This suggests a greater interest in understanding the UNAD pedagogical model, which is characterized by being virtual and distance-based, but it also poses a risk of dropping out of the program if they do not adapt well to the study methodology.

Having said that, we will proceed with the first identified aspect: a) interdisciplinary perspective in the training of Law professionals;

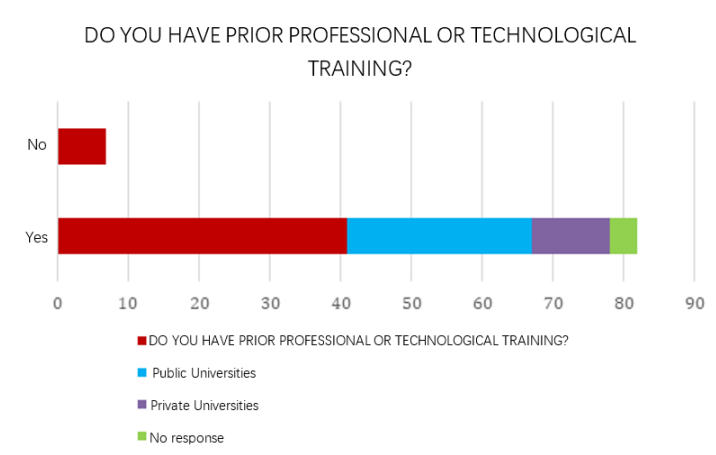


Figure 3. Prior professional or technological training.

Source: Own elaboration based on the applied instrument, 2024.

When asked, “Do you have prior professional or technological training?” 15% of the respondents answered no, and the remaining 85% answered positively. Of the students who stated they had other training, 63.4% come from public universities, 26.8% from private universities, and 9.8% did not respond. **Figure 3.**

We also asked students why they decided to study law, and 62.5% of the respondents said it was to complement their initial training, while the remaining 37.5% said they decided to change their professional path. **Figure 4.**

From the two aforementioned options, we also identified that the largest number of responses for complementing their initial training was registered in the Western Region with 26.7%, followed by the Central-Bogotá Region with 23.3%. On the other hand, regarding the responses to the option: decided to change their professional path, we found that the largest number of responses came from the Central-Bogotá Region with 22.2%, and with the same percentage, 16.7% were from the Caribbean Region, Central-Southern Region, Western Region, and Southern Region. The Central-Eastern Region had 11.1%. **Figure 4.**

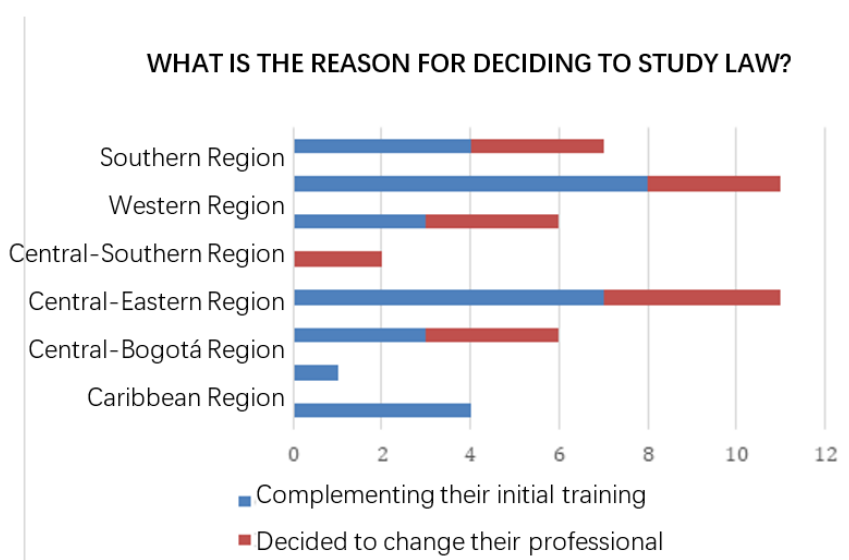


Figure 4. Reason for deciding to study law.

Source: Own elaboration based on the applied instrument, 2024.

Similarly, we found from the interviews that students have decided to complement their previous professional training by adding value to their academic curriculum with a view to continuing to expand their trajectory and allowing them to relate their initial training with legal training. This is the case of one of the interviewees (Personal communication, Esguerra, 2024), who expressed his desire to start a master’s degree in medical law once he finishes his law degree, combining his foundational training in Medicine with Law.

We have decided to integrate the responses collected from the following questions asked to the respondents: 1) Have you seen the interdisciplinary training reflected in the Law program? 2) Are you part of any research groups at the school? 3) Do you consider that the research groups have contributed to your training process? and; 4) Have you participated in international events as a speaker representing the Law

program of the School of Legal and Political Sciences? with the purpose of identifying the perceptions they have, considering that research is also a relevant aspect during the training process of a student at the school.

We must say that 10.4% of the respondents said no and 89.6% said yes to question 1. We identified that the Western Region, with 22.9%, is the one that most recognizes that there is interdisciplinarity in the training process in the Law program, followed by the Central-Bogotá Region with 18.8%. **Figure 5.**

In response to question 2), we found that there is low participation of students in belonging to any research group at the school, with the Central-Bogotá Region standing out with 6.3% of the respondents. They are followed by the Caribbean Region with 4.2%, and with the same percentage, 2.1% are the Amazon-Orinoquía Region, Central-Eastern Region, Western Region, and Southern Region. **Figure 5.**

It is noteworthy that in response to question 3), we identified that the Western Regions with 20.8% and Central-Bogotá with 16.7% registered a high percentage of non-participation in research groups at the school, but this contrasts with the 12.5% of both Regions that do consider that the research groups have contributed to their training process, and with the 10.4% that responded negatively. **Figure 5.**

Finally, in response to question 4), we observed that only the Central-Bogotá Region with 8.3% and the Caribbean Region with 2.1% were the only regions that registered participation in international events of students from the Law program of the ECJP as speakers. **Figure 5.**

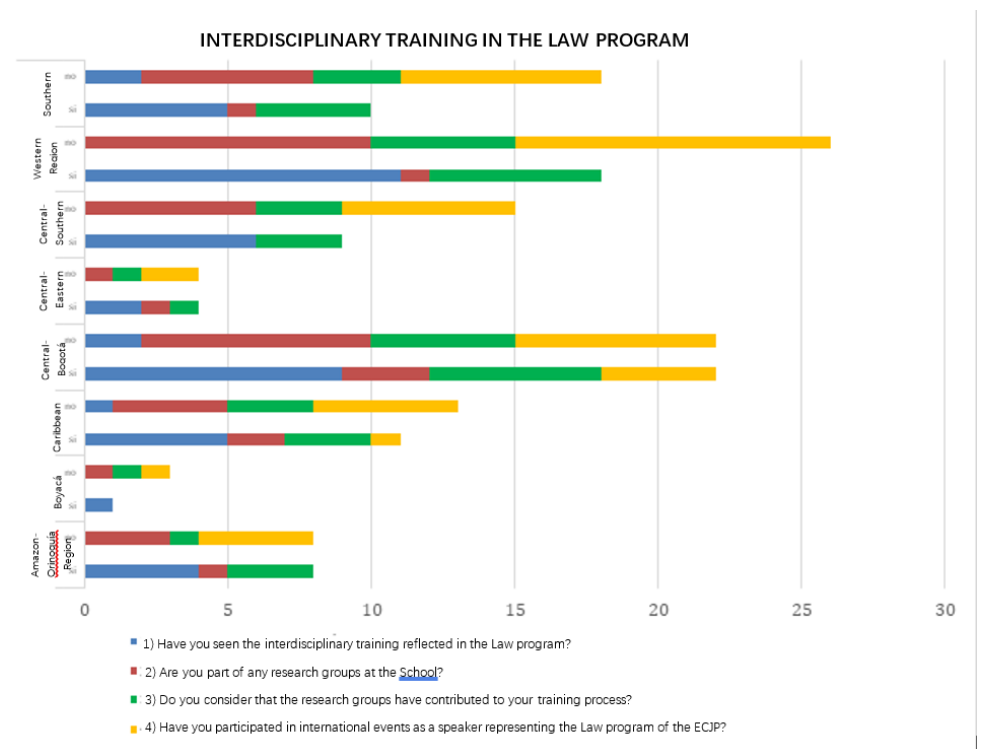


Figure 5. Interdisciplinary training in the law program.

Source: Own elaboration based on the applied instrument, 2024.

In addition to the above, we were able to identify in the results of the interviews that interdisciplinarity is considered from various aspects, one of which relates to the high percentage of students who have prior professional or technical training. This

enriches the interaction between students and the academic discussions with teachers, contributing with elements that help provide this interdisciplinary perspective, for example, through the Academic Interaction and Participation Communities program (CIPAS) at UNAD and b-Learnings that aid in the construction of collective knowledge (Personal communication, Esguerra, 2024).

In the academic life guidelines of UNAD, the principle of pedagogical and didactic planning is proposed, from which the Academic Interaction and Participation Communities (CIPAS) are constituted. Through dialogue, reflection and meaningful action are proposed to strengthen knowledge related to the disciplinary area that goes beyond the course. According to these guidelines, “CIPAS promote the positive interdependence of groups, with ethical sense, respect, discipline, debate, agreement, and conciliation, in terms of effective and affective communication among peers, co-responsibility, teamwork and networking, and the development of distributed leadership” (Abadia et al., 2024).

From the Master Document of the program (Serrano, 2019), we identified that interdisciplinary training is proposed through the inclusion of common basic interdisciplinary courses, training in a second language, the inclusion of innovative didactic strategies, the approach to topics on new technologies in the micro-curriculum, the complementary training component, and a teaching staff from different disciplines.

It is important to highlight that the Law programmer analyzed makes a statement in favor of Case-Based Learning (in Spanish ABC), in which the different problems of Law are addressed to encourage discussions, debates, reflections and critical thinking. This type of learning, according to Gillfoos and Pape (2020), focuses on the student, aligning itself from the macro-curricular with what is stated by UNAD in its pedagogical model.

On the other hand, some courses are highlighted that, by their nature, imply an interdisciplinary approach, such as the history of law, legal philosophy, legal sociology, among others. This is further enriched by the level of disciplinary training of the teachers, as this adds value by providing pedagogical tools for teaching law. Some integrate Japanese anime, others use art, philosophy, anthropology, and sociology, always aiming to problematize social realities, which adds value both personally and professionally.

Moreover, they consider that, from law, interdisciplinary dialogues can be generated with other fields of knowledge, always asking how law contributes to solving problems that other professionals may face now and in the future. This shows that this relationship of interdisciplinarity has two pathways: from outside to inside, as in the first case, and from inside to outside, as in this latter scenario. They also converge on something they highlight: the place of enunciation of students and teachers, not only from their academic experiences but also from their realities and territorial contexts, given that students are enrolled from all over the country.

In this context, we have also identified that both interviewed students belong to a research group at the School of Legal and Political Sciences, “Ratio Iuris”, who are special from various angles. The first is that the complementarity of their disciplinary training process with participation in research projects allows them to develop a broader perspective on a social and/or environmental issue. Secondly, they also emphasize that the research group itself allows them to identify that interdisciplinary

perspective by bringing together different students with other perspectives and prior disciplinary knowledge from diverse contexts that enrich their academic training process.

However, we would like to highlight Edgar Morin mentions that from the vast knowledge we have acquired throughout our history as human civilization, we neglect the importance of maintaining the organization of that knowledge. Instead, we have turned it into theories and ideologies governed by systems of ideas that disregard the very essence of science, leading to an intellectual blindness of reason that drives us toward self-destruction, as there is no awareness of what we are doing with knowledge. Morin (2007) states that we are immersed in a unidimensional view that prevents us from recognizing and grasping the complexity of reality. He criticizes Cartesian thinking for its simplification, disjunctive nature, reductionism, and abstraction, which separates the thinking subject (*ego cogitans*) from the object (*res extensa*). This separation is assumed to be the division between philosophy and science, as it was considered necessary for ideas to be clear and distinct, reduced to a single truth. And this is a permanent threat faced by the training processes in the field of law, when the interdisciplinary approach is neglected.

It is for this reason that from an interdisciplinary perspective in the training of legal professionals, authors such as Bosch (2020), Flores Flores (2020) or Ramírez et al. (2015), interdisciplinary legal education can complement traditional views of law by providing elements for critical thinking and developing skills through the integration of other disciplines that offer approaches for resolving contemporary complex conflicts. From this idea, an interdisciplinary perspective in the training of legal professionals has gradually made its way into the curriculum, not only through the integration of common basic interdisciplinary courses but also with elements from social, environmental, administrative, accounting, economic, exact, and political sciences, which have significantly contributed to the micro and meso curriculum in law.

This perspective has been particularly relevant in the training of legal professionals, as it has allowed for new approaches in legal sciences that achieve a closer understanding between the student and the environment. Max-Neef (2009) proposes that it is necessary to train individuals who not only learn technical and scientific aspects but also understand the impacts of their profession on society and the environment. Following a similar position, we can also mention Serna Ramírez (2007) who demonstrates the need to conceive the environment with a systemic approach and points out the transformative capacity of education in sustainability or Arnouil (2018) who proposes the inclusion of environmental issues in education as key in the formation of future leaders.

For Max-Neef (2004), current global concerns, such as the civilizational crisis, climate change, wars, and geopolitical challenges, demand professionals who are comprehensively trained to transcend the single-disciplinary view and commit to understanding and transforming their disciplines through more integrative perspectives to offer solutions to the problems of civilization. As Ramírez et al. (2015) rightly point out, societies change and, with this, new educational problems arise that can only be solved through critical reflection of all those aspects that intervene in the

teaching and learning processes. In short, the subject’s environment determines learning.

b) Development of Capacities and Competencies in Legal Training;

Next, we will present the responses provided by the respondents regarding the skills developed in the training process of the Law program at the ECJP. In this regard, we identified from the ten possible scenarios the top five positions and the last position.

The ability to act legally and technically in different administrative or judicial instances with the proper use of processes, acts, and procedures was the first option chosen by the majority of the surveyed students, and to confirm this, it also occupied the second place. In contrast, in the third position, we found that three skills competed for that spot. We are talking about the ability to work interdisciplinarity and contribute effectively to their tasks by demonstrating critical awareness in the analysis of the legal system; the ability to argue, write texts, and express oneself orally in a fluent and technical language, using precise and clear legal terms while understanding different viewpoints and articulating them to propose a reasonable solution; and the ability to face new situations and contribute to the creation of legal institutions and solutions in general and specific cases. The fourth place was held by the ability to use the necessary technology to search for relevant information for professional performance and updating, the fifth position was the ability to apply scientific research criteria in their professional activity, and in the last place was the ability to know a foreign language that allows efficient performance in the legal field (English, Portuguese, French, and Spanish). **Figure 6.**

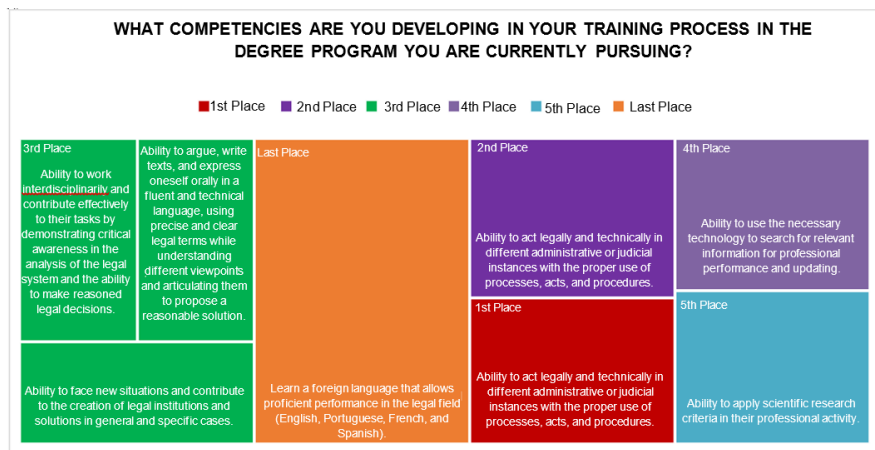


Figure 6. Main skills developed in the training process of the law program at the ECJP.

Source: Own elaboration based on the applied instrument, 2024.

From the interviews conducted, we highlight two important aspects. One of them relates to what one of the interviewees emphasized (Personal communication, Esguerra, 2024), mentioning that the different strategies used by teachers allow for the development of skills that invite students to think about the reasons behind legal problems and how to solve them. It is not just about the cold application of the law, but about developing the capacity for interpretation. This is complemented by another interviewee (Mejía, 2024), who stated that the ability to listen, observe, analyze, argue,

and communicate becomes key to the conflict solving skills that a legal professional must develop in their training process.

Next, we will present the respective findings regarding the responses provided by the respondents concerning the competencies that the Law program at the ECJP is enhancing for the practice of its students. In this regard, we will outline the five identified positions.

The first competence considered by the majority of respondents was substantial and procedural legal training, as well as humanistic and ethical training, which guarantees their professional practice for the benefit of society and the environment. In the second place, we identified two competencies: a) analytical and critical training for research, interpretation, and argumentation of social, political, environmental, and economic problems in the country, as well as the impact of laws on reality; and b) training for the understanding, interpretation, analysis, and argumentation of classical and contemporary currents of legal thought. In the third position, the acquisition of cognitive, investigative, interpretative, argumentative, and communicative competencies, as well as skills for conciliation, interdisciplinary work, and litigation. In the fourth position, training for the role that a lawyer must fulfill in resolving conflicts alternatively, as a mediator, facilitator, or conciliator. Finally, in the fifth position, training in the use of information and communication technologies applied to the field of law. **Figure 7.**

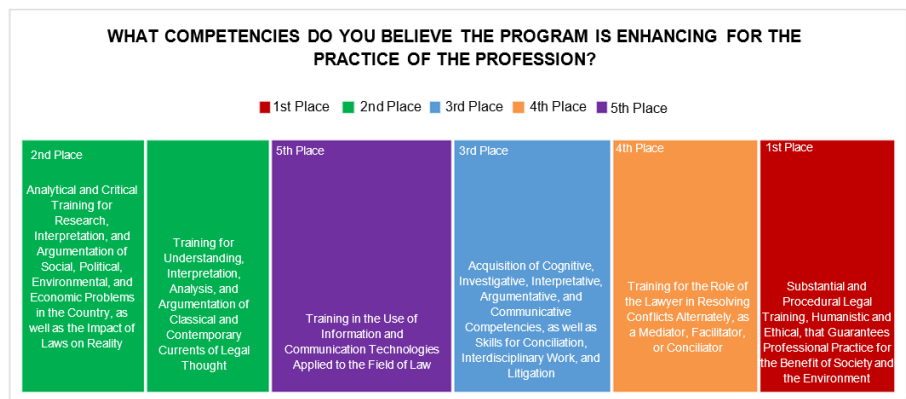


Figure 7. Competencies that the law program at the ECJP is enhancing for the practice of the profession.

Source: Own elaboration based on the applied instrument, 2024.

In addition to the above, we have observed in relation to the responses obtained from the interviews, as highlighted by one of the interviewees (Personal communication, Esguerra, 2024), that “many of our professors are constitutionalists, and being constitutionalists, there is always a focus on fundamental rights...”. Then, for instance, for a law student with a background in medicine, understanding that the issue of special subjects of constitutional protection is relevant and can be applied not only in the field of law but also in the practice of medicine, this fills them with great enthusiasm to see how their training process in law articulates with their daily life.

Additionally, despite being in the last position in the ranking according to the survey results regarding the competencies that the Law program is enhancing for professional practice, we highlight what one of the interviewees (Mejía, 2024)

mentioned regarding the study methodology. Since it is conducted virtually, students are required to use technological tools that, in some of their previous academic experiences they had not encountered it in the same way as with the UNAD model, including its focus on autonomous, meaningful, and collaborative learning (Abadía et al., 2014).

Regarding the Law program (Serrano, 2019), from the Solidarity Pedagogical Academic Project (PAPS) of UNAD, we identify that the focus on capacities and competencies is coherently integrated with the training objective of the program, as students must develop the ability to adapt to new legal and social contexts, incorporating disciplinary, transversal, and communicative competencies promoted by the PAPS (Abadía et al., 2014).

It should be noted that the traditional approach to teaching Law, from the normativist and formalist approaches, which in many faculties focuses on transmitting dogmatic knowledge, has left aside critical and complex thinking, as well as reflection and ethical debates in the exercise of the profession, which for authors such as Sedeño (2018) generates a disconnection between theory and practice, where future lawyers do not have the necessary competences to apply ethical principles in real situations.

Within the legal profession, there are different positions on ethics in professional practice, which are raised from both theory and practice. Within this dilemma, in the Colombian case, factors such as the relationship between the defence of human rights, impartiality of justice, confidentiality and the social responsibility of the lawyer come into play, issues that are not addressed by the disciplinary code of the lawyer (law 1123 of 2007), which leaves important ethical gaps in the regulations. This phenomenon is not exclusive to Colombia, authors such as Wu et al. (2020) from a study of legal professionalism in China suggest that this debate on ethics and the legal profession is a global debate, given that there is a tendency towards a professional orientation that puts financial success above the ideals of justice.

It is in this sense that the development of skills and competences in the law education process is most important. It is important to note that following the proposals of Suárez-Rodríguez et al. (2007), capacities in the training of professionals are understood as complex psychological structures that form the cognitive basis of personality, integrating and generalizing other psychological formations. Therefore, they have a primarily executive character, both in general and specific contexts, and are both potential and real. These capacities are essential for success in professional activity and the creation of something new. In this regard, capacities do not manifest directly in the activity of individuals but through competencies, which reflect how the individual meets new requirements in an activity, known as the level of performance.

Thus, in the training of professionals, as noted by Suárez-Rodríguez et al. (2007), the development of competencies is the result of the teaching-learning process, which in turn reflects strategic learning and is based on the didactic logic for creating competencies. This has a strong relationship with epistemological proposals concerning the practice of the profession ethically and the content that contributes to the formulation of explanatory categories of the object of study, which in this case is law.

c) Paradigm Shifts in Law: From Anthropocentrism to Biocentrism;

In this regard, we identified from the responses to the question, “Do you consider that emerging paradigms in Law (anthropocentric and biocentric perspectives) are addressed in the curriculum or through research groups?” two particular situations. The first relates to the negative responses, which accounted for 16.7% of the respondents, while the remaining 83.3% responded positively.

Having said that, we took the percentage of negative responses, that is, 16.7%, and contrasted them with the following questions: a) “Do you consider that the research groups have contributed to your training process?” 25% responded positively while 75% responded negatively; and b) “Do you consider that the program has strengthened your critical thinking?” 12.5% was negative and 87.5% was positive. This allowed us to identify that from that small percentage who did not consider that emerging paradigms in Law were being addressed in the curriculum or through research groups, a high percentage of them believed that the groups had not contributed to their training, but they do value that the program has significantly strengthened their critical thinking. **Figure 8.**

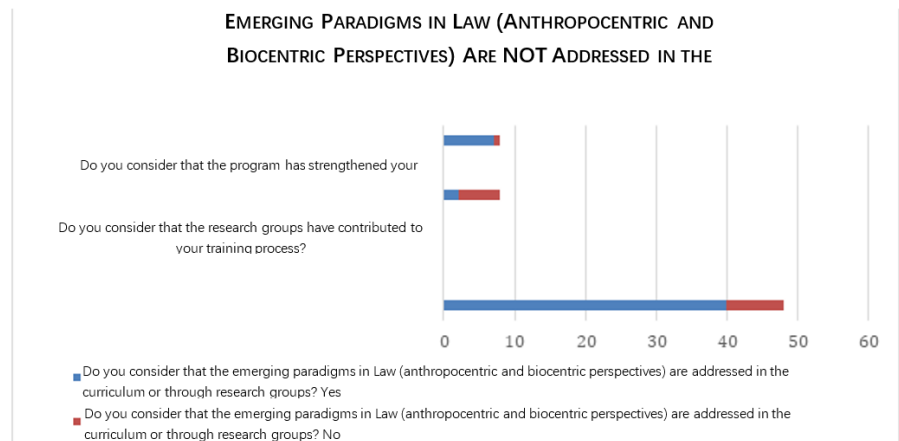


Figure 8. Emerging paradigms in law are NOT addressed in the curriculum or through research groups.

Source: Own elaboration based on the applied instrument, 2024.

Having said that, we also took the percentage of positive responses, that is, 83.3%, and contrasted them with the following questions: a) “Do you consider that the research groups have contributed to your training process?” 60% responded positively while 40% responded negatively; and b) “Do you consider that the program has strengthened your critical thinking?” 97.5% was positive and 2.5% was negative. From this, we were able to identify that there is coherence among the three responses with the findings, since a high percentage of those who considered that the research groups and the strengthening of their critical thinking do correspond with the approach to emerging paradigms in Law from the curriculum and the groups. **Figure 9.**

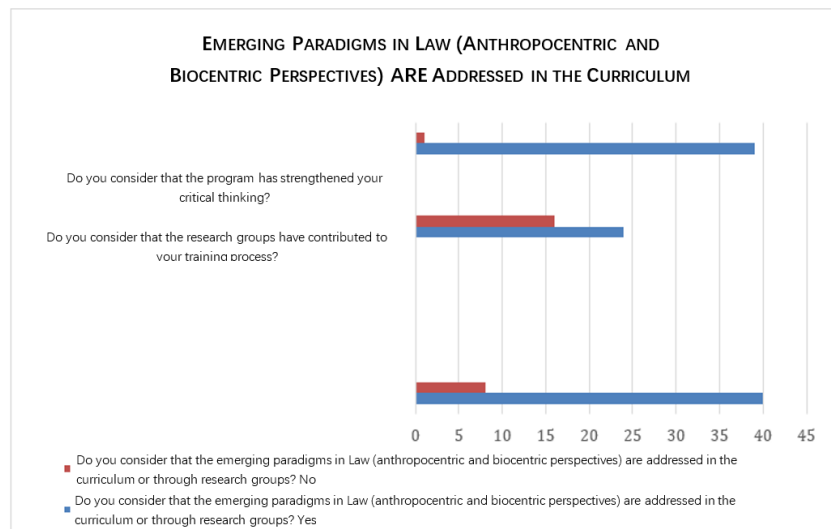


Figure 9. Emerging paradigms in law are addressed in the curriculum or through research groups.

Source: Own elaboration based on the applied instrument, 2024.

Based on the responses obtained in the interviews, we highlight two aspects regarding whether emerging paradigms in Law are being addressed in the curriculum or through the research groups of the school. The interviewees (Personal communication, Esguerra and Mejía, 2024) agree that a biocentric approach is not clearly evidenced within the curriculum; they see it as more anthropocentric. However, the interesting thing is that in the development of the content of some mandatory and elective courses, teachers do include current and debated topics that invite the student to reflection and critical thinking around the emergence of new paradigms in Law, such as the analysis—though not in depth—of verdicts that recognize rights for Nature, such as those for the Atrato River, Bogotá River, or the Paramo Santurbán, among others.

In the case of the research groups, more in-depth analyses can be developed, provided they are of interest to the student and the research project being supported, such as in the environmental peace project from a Latin American perspective.

One aspect to consider in this regard would be to make this shift in perspective from an anthropocentric view to a biocentric one explicit in the Law program, both in the curriculum and in the research groups of the school, as currently, they only observe the potential of this scenario from the academic offerings of the Master’s in Politics, Law, and Environmental Management.

Regarding the educational approach of the institution, we observe that UNAD has articulated problem-based learning; for this reason, the Law program has established an Integrative Problem Core that arises from the social and disciplinary context to be addressed by the program as a contribution to solving problems. Thus, the importance of addressing Law in conflicts and social realities in the digital age is expressly stated, addressing emerging perspectives and approaches in Law from courses such as Environmental Law and Development and Ethnic Communities and Law.

On the other hand, the paradigmatic and pedagogical changes in the training process of legal professionals, from anthropocentrism to biocentrism, we identify that

for authors like Bykov (2023) paradigms influence the development of legal systems due to the dynamic nature of states, as they are significantly impacted by advances in the sciences. For example, when discussing new technologies, laws related to information and privacy have undergone significant changes, even referring to the right to the internet as a human right. In the case of issues related to nature, there are impacts on public policies and new legal frameworks that seek to protect living entities from different perspectives. Koval et al. (2023) mention that the new ecological and legal doctrine aims to redefine the relationship between humans and nature within a new ecological paradigm of law.

In addition, the last decade, Latin American environmental law has experienced paradigm shifts that distinguish it from other legal systems regarding environmental issues worldwide. These changes have arisen from the inclusion of other disciplines in the analysis of legal problems, as well as through the dialogue of knowledge with ancestral peoples, which has allowed for the incorporation of different worldviews, traditions, and knowledge.

These paradigm shifts have occurred through judicial decisions that identify attempts to overcome anthropocentrism to construct a biocentric, ecocentric, or biocultural line, where it is highlighted, that environmental law has gained ground due to phenomena such as ecological collapse and the civilizational crisis, which have been integrated as a response to the need for protection, guarantee, and respect for nature as a fundamental element in the existence of humanity.

Notions such as the Rights of Nature, new subjects of law, ecocentric or biocentric paradigms, and biocultural rights are developments from an inter, trans, and multidisciplinary approach to law that have proposed frameworks like political ecology to understand that environmental issues transcend technical-scientific aspects and have a political character with a clear impact on law, this is why verdicts that recognize new subjects of law have not been limited to citing doctrine or previous verdicts but have also included concepts and categories from the peoples and communities, as well as from relevant authors in environmental matters. (Flores, 2021; González Aguilar, 2020; Gómez, 2014; Serna Ramírez, 2007)

d) Legal Professionals with an Environmental Humanistic Sense

For this item, we consider two important questions. The first: “Do you consider that the program has strengthened your critical thinking?” 95.8% of the respondents answered positively, whilst 4.2% answered negatively. The second: “Do you consider that environmental humanism is important in the training of legal professionals?” 97.9% of the surveyed students answered yes, while only 2.1% answered no. **Figure 10.**

In this regard, we highlight that the interviewees (Personal communication, Esguerra and Mejía, 2024) agree in mentioning that the importance of environmental humanism lies in the analysis of social and environmental issues that become potential scenarios for generating opportunities for change through law, in relation to the protection of subjects, both collective and territorial. Thus, law becomes a legal tool to achieve this goal, and this environmental humanism is a humanism focused on ecocentrism.

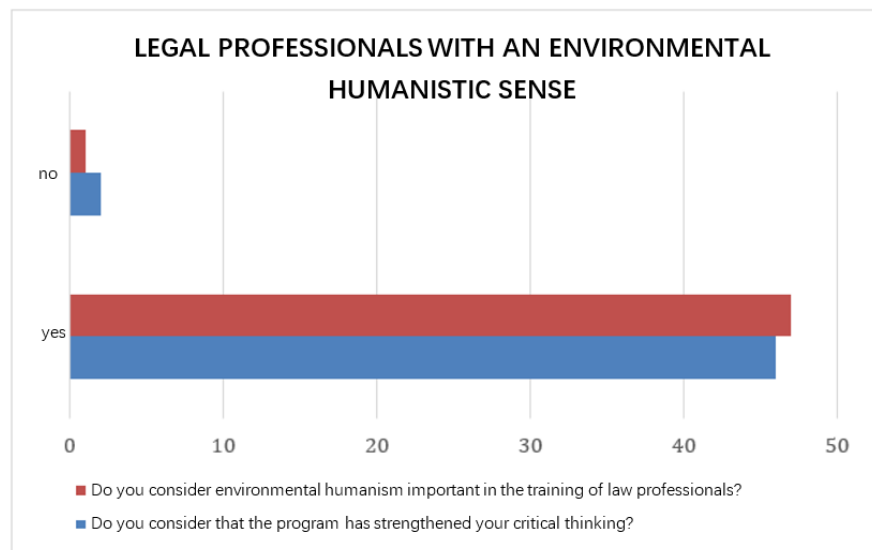


Figure 10. Legal professionals with an environmental humanistic sense.

Source: Own elaboration based on the applied instrument, 2024.

Similarly, we identify that interdisciplinarity and critical thinking play a significant role in the educational process, as law, as a tool, in itself does not achieve the purpose of protecting and guaranteeing rights without first understanding reality and the issues from differentiated perspectives grounded in cultural and natural contexts (Mejía, 2024). With the above mentioned, opportunities arise for the interdisciplinarity proposed by environmental humanities to become a reality in the training of law professionals at the School of Legal and Political Sciences of UNAD.

It is becoming increasingly important for the training of jurists to have a sense of environmental humanism, because here the cultural sphere is integrated with the environmental crisis, uniting humanities and science. Their objective is to imagine sustainable futures, moving away from utopias and apocalyptic scenarios. They propose a worldview that prioritizes the good life and the balance of the biosphere, rejecting the economy as the measure of everything. Although scientists and activists warn of a civilizational collapse, social reaction has yet to occur. For this reason, Albelda et al. (2018) suggest that the arts reflect this change and can guide and foster new attitudes toward the environment through emotion.

In this regard, Rosa et al. (2023) indicate that environmental humanities have been based on trans disciplinarity to bring together natural sciences, humanities, and communities. Meanwhile, Nye et al. (2013) highlight that 1) they are inherently interdisciplinary, 2) their work crosses national and cultural boundaries when addressing issues of international interest, and 3) they seek to be more than critical observers, influencing public policies and narratives that guide decision-makers. This is where law can play a role, as the inputs generated from judicial rulings and national and international legislation contribute to the creation of these narratives that are reclaimed from environmental humanities concerning the relationship between culture and nature.

Furthermore, as Ponce de León et al. (2022) state, environmental humanities explore the relationships between the “human” and “nature,” blurring their boundaries. They include questions from ecocriticism, environmental history, political ecology,

and ecofeminism, seeking to establish transdisciplinary bridges that challenge anthropocentrism in modern epistemology.

Finally, considering Beilín (2022), who asserts that transdisciplinary environmental humanities seek to repair epistemic injustices, such as the marginalization of indigenous knowledge and explore alternatives to development, it makes sense for law to articulate with these legal, social, and environmental claims. On the other hand, Marcone (2022) emphasizes that, although there are many publications on environmental humanities in Latin America, there is a lack of approaches that reach the public and communities. This is truly an aspect that must also be strengthened in the training of legal professionals with a sense of environmental humanism.

e) UNAD Law Program and its commitment to a territorial and environmental approach.

Finally, as it can be observed in the following **Figure 11**, with the question “Do you consider that the UNAD Law program demonstrates a territorial and environmental approach?” we found that the majority of interviewed, 77.1%, answered yes, whilst 22.9% said no. The order of participation by region in this response was: Western Region, Central-Bogotá Region, Southern Region, Central-Southern Region, Amazon-Orinoquía Region, Caribbean Region, Central-Eastern Region, and Boyacá Region.

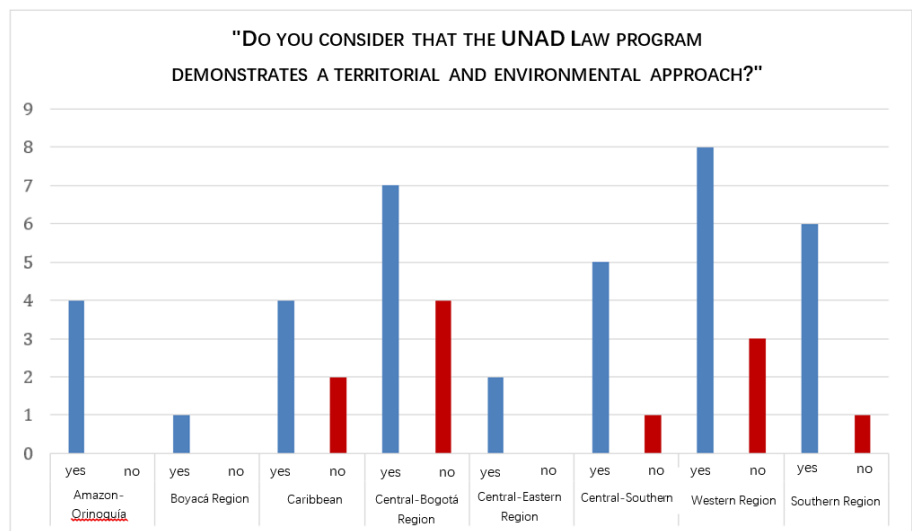


Figure 11. Territorial and environmental approach in the UNAD law program. Source: Own elaboration based on the applied instrument, 2024.

Considering the interviews conducted, (Personal communication, Esguerra and Mejía, 2024), we emphasize that the territorial approach, that is, UNAD’s presence in the territory, achieves a reach that other universities do not have, not only virtually but also physically, since there is presence in the territory. This is a winning effect of the National Open Distance University, which is reflected in the Law program, with the participation of students enrolled from all regions of the country, allowing for the contribution of local academic experiences from both students and faculty to the training scenarios.

In addition, regarding the environmental approach, both agree (Personal communication, Esguerra and Mejía, 2024) that it is not as clearly defined within the Law program, and it is only highlighted in the offering of the Environmental Policy, Law, and Management Program, and in some research, projects being developed within the school, which perhaps students are not fully aware of in terms of their scope and achievements as one would hope.

We also identified that the territorial approach in the program materializes not only in UNAD's strong territorial commitment with its presence in the country through various centers and branches but also integrates into the competencies that the program aims to develop, as stated in its master document, which mentions: "Respect for the subjects of legal realities, taking into account their personal and territorial dimensions, to achieve the respect of human rights in the context of the Colombian Social State of Law" (Serrano, 2019). Likewise, we observe the environmental approach within the development of its problematic nuclei that articulate courses such as Environmental Law and Development; and Ethnic Communities and Law, where biocultural elements of the Colombian legal framework and developments in Environmental Law in Colombia and the world are addressed.

With all of the above said, it is worth noting that academic programs that incorporate territorial and environmental approaches significantly contribute to understanding issues at different scales, offering relevant training that comprehends the social and territorial context. Del Carmen Caldera Reyes et al., (2017) affirm that by incorporating these approaches, both the curriculum and the territory benefit, as it proposes multiscale and multidimensional approaches.

4. Discussion

Delving into the discussion, we want to highlight that, from the interdisciplinary perspective in the training of law professionals, we were able to identify two possible scenarios that emerged from the results. The first relates to what we call from the outside in, as it is noteworthy that a high percentage of surveyed students have prior professional or technical training, this represents an advantage that contributes to the educational process, as it stimulates the review of topics and issues that students and teachers bring with them based on their academic and personal experiences, which are characteristic of their daily lives and regions of the country. In addition to this, the various academic spaces enriched by other fields of knowledge, such as sociology, history, philosophy, and of course, extracurricular activities like CIPAS or b-learnings, constitute valuable opportunities for collective knowledge construction around complex thinking, as Morin (2007) would say.

Following this thread, we also highlight in this first scenario that, in addition to the level of training of the faculty and the use of pedagogical tools, such as Japanese anime, art, literature, among others, for teaching topics of legal relevance, they give significant importance to this interdisciplinary perspective. This is also reflected in the students involved in research groups, who, although their participation in these formative strategies is very low, and despite the limitations of researching some topics more than others, it is still of interest that this contributes to the meeting of students who, without prior experience in these paths, encounter others who not only have a

profession but have also participated in these processes on other occasions. All of this strengthens their educational processes.

The second scenario is from the inside out, which prompts us to ask, how can we generate interdisciplinary dialogues with other fields of knowledge from law? This situation inevitably involves a staging with complex thinking and the value of knowledge and boundaries research. It invites us to recognize in other disciplines opportunities for collaboration that strengthen points of encounter and the search for common solutions to problems faced by the human and natural world, where the absences and disciplinary weaknesses seen from a single perspective would reduce their field of action and potential in legal training, thus curtailing the capacity for complex thinking.

The scattering of knowledge under the term of hyper-specialization—opposed to interdisciplinarity—occurred, further widening the gaps between areas of knowledge and the complex network that exists regarding reality, which we can observe in our daily life increasingly disintegrated between humans and nature.

In this sense, taking up Morin's (2007) question: What is complexity? In order to maintain the relationship between unity and diversity, defining it as; "the fabric of events, actions, interactions, feedback, determinations, and chance that constitute our phenomenal world". This also includes indeterminacies and uncertainties, as in this world of complexity, they are important components that, without being reduced to this phenomenon, do present themselves in highly organized systems, resulting in a composition between order and disorder. This would be the challenge to the hyper-specialization of knowledge, which occurs in every discipline, and law is no exception.

It is worth noting that for Professor Morin, the ability to unite antagonistic dimensions of our phenomenal world, from which various relationships emerge that act randomly between order and disorder to organize themselves, prompts individuals to replace simple and reductionist thinking with the development of complex thinking. This is precisely a capacity that should be proposed in all educational systems and, of course, implemented in law schools.

Applied to law, it would be explained as follows: the self-organizing system has separated into different areas of legal knowledge and has an organization that distinguishes it from the environment, that is, from other disciplines, considering relative autonomy and individuality, the system increasingly connects with other disciplines as it opens up to the interactions that complexity offers, which means it will require not to close in on itself so that it can be complemented by the external environment. This is what Morin (2007) called a self-eco-organizing system. In other words, the whole is within the part that is within the whole. Knowledge integrates, it does not isolate, thus emerging the interdisciplinarity of knowledge and the capacity for complex thinking.

In summary, if we relate the self-eco-organizing system we have mentioned, which is becoming increasingly complex, Morin (2007) tells us that we would arrive at a reflective subject who is none other than myself trying to think about the subject-object relationship. Therefore, students of legal sciences are also called to be self-eco-organizers, as they potentially possess the capacity to be self-eco-organizing subjects in the construction of new knowledge through frontier research, opening up to new

academic and non-academic scenarios that promote the development of skills and competencies in the training process of future legal professionals.

To briefly highlight what constitutes Edgar Morin's complex thinking, we will mention the three core principles of complexity that explain the above more concretely, demonstrating that each one is related and complementary to the others. Therefore, we will use them to explain complexity from law in relation to other fields of knowledge.

The first principle is called dialogical, and it addresses the relationship between order and disorder in constructing a dialogue between two antagonistic elements, which, when complemented, produce organization and complexity. This principle contributes to maintaining the understanding of opposites in unity. Morin (2007) can be understood in law through the dialogical relationship that emerges between different areas of knowledge or disciplines that are external to law and also those within the legal field that do not engage in dialogue with each other. The second principle, called organizational resourcefulness, is explained through circular movements, referring to the fact that each movement is produced and at the same time is a producer. For this reason, it adopts the name of organization resourcefulness, as there is a cyclical relationship between the product and the effects that are also causes and producers of what produces them. In this sense, Morin (2007) states that disciplinary knowledge that dialogues with another opposite has the capacity to generate new knowledge simultaneously, and thus has the cyclical effect of being both product and producer. This highlights the importance of frontier research, as it connects knowledge, expertise, and recreates new scenarios, dissolving the linear understanding of cause-effect, product-producer, since everything that is produced reintegrates into what has already been produced in a self-constitutive, self-organizing, and self-producing cycle. The third principle is holographic, of which Morin (2007) states that the part is in the whole and the whole is in the part. This understanding surpasses reductionism, which only sees the parts, and holism, which only sees the whole. In the field of law, this is understood through the dialogical and organizational recursive relationship constructed through interactions between different sciences, areas, fields, and disciplines, recognizing that despite being different, they have common points that allow them to develop the capacity for complex thinking for the generation of new knowledge that emerges from the loop: disorder-order-organization.

Now, from the perspective of the capacities and competencies identified, we emphasize that, in the former, the common ground lies in the "why" and "for what purpose?" Considering that understanding the why of a legal problem will allow one to know the for what purpose of a certain capacity. This makes the student fully aware of the capacities they possess to propose solutions and resolve situations that call for the action of a law professional. In this regard, we highlight the coherence of the first and second options with the highest number of affirmative responses concerning the ability to act legally and technically in different administrative and judicial instances with the proper use of processes, acts, and procedures. This does not overlook the fact that both the ability to work interdisciplinarily, argue, write, express oneself correctly orally, and the ability to face new situations that offer legal solutions are part of the hallmark of someone who prides themselves on being a law professional, which should be strengthened within the Law program to fully develop that capacity for complex thinking.

In addition to the above, we find it noteworthy that, regarding the use of technology for information search in professional activities, it was not among the top options. A reasonable explanation for this situation could be that the study methodology of the Law program already has this capacity in permanent development, and therefore it would be taken for granted. However, it would open a window of opportunity if this capacity was not being focused on strengthening legal training.

Another situation that challenges us is that the application of scientific research criteria in professional activity did not seem to generate much interest, which we confirmed with the low participation of students involved in research groups within the school, but with a slight contrast in identifying a low percentage of responses indicating that participating in these strategies did contribute to their educational process. Nevertheless, we observe that there is a pending task for the Law program regarding the strengthening of these types of formative strategies for research aimed at the development of their professional activity.

To close this aspect of capacities, we also observed that knowledge of a foreign language that allows one to perform in different areas and scenarios offered by the field of law was not of great interest among the respondents, as it ranked last among the ten options provided. This also suggests an area for improvement in strengthening this capacity within the program, considering that the challenges faced by law professionals in a globalized world necessarily involve interlingual communication.

Regarding competencies, we observed a correspondence between the first capacities mentioned and the competencies in substantial and procedural legal training, as well as humanistic and ethical training that guarantee the exercise of the profession for the benefit of society and the environment.

It is therefore important to develop skills and competences that are coherent with debates and ethical reflection in the exercise of the legal profession. In this sense, for Bernal (2022), the inclusion of ethics in the micro-curriculum is not a subject of minor importance, but a fundamental and transversal component that allows students to recognize, analyze and resolve ethical problems specific to their profession, as it prepares them to act with integrity and responsibility in their professional practice. The inclusion of learning strategies, such as the use of case studies, are effective in teaching students to analyze and resolve ethical dilemmas (Sánchez et al., 2023), as they promote the development of critical thinking and reflection, preparing them to face the ethical challenges that will arise in their professional practice, in this sense, it is essential that the strategies around ethical training are not limited to the micro-curricular, but are incorporated from the meso-curricular, so that they form part of the formal structure of academic programmers.

Furthermore, from the reflection of authors such as Sánchez et al. (2023) and Valderrama et al. (2023), they mention a generalized perception that universities are not training ethical professionals, which shows the need to adjust study plans to ensure that ethical competences are a central part of university education, especially in legal training. Thus, De Mello Massimino et al. (2016) propose that it is necessary to integrate metacognitive strategies and ethical assessment so that future lawyers are prepared to address the ethical issues that may arise in their professional work.

We would also like to point out that training for the role that a lawyer should play in alternative dispute resolution, as a mediator, facilitator or conciliator, was not

among the main options to be highlighted. It is an opportunity for improvement that would allow UNAD law professionals to be recognized more as legal conflict resolvers rather than as lawyers who take everything to the courts, potentially avoiding unnecessary wear and tear that often leads to the loss of time, money, and many other things. Regarding the training in the use of Information and Communication Technologies focused on law, we believe that attention should be paid to this, despite the program having a pedagogical approach mediated by technology.

Now, from the perspective of emerging paradigms in legal training, we highlight two aspects, first, relates to the contrast between the survey responses and the interviews, with a high percentage of the former validating that emerging paradigms in the anthropocentric/biocentric relationship are being addressed in the curriculum or research groups for law professionals. However, the latter nuance the response and affirm that there are no courses explicitly addressing these emerging paradigms in the curriculum; nonetheless, different faculty members do incorporate them in the development of their courses through various activities and pedagogical strategies within the program. Similarly, they maintain that with research groups, there is greater freedom for these issues to be considered at the discretion of the researcher and the student involved in supporting the development of an ongoing research project. Having said this, what we can highlight is that there is an opportunity for the program to consider the feasibility of updating its curriculum with courses that have a clear focus on the teaching of emerging paradigms in law, rather than being an activity of some teachers but a program-wide initiative.

From the perspective of environmental humanism in relation to strengthening critical thinking, we emphasize a highly relevant aspect, which is to conceive law as a fundamental legal tool that facilitates the realization of environmental humanism. This means that from an interdisciplinary perspective, it calls for the articulation of different fields of knowledge to address the social and environmental problems that humanity faces. For this reason, it is important to promote critical, reflective, and proactive thinking that calls for action and interaction with other disciplines, which aligns with what we have previously mentioned about promoting the capacity for complex thinking in the training of law professionals at the School of Legal and Political Sciences of UNAD. Teaching has a liberating capacity from a 'transformative-creative conception or activity' and this characteristic should guide us in the face of the questions 'what, how and why teach law' (Gómez, 2014). Only by teaching law in real practice will we be able to provide students with the tools that will enable them to confront the ecosocial crisis.

Meanwhile, from the perspective of the territorial and environmental approach in the Law Program, we must highlight the notable presence of UNAD in the territory, with 73 centers distributed across eight regions of the country, which we saw reflected in the survey responses and confirmed by the interviewees. However, in contrast to the high percentage that responded affirmatively regarding the observation of these approaches within the program, it is true that these results can be nuanced based on the responses given in the interviews, as the environmental approach is not explicitly observed in the curriculum, with some exceptions in certain research projects being developed with the research groups. This opens an opportunity for courses to be

included that allow students to strengthen their capacities and competencies for practicing the profession from an environmental perspective as well.

We want to point out that one of the major challenges in conducting fieldwork was achieving student participation in the survey, more responses were expected, and despite persistent efforts to encourage collaboration, only 48 surveys were completed, nevertheless this number was important and valuable for conducting a study that identified extremely significant aspects for the training of law professionals, not only at UNAD but also at the national level.

The scope and importance of the results of this research are considered in light of the three years since the Law program was offered. Always viewed as opportunities for improvement, they open possibilities for a program like this, that being a pioneer in Colombia for its virtual modality, can make the necessary adjustments for the benefit of our students' educational processes. As we have mentioned in the preceding paragraphs, interdisciplinarity, the development of capacities and competencies, emerging paradigms, environmental humanism, and the territorial and environmental approach in the training of future law professionals also become inputs for analysis and discussion both within and outside the academic program, in the face of the complex challenges that our humanity faces in the relationship between culture and nature. In this way, we have answered the research question by highlighting the keys aspects in the training process of jurists in the face of the environmental challenges of the 21st century.

5. Conclusions

At this point, based on the integration of the results obtained in the development of the objective and in order to answer the research question, we specify from a comprehensive perspective, seven main conclusions of this study regarding the training of legal professionals at the School of Legal and Political Sciences of UNAD in the face of current environmental challenges.

- 1) **Interdisciplinarity in Legal Training:** We highlight two significant scenarios in the training of legal professionals at UNAD. The first, "from the outside in," emphasizes the advantage of having the majority of students previously trained in other disciplines, enriching the educational process with diverse perspectives and experiences. In addition to valuing the level of training of teachers, academic experience, curricular and extracurricular activities that promote interdisciplinary knowledge. The second scenario, perhaps still in an incubation phase within the program, "from the inside out," poses the question: How can we generate interdisciplinary dialogues with other fields of knowledge from law? This calls for openness and collaborative work with other disciplines to address legal problems that connect society and nature. In both cases, the idea of complex thinking mentioned earlier would be realized.
- 2) **Capabilities and Pedagogical Tools:** We emphasize that the Law program is developing the capacity to act legally and technically in different administrative and judicial instances with the proper use of processes, acts, and procedures. This is articulated with the involvement of faculty who uses various pedagogical tools, such as art and literature, to teach legal topics. These strategies not only enrich

the educational process but also foster critical and reflective skills among students. The call here would be to make these good practices a general standard for the program, aiming to develop the capacity for complex thinking in law professionals at the School of Legal and Political Sciences of UNAD.

- 3) **Key Competencies in Legal Training:** We highlight that competencies are being fostered in legal training, including substantial and procedural aspects, as well as humanistic and ethical considerations that guarantee the exercise of the profession for the benefit of society and the environment. However, we noted the need to strengthen the use of technology in legal research and the development of competencies in alternative conflicts resolution.
- 4) **Emerging Paradigms and Environmental Humanism:** There is an opportunity to integrate emerging paradigms, such as the anthropocentric/biocentric relationship from a pedagogical perspective, and to strengthen environmental humanism in the law curriculum. This implies deeper interdisciplinary collaborations and the incorporation of environmental approaches in the training of law professionals, highlighting the strengths that UNAD and the program have with their territorial focus.
- 5) **Electivity:** From the program's elective offerings, courses can be developed that aim to integrate discussions related to new paradigms in law and the incorporation of environmental focus into the curriculum through specific courses that develop these themes.
- 6) **Challenges and Opportunities:** We identified challenges in the low participation in research activities and in the use of technology for information retrieval focused on the field of law. However, these areas also represent opportunities to improve legal training and adapt the curriculum to contemporary demands, suggesting the need to update it to include explicit courses on emerging paradigms and to strengthen the environmental focus. This aims to promote complex thinking and interdisciplinary skills among future law professionals with a sense of environmental humanism.
- 7) Finally, this research opens pathways and possibilities for moving forward in frontier research in generating new knowledge based on Morin's complexity, applicable to diverse realities with territorial, environmental, and global perspectives, since the exercise of the legal profession, despite being considered merely adjustable to country contexts, we are seeing more and more that complex thinking is gaining ground in academic and training scenarios in law. Thus, the question that all this analysis has generated is: How can the development of capacities and competencies in law professionals with a sense of environmental humanism be strengthened through complex thinking? This empowers them to take on a more preventive, integrative, conciliatory, and mediating role, rather than a belligerent one, addressing legal issues that could have been resolved without the need to resort to judicial proceedings.

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and MARG; writing—review and editing, MARG, AA and BAHU. All authors have read and agreed to the published version of the manuscript.

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