

Transversal Competences and Higher Education: A Contextualized Study between Engineering and Social Sciences

Verónica Piedad Bravo Santana¹, Ignacio Wilhem Loor Colamarco², Hilarión José Vegas Meléndez³, Vicente Fabricio Álvarez Tituano⁴

1. Miembro del Grupo de Investigación Gerencia Estratégica y Gobernanza Institucional de la Pontificia Universidad Católica del Ecuador sede Manabí, Docente PUCEM - Maestrante del Programa en Gestión del Talento Humano de la Pontificia Universidad Católica del Ecuador, vpbravo@pucesm.edu.ec.
2. Doctor de Filosofía en Geografía Humana, Docente del Programa de Maestría en Gestión del Talento Humano de la Pontificia Universidad Católica del Ecuador sede Manabí, iwloor@pucesm.edu.ec
3. Líder del Grupo de Investigación Gerencia Estratégica y Gobernanza Institucional de la Pontificia Universidad Católica del Ecuador sede Manabí, Docente PUCEM, hvegas@pucecm.edu.ec
4. Coordinador y Docente del Programa de Maestría en Gestión del Talento Humano de la Pontificia Universidad Católica del Ecuador sede Manabí, Docente PUCEM, falvarez@pucecm.edu.ec

ABSTRACT

We focus our research on the evolution of transversal competences in higher education, highlighting the need for educational institutions to adapt their practices to prepare students for the challenges of an ever-changing society. We argue that, in addition to disciplinary knowledge, it is essential to complement this knowledge with the development of transversal skills such as critical thinking, problem solving and effective communication, which are essential to adapt to the constant changes of the work environment and contribute significantly to society. We start by asking ourselves how the results vary in the formation of transversal competencies among teachers of Engineering and Social Sciences, justifying our interest in the need to train individuals capable of facing complex challenges, promoting an education that transcends the mere transmission of knowledge. We analyze the impact of this training on teacher performance and administrative management, comparing the evolution between two groups of teachers before and after their participation in a specific training section. The general objective was to analyze the differences in the professional implementation of transversal competencies according to disciplinary origin, while the specific objectives included evaluating the impact of training on teaching performance and exploring the relationship between research and the development of transversal competencies. Training in transversal competencies had a positive impact on the development of these skills in Engineering and Social Sciences teachers, although with some differences between the groups; Even so, challenges remain in terms of the systematic integration of these competencies into the

curriculum and their assessment.

KEYWORDS: Transversal competencies, Higher Education, Professional and social development, Impact on teaching performance, Systematic integration of the curriculum.

1. Introduction

In a context of unprecedented and rapid changes, educational institutions are challenged to continuously adapt their teaching practices, and in recent decades the need for a plus in training that aims to develop skills and abilities complementary to disciplinary knowledge has emerged. Education – as never before – is called to embrace a comprehensive vision that fosters the development of both disciplinary and transversal competencies, since it is essential that the professionals of the future not only master their areas, but also be able to understand and face the complex scenarios of today and tomorrow, based on a way that contemplates "the human dimensions, social, political, cultural, and scientific" (Calle et al., 2023, p. 10). From this perspective, our proposal was framed in the line "Efficient and effective administration of organizations for local and global sustainable competitiveness" taking the "Human talent management" axis linked to the Sustainable Development Goals presented by UNESCO (2023, Quality Education), as a trace that runs through the action of management and a basis that guarantees the fulfillment of all human rights.

Responding to this guideline, we investigate the work that has been carried out in a Higher Education Institution, based on a training period synthesized in the Diploma in Development of Transversal Competencies. Specifically, we propose a contextualized study between Engineering and Social Sciences, forming the sample with teachers from both disciplines and inquiring about the difference between Engineering and Social Sciences teachers. Methodologically, we locate a phase in the qualitative study, which we reflect in this article, reviewing the scientific literature on teaching in technical and social disciplines. Thus, we show that, for the most part, the most reflective and critical approaches are emphasized in the social sciences and pragmatic approaches are applied more frequently in engineering.

An ever-current debate: competences

To properly conceptualize the term "competence", a multidimensional view is required, given the facets it encompasses and the need to attend to its various dimensions, depending on the field in which it is located. It is interesting to recover the motion of López (2016) when, when framing the revision of this concept, he situates the problem in its divergence and complementarity with other terms, since numerous classifications and variants appear. Understanding that the initial question is conceptual in nature, he proposes "a bridge to move from use to the sense of competition through three elements: historical vision, etymological reference and semantic delimitation" (p. 312). He considers that these aspects allow them to be addressed, by understanding their historical evolution with the nuances and meanings that they have acquired over time. By unraveling the term from an etymological perspective, its original meaning and transformations are clarified, making it feasible to delimit the term and differentiate it from other related concepts,

but not identical. Finally, semantically, the current meaning is precisely defined by establishing its substantial attributes and differentiating it from other realities with which it may be confused. This approach should be nourished by a review of the relevant literature on the subject, identifying the main theoretical currents and existing debates.

It is worth remembering that in 1998 the World Conference in its document *Higher Education in the Twenty-first Century: Vision and Action* pointed out the need to promote lifelong learning and the construction of competencies that would be appropriate to the cultural, social and economic development of the Information Society. At that time, four principles were established with their functions: to generate new knowledge (research), training of highly qualified people (education); services to society (social) and social criticism (ethics) (p. 4 and ff.). It then defines competence as the "set of socio-affective behaviors and cognitive, psychological, sensory and motor skills that allow one to adequately carry out a performance, a function, an activity or a task." This definition, enriched over time and with variations depending on the approach adopted, becomes more complex when approaching the field of transversal competences. Following Climént Bonilla (2010, p. 92), they are considered to be:

- Ability to satisfy demands or carry out tasks successfully, made up of cognitive and non-cognitive dimensions (OECD, 2002, 7);
- Ability to perform activities at the expected level of employment (Lloyd, 1993, 14);
- Standards specifying the level of knowledge and skills required to successfully perform, in the world of work, appropriate functions for each occupational group (European Commission, sf, a and b) and
- A combination of knowledge, abilities, skills, attitudes, and values that is required for the understanding and transformation of a complex reality, from among the entire universe of knowledge related to that reality (Mateo, 2006; cited by Mir, 2006).

In the first three definitions, the interest in results is emphasized, while in the fourth, by integrating several elements, they make up a systemic dimension: elements of competencies, individual context (the person and his/her environment) and processes and results in relation to individuals, organizations, communities and society, in order to seek solutions to specific situations and problems. However, we must remember that already in 2002 González Maura had stated that the definition of competence is not simple, since the difficulty of combining structural and functional elements in the regulation of professional performance gives rise to varying degrees of development of professional competence. (p. 5)

In the field of Education

Soft Skills in Education

Various studies show how students manage to develop interpersonal skills to obtain employment and professional promotion, but in some cases they do not reach the

desired levels, possibly due to the teaching strategy that the teacher presented with the group of students. This raises concerns since previous studies have identified communication as the skill of choice by employers, hence the need to raise awareness among students of the importance of developing stability. The research team formed by Majid et al., (2012), expressed that it is important to integrate soft skills in negotiation courses, carefully reviewed and incorporated into the curricula through specialized workshops that enable them to improve their ability within the professional field.

Soft Skills in the Teacher

The search for the soft skills achieved by teachers towards their excellence is based on teamwork/collective work skills, communication skills, critical thinking skills and problem solving. Another important aspect in the teacher is the ability to be an active listener in order to provide accurate and timely answers. These skills include the ability to discover solutions to problems that require the teacher's creativity, reasoning, and past experiences. Similarly, the ability to work in a team that the teacher shows means the ability to collaborate with students and other teachers in numerous social and cultural contexts in order to build a good relationship between peers and students through respect (Tang, 2020).

Teaching Performance

University teaching performance is framed in the criteria established by the legislation of each country. However, several factors regarding the role of teacher performance and its impact on higher education are available in the literature: Pedagogical competence (planning, implementing, and evaluating academic content that contributes to the learning outcomes of a study program, Álvarez, 2019); Research and Professional Development (generator of knowledge in their field of study, updating to enrich their teaching with scientific evidence, encouraging the analysis of content reviewed in class with students, Galán, 2020); Teacher-student relationship (importance of establishing a relationship of trust and respect with students that fosters effective communication and constructive feedback, Moreno, 2010); Competency-based approach, (design of activities and evaluations where the student can apply knowledge in practical cases generating transferable skills, Durán, 2020).

Educational innovation

Educational innovation is related to the implementation of new approaches, methodologies and technologies that promote more effective educational environments, according to social, technological and cultural changes. One of the current aspects is the use of technologies represented in online platforms, applications and digital resources that allow access to information on curricular content. These media provide opportunities to personalize learning, create spaces to foster creativity by developing digital skills, and promote collaborative student work (Del Moral, 2021). Thus, networking becomes key in educational innovation by favoring collaboration between various actors related to education as it allows the sharing of ideas, experiences, and resources that strengthen teaching practice (Díaz-Barriga, 2019). This personalization of digital learning favors a more relevant and

meaningful educational process, empowering students to foster their autonomy and promote their intrinsic motivation in content of curricular and extracurricular interest (Freire, 2020). Educational innovation is projected to overcome the barrier of knowledge acquisition, to work on the development of critical thinking, creativity, communication, collaboration and problem solving (Granda-Cabrera, 2021).

360 Model for Competency-Based Assessment

When UNESCO (1998) referred the issue of quality to educational evaluation, debates began regarding its significance, implication and relevance in this field. Conceptualizing quality and education is multifaceted and requires constant reflection. By considering equity, massification, and relevance, we can build education systems that are fairer, more inclusive, and prepared to meet the challenges of the future.

UNESCO defined the concept of educational quality in a systematic way in such a way that it involved teaching, educational programs, teachers, students, scholarships, facilities, equipment and service to the community, research, among others. In this scenario, the advance of evaluation proposals is understood, highlighting as Jiménez Galán, González Ramírez and Hernández Jaime (2010) state that it directs the curriculum and has the potential to cause a significant change in the teaching and learning processes; it should create learning opportunities and not be used to identify or select those who possess certain competencies, but to promote them. The evaluation can be carried out by the teaching staff, classmates, the student himself, or by all of them in a 360° evaluation model. In addition, it must offer information on the progress in the development of the competence and propose ways of improvement. In addition, it must be consistent with the other elements of the training design and integrated into it; therefore, experiences should include activities relevant to competency-based assessment. (p. 45) From this perspective, the expression 360° evaluation must cover all the degrees of a circle that represents the relevant links of a person with his or her work environment. In the educational field, it refers to evaluating the teaching and learning process to develop a model that effectively reaches all relevant aspects regarding both the performance of teachers and students, as well as all aspects involved in the institution.

Transversal competences according to studies from different disciplines

Before addressing the problem we raised, we resorted to the search for antecedents that would enable us to build a theoretical framework, recognizing the progress of the lines we set. In this tracking, according to Codina (2024), we give significance to "reviews in which each and every one of the phases has been subject to complete systematization, which includes transparency and traceability" (p. 2).

First, we focus our analysis on studies on transversal competencies and then investigate whether there are studies related to differences in their implementation between Engineering and Social Sciences. From the point of view of Toro Espinosa (2023), the challenge is the training of competent professionals, who can respond to the social imaginaries that the social order demands today. According to its position, the university has a social responsibility to train professionals with integrity who serve their community, and who are competent in their areas of scientific and

disciplinary knowledge. Therefore, it is essential that students develop competencies that make them responsible for their constantly evolving learning, coherent in their decisions and with a high critical capacity in the face of social challenges. (p. 149)

Ruiz Domínguez and Codina Sánchez (2023), presented a novel service-oriented research framework, placing themselves in the cultural field by analyzing the activities of this nature organized by the University of Almería (UAL) as a case study. They defined their purpose in helping to "design educational plans that recognize, classify and sequence the acquisition of competencies developed in them. (...) In this way, students will be able to certify their competencies to future employers.

Vallejo-Trujillo, S., and Hernández Aguilar, J. A. (2019), in the sphere of administration and organizations, evidenced the vision of 67 executives of Morelos companies about the preferences in terms of transversal competencies in employees. In their research, they found that some referred to those competencies acquired through formal education such as the ability to analyze and synthesize, the use of Information and Communication Technologies (ICT), and the ability to make decisions. Others are implicit during the educational training process such as resilience, self-motivation, and management of emotions, of great importance for success in the work environment.

We find important advances on general and transversal competences in doctoral theses and referenced articles such as: González Morga (2018), A study of transversal competences at the University of Murcia); López Gómez (2016, Around the Concept of Competence: An Analysis of Sources); Alarcón and Grirao (2013, The approach to transversal skills and competences in the EHEA). Among the different authors who have advanced to the subject of evaluation are the contributions of Edwards Schachter, M. and Tovar Caro, E. (2008), Cano, E. (2008) and Corominas, E. (2001) among others. But when we specifically outline the point of the challenges posed in Engineering and Social Sciences, separate observations appear, highlighting the importance of their implementation in each area, as an opportunity for institutions to review and enrich their educational programs, both as interdisciplinary courses and extracurricular activities.

In the search for antecedents taking the period 2022-2024, Martínez-Clares, González Morga, González Lorente, and Pérez Cuso (2024) when studying transversal competencies focus on decision-making, considering them one of the most complex due to the different dimensions and processes they involve in organization, management, and time. Also in 2024, Corbella and Giuliani evaluated the perception of the students of the Universidad Católica Argentina about transversal competencies. In their analysis, they highlight the need to reconsider university curricula and teacher training in the various disciplines, given the importance that these competencies acquire in the workplace. Muñoz Alcón, Gómez Pérez and Zorzo (2020), from the Catholic University of Avila, Spain, established clues to enhance social competences and values in engineering students through service learning, based on the four pillars of education presented in the Delors report (1966), in this case linked to learning to be and learning to live together. Vidal-Sepúlveda et al. (2021) focused their interest on the development of transversal

competencies in the training of engineers, related to collaborative work and critical thinking through cross-evaluations in the context of a disciplinary course. Torres-Barreto et al. (2021) also ventured into this discipline by studying transversal competencies in engineering based on an approach based on the Principles of gamification. In Mexico, at the National Polytechnic Institute, Jiménez, Gutiérrez, and Hernández (2019) conducted a study on the achievements and challenges in the formation of transversal competencies, by areas of knowledge. This article is the one that comes closest to our problem as its main objective was to determine, from the perception of the students, the development of competencies such as teamwork, awareness and openness to change. Students from three areas of knowledge participated: Engineering and Physical and Mathematical Sciences (ICFM), Medical Biological Sciences (CMB) and Social and Administrative Sciences (CSA). The results showed that teamwork is the most developed in CSA and least in ICFM. Regarding awareness and openness to change, it was reflected that roles and stereotypes prevail.

Methodological Construction

We start from a conception focused on the construction of knowledge through social interaction, experience and authentic tasks. By considering that each individual, including the researcher, constructs his or her own reality in a subjective interrelation that jointly cements meanings (co-construction), the importance of generating theory in the research process is highlighted. Through this methodological conception we proposed different lines, and, for this article, we recover the qualitative approach that guided us and led us to understand the phenomenon in its subjective expressions, exploring meanings and contexts. We set out to evaluate the impact of the training carried out on teaching performance and administrative management; to compare the evolution of transversal competencies between teachers of social sciences and engineering before and after training and to present a theoretical framework of transversal competencies applicable to teachers of Higher Education that serves as a reference for the design of training programs.

As a first step, as we showed in the previous section, we carried out a documentary analysis on transversal competences, contextualising the research and setting the space that our fieldwork would cover. Thus, the selection criterion was based on the basic differences between both disciplines, considering their indicators, due to their areas of knowledge and pedagogical approaches. We established causal relationships and generalizations, which allowed us a more complete understanding to validate findings and, above all, determine which variables act in the formation of competencies. The sample was made up of a group of professors from the Engineering and Social Sciences careers through various stages, ensuring that all the itemized elements could be chosen: Full-time or part-time professors; who teach in the Engineering and Social Sciences careers; with at least 1 year of teaching experience at the university. The inclusion criteria are: Teachers who voluntarily agree to participate in the study; teachers who meet the established selection profile; teachers who can provide relevant information for the objectives of the research. After identifying teachers from both disciplines who met the selection profile, we contacted them, inviting them to participate voluntarily and selected those who accepted the proposal until the desired sample size was reached.

Figure 1. Methodological proposal. In original language: Spanish



2. Results

We carry out the proposed strategies (structured interviews, analysis of virtual environments and 360^a evaluation). In order to advance in this stage, we proceeded to the breakdown of the selected competencies to establish the measurement parameters. This implied setting dimensions and establishing indicators for methodological analysis; This process varied according to the specific context and nature of the competencies to be considered, however, it provided a general framework.

Table 1. Coding Interview Questions

Descriptive codes	Conceptual codes
1. Integration of Research in Teaching: Answers that describe how teachers integrate research into their teaching practice.	1. Practical Application of Theory: How research and project-based learning are used to apply theory in practical situations.
2. Promotion of Student Autonomy: Answers that detail how teachers promote self-management and responsibility in students.	2. Pedagogical Innovation: Use of innovative pedagogical approaches and strategies that promote more effective learning.
3. Collaborative Learning Strategies: Responses that focus on how teachers encourage teamwork and collaborative learning in the classroom.	3. Comprehensive Student Education: Development of transversal competences and key skills through the integration of research, autonomy and collaboration.
4. Continuous Improvement in Teaching: Responses that reflect the commitment of teachers to professional development and the continuous improvement of their teaching practice.	4. Connection between Theory and Reality: Focus on linking theory with real problems and situations, especially in interdisciplinary contexts.
5. Interdisciplinary Approaches to Teaching: Responses that describe how teachers integrate different disciplines to enrich learning.	5. Continuous Adaptation and Updating: Participation in professional development activities and constant updating to improve teaching and learning.

Analysis by discipline

1. Business Administration: Focus on Integral Projects and Practical Application (Teachers tend to unite research and collaborative learning through comprehensive and practical projects that connect different disciplines. They focus on self-

management and autonomy through teamwork and projects that require independent planning and execution); Commitment to Continuous Improvement (strong commitment to participation in professional development activities, interdisciplinary collaborations, and adapting their teaching methods based on recent research).

2. Law: Focus on Social Problems and Legislation (integration of research through the formulation of social and legislative issues, interaction and critical discussion in the classroom); Promotion of Autonomy and Responsibility (autonomy through participation in research groups and the application of theoretical concepts in practical contexts, such as simulations of legislative sessions).

3. Hydraulic Engineering: Constant Updating and Technical Application (constant updating of knowledge and tutoring of degree projects, commitment to technical excellence); Promotion of Collaborative Learning and Autonomy (collaborative learning through group work and individual work respectively).

4. Agribusiness: Direct Relationship with Research and Production (research in teaching practice through assistantships and projects for the development of new products, direct connection between research and practical application in agro-industrial production). Focus on Project-Based Learning (Project-Based Learning) is based on autonomy as collaborative learning through the development of projects that integrate aspects of entrepreneurship, production and feasibility, reflecting a practical and applied approach to its teaching.

5. Architecture: Interdisciplinary Approach and Transversal Competencies: (architecture with sociology, technology and urbanism; teamwork, communication and critical thinking); Commitment to Pedagogical Innovation (participation in professional development activities and incorporation of new technologies and pedagogical tools in their teaching)

6. Civil Engineering: Disconnection between Research and Teaching (this situation could indicate a challenge in integrating both aspects effectively); Focus on Collaborative Learning through Workshops (group workshops, there is less evidence of innovative or integrative strategies compared to other disciplines).

7. Tourism: Focus on Real Problems and Interdisciplinary Projects (research and promotion of autonomy through projects based on real problems of the sector and work on interdisciplinary projects); Commitment to Innovation and Collaboration (continuous improvement, updating of knowledge and use of digital tools to facilitate collaboration and team learning).

Research Integration: Critical vs. Technical Approaches

The first central theme is the different way in which teachers of social sciences and engineering integrate research into their teaching practice. In the case of the social sciences, research is closely linked to the development of the ability to learn and be permanently updated and the orientation to results through critical reflection on social problems. As one of the teachers mentioned: "By sharing in class the results of my own research, because the teacher should not be a mere reproducer of knowledge or culture but a generator of knowledge and do it together with the students" (Teacher 4). This approach suggests that research is not only a mechanism for

imparting content, but also a tool for empowering students in the process of knowledge creation, promoting critical and reflective skills that enable them to face societal challenges from a grounded perspective.

The use of research in social sciences is also articulated with the ability of teachers to manage interpersonal relationships and teamwork, since teacher-student interaction is a key component in the development of these research projects. Phrases such as "formulation of social issues that legislation has not addressed" (Teacher 2) reflect the intention to connect theory with practice in the context of society, allowing students to explore problems from multiple perspectives while also improving their skills to work in groups and discuss complex issues.

In contrast, in the field of engineering, research has a more technical focus and is oriented towards the practical application of scientific knowledge. An engineering professor stated: "Generation of projects for new food products" (Teacher 5), which highlights how product development becomes an end in itself and research is aligned with the orientation to results through technological innovation. This approach is directly linked to the use of digital tools and microcurricular planning, since the projects require precise organization, the use of technological platforms and the integration of knowledge from different technical areas.

Likewise, another professor highlighted: "Interdisciplinary projects that address real problems" (Teacher 6), which underscores the applied nature of engineering research, where the generation of resources and strategies in virtual environments is essential to coordinate work teams and for the implementation of technical solutions in real time. In this sense, transversal competences are reflected not only in students' ability to solve specific problems, but also in their ability to collaborate and use digital tools efficiently.

The integration of research in both disciplines reveals key differences in the transversal competences that are developed in students. While in social sciences the emphasis is on critical reflection, updating and interpersonal interaction, in engineering a focus on results orientation, the use of digital tools and technical planning predominates, thus reflecting the specific needs of each discipline and the impact of research on the professional development of students.

Promoting autonomy: Critical reflection vs. technical responsibility

The promotion of autonomy presents significant differences between teachers of social sciences and those of engineering, reflecting again the nature of each discipline and its relationship with the development of transversal competencies. In social sciences, autonomy is promoted through critical reflection and informed decision-making, which is evidenced by the implementation of projects that require students to debate and argue about complex social issues. As one of the teachers expressed: "Debates, forums, as well as case studies and project-based learning" (Teacher 4), highlighting that this type of activities encourage students to question social structures and to base their opinions on academic evidence, which develops the ability to communicate effectively (oral and written) and orientation to results through a critical approach.

Another teacher mentioned: "By sharing the results of my own research in class,

asking them to carry out and guiding them in the writing of their own research projects" (Teacher 4), which illustrates how students are driven to manage their own learning and to acquire microcurricular planning and execution skills, since they must organize their ideas and work autonomously to complete academic projects. This approach not only fosters autonomy, but also promotes the development of the ability to learn and update themselves permanently, since students must be in constant search of information and new perspectives.

On the other hand, in engineering, the promotion of autonomy is more closely linked to technical responsibility and independent project execution. Here, students face challenges that require the practical application of technical knowledge and problem-oriented decision-making. As one teacher noted, "Research before proposing an architectural project" (Faculty 6), engineering students must research and propose technical solutions, which reinforces their ability to manage projects independently and take individual responsibility for the results. This underlines the focus on competencies such as technical planning and the use of digital tools, which are essential for the successful implementation of projects.

Another relevant example is the project described by a teacher: "Irrigation project for rural communities" (Teacher 10), in which students are not only responsible for proposing viable technical solutions, but also for coordinating with external actors to carry out the project. This type of activity fosters the autonomy of students, as they must apply theoretical knowledge to practical contexts, while taking responsibility for each phase of the project, from research to implementation. In this sense, the management of interpersonal relationships and the orientation to results become key transversal competencies, since students must collaborate with communities and face the challenges of technical implementation in real situations.

The promotion of autonomy in social sciences is more related to the development of critical and reflective skills, where students are encouraged to question, investigate and learn to learn, managing their own educational process. In engineering, autonomy is more linked to independent technical execution and students' ability to solve specific problems autonomously. While in social sciences autonomy is fostered through dialogue and reflection, in engineering it is reinforced through responsibility in technical projects that require precise planning and execution.

Collaborative Learning: Critical Interaction vs. Practical Problem Solving

Collaborative learning in social sciences and engineering reveals different approaches that respond to the specific pedagogical needs of each discipline and that impact the development of key transversal competencies. In the social sciences, teamwork is oriented towards critical reflection and the collective construction of knowledge. The teachers in this group highlight the importance of assigning roles within teams, promoting systemic thinking and constructive dialogue among students. A social science teacher mentioned, "Discussions, forums, as well as case studies and project-based learning" (Teacher 4), suggesting that collaborative work is not just about dividing tasks, but about creating a space where students can dialogue, argue, and listen to reach a deeper understanding of social issues.

In this context, the management of interpersonal relationships and effective

communication (oral and written) become essential competencies, since students must learn to share their ideas clearly and persuasively, in addition to being open to the perspectives of their peers. As another teacher put it: "Both in face-to-face and virtual classes, in collaborative work, assigning a role to each of the participants" (Teacher 4), this structure fosters a dynamic of critical interaction, in which students develop leadership and teamwork skills. Collaboration, then, becomes a process of knowledge construction where each member of the team contributes from their experience and point of view.

In contrast, in engineering, collaborative learning is oriented towards practical problem solving and focuses on technical efficiency within interdisciplinary teams. An engineering professor highlighted: "Interdisciplinary groups that address real problems" (Teacher 6), which reflects the importance of technical collaboration to face complex projects that require the joint application of knowledge from different disciplines. In this environment, teamwork is organized to optimize resources and achieve viable solutions, which highlights competencies such as results-oriented and teamwork in technical contexts.

A highlight of collaborative learning in engineering is students' ability to combine digital tools and specific techniques to coordinate their work efficiently. As one teacher points out: "Team projects for the development of new products" (Teacher 5), the objective of collaborative learning in this case is to produce concrete results that can be applied in real life, and for this, students must not only collaborate, but also integrate the technical skills that each one possesses. This approach reinforces the importance of microcurricular planning and the use of digital tools, given that projects require precise coordination to manage all stages of the process.

In this sense, collaborative learning in engineering becomes a platform for the development of products and technical solutions, where collaboration is based on the efficient application of knowledge. Unlike the social sciences, where the emphasis is on critical reflection and the construction of new ideas through dialogue, in engineering collaboration has a more pragmatic character and focuses on the production of tangible results.

Collaborative learning in social sciences fosters the development of competencies such as the management of interpersonal relationships, effective communication and critical reflection, while in engineering it is oriented towards technical efficiency, orientation to results and interdisciplinary work. These differences reflect how teachers adapt their collaborative methods to respond to the specific demands of each discipline, thus maximizing the development of the transversal competencies that students will need in their respective professional fields.

Continuous improvement: Pedagogical update vs. technical update

The concept of continuous improvement shows clearly differentiated approaches between teachers of social sciences and those of engineering, reflecting again the particular character of each discipline in the development of transversal competencies. In social sciences, continuous improvement is intrinsically related to pedagogical updating and the incorporation of new teaching methodologies that encourage learning and critical reflection in students. Teachers in this area stress the

importance of keeping up with advances in pedagogy, which allows them to adapt their teaching methods to an ever-changing social environment. As one teacher mentioned: "In recent years I have completed 2 postgraduate studies (diplomas in HR and Transversal Competencies) in addition to completing my PhD studies, which implies constant preparation" (Teacher 3). This commitment to continuous training reflects how teachers in social sciences seek to develop transversal competencies such as the ability to learn and update themselves permanently and the use of evaluation tools and techniques to improve their teaching practices.

Another teacher pointed out: "Conducting scientific research. Attending to the evaluations made by the students to my management" (Teacher 4), which highlights that continuous improvement is not only focused on acquiring new knowledge, but also on constant feedback from evaluations and reviews of students. This critical self-evaluation is part of a pedagogical approach that emphasizes improving the quality of teaching and adapting to the emerging needs of students, which is aligned with competencies such as microcurricular planning and interpersonal relationship management, as teachers must be able to adjust their teaching methods to respond to changing group dynamics.

In the field of engineering, the focus on continuous improvement is more focused on technical updating and the incorporation of new technological advances in teaching practices. Engineering faculty focus on keeping their skills and knowledge aligned with technological developments that impact their field. As one teacher noted, "Participate in multidisciplinary research groups" (Teacher 6), this shows the importance of collaborating with other professionals in technical areas to keep up with the latest innovations and apply them effectively in the classroom. In this sense, results-oriented and the use of digital tools are key competencies in the continuous improvement of engineering teachers, as they seek to improve not only their technical knowledge, but also the efficiency in teaching their students.

Another teacher added: "By taking refresher courses (such as the diplomas in transversal skills and conflict resolution)" (Teacher 4), which indicates that, although there is a certain focus on the development of pedagogical skills, continuous improvement in engineering is predominantly oriented towards technical efficiency. This professional update allows teachers to better prepare students to face technological and innovation challenges in their careers, since they must be familiar with the latest tools and techniques applicable in their field of study.

In summary, continuous improvement in social sciences is mainly oriented towards pedagogical updating, where teachers seek to improve their competencies in assessment, effective communication, and teaching planning through feedback and continuous training. On the other hand, in engineering, continuous improvement focuses on technical updating and the application of new technological developments, which implies an improvement in results-oriented skills, use of digital tools and technical efficiency. Both disciplines, although with different approaches, reflect the commitment of teachers to the development of transversal competencies that improve both their educational practice and the learning experience of students.

Interdisciplinary Approaches: Soft and Hard Sciences vs. Technical Collaboration

The use of interdisciplinary approaches reflects profound differences between the social sciences and engineering, responding to the pedagogical needs of each field and contributing to the development of diverse transversal competencies in students. In the social sciences, the interdisciplinary approach involves a combination of soft and hard sciences to address complex social problems from multiple perspectives. This approach is based on the integration of disciplines such as law, sociology, psychology, and other areas that allow students to better understand the multifaceted nature of social problems. As one teacher noted, "By formulating real social problems that are fully known to the administration of justice in conflict resolution" (Teacher 2), the interdisciplinary approach allows students to address social issues in a holistic way, connecting theories and practices from different disciplines to find more complex and comprehensive solutions.

This approach promotes the development of competencies such as the management of interpersonal relationships, since students must collaborate with professionals and theories from different fields, and effective communication, due to the need to articulate ideas and theories from various disciplines in a clear and coherent way. Another teacher highlighted the importance of these interdisciplinary connections: "By implementing problem-based and project-based learning, you can easily combine hard sciences (physics, chemistry, biology) with soft sciences (ethics, sociology, law...)" (Teacher 4). This shows how social science teachers foster in their students the ability to learn and update themselves permanently, since they must adapt to a variety of theories and methods to understand and analyze complex problems from an interdisciplinary perspective.

In engineering, interdisciplinary approaches are more technical and focus on collaboration between different specialized areas to solve practical problems. An engineering professor mentioned: "When an irrigation study is carried out for communities, the activities that must be carried out need professionals from different areas, for example: sociologist, economist, environmental, agronomists..." (Teacher 10). This type of interdisciplinary collaboration reflects the pragmatic orientation of engineering, where technical efficiency and the production of measurable results are key aspects of the pedagogical approach. Interdisciplinary projects in this context involve students and professionals from different technical areas, such as agronomy, technology, and civil engineering, who work together to develop applicable solutions to real problems, such as the creation of products or services that can be implemented in the market.

In these projects, students develop transversal competencies such as results-orientation, teamwork, and the use of digital tools, as they must collaborate closely with specialists from various technical disciplines, integrating their knowledge to achieve tangible results. Another engineering teacher mentioned: "Interdisciplinary projects that address real problems" (Teacher 6), which underscores the practical nature of these approaches, where students must not only work in teams, but also apply various techniques and technologies to solve problems effectively.

In summary, interdisciplinary approaches in social sciences encourage critical reflection and multifaceted analysis, allowing students to combine different disciplines to address complex social problems and promote competencies such as

interpersonal relationship management and effective communication. In engineering, these approaches are more oriented towards technical collaboration and pragmatic efficiency, where students develop competencies such as results-orientation, teamwork, and the use of technological tools to face specific technical challenges. Both approaches reflect the demands and characteristics of each field, and allow students to acquire the transversal competencies necessary for their professional development.

3. Conclusions

The qualitative analysis of the interviews with the teachers of social sciences and engineering reveals significant differences in their pedagogical approaches. Social science teachers tend to prioritize critical analysis, reflection, and social interaction, using research and teamwork as tools to foster autonomy and collaborative learning. In contrast, engineering faculty place greater emphasis on technical application and practical problem-solving, using interdisciplinary research and collaboration to develop innovative products and solutions. These differences are consistent with the nature of each discipline and reflect how teachers adapt their teaching practices to respond to the specific needs and challenges of their fields.

The findings of this study reflect much of the existing scientific literature on teaching in technical and social disciplines, which emphasizes more reflective and critical approaches in social sciences and pragmatic and applied approaches in engineering. However, the study also provides a particular vision that enriches the existing literature by analyzing these differences in a specific context: a private university in Manabí. This context, with its own challenges and social characteristics, can influence how teachers approach transversal competences and adapt their methods to local demands. Therefore, the study not only corroborates what is established in the literature, but also offers an original contribution by analyzing the implementation of these practices in a particular educational environment, which may open new lines of research to explore how local dynamics influence pedagogical approaches in diverse disciplines.

The path proposed throughout this research work allowed us to close the section by specifying our proposal for a Conceptual Framework of Transversal Competencies Applicable to Higher Education Teachers, in which we recover the thought of P. Perrenoud (2007) who recalls a facet that we consider fundamental: the concept of competence represents an ability to mobilize various cognitive resources to face situations. Our framework contemplates the assessment of the effect of training in that they highlight aspects that the Swiss sociologist developed: competencies mobilize, integrate and orchestrate relevant and flexible resources as each situation is unique; The exercise of competencies responds to complex mental operations, supported by thought schemes that allow us to determine answers; "Professional skills are created, in training, but also at the mercy of the daily navigation of the practitioner, from one work situation to another. (p. 11) Hence, we structured it around several key components including:

1. Research Competence: To keep up with advances in each field, develop creativity

and innovation skills, and become generators of knowledge instead of simply being replicators of what already exists.

2. **New Educational Paradigms:** Adopt teaching methods that promote the development of skills and capacities that are relevant in various contexts, rather than focusing solely on the domain of specific content.

3. **Assessment of Transversal Competencies:** To clearly define what students are expected to learn and how they can demonstrate it.

4. **Integration of Transversal Competences in Teaching:** Promotion of collaborative work, self-regulation of learning, and the ability to apply knowledge in real situations.

5. **Active Student Participation:** Encourage the active participation of students in the teaching and learning process so that students reflect on their own learning, participate in the self-regulation of their learning process, and get involved in activities that allow them to apply and deepen their knowledge in real contexts.

Situations, resources, flexibility to respond to complex situations in real time. In short: nesting a concept that is under constant construction, to cement a space for study, where educators and students are committed to activities, processes and projects in view of an empowering interaction, which allows all the actors involved to perform a performance that impacts the community.

References

- Alarcón García, G. and Guirao Mirón, C. (2013) The approach to transversal skills and competences in the EHEA. *History and Social Communication*. Vol. 18. Special Issue December. pp. 145-157 https://www.researchgate.net/publication/277669184_El_enfoque_de_las_capacidades_y_las_competencias_transversales_en_el_EHEA
- Álvarez, C. (2019). University teaching performance: an analysis of pedagogical competencies in higher education. *Revista Prisma Social*, 23, 194-214.
- Calle Álvarez, G., Toro Espinosa, C., Arango Navarro, D.D., Ocampo Zapata D.A. and others. (2023). Reflections on transversal competences in higher education. <https://www.uniremington.edu.co/libros-academicos-artisticos-oculturales/reflexiones-sobre-las-competencias-transversales-en-la-educacion-superior/>
- Climént Bonilla, J. B., (2010). Common biases in competency-based education and training. *REDIE. Electronic Journal of Educational Research*, 12(2), 1-25.
- Codina, L. (2024). Traditional, systematic or scope reviews: how to choose the type of literature review that corresponds in each case? *Infonomy*, 2(2) e24021. <https://doi.org/10.3145/infonomy.24.021>
- Corominas, E. (2001). Generic competencies in university education. *Revista de Educación*, 325, 299-321. <https://dialnet.unirioja.es/servlet/articulo?codigo=19417>
- Del Moral, M. E. (2021). Educational technology: challenges and opportunities. *Electronic Journal of Educational Research*, 23(1), 3-15.
- Delors, J. (coord.). (1996). *Education holds a treasure*. Santillana.
- Díaz-Barriga, A. (2019). Educational innovation in the twenty-first century: challenges and challenges. *Ibero-American Journal of Higher Education*, 10(29), 144-162.
- Durán, M. (2020). Teaching performance in higher education from the competency-based approach. *Revista Ciencia y Tecnología*, 10(20), 9-26.
- Edwards Schachter, M. & Tovar Caro, E. (2008). *Transversal or generic competences. Definitions Criteria for evaluation*. Faculty of Computer Science (Polytechnic University of Madrid). https://www.fi.upm.es/verificacion/grado/MI/evaluacion_competencias_transversales.pdf
- Freire, P. (2020). *Pedagogy of autonomy: knowledge necessary for educational practice*. (9th Ed.) Siglo veintiuno editores.
- Galán, E. (2020). Teaching research and university teacher training. *Revista Fuentes*, 21(4), 157-177.
- González Maura, V. (2002). What does it mean to be a competent professional? Reflections from a psychological perspective. *Cuban Journal of Higher Education*, 22(1), 45-53. <https://rieoei.org/historico/deloslectores/Maura.PDF>
- González Morga, N.; Pérez Cusó, J.; Martínez Juárez, M., (2018) Development of Transversal Competences at the University of Murcia: Strengths, Weaknesses and Proposals for Improvement. *Digital Journal of Research in University Teaching*, Vol. 12, no. 2, pp. 88-113 Universidad Peruana de Ciencias Aplicadas Lima, Peru.

- https://www.researchgate.net/publication/277669184_El_enfoque_de_las_capacidades_y_las_competencias_transversales_en_el_EEES
- Granda, C.; Cabrera, A. (2021). Overcoming barriers to educational innovation. Quito: FARO. <https://grupofaro.org/analisis/superar-las-barreras-de-la-innovacion-educativa/>
- Jiménez Galán, Y.; González Ramírez, M. & Hernández Jaime, J. (2010). 360° model for competency-based assessment (teaching-learning). *Innovación Educativa*, 10 (53), 43-53.
- Jiménez, Y. I.; Gutiérrez, J.J. & Hernández, J. (2019). Achievements and Challenges in the Training of Transversal Competencies by Areas of Knowledge in Higher Education of the National Polytechnic Institute (Mexico). In *Revista Formación Universitaria*, 12(3) 91-100. <http://dx.doi.org/10.4067/S0718-50062019000300091>
- López Gómez, E. (2016). Around the concept of competence: an analysis of sources. *Journal of Curriculum and Teacher Training*, University of Granada. 20 (1), 311-322.
- Majid, S., Liming, Z., Tong, S., & Raihana, S. (2012). Importance of soft skills for education and career success. *International Journal of Interdisciplinary Issues in Education*. 2(2), 1037-1042.
- Martínez-Clares, P., González-Morga, N., González-Lorente, C., & Pérez-Cusó, J. (2024). Decision-making in Higher Education. Analysis of transversal competences. *Teaching staff. Journal of Curriculum and Teacher Training*, 28(1), 263-280. DOI: <https://doi.org/10.30827/profesorado.v28i1.28001>
- Mir, B. (2006). Competencies, knowledge, skills and abilities. The pedagogical gaze. <http://blog.lamiradapedagogica.net/2006/09/competencias-conocimientos-capacidades.html>
- Moreno, G. (2010). Attachment styles in teachers and perception of their relationships with students. Doctoral Thesis Faculty of Psychology, Complutense University of Madrid. <https://revista.infad.eu/index.php/IJODAEP/issue/view/6>
- Muñoz Alcón, A. I., Gómez Pérez, M. N., Elvira Zorzo, M. (2020). Enhancing social competences and values in Engineering students through service-learning. In L. Habib-Mireles (Coord.), *Technology, diversity and inclusion: rethinking the educational model*. (pp. 75-86). Adaya Press.
- OECD (2002). *OECD Information Technology Outlook 2002*. https://www.oecd-ilibrary.org/docserver/it_outlook-2002-sum-es.pdf?expires=1711653408&id=id&accname=guest&checksum=5462122780DB6C42D6CDF13272A2C7A7
- Perrenoud, P. (2007). Ten new skills to teach. Grao.
- Ruiz Domínguez, M. del M., & Codina Sánchez, A. (2023). Design of a model for the recognition of competencies in complementary cultural activities at the university. *International Peripheral. Journal for the Analysis of Culture and Territory*, (23), 108–127. <https://doi.org/10.25267/Periferica.2022.i23.13>
- Tang, K. N. (2020). The importance of soft skills acquisition by teachers in higher education institutions. *Kasetsart Journal of Social Sciences*, 41(1), 22-27.
- Torres-Barreto, M.; Álvarez-Melgarejo, K. & Plata-Gómez, K. (2021). Transversal competences in engineering: an approach from the principles of gamification. In *Panorama Magazine* (15)28. <https://doi.org/10.15765/pnrm.v15i28.1820>
- Toro Espinosa, C. (2023). Behavioral competencies for the comprehensive training of university students. In Calle Álvarez, G., Toro Espinosa, C., Arango Navarro, D.D., Ocampo Zapata D.A. and others. *Reflections on transversal competences in higher education*. <https://www.uniremington.edu.co/libros-academicos-artisticos-o-culturales/reflexiones-sobre-las-competencias-transversales-en-la-educacion-superior/>
- UNESCO, N. (2023). What are the Sustainable Development Goals? UNESCO International Institute for Higher Education in Latin America and the Caribbean; PDF. https://www.undp.org/es/sustainable-development-goals/educacion-quality?gad_source=1&gclid=CjwKCAiAvoqsbhB9EiwA9XTWGT0eISuMubLTnS51WVF7Yuen82HE_fPEwMVFkMbftDsC4VdnMLnPuxoCb94QAvD_BwE
- UNESCO. (1998). *World Declaration on Higher Education in the Twenty-first Century: Vision and Action and the Priority Action Framework for Change and Development in Higher Education*. <https://www.iesalc.unesco.org/ess/index.php/ess3/issue/view/21>
- Vallejo-Trujillo, S., & Hernández Aguilar, J. A. (2019). Transversal competence preferences: senior management approach. *Administration and Organizations*, 22(42), 53–72. <https://doi.org/10.24275/uam/xoc/desh/rayo/2019v22n42/Vallejo>
- Vidal-Sepúlveda, M.; Valdés-León, G. & Olivares-Rodríguez, C. (2021). Development of Transversal Competences in the Training of Engineers through cross-evaluations. *Journal of Social Sciences Research*. 17(1). <https://doi.org/10.18004/riics.2021.junio.100>