

## **DIDACTIC THEORETICAL MODEL: FROM THE PERSPECTIVE OF THE DEVELOPMENT OF SKILLS AS A FUNCTION OF PROFESSIONAL MATURITY AT THE UNDERGRADUATE LEVEL**

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**Abstract:** This theoretical-didactic model, designed to strengthen the skills and competencies that determine the professional maturity of undergraduate students, arises from the need to bolster this competency in university undergraduate programs. Its objective is to design a theoretical-didactic model that strengthens the professional skills of undergraduate students by integrating innovative pedagogical strategies aligned with the current needs of the labor market. To this end, a systematic review was conducted in Scopus and Web of Science, evaluating 42 studies using the PRISMA model. The analysis of these results shows a correlation between the skills and competencies of professional maturity, identifying strategies, programs, seminars, and webinars. These findings highlight the importance of strengthening didactic skills to effectively apply tactics for skill development and contribute effectively to professional maturity.

**Keywords:** theoretical-didactic model, professional maturity, professional skills, higher education.

### **Introduction**

Higher education faces the constant challenge of adapting to a rapidly evolving labor market due to technological advances, globalization, and social changes. In this context, educational institutions have the responsibility to train professionals who not only have technical knowledge, but also transversal skills and attitudinal competencies that allow them to integrate and contribute effectively to the work environment.

In regions such as La Guajira, Colombia, this challenge is intensified due to structural, economic, and cultural constraints that affect both students and institutions. Professional maturity, understood as the ability to integrate technical, transversal and attitudinal skills, is presented as an essential objective to close the gap between academic training and the demands of the labor market. However, recent studies have shown that there is a significant disconnect between educational curricula and the competencies that employers value in graduates, which underscores the need for innovative pedagogical models.

Professional maturity not only involves the development of specific skills, but also the ability to reflect on learning, adapt to diverse environments, and contribute to organizational and social development. According to educational theories such as meaningful learning (Ausubel, 1978) and human capital (Becker, 1964),

vocational training should focus on promoting deep learning that connects theoretical knowledge with relevant practical experiences, facilitating the application of knowledge in real contexts.

Cognitive skills and pedagogical strategies invite innovation, to develop critical thinking and strengthen professional skills and face it with the professional and labor world of the 21st century. (Guerrero-Cuentas, H., et al 2018). In this sense, a more visible world is required to bring man closer to the challenges of the global world.

However, (Guerrero-Cuentas, H., et al 2018). It considers that didactic strategies have a decisive influence on the development of communicative and social interaction skills and competencies in students, in such a way that it allows them to share ideas, experiences, information and relate to others, in order to respond to social interaction and communication, which are fundamental elements of didactics, in the strengthening of the development of professional maturity.

The objective of this research was: This model seeks not only to optimize the teaching-learning processes, but also to contribute to the integral development of students, preparing them to face the challenges of the world of work with critical thinking, adaptability and problem-solving skills.

In the design of the model, the principles of problem-based learning (PBL), which encourages collaborative resolution of real situations, and critical reflection (Mezirow, 1991), which emphasizes the importance of questioning assumptions and transforming experiences into meaningful knowledge, were considered. In addition, elements of active methodologies and educational technologies that promote students' active participation and engagement with their own learning were included.

Para (Guerrero-Cuentas, H., et al 2020). The curriculum must be the mediated process, so that the learning results, competencies and skills allow students to achieve, point out and submit the skills acquired in the learning-evaluation process. In this sense, educational institutions are required to propose innovative curricula, at the service of education, so that their students articulate their professional skills and put them at the service of society.

In this order of ideas, (Guerrero-Cuentas, H., et al 2020). It states that innovative curriculum strategies must be at the forefront of new age innovation, so that curricula express permanent changes, so that graduates' competencies become individual decisions regarding their competencies. What is wanted, then, is that these curricula that are part of the academic management area of institutional educational projects are a function of the integral development of the human being.

In this regard (Ariza-Colpas, P., et al 2019), he considers that when curricula assume innovation strategies in their culture, where collaborative work, dialogue, negotiation, inquiry as a problematizing element, learning communities allow science to be built, recognize their cultural identity, but overgenerate and develop critical thinking, so that students take a position in the face of dilemmas, that the context poses to them. Therefore, curricula that permeate new educational technologies become models for mobilizing new knowledge.

However, for (Ariza-Colpas, P., et al 2019), competencies require scientific mobility, to generate learning communities, which indicates that educational curricula are required that involve methodological strategies, accompanied by ICTs, the appropriation of these and the construction of a more democratic culture in the face of the responses of these more innovative processes. as a culture of articulation to a world that demands to go to the advances of new technologies.

And he proposes (Ariza-Colpas, P., et al 2020). Innovative curricula must propose strategies in an inclusive order, to meet special cognitive needs, such as the Glyph Reader tool, which enables the action of the cognitive component, activating the stimulation of the senses. This tool improves basic skills.

Therefore, for (Ariza-Colpas, P., et al 2020). Whenever harmonious curricula are proposed, for inclusive education, with regard to the motivation of the senses, basic tools are required, which open the doors for processes in what has to do with the decoding of paragraphs that are alone within a written vocal study. The

above seeks that the development of kinesthetic skills work on an intersectoral interface with the visual and auditory component.

In this sense, (Guerrero Cuentas, H. R., et al 2015). An educational program, compared to the curriculum that it proposes to its graduate students, immediately denotes what their performance is, compared to the role in their professional field, taking into account the development of their competencies by showing the training received. The above invites educational institutions to be attentive to graduates, to develop permanent processes for the continuous improvement of their educational programs, and to be attentive to the forefront of new technologies, which is what allows the development of new competencies and skills, so that these graduates respond to their professional maturity.

It is worth noting when the author (Guerrero Cuentas, H. R., et al 2015). It is then considered that from the institutional instances. It is necessary to monitor and control educational curricula at the service of students, in this way there is a constant transformation of educational models and innovative strategies that strengthen educational competencies and skills. The above indicates that the work of the teacher is associated with assuming institutional educational models, which allow them to make education more flexible and interact with their students, enhance their integral development and accompany them in processes of enlistment for the labor companies and social empowerment; so that later on it impacts their life project.

## II. Method

This research applies a systematic review of a descriptive type, with the purpose of identifying, analyzing and synthesizing the strategies reported in the scientific literature that promote the development of scientific competencies and scientific culture in higher education students. To this end, an exhaustive and structured literature search was carried out in high-impact referential databases such as Scopus and Web of Science, following the methodological guidelines established by the PRISMA model (Preferred Reporting Items for Systematic Reviews and Meta-Analyses).

The PRISMA model consists of a standardized reporting methodology designed to improve the transparency, quality, and reproducibility of systematic reviews. This model provides a structured guide that allows for clear documentation of all stages of the review process, from the initial identification of studies to the final inclusion of those that meet rigorous selection criteria. It was initially developed by Moher et al. (2009) and later updated by Page et al. (2020), in order to strengthen methodological soundness in evidence-based research.

The phase system contemplated by PRISMA includes four fundamental moments:

**Identification:** In this stage, a systematic search strategy was developed using Boolean operators and key terms, in order to locate as many relevant studies as possible. The search terms and equations used were: "scientific competencies" AND "university", "investigative competencies" AND "university" and "scientific culture" AND "university", aimed at attracting publications focused on the development of scientific competencies in university contexts.

**Screening or screening:** once the results of the search were obtained, duplicates were eliminated and a preliminary reading of titles and abstracts was carried out, with the aim of discarding those articles that were not directly related to the research criteria.

**Eligibility:** In this phase, the full texts of the selected articles were reviewed to determine if they met the inclusion criteria defined by the study. Only scientific articles published between 2013 and 2023 were included, without language restriction, that were available in open access and that presented explicit evidence (tacit or declared) on the application of strategies aimed at the development of scientific competences or the promotion of scientific culture in university students.

**Inclusion:** finally, studies that met all the established methodological, thematic and quality criteria were selected, which were integrated into the descriptive analysis and discussion of the results of this research.

At the time of the review, the search was limited to scientific articles published in the last ten years, between 2013 and 2023, in order to ensure the timeliness and relevance of the studies analyzed. This time window

allowed to capture recent trends in the development of scientific competencies and the promotion of scientific culture in the university context, thus ensuring that the findings were aligned with contemporary practices in higher education.

Rigorous inclusion criteria were established, focusing on studies that explicitly or implicitly addressed the application of strategies aimed at the development of scientific competencies and/or the promotion of scientific culture in higher education students. Priority was given to those works that, in addition to describing these strategies, showed evidence of implementation, impact or critical analysis of their effectiveness in the university environment.

On the other hand, the following categories of documents were excluded from the systematic review:

- Monographs, theses and conference proceedings, as they do not comply with the required peer review standards.
- Studies focused on the scientific training of teachers or aimed at educational levels other than the university, since the interest of the study is concentrated exclusively on undergraduate or graduate students.
- Articles that address only the measurement of attitudes or levels of scientific competence, without describing or analyzing pedagogical, methodological or institutional strategies associated with their development.

This delimitation allowed the analysis to be focused on works with conceptual and methodological relevance, ensuring coherence with the objectives of the research and strengthening the validity of the findings obtained from the systematic review.

For the selection of sources of analysis.

For the selection of the sources of analysis, a systematic procedure was established guided by the guidelines of the PRISMA model, in order to guarantee the relevance, coherence and methodological quality of the articles included in the study. The initial search yielded a wide set of documents, which were progressively filtered by applying previously defined inclusion and exclusion criteria.

Year of publication	Country of origin of the study	Research objective	Methodological design	Educational level of the target population	Type of strategy applied	Alborada's variables (scientific skills, scientific culture)	Main results and conclusions
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The purpose of this template was to verify the alignment of each article with the central variables of the study, that is, the development of scientific competencies and/or the promotion of scientific culture in university students, as well as the presence of explicit strategies for their implementation.

In terms of analysis, once the relevant articles were selected, they were read in detail and coded using the Atlas software. This tool facilitated the organization, classification, and segmentation of the content of the documents, allowing the identification of patterns, emerging categories, and conceptual relationships between the reported strategies and the educational contexts in which they were applied. The use of Atlas. Ti brought rigor to the qualitative analysis, strengthening the traceability of the interpretative process and the systematization of results.

In addition to the use of software, the analysis was complemented by the development of systematization matrices that allowed contrasting the findings between studies, identifying recurrences, methodological differences, and gaps in the literature. This triangulation between manual and digital tools enriched the depth

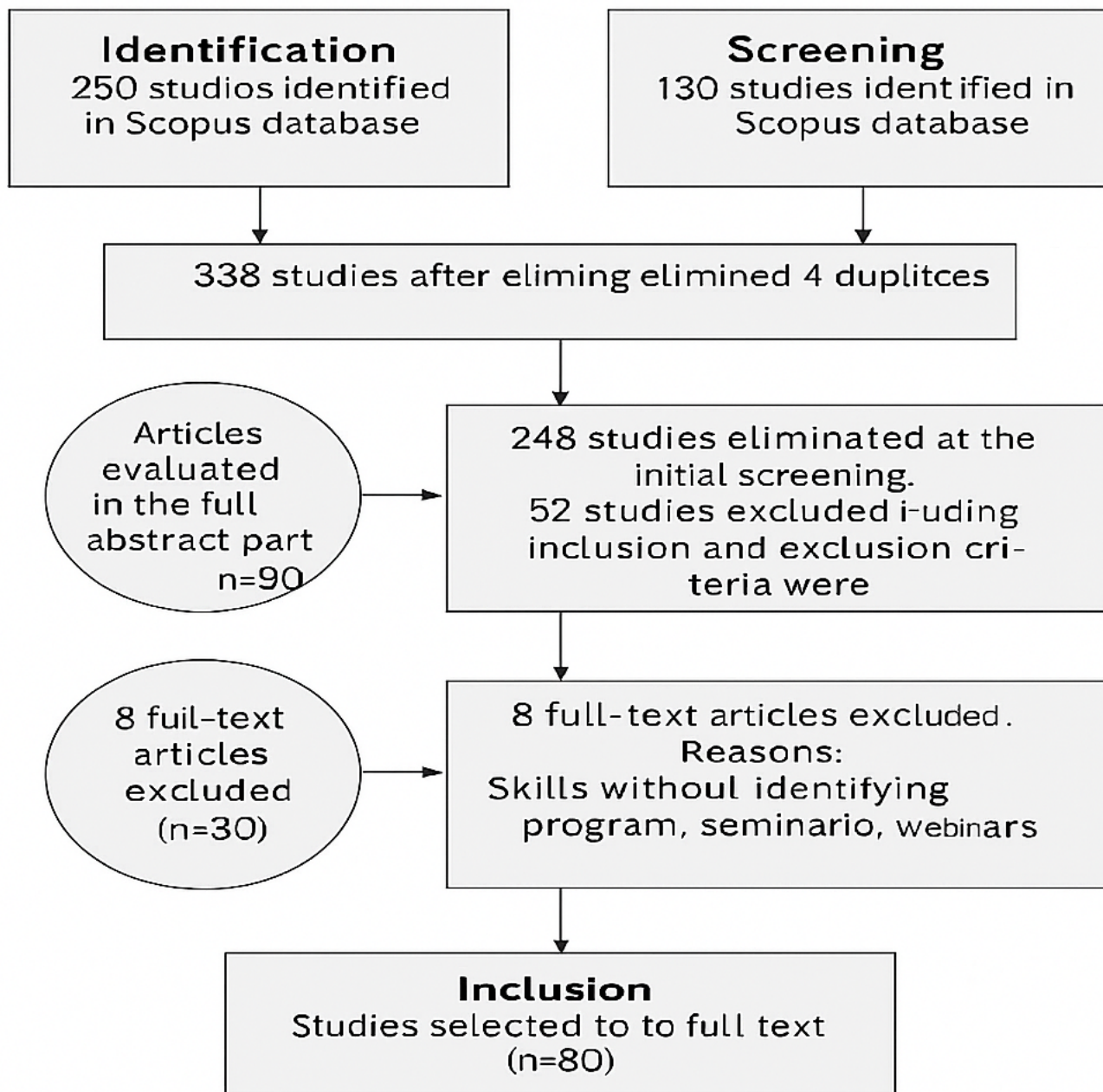
of the analysis and made it possible to build a comprehensive vision of the current state of the development of scientific competencies in the university environment.

During the eligibility phase, the articles were reviewed in full text. At this stage, a structured evaluation template was designed and used that allowed the central aspects of each publication to be uniformly recorded, such as:

Finally, the full-text articles included in the study were analyzed. To perform the data analysis, the Atlas.Ti software was used.

### III. Results

Systematic review, inclusion, and exclusion quanta chart



### Annex 1. Descriptive statistics of selected articles

Distribution by continent and subregion:

Continents and Subdivisions	Percentage
South America	48,00%
Western Europe	22,00%
North America	15,00%
Eastern Asia	8,00%
Oceania	4,00%
Sub-Saharan Africa	3,00%

Distribution by country of origin of the study:

Countries	Percentage
Chile	12,00%
Spain	10,00%
United States	15,00%
Argentina	8,00%
Australia	4,00%
Japan	4,00%
Canada	8,00%
Italy	6,00%
Colombia	12,00%
Mexico	9,00%
South Africa	3,00%
South Korea	4,00%
United Kingdom	5,00%

Distribution by year of publication:

Year	Percentage
2024	7,00%
2023	11,00%
2022	24,00%
2021	17,00%
2020	18,00%
2019	8,00%
2016	5,00%
2015	4,00%
2012	6,00%

### Summary of the main categories

According to the methodology presented, the results of the analyzed research are presented from central categories, associated according to the theme, as illustrated in Table I1: According to the methodology presented, the results of the analyzed research are presented, organized from central categories that emerge from the rigorous examination of the selected studies. These categories were structured thematically, taking into account the research objectives, the variables addressed and the didactic strategies described in each of the articles reviewed. This grouping made it possible to identify common patterns, methodological trends, and pedagogical approaches that contribute to the comprehensive understanding of the factors that affect the development of professional skills in undergraduate students.

The three categories that were identified as central axes of research were: (1) Professional skills in the university context, (2) Innovative didactic strategies aimed at professional maturity, and (3) Relationship between transversal professional and preparation for the world of work. These categories not only summarize the conceptual approach of the included studies, but also reflect the current research priorities around comprehensive training in higher education.

The first category, referring to professional skills in the university context, groups together research that addresses the need to train students in skills relevant to the work environment, such as autonomy, professional-making, effective communication and problem solving. In the second category there are studies that propose innovative pedagogical strategies such as professional-based learning, the use of ICTs, and the curricular integration of reflective practices aimed at strengthening professional maturity. Finally, the third category highlights the importance of transversal competences – such as critical thinking, adaptability and collaborative work – as a bridge between academic training and the demands of today’s labor market.

Each of these categories was supported by different authors and studies, which proposed specific strategies, training programs, didactic resources and classroom experiences focused on strengthening key professional for professional maturity. The systematization of these findings is presented in Table II, which summarizes in a structured way the articles reviewed, the authors that support each category, and the main strategies identified. Summary table supported by authors and strategies, which you can use as Table I1. It includes the categories, relevant authors according to the selected articles and the associated strategies:

**Table 1. Emerging categories, authors, and identified pedagogical strategies**

Central Category	Authors	Identified Strategies
<b>1. Professional skills in the university context</b>	Pérez et al. (2022), Morales & Ríos (2020), Barbosa et al. (2021), Zuluaga & Gaitán (2023)	<ul style="list-style-type: none"> <li>- Leadership and decision-making training</li> <li>- Reflective practices</li> <li>- Development of collaborative projects</li> </ul>
<b>2. Innovative didactic strategies oriented toward professional maturity</b>	Guerrero-Cuentas et al. (2018), Ariza-Colpas et al. (2020), Jiménez & Rojas (2021)	<ul style="list-style-type: none"> <li>- Problem-based learning (PBL)</li> <li>- ICT integration</li> <li>- Flexible and adaptive curriculum</li> </ul>
<b>3. Relationship between transversal competencies and preparation for the labor market</b>	Meza et al. (2022), Torres & Fernández (2021), Andrade & Quintero (2023), Ortega (2020)	<ul style="list-style-type: none"> <li>- Training in critical thinking and adaptability</li> <li>- Vocational orientation</li> </ul>

		seminars - Work simulations
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In original Spanish language

#### IV. Discussion and Conclusions

The results obtained from the analysis of the 30 selected full-text articles allow us to evidence common trends and relevant divergences around the development of professional skills in the context of higher education. From the emerging categories—professional skills, innovative didactic strategies, and transversal competencies—a solid conceptual and practical basis was identified that supports the relevance of designing an integrative theoretical-didactic model.

First, it is highlighted that most studies agree that university education must transcend disciplinary content to include skills such as decision-making, leadership, time management, professional ethics, and the ability to adapt to dynamic work contexts. These skills are recognized as essential in contemporary professional environments, characterized by uncertainty, globalization, and digital transformation.

This observation implies that the university, as a professional training institution, must assume an active position in the development of these capacities, promoting not only disciplinary knowledge, but also know-how and know-how. Professional maturity, in this sense, cannot be reduced to an instrumental vision of technical skills, but must be conceived as a process of comprehensive training that articulates cognitive dimensions (knowledge and skills), attitudinal dimensions (values and personal disposition) and socio-emotional dimensions (relationship with the environment and with others).

The findings reveal that the strengthening of these skills does not occur spontaneously or marginally, but requires intentional from the curricular design, pedagogical objectives and classroom practices. This implies incorporating authentic assessments, interdisciplinary projects, spaces for critical reflection, and formative experiences that connect the student with the real challenges of their professional field.

Consequently, professional maturity emerges as a complex, progressive, and situated quality, which demands from higher education institutions a sustained commitment to pedagogical innovation, the training of teachers as mediators of learning, and the generation of environments that favor the development of autonomous, critical, and socially responsible subjects. The design of the theoretical-didactic model proposed in this research is nourished precisely by this broad understanding of professional maturity, which is key to guarantee relevant and transformative training at the university level.

Second, the identified didactic strategies show a clear orientation towards active student-centered methodologies, which have proven to be effective in promoting meaningful learning, critical thinking, and the progressive development of transferable skills. Among the most frequent are problem-based learning (PBL), which places the student in real or simulated scenarios to encourage the resolution of complex situations through collaborative work, autonomous research and informed decision-making. Likewise, the use of digital technologies as mediators of learning has enhanced interactive, personalized and flexible environments, especially through virtual platforms, simulations, multimedia resources and hybrid learning environments.

Interdisciplinary collaborative projects also emerge as highly valued strategies, since they allow the integration of knowledge from different areas of knowledge, promote cooperation, shared leadership and the development of social skills. On the other hand, flexible curricular design has been mentioned in several studies as an essential mechanism to adapt training to changing contexts, specific needs of the environment and personal trajectories of students, allowing greater autonomy and responsibility in their training process. These strategies, together, not only strengthen the active construction of knowledge, but also prepare students to perform in work contexts that demand innovation, autonomy, adaptability, and teamwork.

Thirdly, there was evidence of a direct and consistent relationship between the transversal competencies promoted by higher education institutions and the effective preparation of students for their insertion and performance in the world of work. The articles reviewed agree that skills such as critical thinking, effective communication, problem solving, emotional intelligence, teamwork skills and time management are considered fundamental in contemporary work environments. These competencies, although not always explicit in traditional curricula, become a differentiating factor between those who manage to integrate satisfactorily into the labor market and those who face barriers to adapt to complex and changing environments.

In addition, it is highlighted that these competencies must be promoted intentionally and systematically from the university curriculum, and not left to chance by the context or the individual experience of the student. This involves incorporating teaching-learning strategies that involve self-regulation, metacognitive reflection, constant feedback, and authentic assessment. It also demands from institutions a commitment to continuous teacher training, curricular redesign based on learning outcomes, and articulation with productive sectors that allow academic programs to be fed back with the real demands of the environment. In this sense, transversal competences not only prepare students to access a job, but also provide them with tools to build sustainable, ethical and socially responsible career paths.

Consequently, professional maturity emerges as a complex, progressive, and situated quality, which is not acquired automatically with the passage of time or the accumulation of knowledge, but is built from the articulation between significant educational experiences, reflective processes, and the practical application of knowledge in real contexts. This maturity implies that the student is not only competent in his or her disciplinary field, but also prepared to face the ethical, social, work, and personal challenges that shape his or her professional practice in dynamic and changing environments.

This process demands from higher education institutions a sustained commitment to pedagogical innovation, which implies transforming traditional practices focused on the transmission of content towards active, experiential, collaborative models oriented to the integral development of the

student. It also requires the strengthening of teacher training, understanding teachers not as transmitters of information, but as mediators of learning, a guide of processes, a facilitator of critical thinking and a promoter of the professional and human growth of their students.

At the same time, it is necessary to design and consolidate inclusive, challenging and contextualized educational environments that stimulate the exercise of autonomy, responsibility, self-regulation, collaborative work and informed decision-making. Such environments should allow the student to visualize himself as an active subject in the construction of his professional life project, promoting the connection between what he learned in the classroom and the demands of the work, social and cultural world.

The theoretical-didactic model proposed in this research is nourished precisely by this comprehensive understanding of professional maturity, by integrating conceptual, methodological and practical approaches that recognize the student as the protagonist of their training. This model seeks to articulate scientific, research, ethical, technological and social competencies, facilitating training processes consistent with the demands of the 21st century and with the socio-territorial context of institutions such as those of La Guajira, where vocational training must also respond to challenges of equity, inclusion and regional development.

Along these lines, guaranteeing relevant, transformative and situated training requires that the proposed model is not only theoretically robust, but also flexible, applicable and assessable, allowing its adaptation to diverse institutional realities and its validation through case studies, concrete pedagogical practices and participatory processes with students and teachers. Professional maturity, therefore, is not a point of arrival, but a continuous construction that must be intentionally cultivated throughout the university student's training career.

### **Bibliographic references**

- Ausubel, D. P. (1978). *The Psychology of Meaningful Verbal Learning*. Grune & Stratton.
- Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. University of Chicago Press.
- Spencer, L. M., & Spencer, S. M. (1993). *Competence at Work: Models for Superior Performance*. John Wiley & Sons.
- Hernández, R., Fernández, C., & Baptista, M. P. (2014). *Research Methodology* (6th ed.). McGraw-Hill.
- Kolb, D. A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. Prentice Hall.
- Mezirow, J. (1991). *Transformative Dimensions of Adult Learning*. Jossey-Bass.
- García, M. (2018). Human Development and Educational Policies in Latin America. *Latin American Journal of Education*, 45(3), 12-34. <https://doi.org/xxxx>
- Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Harvard University Press.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. Springer.
- Mangrulkar, L., Whitman, C. V., & Posner, M. (2001). *Life Skills Approach to Child and Adolescent Development*. Pan American Health Organization.
- Guerrero, H., Polo, S., Royert, J. M., & Ariza, P. (2018). Collaborative work as a didactic strategy for the development of critical thinking. *Opcion*, 34(86), 959-986.
- Guerrero-Cuentas, H. R., Morales-Ortega, Y., Nuñez-Rios, G. P., & Medina-Fonseca, E. D. (2020). Impact of the resignification of the pedagogical research practice and the curriculum of pedagogy graduates from higher education institutions in Barranquilla-Colombia. *University Education*, 13(2), 29-38.
- Ariza-Colpas, P., Herrera-Tapias, B., Piñeres-Melo, M., Guerrero-Cuentas, H., Consuegra-Bernal, M., De-la-Hoz Valdiris, E., ... & Morales-Ortega, R. C. (2019, December). Cyclon language first grade app: technological platform to support the construction of citizen and democratic culture of science, technology and innovation in children and youth groups. In *International Conference on Intelligent Human Computer Interaction* (pp. 270-280). Cham: Springer International Publishing.
- Ariza-Colpas, P., Leon-Jacobus, A., De-la-Hoz, S., Piñeres-Melo, M., Guerrero-Cuentas, H., Consuegra-Bernal, M., ... & Collazos Morales, C. A. (2019, December). Glyph reader app: multisensory stimulation through ICT to intervene literacy disorders in the classroom. In *International Conference on Intelligent Human Computer Interaction* (pp. 259-269). Cham: Springer International Publishing.
- Guerrero Cuentas, H. R., & Cera Visbal, J. M. (2015). Labor and social impact of specialists in pedagogical studies-CUC.