

## Teacher development in the age of education 4.0: Challenges, practices, and internationalization

*Desarrollo de docentes de inglés en la era de la educación 4.0: Desafíos, prácticas e internacionalización*

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### ABSTRACT

In an era defined by digital transformation and rapid change, educators are professionals who, beyond transmitting knowledge, face the daily challenge of adapting to new technologies, global languages, and emerging methodologies. This study arises from the acknowledgment of that reality, aiming to understand the challenges faced by English teachers in Ecuadorian universities in their ongoing professional development, within a context shaped by Education 4.0 and internationalization. Using a mixed-methods approach that combined surveys, interviews, and a well-being questionnaire administered to 50 teachers, four key factors were identified: structural barriers, effective pedagogical practices, Education 4.0 and its impact on internationalization, and teachers' mental health. The study revealed good practices that enhance teaching and emotional well-being, such as the use of active methodologies, continuous feedback, and collaborative learning. One of the most significant correlations was between these good practices and teachers' mental health ( $r = 0.93$ ), highlighting a strong connection between teaching well and feeling well. This study explores teacher development in the context of Education 4.0, proposing educational improvements and future research directions.

**Keywords:** Academic Mobility; Higher Education; Educational technology; Teacher Mental Health; Digital Skills.

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## RESUMEN

En una era marcada por la transformación digital y la aceleración del cambio, los docentes son profesionales que, más allá de transmitir conocimiento, enfrentan el desafío diario de adaptarse a nuevas tecnologías, lenguajes globales y metodologías emergentes. Este estudio surge del reconocimiento a esa realidad, para comprender los desafíos que enfrentan los docentes de inglés en universidades ecuatorianas en su proceso de formación continua, en un contexto atravesado por la Educación 4.0 y la internacionalización. A través de un enfoque mixto que combinó encuestas, entrevistas y un cuestionario de bienestar aplicados a 50 docentes se categorizó en 4 factores clave: barreras estructurales, las buenas prácticas pedagógicas, la Educación 4.0 y su impacto en la internacionalización y la salud mental de los docentes. Se revelaron buenas prácticas que mejoran la enseñanza y el bienestar emocional, como el uso de metodologías activas, la retroalimentación constante y el aprendizaje colaborativo. Una de las correlaciones más significativas fue entre estas buenas prácticas y la salud mental del docente ( $r = 0.93$ ), lo que evidencia que enseñar bien y sentirse bien están profundamente conectados. Este estudio explora el desarrollo docente en Educación 4.0, proponiendo mejoras formativas y futuras investigaciones.

**Palabras Clave:** Movilidad Académica; Enseñanza Superior; Tecnología Educacional; Salud Mental Docente; Alfabetización Digital.

## INTRODUCTION

Education 4.0 aims to transform the traditional education model by integrating a pedagogical approach based on self-learning, self-reflection, and metacognition (Miranda et al., 2021). This educational model, implemented in higher education, seeks to enhance collaboration among students, educators, and technological tools (Dehbi et al., 2025). Additionally, it aims to train competitive professionals capable of utilizing both physical and digital resources to innovatively address the challenges of today's and tomorrow's society (Miranda et al., 2021).

English, as the lingua franca of international education, not only emerges as an essential means of academic communication and collaboration, but also acts as a catalyst for cultural, economic, and opportunity Exchange (Adriansen et al., 2023). In various parts of the world, there has been a growing need within higher education for competencies that effectively prepare both educators and students to engage in globalized contexts (Karimova et al., 2023). In this context, the internationalization of higher education accelerates the demand for training programs, prompting universities to maintain language proficiency standards—particularly at B1 and B2 levels—as a fundamental requirement for participation in international academic networks (Zhang, 2024).

Educational internationalization has transformed higher education, generating a demand for continuous professional development among English language

instructors, who face the challenge of updating their competencies within an evolving educational environment (Knight, 2021). Adapting to these changes requires ongoing professional development from educators. As globalization progresses, higher education institutions strive to equip their faculty with the necessary tools—tools that are increasingly complex due to emerging technologies and evolving pedagogical methodologies that are updated over time (Zhang, 2024).

The English language has become an important component in the lives of academic professionals at the international level, serving as a requirement for mobility, collaboration within global networks, and the implementation of EMI (English as a Medium of Instruction) programs (Adriansen et al., 2023; Salö, 2022). Recent studies show that the country ranks among the lowest in English proficiency in the region—placing 82nd out of 116 countries, according to (EF English Proficiency Index, 2024).

The Education 4.0 model will enable educators to creatively transmit knowledge and requires the development of new pedagogical, digital, and intercultural skills that support inclusive teaching (Mukul & Büyüközkan, 2023). In this way, today's generation of students—who have been shown to possess limited attention and concentration spans—can acquire essential skills to create new opportunities beyond disciplinary expertise (Abubakar et al., 2025). Therefore, teacher training programs must align with the demands of a globalized digital environment by promoting technological competencies among educators and preparing students to engage in the international academic community.

The current urgency of Education 4.0 has introduced new demands on teacher training programs within higher education institutions. However, studies indicate that these initiatives are often fragmented and lack strategic planning that addresses the actual needs of the institutions, which limits their impact on educational improvement (Zhang, 2024). This highlights the need for a thorough analysis involving universities and their commitment to training programs for English language instructors, in order to determine their effectiveness in enhancing teaching capabilities and their influence in an international context.

This research aims to identify the structural challenges faced by universities in the implementation of continuous professional development programs for English language instructors and to systematize strategies that contribute to strengthening their ongoing training in higher education. The focus is on integrating emerging technologies and innovative pedagogical practices that support inclusive teaching and enhance the potential for educational internationalization, aligned with the real needs of the contemporary university environment.

## THEORETICAL FRAMEWORK

Teaching methods in education have been evolving, and humanity has likewise been steering the development of its competencies toward creativity and collaborative problem-solving, in alignment with the demands of the Fourth Industrial Revolution.

**Table 1.**  
Comparison of the Educational Paradigms.

Dimension	Education 1.0	Education 2.0	Education 3.0	Education 4.0
<b>Social-historical context</b>	Agricultural society	Industrial society	Globalization age	Industry 4.0
<b>Available technology</b>	Blackboard, printed books	Radio, TV, overhead projector	Web 2.0, social networks, LMS, OER	Artificial Intelligence, IoT, mobile devices
<b>Teacher's role</b>	Single source of knowledge	Expert instructor	Facilitator and co-curator of digital resources	Designer of intelligent environments for personalized learning
<b>Student's role</b>	Passive recipient	Mostly passive recipient with instrumental tasks	Active, self-regulated and collaborative learner	Knowledge creator
<b>Pedagogical model</b>	Memorization, instructivism / behaviorism	Cognitivism	Social constructivism; ubiquitous and collaborative learning	Connectivism, heutagogy and cybergogy
<b>Competencies</b>	Basic reading, writing and arithmetic	Work discipline, accuracy and repetition	Critical thinking, global collaboration, digital literacy	Creativity, complex problem-solving, entrepreneurship, lifelong learning

**Note:** LMS = Learning Management System; OER= Open Educational Resources.

**Source:** Information extracted from Mukul & Büyükközkcan (2023).

### Teacher Professional Development in University English Programs

Teacher professional development ensures the quality of instruction in university-level English programs (Ruiz-Madrid & Fortanet-Gómez, 2022). This process involves the continuous updating of knowledge in pedagogical, linguistic, and technological fields, adapting to a rapidly evolving global educational environment. Professional development models emphasize the importance of reflection, collaboration among educators, and the integration of research into teaching practice (Cozart & Gregersen-Hermans, 2021). Teacher professional development must be understood as a continuous process that extends beyond initial training and encompasses the educator's entire professional career. The ongoing nature of professional development responds to the constant need to adapt to changes in disciplinary knowledge, pedagogical methodologies, and societal demands (Klimova et al., 2021).

Authors such as Sadeghi & Richards (2021), emphasize that teacher training initiatives require strategic planning, institutional support, continuous evaluation



and monitoring, as well as collaborative spaces that foster research and learning for effective professional development. There is limited evidence regarding language teachers' participation in professional development activities and how they engage in them.

It is suggested that ongoing English language instruction should be framed as the incorporation of new knowledge, with an emphasis on staying current with advances in applied linguistics, evolving methodological approaches, changes in student needs and curricula, and improving linguistic and cultural competence through digital and online tools, as well as adapting to the transformation in modes of language communication (Klimova et al., 2021).

On the other hand, Miranda et al. (2021), point out that the digital age has transformed teaching ever since it began impacting humanity. Today, educators are required to modify both their content and methods—not merely by incorporating technological tools, but by undergoing a mindset shift. Some educators perceive themselves as “digital immigrants,” while their students are “digital natives.” This generational gap can hinder the effective adoption of educational technologies, highlighting the importance of professional development programs that address not only technical skills but also educators' attitudes and beliefs toward technological innovation (Anis, 2024).

#### **Education 4.0: A New Vision for Teacher Training**

Education 4.0 emerges as an evolution of the traditional educational paradigm, aligned with the changes brought about by the Fourth Industrial Revolution (Mukul & Büyüközkan, 2023). This approach promotes the use of emerging technologies—such as artificial intelligence, learning analytics, augmented reality, among others—to create personalized, flexible, and student-centered learning environments (Dehbi et al., 2025). In this new context, the teacher's role shifts from being a source of knowledge to becoming a facilitator of information, a designer of learning experiences, and a mentor in digital environments. Meanwhile, the student takes on the role of an active participant and knowledge creator. In this sense, the teacher remains a fundamental element of the teaching process, in collaboration with the student (Miranda et al., 2021).

The fundamental principles of Education 4.0 include:

- **Personalized Learning:** Adapting content and methodologies to the needs, interests, and learning pace of each student, using technologies such as artificial intelligence to create individualized learning paths (Souza & Debs, 2024).
- **Ubiquitous Learning:** Going beyond the physical and temporal boundaries of the traditional classroom, enabling access to knowledge anytime and anywhere through mobile devices and digital platforms (González & Ramírez, 2022).

- **Competency-Based Approach:** Prioritizing the development of practical, applicable skills in real-world contexts, beyond the mere acquisition of theoretical knowledge (Kin et al., 2022).
- **Active Methodologies:** Implementing strategies such as project-based, problem-based, or challenge-based learning that position the student as the central figure in their educational process (Miranda et al., 2021).
- **Interdisciplinarity:** Integrating knowledge from various fields to address complex problems, reflecting the interconnected nature of real-world challenges (Souza & Debs, 2024).
- **Collaboration and Co-Creation:** Encouraging teamwork and collective knowledge-building, in both in-person and virtual environments (González & Ramírez, 2022).
- **Formative and Continuous Assessment:** Using digital tools to continuously monitor student progress, enabling immediate feedback and adaptation of the teaching process (González & Ramírez, 2022).

### University English Programs

University English programs not only serve to strengthen students' communicative competence but also act as catalysts for the internationalization processes of universities (Gregersen-Hermans, 2021). English enables participation in global academic networks, access to up-to-date scientific literature, and international mobility for both students and faculty (Knight, 2021). Thus, the professional development of English instructors holds dual importance: pedagogical and strategic. Incorporating the principles of Education 4.0 into these programs can enhance the quality of the teaching and learning process and increase the academic prestige of institutions on an international scale (González & Ramírez, 2022).

On the other hand, English Medium Instruction (EMI) represents an enhancement in English language teaching as a vehicle for communication in contexts where English is either the native language or spoken by the majority of the population, in order to maximize its (Alhamami, 2024). Universities seek to showcase their international profile through such tools, also aiming to attract students from other regions (Gacel et al., 2024). However, the implementation of EMI faces several challenges, including insufficient language proficiency among both faculty and students, difficulties in methodological adaptation in areas where traditional methods are deeply rooted, identity conflicts between the promotion of English and the preservation of local languages and associated cultural identities, and the design of fair and equitable assessment systems, among others (Al Zumor, 2019).

### Educational Internationalization

Educational internationalization is a strategic and transformative process that integrates intercultural and global dimensions into the goals, functions, and delivery of higher education (Zurita & Pinos, 2024). Knight (2021), notes that

internationalization has evolved into a strategic factor in higher education, reflecting the growing interconnection among societies and economies and the need to prepare students for a competitive global environment. Linguistic and cultural exchange serves as a gateway to opportunities, where students seek to participate through various projects (Zhang, 2024).

Academic mobility offers opportunities for both personal and professional development, exposure to diverse cultural and academic contexts with different pedagogical approaches, the establishment of professional networks, and the transfer of knowledge and best practices (Ridel et al., 2025). For several years, it has been recognized that attracting foreign faculty promotes the progressive training of national professors (Bense, 2016). However, despite its benefits, academic mobility faces various barriers such as limited resources, complex visa procedures, unequal opportunities, corruption, and both personal and institutional retention. To address these challenges, Karimova, et al. (2023), describe how "internationalization at home" programs have enhanced linguistic and cultural competence through collaborative lessons and intercultural interactions, providing meaningful experiences without the need for physical travel by leveraging digital resources and the cultural diversity already present.

## Conceptual Matrix

**Table 2.**

Conceptual matrix for categorizing the approach to the central topic.

Main Category	Subcategories/Key Concepts	Relation to the Study
<b>Teacher Professional Development</b>	<ul style="list-style-type: none"> <li>Continuing education</li> <li>Pedagogical updating</li> <li>Teaching competencies</li> </ul>	Basis for analysis: explores how English teachers' training is developed in university contexts.
<b>Education 4.0</b>	<ul style="list-style-type: none"> <li>Emerging technologies</li> <li>Personalized learning</li> <li>Digital literacy</li> </ul>	A new vision of teacher training that integrates technology, flexibility, and autonomy.
<b>University English Programs</b>	<ul style="list-style-type: none"> <li>English language teaching as L2</li> <li>Methodological approaches (CLIL, TBLT)</li> <li>Competency-based assessment</li> </ul>	The specific context in which the phenomenon under study occurs.
<b>Educational Internationalization</b>	<ul style="list-style-type: none"> <li>Academic mobility</li> <li>Cultural exchange</li> <li>Global positioning</li> </ul>	Expected outcome of strengthened teacher training and the use of English as a language for internationalization.

**Note:** L2= second language, CLIL= Content and Language Integrated Learning, TBLT= Task-Based Language Teaching. **Source:** Prepared by the author.

## METHODOLOGY

### Research Approach and Design

This study focuses on an analysis of data collected through a mixed-methods approach, combining a quantitative component via structured surveys and a qualitative component through semi-structured interviews. The aim of this approach is to identify, analyze, and synthesize recent scientific evidence on teacher professional development in university English programs, its connection to Education 4.0, and its impact on educational internationalization.

### Participant Selection

The sample consists of university instructors teaching in English programs at universities in Ecuador. A total of 50 instructors were selected, all of whom had participated in at least one teacher professional development program within the past three years

### Inclusion and Exclusion Criteria

**Table 3.**

Inclusion and exclusion criteria for the development of evaluation instruments used in data collection.

Inclusion	Exclusion
Instructors with at least 2 years of experience in English programs	Instructors with limited experience
Instructors who have participated in professional development training programs	Instructors who have not participated in any training programs
Instructors teaching in universities with educational internationalization programs	Instructors whose courses are not aligned with educational internationalization practices.

**Source:** Prepared by the author.

### Data Collection Methods

Three data collection instruments were employed to obtain direct insights from selected instructors across various universities

- Structured Surveys:** Designed to assess instructors' perceptions of structural challenges and the effectiveness of professional development strategies. The survey included Likert scale questions (1–5) to evaluate the effectiveness of these strategies and instructors' well-being.
- Semi-Structured Interviews:** Aimed at gaining deeper insight into instructors' individual experiences with emerging best practices and the impacts of Education 4.0. The interviews focused on exploring educators' personal experiences with learning strategies, challenges encountered, and observed benefits.
- Satisfaction and Well-Being Questionnaire:** Using a self-report questionnaire (SQR), this instrument measured instructors' psychological



well-being before and after participating in continuing education programs. It indicated their satisfaction levels and perceived improvement in emotional well-being.

### **Specific Objectives of Data Collection:**

1. Identify the main structural barriers and obstacles faced by instructors in their professional development process.
2. Explore the best practices implemented by instructors in their English teaching programs.
3. Measure the impact of Education 4.0 and how it influences instructors' professional development and their ability to internationalize learning.
4. Assess the relationship between learning strategies and improvements in instructors' mental health.

### **Data Collection Procedure**

#### **Phase 1: Quantitative Survey**

Sent electronically to the selected instructors, the survey included clear instructions and was accompanied by an informed consent form to ensure participants' confidentiality.

#### **Phase 2: Qualitative Survey**

Conducted via platforms such as Zoom or Google Meet. The interviews were transcribed for later analysis.

#### **Phase 3: Well-Being Questionnaire**

Completed by instructors at the conclusion of their participation in the professional development programs. The results were used to measure changes in well-being before and after the implementation of learning strategies.

This study ensured compliance with ethical research principles. All participants provided informed consent prior to participating. Participant confidentiality and anonymity were preserved throughout all phases of data collection and analysis.

### **Data Analysis**

#### **Quantitative Analysis**

Data obtained through the questionnaires will be analyzed using descriptive and inferential statistical tools. First, measures of central tendency (mean, median) and dispersion (standard deviation) were calculated to describe key variables such as stress levels, perceptions of digital competencies, and use of educational technologies.

#### **Qualitative Analysis**

The semi-structured interviews will be analyzed using thematic analysis. Patterns and recurring themes related to challenges, emerging best practices, and effects on teachers' mental health will be identified.

#### **Well-Being Questionnaire Analysis**

The well-being questionnaire will be analyzed using a pre- and post-test approach to identify significant changes in teachers' mental health as a result of the implemented learning strategies.

## RESULTS

The quantitative analysis of the surveys provided data across four main categories: a) structural barriers and obstacles in teacher professional development, b) emerging best practices in English teaching programs, c) the impact of Education 4.0 on professional development and internationalization, and d) the relationship between learning strategies and teacher mental health. Survey questions were categorized based on the established research objectives (Table 4).

**Table 4.**

Question selection criteria for data collection based on the established objectives.

Category	Questions
Structural barriers and obstacles in teacher professional development	Q5, Q8, Q21, Q29, Q33, Q34, Q35
Emerging best practices in the English teaching program	Q4, Q6, Q9, Q13, Q16, Q22, Q23, Q24, Q25, Q26, Q27, Q28
Impact of Education 4.0 on professional development and internationalization	Q1, Q3, Q7, Q10, Q11, Q14, Q30, Q31, Q32
Relationship between learning strategies and teacher mental health	Q2, Q5, Q8, Q12, Q15, Q17, Q18, Q19, Q20, Q29

**3/Note.** Q=Question. **Source:** Prepared by the author.

The most relevant findings for each category are described below.

### a) Structural Barriers and Obstacles in Teacher Professional Development

Two factors were identified, explaining 69.40% of the variance. The first factor, accounting for 39.10%, groups items related to internationalization (Q33, Q34, Q35). The second factor, with a variance of 30.30%, includes items linked to training and preparation (Q5, Q8, Q29).

### b) Emerging Best Practices in the English Teaching Program

Two factors were also identified in this category, explaining 53.35% of the variance. The first factor, with 28.38% of the variance, includes items related to pedagogical approaches (Q4, Q6, Q9, Q16, Q22). The second factor, explaining 24.97%, comprises items related to feedback and collaboration (Q6, Q13, Q27, Q28).

### c) Impact of Education 4.0 on Professional Development and Internationalization

Factor analysis could not be performed due to the presence of a singular matrix, indicating a high correlation among variables. This suggests that the items in this category are strongly interrelated.

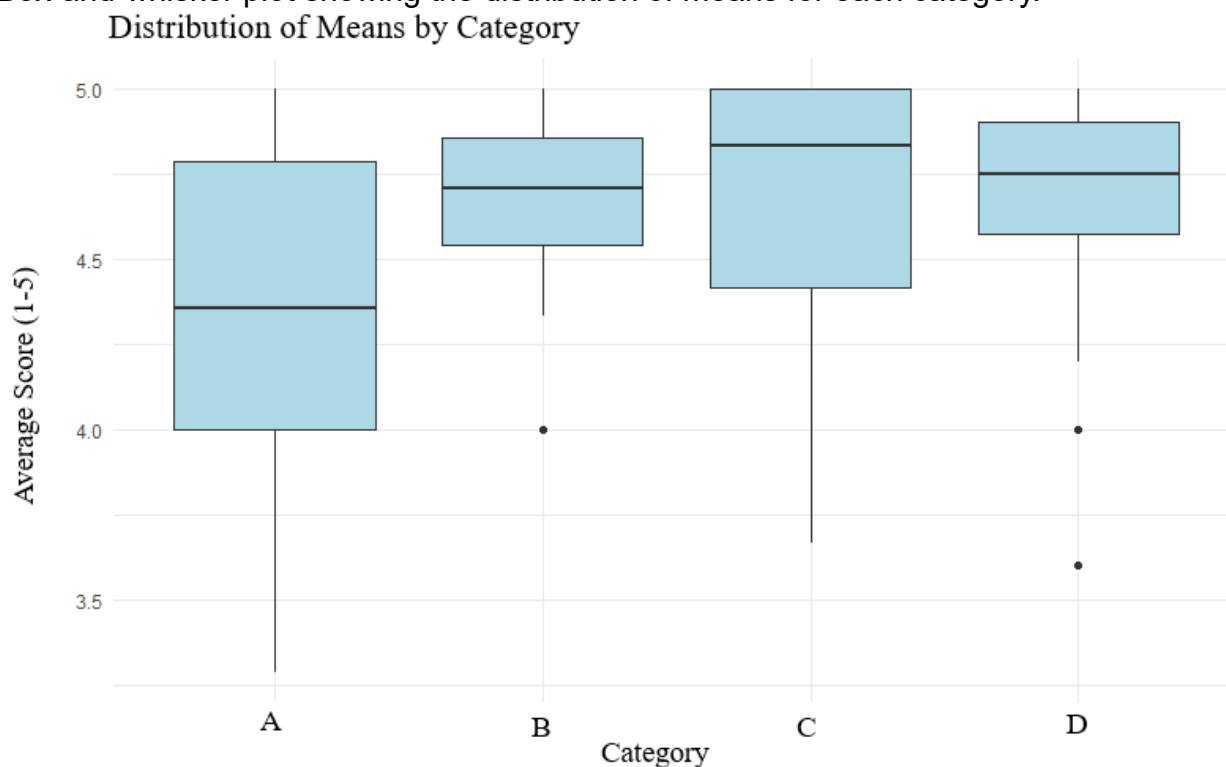
### d) Relationship Between Learning Strategies and Teacher Mental Health

Two factors were identified, accounting for 66.55% of the variance. The first factor, explaining 42.10%, includes items related to emotional preparedness and training (Q2, Q5, Q8, Q12, Q15, Q17, Q29). The second factor, accounting for 24.45%, groups items related to motivation and balance (Q18, Q20, Q29).

Overall, the categories assessed through the evaluation instrument show high scores (between 4 and 5). As illustrated in the box-and-whisker plot in Figure 1, the Structural Barriers category (category a) presents the greatest dispersion and the lowest median (4.35). The Education 4.0 category (category c) has the highest median (4.83), though it includes outliers that may be tied to specific cases. On the other hand, the Best Practices (category b) and Mental Health (category d) categories exhibit the most similar median distributions, both centered around 4.7.

**Figure 1.**

Box-and-whisker plot showing the distribution of means for each category.



**1/ Note.** Category Axis: A: Structural barriers and obstacles in teacher professional development. B: Emerging best practices in the English teaching program. C: Impact of Education 4.0 on professional development and internationalization. D: Relationship between learning strategies and teacher mental health

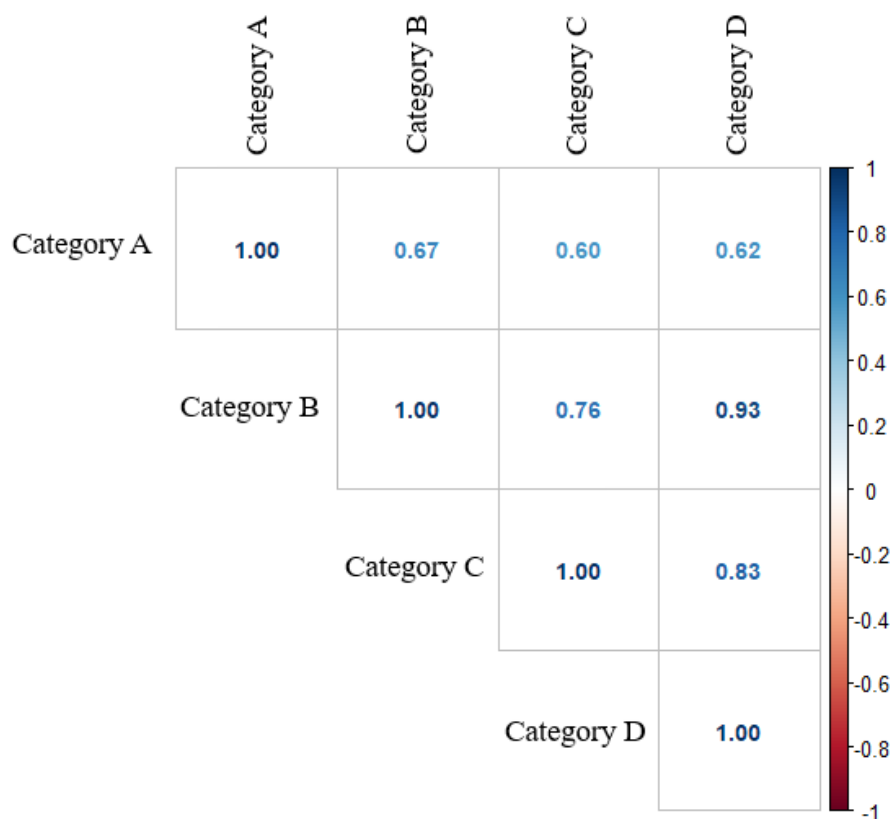
**Source:** Prepared by the author using RStudio.

The strongest correlation observed (Figure 2) is between Pedagogical Best Practices (category B) and Mental Health (category D), with a value of 0.93. This is followed by the correlation between Education 4.0 (category C) and Mental Health (category D). These values may be linked to the emotional well-being of educators. On the other hand, Structural Barriers (category A) show a weaker correlation with

the other three categories, which may reflect a perception of obstacles and educational limitations.

**Figure 2.**

Correlation matrix for the distribution of means across each category



**2/Note.** Category A: Structural barriers and obstacles in teacher professional development. Category B: Emerging best practices in the English teaching program. Category C: Impact of Education 4.0 on professional development and internationalization. Category D: Relationship between learning strategies and teacher mental health.

**Source:** Prepared by the author using RStudio.

The qualitative analysis of interviews and documents made it possible to identify four main categories: a) structural obstacles to teacher training, b) emerging best practices, c) tensions and future directions within the framework of internationalization, and d) perceptions of mental health

Below are the most relevant findings for each:

a) Structural Obstacles to Teacher Training

Participants agreed that, while their institutions recognize the importance of professional development, it is not always translated into concrete actions. The main obstacles identified include:



- Lack of clear institutional policies: Although strategic plans mention teacher training, it is often not aligned with measurable goals. One teacher noted:

*"There's talk of professional development, but no clear action plan or designated person to coordinate it."*

- Excessive workload: The overload of academic and administrative tasks was cited as one of the main reasons teachers do not participate in training programs.

*"We barely have time to prepare lessons, let alone participate in training that often isn't even recognized by the institution."*

- Disconnect between training offerings and real needs: Many courses offered are perceived as not addressing the actual pedagogical challenges of teaching English at the university level.

*"Courses aren't always aligned with specific classroom issues. I believe we need training focused on managing real-life challenges students face outside the classroom."*

#### b) Emerging Best Practices

Interviewed teachers identified several emerging pedagogical practices that have proven effective in improving English instruction. The main practices highlighted include:

- Innovative pedagogical approaches: Teachers were asked about their familiarity with CLIL (Content and Language Integrated Learning) and TBLT (Task-Based Language Teaching). Those familiar with them explained how these approaches have significantly improved English teaching.

*"Yes, I've implemented both CLIL and TBLT, because I believe they are more effective for teaching languages naturally."*

- Collaborative learning: Many teachers agreed that group activities not only boost student motivation but also foster autonomous learning.

*"I try to make all activities group-based to promote more creative learning. It also helps generate more productive classroom interaction."*

- Use of emerging technologies: Teachers emphasized the importance of integrating emerging technologies such as digital resources and online platforms to make learning more interactive and dynamic. One teacher said:

*"Autonomous learning with technological resources allows students to learn independently and effectively."*

- Platforms like Moodle and mobile language learning apps were also mentioned as valuable tools to increase student engagement and access to resources.
- Assessment and feedback: Teachers emphasized the importance of continuous feedback in improving student performance. The use of

formative assessments, paired with timely feedback, was highlighted as a best practice.

*"Feedback in class is very important. Even though students learn outside the classroom, assessments help reinforce what they've learned and improve performance."*

c) Tensions and Future Directions in the Context of Internationalization

- Lack of resources: While teachers recognize the importance of internationalization in student education, many pointed out that limited resources (e.g., trained personnel and technological infrastructure) and institutional support hinder effective implementation.

*"Educational internationalization is important, but we don't always have the budget to support these practices."*

- Pedagogical preparation: Internationalization initiatives are valuable but often misaligned with classroom realities and teaching preparation.

*"There should be a training program for teachers, because internationalization is not just about the institution—it involves all personnel"*

- Continuous training: Teachers expressed that ongoing training is essential to overcome internationalization challenges. They anticipate that, over time, universities will develop more specific and tailored programs for internationalization needs.

*"I value training programs, but they're often not appreciated by academia, and sometimes it's too costly to access proper training"*

d) Perceptions of Mental Health

- Emotional well-being: Some teachers reported that implemented strategies have improved their well-being, while others noted persistent difficulties. One teacher shared:

*"Feeling good about yourself is essential to staying motivated and committed to students. But we must also consider the poor logistics of the situation"*

- Emotional impact of pedagogical strategies: Teachers had varied views on how pedagogical practices affect stress, anxiety, and emotional balance. Two contrasting perspectives emerged: *"It's had a positive impact on my work,"* said one teacher, while another noted: *"These teaching strategies have brought me stress and workload overload."*

## DISCUSSION

The research findings, based on the objectives addressed, reveal four key categories that influence the professional development of instructors in university English programs. These categories are identified as structural barriers, pedagogical best practices, the impact of Education 4.0 on internationalization, and the relationship between learning strategies and teacher mental health.

The exploratory factor analysis identified underlying structures in three of the four categories, with variance percentages ranging from 53.35% to 69.40%. Notably, a strong correlation ( $r = 0.93$ ) was found between pedagogical best practices and teacher mental health, suggesting a bidirectional relationship between emotional well-being and the implementation of effective teaching strategies. The complementary qualitative analysis revealed significant tensions between institutional aspirations for internationalization and the everyday realities faced by instructors, which are marked by workload overload and limited resources.

### **Structural Barriers and Obstacles in Teacher Professional Development**

Two factors were identified, explaining 69.40% of the total variance. The first factor (39.10%) groups elements related to internationalization (Q33, Q34, Q35), while the second (30.30%) is associated with teacher training and preparation (Q5, Q8, Q29). This two-factor structure suggests that the obstacles perceived by instructors are primarily organized around challenges related to international engagement and limitations in professional development (Zurita & Pinos, 2024).

Structural barriers—such as deficiencies in institutional policies, excessive workloads, and the disconnect between training offerings and real classroom needs—have emerged as key limitations to teacher professional development. Chin et al. (2022), similarly argue that the primary barriers to professional growth include lack of funding, low motivation, insufficient logistical support, and limited time for instructors to implement development strategies. A significant factor contributing to the unexpected rise of new teaching methodologies in the educational system was the impact of the COVID-19 pandemic, which necessitated remote teaching and led many instructors to reevaluate their teaching methods and professional identity (Choi et al., 2021).

Beyond individual perspectives, the lack of institutional policies or logistical support has also been highlighted, often manifesting as bureaucracy, inequitable hiring or promotion practices, and even nepotism (Muthanna & Sang, 2023). Despite this somewhat pessimistic Outlook González & Ramírez (2022), explain that even when institutions offer learning programs, their success also depends on instructors' digital literacy. Similarly, Fernandes et al. (2023), emphasizes in his research that academic development among teaching staff must be prioritized, as it is essential for ensuring high-quality instruction for students.

### **Emerging Best Practices in the English Teaching Program**

The 53.35% variance found in this section is explained by two factors. The first factor (28.38%) encompasses innovative pedagogical approaches (Q4, Q6, Q9, Q16, Q22), while the second (24.97%) focuses on feedback and collaboration (Q6, Q13, Q27, Q28). This structure reflects a distinction between methodological aspects and relational aspects of teaching practice. Costan et al. (2021) and (Zhang, 2024), suggest that emphasizing collaborative learning and emerging digital competencies helps prevent a return to traditional, outdated educational models. On the qualitative side, the adoption of approaches such as CLIL (Content

and Language Integrated Learning) and TBLT (Task-Based Language Teaching) aligns with the findings of Ruiz-Cecilia et al. (2023), who highlight the potential of these methods to enhance pedagogy in transnational education. Overall, CLIL and TBLT were positively received and valued by participants.

### **Impact of Education 4.0 on Professional Development and Internationalization**

The factor analysis revealed a high correlation among variables ( $r = 0.83$ ), suggesting that most instructors perceive the elements of Education 4.0 as a highly integrated construct. This contrasts with Karimova et al. (2023), who identify several distinct dimensions within the framework of Education 4.0. Most responses to questions categorized under the domain of teacher internationalization acknowledged its importance, while emphasizing the lack of adequate resources, misalignment with classroom needs, and limited institutional support. This strong correlation may be explained by participants' experiences during the early stages of implementing Education 4.0 in the Ecuadorian context.

### **Relationship Between Learning Strategies and Teacher Mental Health**

Two factors were identified, explaining 66.55% of the variance. The first factor (42.10%) groups elements related to emotional preparedness and training (Q2, Q5, Q8, Q12, Q15, Q17, Q29), while the second factor (24.45%) is associated with motivation and balance (Q18, Q20, Q29). This structure suggests a distinction between formative aspects and motivational aspects of teacher well-being. There is a divided perspective: on one hand, some teachers report increased stress due to the workload associated with implementing educational strategies; on the other hand, some feel motivated and engaged. Teachers' perceptions regarding the implementation of Education 4.0 strategies are divergent. One side reports emotional and cognitive strain linked to intensive use of digital technologies, which can lead to stress, fatigue, or even digital burnout syndrome (Abubakar et al., 2025). Conversely, some faculty members report feeling motivated and professionally renewed by contemporary pedagogical challenges (Anis, 2024).

The strong correlation between pedagogical best practices and teacher mental health ( $r = 0.93$ ) can be explained within the framework presented by Costan et al. (2021), who note a common fear of adopting Education 4.0 strategies in developing countries. They explain that prolonged exposure to digital devices has been linked to physical and mental health issues, including symptoms of anxiety, digital fatigue, or occupational stress—conditions that may result in decreased motivation.

Since professional competencies are deeply tied to individual emotional states—an essential psychological component in executing any task—teachers must adopt a growth mindset at the international level to achieve metacognitive learning. For metacognitive learning to serve as a protective factor, individuals must believe that their abilities can be developed through effort and continuous learning, thus strengthening resilience and self-confidence in changing environments (González & Ramírez, 2022).



Bondin & Zammit (2025), argue that, to bridge the gap between traditional models and the demands of today's industrial context, it is essential to guide teacher training toward a model based on Education 4.0. This model should promote immersive, meaningful learning aligned with the competencies required by a rapidly evolving digital economy.

### Limitations and Future Research

This study represents an initial contribution to the analysis of teacher professional development in university English programs in Ecuador within the framework of Education 4.0. However, it presents several methodological and contextual limitations that should be considered when interpreting the results. First, the small sample size—50 participants—affects the statistical robustness of the exploratory factor analysis, as such analysis typically requires larger samples to ensure adequate stability of the factor structure (Zhang, 2024). Additionally, a potential ceiling effect was identified in the scores, which could limit the instrument's sensitivity to interindividual variations. The possibility of self-selection bias is also acknowledged, given that teachers who voluntarily participated may be more committed to their professional development, potentially leading to more favorable perceptions (Anis, 2024).

The cross-sectional nature of the study limits the ability to observe changes over time or establish causal relationships. Therefore, future research should incorporate longitudinal designs that enable the monitoring of changes in teacher perceptions, especially in response to sustained pedagogical interventions (Choi et al., 2021). Further exploration of the link between pedagogical practices and teacher well-being is also recommended, given the high correlation found in this study and the increasing relevance of this relationship in digitally transforming environments (Abubakar et al., 2025). Additionally, including the student perspective could enrich the analysis by offering a bidirectional view of the educational phenomenon (Chin et al., 2022).

### CONCLUSIONS

The analyses confirm that the four objectives set for this study were met. First, the exploratory-factor findings show that perceived obstacles to professional development are organised around two well-defined, data-driven dimensions—internationalisation challenges and limitations in training and preparation—together explaining 69.4 % of the variance; this validates the initial assumption that structural conditions constitute a discrete barrier to continuous teacher growth. Secondly, the two-factor solution obtained for emerging classroom practices (53.35 % of total variance) demonstrates that innovative pedagogical approaches and systematic feedback–collaboration form separate, measurable components of good practice, thus addressing the hypothesis that specific methodological clusters underpin effective teaching. Third, the singular matrix encountered for the Education 4.0 block indicates that instructors experience the technological, pedagogical and organisational aspects of this construct as a single, tightly inter-

related domain, supporting the premise that Education 4.0 operates holistically rather than as loosely connected elements. Finally, the exceptionally high correlation ( $r = 0.93$ ) between good practices and teacher mental health corroborates the expected positive linkage between effective pedagogy and emotional well-being, while the weaker associations observed for structural barriers highlight how institutional constraints remain relatively detached from individual wellness.

Taken together, these results provide empirical evidence that (a) institutional policies and workload conditions continue to delimit teachers' professional capacity; (b) active methodologies, continuous feedback and collaborative learning constitute the core of effective practice in university English programmes; (c) Education 4.0 is perceived as a unified transformative driver rather than a set of independent tools; and (d) teacher well-being is strongly reinforced when those good practices are present. These findings represent a novel contribution for Ecuadorian higher education by quantitatively linking pedagogical practice with mental health and by clarifying the structural configuration of Education 4.0 readiness among language instructors.

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