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Multivariable Study of Innovative Competence Profile in University Faculty: Analysis of Determining Factors and Their Relationship to Improvement of Educational Quality

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Abstract

Innovation in university education has become a key pillar for improving learning quality and ensuring faculty adaptation to the challenges of the 21st century. This study aims to analyze the innovative competence profile of university faculty, exploring their disposition toward innovation, the use of advanced pedagogical methodologies, and their integration of information and communication technologies (ICT). A quantitative, non-experimental, cross-sectional design was employed, using a validated questionnaire administered to a sample of 136 faculty members at the University of Murcia. Findings indicate that educational innovation in higher education is influenced by both individual and institutional factors. Female faculty members demonstrate greater openness to innovation, particularly in development and training, while those with intermediate teaching experience (11–20 years) report higher implementation of innovative methodologies compared to those with less than 10 years or more than 20 years of experience. Additionally, the Faculty of Education stands out for its integration of innovative strategies, in contrast to other faculties where adoption is more limited. Despite a generally positive attitude toward innovation, shortcomings were identified in the evaluation and dissemination of these methodologies, which hinder their consolidation within the academic community. The results highlight the need for institutional strategies that enhance teacher training, promote effective evaluation, and foster interfaculty collaboration to share experiences and best practices.

Keywords: educational innovation; higher education; teacher competencies; teacher training; methodology

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1. Introduction

Twenty-first century higher education is at a critical juncture of redefinition, confronted with challenges and opportunities that demand an innovative and adaptive response from educational institutions and, fundamentally, from faculty members (UNESCO, 2024). This scenario—characterized by disruptive technological advances, globalized labor markets, and the pressing need to promote equity and educational quality—requires a thorough reassessment of the role of university faculty and their capacity to foster meaningful and transformative learning (Díaz-Barriga, 2021).

UNESCO (2024) highlights the relevance of higher education as a driver of individual and social development, promoting economic, technological, and social progress. It also underscores its role in fostering knowledge exchange, research, and innovation, and in preparing students for a constantly evolving labor market. At the same time, it recognizes the challenge of ensuring equitable access to higher education, particularly for vulnerable groups, in alignment with Sustainable Development Goal (SDG) 4.

Globalization and the knowledge society—two interrelated phenomena—have transformed the educational landscape (Bernate & Vargas, 2020). Globalization has created a divide between the "globalizers" and the "globalized," generating a segmented world society in which some sectors benefit from globalization while others remain excluded from its advantages (Díaz-Barriga, 2021). In contrast, the knowledge society is defined by the increasing value placed on knowledge and information in production processes, requiring educational institutions to promote skills and competencies related to knowledge management, innovation, and creativity (Moscoso & Carpio, 2022).

In this context, higher education faces both quantitative and qualitative challenges. Quantitatively, it must address a continuously growing student body without compromising educational quality. Information and communication technologies (ICT) offer opportunities to improve efficiency and scalability in higher education, although their effective implementation demands careful planning and investment in faculty training (Guerrero, 2018; C. Hernández et al., 2014). Qualitatively, there is a need to ensure the quality of faculty, students, curricula, and teaching–learning methods. Universities must strengthen interdisciplinary capacities in teaching, research, and innovation, adopt more flexible academic structures, and incorporate lifelong learning through professional development programs for faculty (Rodríguez-Gómez & Gairín, 2015; Vaillant & Marcelo, 2021).

In this scenario, the role of university faculty is undergoing a significant transformation—from being the central figure in the educational process to becoming a guide, facilitator, and co-learner alongside students (Bokova, 2015). This transformation requires prioritizing competencies such as critical thinking, problem-solving, and independent learning (Díaz-Barriga, 2021). Educational institutions must therefore promote innovation competence from an organizational perspective (Rodríguez-Gómez & Gairín, 2015).

Innovation competence is defined as the ability to generate, promote, and implement new ideas, approaches, and solutions in teaching and learning (Deroncele-Acosta et al., 2021). It encompasses technical and pedagogical skills, as well as attitudes and values enabling faculty to adapt to change, experiment with new methodologies, and create transformative learning environments (Caliskan & Zhu, 2020). In this sense, faculty face the complex mission of making education more appealing and preparing students for active participation in the knowledge society (Sanz-Ponce & González-Bertolín, 2018).

It is therefore essential to understand that education is more than mere instruction, and must aim toward the integral formation of the human being (Jarauta & Imbernón, 2012). At the global level, education is experiencing changes in pedagogical approaches, content, and learning environments, affecting both primary and higher education (Bokova, 2015). Educational innovation implies a dynamic interaction across organizational levels, supported by a culture that encourages proactivity, creativity, and continuous improvement (Deroncele-Acosta et al., 2021).

As UNESCO (2016) notes regarding contemporary innovation: "The urgency to adapt education to societal changes in knowledge, technology, information, new languages, communication, and research led to incorporating innovation as a central aspect of the new social landscape." Innovation is thus based on learning and transformative action,

requiring organization and planning to achieve a broad societal impact. Institutions that strive to innovate tend to become more flexible, avoiding stagnation and fostering systems that are less individualistic and more participatory.

Consequently, teacher performance evaluation models should include an innovation-oriented dimension, encouraging self-reflection and self-assessment of teaching practices, and fostering a willingness to introduce changes and improvements in planning, delivering, and assessing student learning (ANECA, 2015).

In this regard, teacher training—both initial and ongoing—is essential for promoting innovation and continuous improvement in educational practice (Delgado, 2014; Vaillant & Marcelo, 2021). Teaching not only involves mastering subject content but also acquiring the pedagogical skills and knowledge necessary for effective instruction (Tedesco, 2003).

From the university perspective, fostering innovation and professional development is a key mechanism for improving teaching quality. To achieve high-quality teaching, universities must regulate and promote faculty training programs, supporting the development of personal skills, curriculum planning strategies, program design, and participation in organizational management (De Miguel López et al., 2020). Likewise, a climate of innovation and institutional support should prevail, ensuring that innovation permeates from educational research into curricula and classroom practices (Cárdenas et al., 2017).

Díaz-Barriga (2021) emphasizes the importance of adapting teaching to the characteristics and needs of each student group, fostering reflection on the learning process, encouraging interaction and dialogue in the classroom, and integrating ICT to enrich teaching.

ICT plays a central role in transforming teaching and learning, enabling faculty to guide students toward diverse resources and tools that promote deeper knowledge construction (Bokova, 2015). Digital competence is therefore indispensable if educational systems are to modernize methodologies through technology, providing students with valuable learning experiences (Area & Adell, 2021). Without digitally and pedagogically qualified faculty, valuable and innovative ICT-based educational projects cannot be effectively implemented (Fuentes et al., 2019).

Innovation must be understood as a multilevel process involving different activities and individual behaviors at each level (Aznar Más et al., 2016). The traditional paradigm of teacher training is showing signs of wear in the face of 21st-century challenges (Darling-Hammond, 2017). Changes in learning organization, student profiles, and the foundations of knowledge have intensified the need to transform current pedagogical models (Vaillant & Marcelo, 2021). This tension between tradition and innovation has been a constant in education, where innovative faculty behavior is recognized as a key component of educational quality (Klaeijsen et al., 2018).

Educational quality in higher education can be understood as the institution's capacity to provide meaningful, student-centred learning supported by competent faculty, adequate resources, and effective mechanisms for monitoring and improvement (Harvey & Green, 1993; European Association for Quality Assurance in Higher Education, 2015; UNESCO, 2024). In this study, educational quality is not approached as an abstract ideal but as a construct shaped by faculty competences and institutional strategies. Variables such as gender, teaching experience, and faculty affiliation are therefore relevant because they condition teachers' opportunities and dispositions to innovate, which in turn directly affects the quality of teaching and learning.

Given this context, the present study aims to analyze the innovative competency profile of university faculty, identifying the factors influencing the adoption of innovative methodologies and the impact of these strategies on educational quality. Through a quantitative, cross-sectional approach, this research seeks to provide empirical evidence on the

current state of educational innovation in higher education and propose recommendations to strengthen teacher training in this field.

In recent years, the emergence of Generative Artificial Intelligence (GenAI), such as ChatGPT and other large language models, has further transformed the landscape of higher education. These tools not only affect teaching methodologies and assessment practices but also challenge traditional conceptions of academic integrity, creativity, and critical thinking (Baig et al., 2024; McDonald et al., 2024). Incorporating GenAI into the broader discussion of educational innovation is essential, as it provides both opportunities (e.g., enhancing personalized learning, facilitating access to resources, supporting faculty in content creation) and challenges (e.g., ethical use, bias, and the risk of overreliance on automated systems) (O'Dea, 2024). Consequently, innovation competence in university faculty should also be understood in relation to their ability to integrate, regulate, and critically assess the use of GenAI within teaching and learning processes.

Previous research has emphasized that factors such as gender, years of teaching experience, and disciplinary affiliation condition the opportunities and willingness of faculty to innovate (Smith et al., 2020; Knight & Trowler, 2016; P. Hernández et al., 2018). However, the extent to which these variables influence the innovative competence profile remains underexplored. Addressing these gaps is essential for understanding how innovation is distributed across different academic contexts and for identifying areas of improvement in teacher training and institutional support.

1.1. Study Objectives

- To analyze whether the perception of educational innovation varies according to faculty gender.
- To determine the impact of teaching experience on the adoption of innovative methodologies.
- To examine whether there are significant differences in the implementation of innovations depending on the faculty of affiliation.
- To identify which dimensions of the innovative competency profile obtain the highest and lowest scores.

1.2. Research Questions

- Does faculty gender influence the perception and application of educational innovation?
- How does teaching experience affect the incorporation of innovative methodologies?
- Are there significant differences in the implementation of educational innovations according to faculty affiliation?
- Which dimensions of the innovative competency profile exhibit the highest and lowest scores?

2. Materials and Methods

2.1. Study Design

This study follows a quantitative approach, as it focuses on the measurement and numerical analysis of the relationship between educational innovation and various variables such as gender, teaching experience, and faculty affiliation. A non-experimental design was adopted, since the variables were not manipulated but rather observed as they naturally occur in the educational setting (Creswell & Creswell, 2018). Furthermore, it is a cross-sectional study, meaning that the data were collected at a single point in time, providing a representative snapshot of the situation at the moment of the research.

The study design is correlational, as it aims to analyze the relationship between the variables under study without establishing direct causality. In other words, it examines whether there are associations between the perception of educational innovation and factors such as gender, teaching experience, and faculty affiliation, without intervening in their development or altering their natural conditions (Field, 2013).

2.2. Population and Sample

The target population of this study consisted of university lecturers from various faculties at the University of Murcia. As it was not possible to access the entire teaching staff, a non-probability convenience sampling method was employed, meaning that participants were selected based on their accessibility and willingness to participate in the research.

The final sample comprised 136 lecturers (Table 1), ensuring balanced representation across different fields of knowledge, including social sciences, humanities, health sciences, engineering, and natural sciences. Efforts were made to include lecturers with varying levels of professional experience, thereby allowing for an analysis of how academic career trajectory influences the perception and implementation of educational innovation.

Table 1. Population and Sample.

Teachers	Population	%	Sample	%
Faculties	2634	100%	136	5.17%

A total of 136 professors from the University of Murcia participated in this study (Table 2), representing different faculties: Faculty of Education (n = 47; 34.56%), Faculty of Health Sciences (n = 30; 22.06%), and Other Faculties (n = 59; 43.38%). Regarding professional experience, most participants had more than 20 years of teaching experience (n = 50; 36.77%), followed by the group with up to 10 years (n = 46; 33.82%) and, lastly, the group with between 11 and 20 years of experience (n = 40; 29.41%). In terms of gender, 50.74% (n = 69) were women and 49.27% (n = 67) were men.

Table 2. Sample Distribution by Gender, Teaching Experience, and Faculty.

	n	**%**
Gender		
Male	67	49.265
Female	69	50.735
Experience		
Up to 10 years	46	33.824
11 to 20 years	40	29.412
More than 20 years	50	36.765
Faculty		
Education	47	34.559
Health Sciences	30	22.059
Other faculties	59	43.382

To minimize potential sampling bias, efforts were made to include faculty members with diverse profiles in terms of age, gender, and years of experience in higher education teaching. Participation was voluntary, and it was emphasized that the results would be used solely for academic research purposes.

Although the sample size (n = 136) may appear limited in comparison to the total population of faculty members at the University of Murcia (n = 2634), efforts were made to ensure its representativeness by balancing gender, faculty affiliation, and teaching experience. The estimated sampling error at a 95% confidence level is approximately

±8.2%, which is acceptable for the comparative analyses conducted. Nevertheless, the findings should be interpreted within the specific institutional context of the University of Murcia and should not be generalized to other settings without due caution.

2.3. Data Collection Instrument

The data collection instrument used in this study was a structured questionnaire developed by Fernández-Cruz and Rodríguez-Legendre (2022a) and Fernández-Cruz and Rodríguez-Legendre (2022b), based on previous models for assessing teaching innovation in higher education. Specifically, this validated questionnaire—used in prior studies—comprises nine dimensions and 54 items related to innovative teaching competencies (Appendix A).

The nine dimensions assessed in the questionnaire were:

1. Teacher's innovative disposition (attitude and motivation towards innovation).
2. Development and implementation of innovations (application of innovative methodologies in the classroom).
3. Training in educational innovation (participation in courses, workshops, and professional development programs).
4. Research applied to pedagogical innovation (publications and studies on teaching innovation).
5. Design of active methodologies (use of strategies such as problem-based learning, gamification, flipped classroom, etc.).
6. Use of technological resources in teaching (integration of ICT into teaching and learning processes).
7. Innovative assessment strategies (use of rubrics, self-assessment, and formative assessment).
8. Impact of innovation on educational quality (teachers' perception of the effectiveness of innovative methodologies).
9. Dissemination of innovation in academia (participation in conferences, innovation networks, and inter-university collaboration).

Each dimension was measured using a five-point Likert scale (1 = Never/Not at all; 5 = Always/Very much), allowing for the quantification of faculty perceptions regarding different aspects of educational innovation. The questionnaire was reviewed by higher education experts to ensure content validity, and its statistical reliability was evaluated using Cronbach's alpha, yielding values above 0.80, which indicate high internal consistency.

2.4. Data Collection Procedure

The data collection process was conducted through an online survey, administered via academic platforms and the university's institutional email system. This strategy allowed for broader outreach to faculty members in an efficient manner, ensuring accessibility to the survey from any device.

Prior to completing the questionnaire, participants received an information sheet and informed consent form outlining the study's objectives, data confidentiality, and the voluntary nature of participation. It was ensured that no faculty member was compelled to participate, and a contact point was provided for any inquiries regarding the research.

The data collection period lasted six weeks, during which reminder messages were sent to participants to maximize the response rate. After the data were gathered, an initial screening was conducted to remove incomplete or erroneous responses, thereby ensuring the quality of the analysis.

For the analysis of the collected data, IBM SPSS Statistics software (version 28) was used. Various statistical techniques were applied to address the study's research objectives.

2.5. Ethical Considerations

This study received approval from the Ethics Committee of the University of Murcia, ensuring compliance with ethical principles for research in education. The guidelines established in the Declaration of Helsinki and the Personal Data Protection Law were followed, guaranteeing participants' confidentiality and the exclusive use of the data for academic purposes.

All faculty members who participated in the study were provided with clear information regarding the research objectives, the voluntary nature of their participation, and their right to withdraw at any time without consequences. Anonymity of responses was ensured, and the data were stored on secure servers with access restricted solely to the researchers responsible for the study.

3. Results

3.1. Data Analysis

The present study is descriptive, exploratory, and correlational. All analyses were conducted using IBM SPSS Statistics 29. The first step was to compute the means, standard deviations, and internal consistency for each component of teaching innovation (TI) through Cronbach's alpha coefficient (α). Subsequently, correlations among the TI dimensions were examined using Pearson's correlation coefficient. Differences by gender were analyzed using Student's t-test for independent samples, and one-way ANOVA was employed to examine differences according to teaching experience groups and faculty affiliation.

3.2. Descriptive and Correlation Analyses

Descriptive statistical analyses were performed to address the first research question regarding the correlation between the different components of teaching innovation (TI). In parallel, mean scores, standard deviations, and Cronbach's alpha values were calculated as indicators of reliability (Table 3).

Table 3. Descriptive statistics and correlation matrix of the study variables.

Dimension	M	SD	Alpha	Development	Training	Research	Design	Methodology	Resources	Evaluation	Dissemination
Disposition	4.096	0.749	0.874	0.547 **	0.457 **	0.273 **	0.471 **	0.408 **	0.298 **	0.278 **	0.259 **
Development	3.471	0.902	0.859		0.635 **	0.533 **	0.516 **	0.497 **	0.555 **	0.547 **	0.588 **
Training	3.537	1.081	0.896			0.419 **	0.432 **	0.396 **	0.451 **	0.498 **	0.620 **
Research	3.471	1.154	0.894				0.589 **	0.496 **	0.570 **	0.536 **	0.594 **
Design	3.654	0.829	0.806					0.459 **	0.581 **	0.358 **	0.425 **
Methodology	3.537	1.018	0.600						0.528 **	0.399 **	0.479 **
Resources	3.169	0.891	0.628							0.552 **	0.584 **
Evaluation	2.434	1.009	0.690								0.623 **
Dissemination	2.574	1.052	0.754								

Note: ** $p < 0.01$ (two-tailed).

As shown in Table 3, statistically significant correlations were found among all dimensions of teaching innovation. Notably, most correlation coefficients exceeded 0.50 across the majority of dimension pairings.

3.3. Differences in ID Dimensions by Gender

To address our second research question, we analyzed differences in the ID variables according to gender.

The analysis examined whether the dimensions differed by gender and found statistically significant differences in the Disposition dimension ($t = -2.670$; $p = 0.009$), with a higher mean score among women ($M = 4.261 \pm 0.634$) than men ($M = 3.950 \pm 0.822$);

in the Development dimension (t = −3.041; p = 0.003), with women scoring higher (M = 3.696 ± 0.845) than men (M = 3.239 ± 0.906); and in the Training dimension (t = −3.639; $p < 0.001$), where women again obtained higher scores (M = 3.855 ± 1.019) than men (M = 3.209 ± 1.052). Significant differences were also found in the Total ID score (t = −2.362; p = 0.020), with women scoring higher (M = 3.467 ± 3.680) than men (M = 3.182 ± 0.725).

As shown in Figure 1, female faculty obtained higher mean scores than their male counterparts in disposition, development, training, and methodology, as well as in the total innovation competence score. This visual representation complements the statistical analysis presented in Table 4 and allows a clearer comparison between groups.

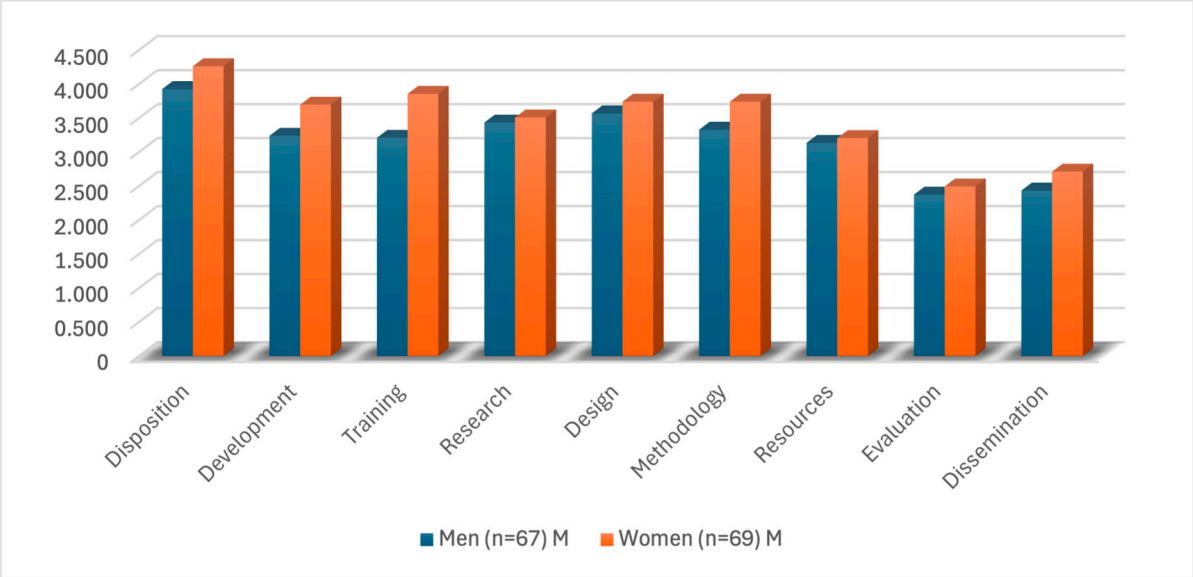

Figure 1. Differences in the dimensions of the innovation competence profile according to gender (n = 136).

Table 4. Student's t-test for ID dimensions by gender.

	Men (n = 67) M	Men (n = 67) SD	Women (n = 69) M	Women (n = 69) SD	t	p
Disposition	3.925	0.822	4.261	0.634	−2.670	0.009
Development	3.239	0.906	3.696	0.845	−3.041	0.003
Training	3.209	1.052	3.855	1.019	−3.639	<0.001
Research	3.433	1.131	3.507	1.184	−0.375	0.709
Design	3.567	0.857	3.739	0.798	−1.212	0.228
Methodology	3.328	0.991	3.739	1.010	−2.394	0.018
Resources	3.134	0.903	3.203	0.884	−0.447	0.655
Evaluation	2.373	1.027	2.493	0.994	−0.690	0.491
Dissemination	2.433	1.033	2.710	1.059	−1.545	0.125
Total	3.182	0.725	3.467	0.680	−2.362	0.020

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation, as well as the experimental conclusions that can be drawn.

3.4. Differences in ID Dimensions Based on Teaching Experience

To address our third research question, we analyzed differences in ID variables according to teaching experience as a university professor.

Three experience groups were considered: high (more than 20 years of experience), medium (11 to 20 years of experience), and low (up to 10 years of experience).

The dimensions in which differences were found between at least two experience groups were as follows: Development (p = 0.663), with a higher mean in the medium-experience group compared to the low-experience group (diff = 0.460; p = 0.049) and also compared to the high-experience group (diff = 0.610; p = 0.004).

For Research (p = 0.004), the medium group also scored higher than the high-experience group (diff = 0.620; p = 0.029). Similar patterns were observed for Methodology (p = 0.001) (diff = 0.815; p < 0.001), Resources (p = 0.031) (diff = 0.480; p = 0.032), and Dissemination (p = 0.007) (diff = 0.685; p = 0.006).

These differences, favoring the medium-experience group (11–20 years) over the high-experience group (more than 20 years), were also found in the total test score (p = 0.006) (diff = 0.477; p = 0.004).

As illustrated in Figure 2, faculty members with 11–20 years of teaching experience obtained higher mean scores than both early-career lecturers (≤10 years) and senior lecturers (>20 years). These differences are particularly notable in the dimensions of development, research, methodology, resources, dissemination, and in the total innovation competence score. The figure provides a clearer visualization of the statistical results presented in Table 5.

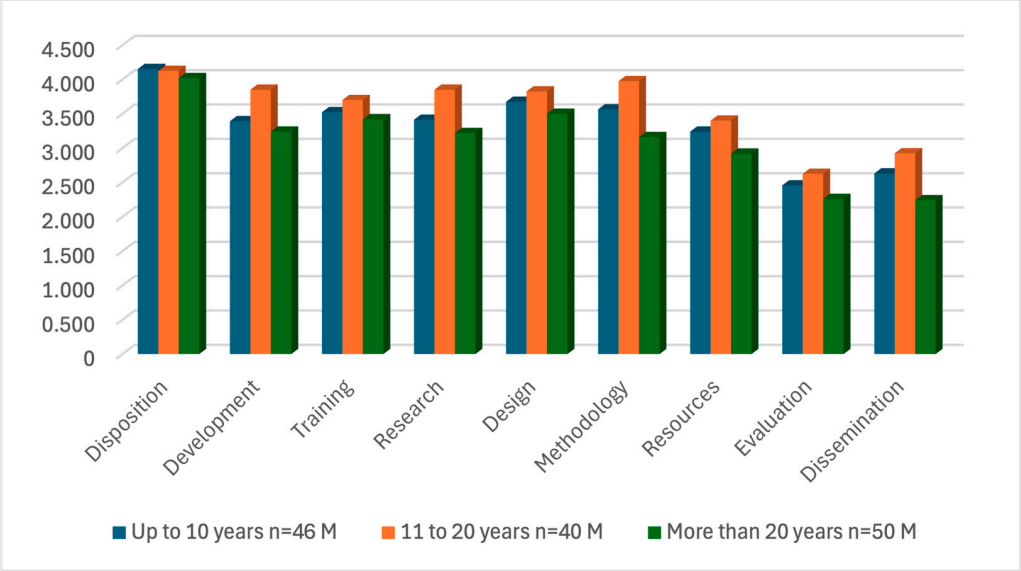

Figure 2. Differences in the dimensions of the innovation competence profile according to teaching experience (n = 136).

Table 5. ID Dimensions by Teaching Experience. One-way ANOVA.

	Up to 10 Years n = 46		**11 to 20 Years n = 40**		**More Than 20 Years n = 50**		***p*-Value**
	M	**SD**	**M**	**SD**	**M**	**SD**	
Disposition	4.152	0.698	4.125	0.757	4.020	0.795	0.663
Development	3.391	0.906	3.850	0.893	3.240	0.822	0.004
Training	3.522	1.150	3.700	0.992	3.420	1.090	0.475
Research	3.413	1.240	3.850	0.975	3.220	1.148	0.032

Table 5. *Cont.*

	Up to 10 Years n = 46		11 to 20 Years n = 40		More Than 20 Years n = 50		p-Value
	M	**SD**	**M**	**SD**	**M**	**SD**	
Design	3.674	0.845	3.825	0.781	3.500	0.839	0.178
Methodology	3.565	1.003	3.975	0.974	3.160	0.934	0.001
Resources	3.239	0.923	3.400	0.928	2.920	0.778	0.031
Evaluation	2.457	1.005	2.625	1.055	2.260	0.965	0.231
Dissemination	2.630	1.123	2.925	1.047	2.240	0.894	0.007
Total	3.338	0.723	3.586	0.735	3.109	0.626	0.006

3.5. Differences in ID Dimensions by Faculty or Field of Knowledge

To address our fourth research question, we analyzed differences in the ID variables according to faculty or field of knowledge.

Differences in the various ID dimensions were examined based on the three fields of knowledge, and statistically significant differences were found in at least two of the areas for Development (p = 0.006), with Education scoring higher than Health Sciences (diff = 0.900; p = 0.002) and also higher than Other faculties (diff = 0.520; p = 0.008). Significant differences were also observed in Research ($p < 0.001$), where Education scored higher than Health Sciences (diff = 0.900; p = 0.002) and Other faculties (diff = 0.763; p = 0.002). For Design (p = 0.016), Education again scored higher than Health Sciences (diff = 0.551; p = 0.013). In Methodology (p = 0.003), Education outperformed Health Sciences (diff = 0.794; p = 0.002). In Resources (p = 0.016), Education scored higher than Other faculties (diff = 0.468; p = 0.020). For Evaluation ($p < 0.001$), Education scored higher than Health Sciences (diff = 0.667; p = 0.007) and Other faculties (diff = 0.966; $p < 0.001$). Finally, in the Dissemination dimension ($p < 0.001$), Education once again scored higher than Health Sciences (diff = 0.618; $p < 0.001$) and Other faculties (diff = 0.545; $p < 0.001$).

As shown in Figure 3, faculty members from the Faculty of Education obtained higher mean scores across most dimensions—development, research, design, methodology, resources, evaluation, and dissemination—when compared to colleagues from Health Sciences and other faculties. This visual representation complements the statistical data presented in Table 6, allowing a clearer appreciation of the disciplinary differences in innovation competence.

Table 6. Differences in ID Dimensions by Faculty.

	Education n = 47		Health Sciences n = 30		Others n = 59		p-Value
	M	**SD**	**M**	**SD**	**M**	**SD**	
Disposition	4.170	0.702	3.933	0.691	4.119	0.811	0.384
Development	3.809	0.876	3.300	0.702	3.288	0.948	0.006
Training	3.830	0.963	3.333	1.241	3.407	1.052	0.067
Research	4.000	0.885	3.100	1.242	3.237	1.165	<0.001
Design	3.851	0.659	3.300	0.837	3.678	0.899	0.016
Methodology	3.894	0.938	3.100	0.885	3.475	1.056	0.003
Resources	3.468	0.856	3.033	0.850	3.000	0.891	0.016
Evaluation	3.000	1.000	2.333	0.884	2.034	0.870	<0.001
Dissemination	3.277	0.926	2.300	0.837	2.153	0.962	<0.001
Total	3.700	0.612	3.081	0.623	3.154	0.722	<0.001

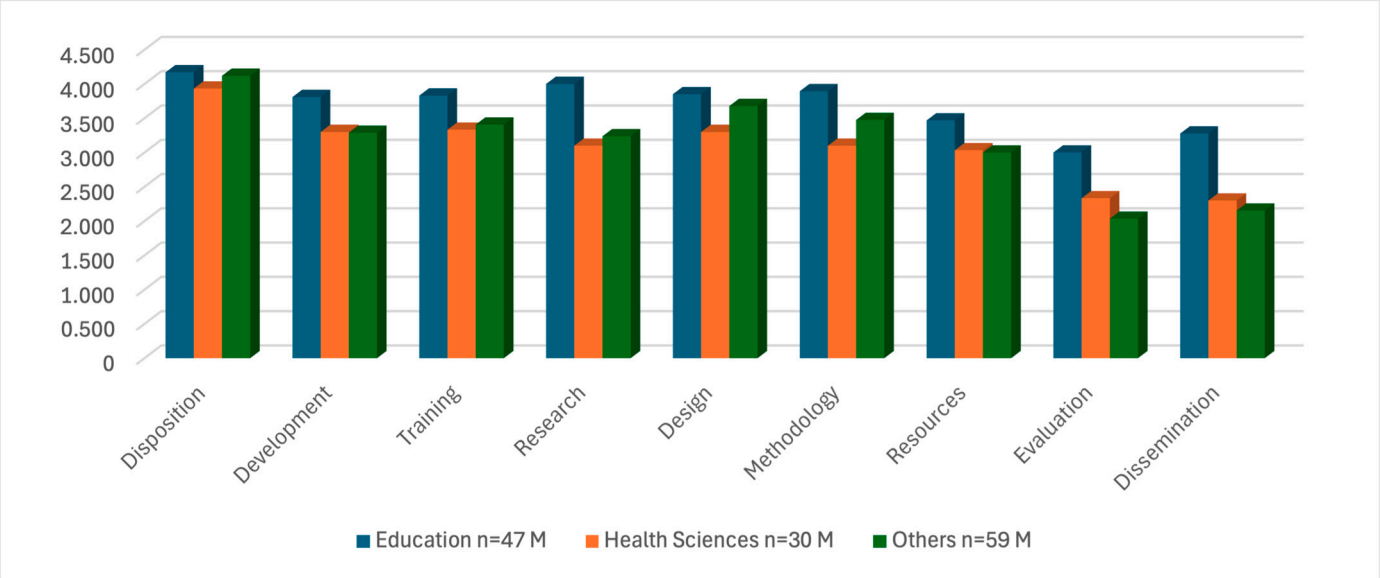

Figure 3. Differences in the dimensions of the innovation competence profile according to faculty affiliation (n = 136).

4. Discussion

The results of this study underscore the multifaceted nature of educational innovation in the university context and the interplay between individual and institutional factors. Innovation in higher education depends not only on the willingness of faculty members but also on the conditions, resources and academic cultures in which they operate. By examining differences across gender, teaching experience and faculty affiliation, this study provides a nuanced understanding of both the challenges and opportunities involved in implementing innovative methodologies.

With respect to gender, the data reveal that female faculty members obtained significantly higher scores in disposition, development and training, suggesting a greater tendency to incorporate innovative practices in their teaching. This pattern echoes earlier findings showing that women in academic roles often participate more actively in pedagogical updating and professional development activities (Smith et al., 2020; Johnson & Brown, 2019). However, large-scale analyses of digital competence among university faculty across Europe and Latin America did not find significant differences in self-perceived digital competence between men and women (Inamorato dos Santos et al., 2023). Similar results were reported in a recent study of Galician universities, where gender was not a factor relevant to digital competence, although age and disciplinary area were (Fernández-Morante et al., 2023). These contrasting findings suggest that factors other than gender—such as access to training, age or institutional support—may play a more decisive role and merit further investigation.

Regarding teaching experience, faculty in the mid-career stage (11–20 years) reported greater use of innovative strategies than early-career or senior faculty. Such mid-career advantage may reflect an optimal balance between receptiveness to new methods and accumulated confidence. In contrast, faculty with more than 20 years of experience demonstrated lower levels of implementation, possibly because of stronger reliance on established routines and reduced willingness to adopt new approaches. These results align with research indicating that innovation tends to decline with seniority, emphasizing the need for targeted professional development for experienced faculty (Knight & Trowler, 2016). Recent evidence also shows that digital competence decreases as teachers age and increases with institutional support (Fernández-Morante et al., 2023; Inamorato dos Santos et al., 2023),

underscoring the importance of renewal strategies that ensure all career stages contribute equally to teaching quality.

Significant differences were also found by faculty affiliation. Members of education faculties consistently scored higher in development, research, design, methodology, resources and dissemination than colleagues from health sciences or other faculties. This advantage may stem from the pedagogical emphasis within education programmes, where innovation and faculty training are central. In contrast, faculties with a more technical or professional focus may prioritize disciplinary expertise over pedagogical renewal, potentially limiting innovation (P. Hernández et al., 2018; Martínez et al., 2020). Studies of disciplinary cultures have shown that each discipline shapes perceptions of essential knowledge and influences how teaching is conducted (Starkey et al., 2023). Digital technologies tend to be integrated more in "soft" and applied disciplines than in "hard" fields (Starkey et al., 2023), which may explain why education faculties appear more innovative. Such disciplinary disparities highlight the need to foster cross-faculty collaboration and knowledge transfer, as well as to consider discipline-specific cultures in quality assurance processes.

Although this study offers a quantitative snapshot of innovative competences, the underlying reasons for these patterns warrant further exploration. The higher scores among women could reflect greater access to professional development or stronger engagement in collaborative teaching cultures; conversely, the lower scores among senior faculty may be associated with resistance to change. Indeed, research on inclusive teaching reports that teachers often struggle to broaden their knowledge and change their practices (Brussino, 2021), indicating that resistance to innovation is a persistent obstacle. These insights reinforce the need for qualitative research to examine the mechanisms driving innovation and to identify structural and motivational factors that inhibit or support change.

Beyond the comparative findings, the analysis also identified strengths and weaknesses critical for institutional strategies. The highest scores appeared in disposition and design, reflecting positive attitudes and creativity. By contrast, evaluation and dissemination received the lowest scores, signalling persistent difficulties in assessing the effectiveness of innovations and sharing them with the wider academic community (López et al., 2021; Pérez et al., 2018). These weaknesses may stem from insufficient training in evaluation methods and a limited culture of interfaculty collaboration. Studies on digital competence stress the need for stronger pedagogical training and institutional support to develop evaluation skills and foster innovation (Fernández-Morante et al., 2023). Without systematic evaluation and dissemination, the feedback loops essential to educational quality frameworks cannot function effectively.

Taken together, the findings suggest several practical directions for institutions. Professional development should be differentiated by faculty profile, with specific programmes for senior academics and discipline-based training that focuses on pedagogical practice rather than mere technological skills. Universities should establish systematic mechanisms for evaluating innovations so that new methodologies are not only implemented but also assessed for their impact on student learning and teaching quality. Cross-faculty collaboration is equally important; communities of practice can facilitate resource sharing and the dissemination of successful experiences. Finally, institutional leadership must actively incentivize and recognize innovative practices and integrate them into long-term strategic priorities. Recent research demonstrates that providing adequate institutional support significantly enhances digital competence (Inamorato dos Santos et al., 2023), underscoring the role of leadership in creating enabling environments.

These conclusions have important implications for quality assurance and accreditation. Frameworks such as the ESG and national programmes like ANECA's DOCENTIA increasingly require evidence of pedagogical innovation and systematic evaluation. The

results underline the need for differentiated development strategies that consider gender, experience and disciplinary context, ensuring that all groups contribute to institutional quality goals. Embedding innovation competences into quality assurance mechanisms can strengthen universities' ability to meet accreditation standards while improving students' learning experiences.

Limitations

This study relied exclusively on faculty self-assessment data. Although the validated questionnaire provides reliable insights into innovative competences, it does not incorporate complementary perspectives such as student feedback, administrative records, performance outcomes, or expert evaluations. Future research should triangulate data from multiple sources to move beyond subjective perceptions and provide a more systematic and comprehensive measurement of innovation in higher education.

5. Conclusions

Considering the results obtained and the reflections presented, this study concludes that the innovative competence of university faculty is an essential factor for addressing the current challenges and demands of higher education. While there is a general predisposition toward innovation, critical areas remain that require targeted attention. Continuous training and a supportive institutional culture emerge as fundamental pillars for fostering the adoption of innovative pedagogical practices. Likewise, participation in collaborative networks and the development of an academic environment open to feedback are identified as key enabling elements.

The analysis highlights that both individual factors—such as gender and teaching experience—and institutional factors—such as the pedagogical orientation of faculties—significantly influence the implementation of educational innovation. Female faculty, those with intermediate teaching experience (11–20 years), and members of education faculties show a greater inclination toward innovative practices, suggesting the need for differentiated approaches in faculty training and professional development. At the same time, the low scores obtained in evaluation and dissemination underscore the urgency of designing training programs specifically focused on these dimensions and of promoting inter-institutional collaboration to share experiences and best practices.

In this context, universities should prioritize the development of comprehensive institutional strategies that not only promote the adoption of innovations but also strengthen faculty capacities to evaluate and disseminate them. As higher education faces increasingly complex challenges, pedagogical innovation becomes a key driver for ensuring teaching quality and preparing students to meet contemporary demands.

Based on these findings, we propose a flexible framework for strengthening educational innovation in higher education. This framework rests on four interconnected pillars:

1. Targeted training—Ongoing professional development tailored to career stages and disciplinary contexts.
2. Systematic evaluation—Tools and indicators that measure the effectiveness and scalability of innovative practices.
3. Collaborative culture—Networks and communities of practice that foster knowledge-sharing across faculties.
4. Institutional support—Leadership commitment through policies, incentives, and resources that sustain innovation.

This adaptable model may guide universities in designing institutional strategies responsive to their specific contexts, while ensuring that innovation contributes effectively to the improvement of educational quality and the integral development of students.

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Appendix A

Questionnaire on the Analysis of the Innovative Competence Profile in the University Teaching Context.

Dear Faculty Member,

We kindly ask for your collaboration in responding to the Questionnaire on the Analysis of the Innovative Competence Profile in the University Teaching Context. This instrument was developed from an adaptation of Fernández-Cruz and Rodríguez-Legendre (2022a) within the framework of the master's degree in research, Evaluation and Quality in Education at the University of Murcia. Its purpose is to analyze and characterize the innovative competence profile of university faculty, identifying key skills, knowledge, and attitudes, as well as the factors that influence the development of these competences. The goal is to provide a comprehensive understanding of the elements required to foster innovation in university teaching.

To this end, the Questionnaire on the Analysis of the Innovative Competence Profile in the University Teaching Context considers the analysis of the following dimensions:

1. Disposition/Innovative Attitude
2. Development of Innovations
3. Training for Innovation
4. Research for Innovation
5. Design/Planning of Innovation
6. Innovative Methodology
7. Innovative Resources
8. Innovative Evaluation
9. Dissemination of Innovation

These dimensions are intended to collect information to achieve the following specific objectives:

1. Identify and analyze the innovative disposition and attitude of university faculty, exploring their perceptions, motivations, and predisposition toward innovation in the context of higher education.
2. Assess the level of development of innovation-related skills and competences among university faculty.
3. Investigate the practices and strategies used by university faculty in the design, implementation, and evaluation of pedagogical innovations.

Your participation is highly valuable, given your teaching and research experience. It is also important that you provide informed consent to participate in this research. Please note that anonymity and confidentiality of the information you provide are fully guaranteed. The analytical treatment of the data will be carried out globally with the evaluations of all participants, making individual identification impossible. At any time, you may decline to continue participating in the study without giving reasons or facing any sanction.

We sincerely thank you in advance for your collaboration and remain at your disposal for any further information or clarification you may require.

Kind regards,
TFM Supervisor: Name
TFM Supervisor: Name
Signed: Name

☐ No ☐ Yes—I give my consent to participate.

Section 1. Sociodemographic Information

- Gender: Male/Female/Other(s)/Prefer not to answer
- Teaching experience: _____ years
- Faculty where you carry out your teaching or research activity: _____
- Undergraduate courses you teach: None/1st/2nd/3rd/4th year
- Postgraduate courses you teach: None/1st/2nd year

Instructions

Below you will find a series of statements related to the subject of this study. Each statement should be rated using the following Likert scale to indicate your degree of agreement:

Likert Scale

- 5 = Very much–Always
- 4 = Quite–Frequently
- 3 = Moderate–Sometimes
- 2 = Little–Rarely
- 1 = None–Never

Please mark with an X the number that best represents your experience regarding each item, using the scale above.

Dimension 1: Disposition/Innovative Attitude

1. I give my students the opportunity to suggest aspects for improvement in my courses and take their suggestions into account.
2. I accept criticism of my teaching performance as constructive feedback from students, colleagues, or supervisors.
3. I face changes in my teaching as personal and professional growth.
4. I introduce changes in my courses based on proposals from other professors, directors, or experts.
5. I approach my teaching as a means of systematically and continuously introducing innovations.

6. I prepare my classes/courses by analyzing and improving on the learning activities from the previous year.
7. I carefully analyze student evaluations of my teaching to identify areas for improvement.
8. Throughout the academic year, I conduct specific studies and analyses to determine improvements in my courses.
9. I take into account students' aptitudes, motivations, and personal/professional needs to introduce innovations in my teaching.
10. In coordination meetings, we analyze ways to improve undergraduate and postgraduate teaching and adapt to social and professional change.

Dimension 2: Development of Innovations

11. I adapt teaching–learning methodologies in undergraduate/postgraduate courses to foster the development of student competences.
12. I introduce innovations in my teaching to promote competences as a foundation of higher education methodologies.
13. I contribute to the creation of a culture of continuous improvement within my undergraduate/postgraduate program.
14. I help my university generate mechanisms for innovation (sharing ideas, creating innovation groups, showcasing materials) to improve teaching.
15. I set specific objectives, derived from self-evaluation of my teaching activity, which I try to achieve through innovation.
16. I participate in teaching innovation projects involving faculty from other programs at my university.
17. I present teaching initiatives at innovation conferences organized by my university.
18. I collaborate on innovation projects involving professors from other programs at my university.
19. I develop innovative teaching experiences in collaboration with different universities.
20. I use questionnaires and other tools to evaluate the impact of the innovation introduced.
21. I analyze the student evaluation surveys conducted by the university to determine the impact of the innovation introduced.

Dimension 3: Training for Innovation

22. I attend training courses on teaching methodologies adapted to the university context.
23. I attend training courses to deepen pedagogical aspects of my activity as a university lecturer.
24. I receive training on new materials/resources being incorporated into my professional field.
25. I train in the use of technologies applied to teaching.
26. I attend training courses on new assessment strategies focused on competences and learning outcomes.
27. I train to organize and manage faculty cooperation groups in undergraduate/postgraduate programs (learning communities).

Dimension 4: Research for Innovation

28. I review the most relevant and recent (last 5 years) high-impact publications on my professional field to stay updated.
29. I participate in academic discussion forums related to my professional field (conferences, professional associations, etc.).
30. I consult recognized national and international professionals in my field of practice.

31. I review the most relevant and recent (last 5 years) high-impact publications on teaching methodologies to stay updated.
32. I review the most relevant and recent (last 5 years) high-impact publications on innovative assessment tools.
33. I review the most relevant and recent (last 5 years) high-impact publications on new teaching resources for higher education.

Dimension 5: Design/Planning of Innovation

34. I manage to align my university's mission/vision with the design of innovations implemented in my courses.
35. When introducing an innovation, I take into account students' needs and motivations at the beginning of classes.
36. When introducing an innovation, I take into account students' professional expectations at the beginning of classes.
37. When introducing an innovation, I take into account the latest professional demands of the labor market.
38. When introducing an innovation, I take into account social problems that need to be addressed through innovation.
39. I design interdisciplinary activities with other professors that allow students to work on content from multiple courses.

Dimension 6: Innovative Methodology

40. I design activities that provide students with real-world experiences linked to their future professional environment (companies, institutions, etc.).
41. I use active methodologies (problem-based learning, project-based learning, flipped classroom, gamification, etc.) in my teaching.
42. I collaborate with faculty, institutions, or other universities in interdisciplinary activities.

Dimension 7: Innovative Resources

43. I search for and select current teaching resources that allow me to innovate in my courses.
44. I hold patents/intellectual property rights for teaching resources/materials.
45. I search for and select innovative materials in my professional field.
46. I hold patents/intellectual property rights for resources/materials in the professional field of the program where I teach.

Dimension 8: Innovative Evaluation

47. I design and apply assessment tools involving the entire community (faculty, students, employers, administrators, technical staff, others).
48. I develop an assessment system where students can evaluate the performance of their peers.
49. I apply forms of assessment that incorporate students as both subjects and objects of the evaluation process.
50. My students participate in creating the evaluation criteria specified in the course activities.

Dimension 9: Dissemination of Innovation

51. I attend activities (workshops, courses, meetings, conferences) where I present my teaching innovations.
52. I publish articles in peer-reviewed journals to disseminate the results of my teaching innovations.

53. I maintain professional and academic networks where I share all aspects related to my teaching innovations.
54. My professional and academic networks have a wide reach (more than 1000 followers), allowing effective dissemination of my innovations.

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