

Evaluating an educational innovation process in higher education: a management model for decision making.

María Isabel Ramírez-Garzón¹ [0000-0003-0975-6528] and Ricardo Abad Barros-Castro² [0000-0002-3708-4522].

¹ Center for Learning, Teaching and Evaluation (CAE+E), Pontificia Universidad Javeriana, Bogota, Colombia.

² School of Engineering, Department of Industrial Engineering, Pontificia Universidad Javeriana, Bogotá, Colombia.

Summary. Scientific and technological advances have generated disruptive changes in society, giving rise to new challenges such as pandemics, environmental deterioration, and poverty. Universities should assume their role as knowledge producers and contribute to the welfare of communities. In this context, educational innovation presents an opportunity to address these issues and promote student learning. To achieve this, institutions must propose models to promote, manage and evaluate educational innovation processes. This article identifies nine factors that influence the design and execution of projects with innovative potential and presents a measurement instrument to evaluate them from the teacher's experience. The instrument is internally validated and applied to a group of 40 participants. The statistical analysis of the results identifies significant factors and relationships, emphasizing the importance of promoting innovation adaptation in diverse contexts, democratizing its access, and ensuring the inclusion of students from diverse profiles. In addition, it is important to note that these factors show a strong interdependence, which suggests that effective management of educational innovation fosters synergies between factors that strengthen it and make its impact more effective.

Keywords: Educational innovation, Teaching strategies, Teacher development, Teacher evaluation, Educational quality.

1 Introduction

The challenge of enhancing student learning has become more pronounced due to circumstances like the pandemic and the rapid advancement of technology. Consequently, higher education institutions (HEIs) have embraced the task of innovating pedagogical practices. As a result, the question of how to effectively manage educational innovation (EI) processes becomes increasingly relevant. Therefore, there is a need to develop a model that serves two purposes: facilitating the management of such processes and providing a roadmap for professors to self-evaluate their progress and determine their advancements.

These challenges materialize at the Pontificia Universidad Javeriana (PUJ,

Colombia), where there is a clear need to support teachers in their educational innovation processes and identify strengths and opportunities for improvement based on the classroom reality. This article proposes the design of a measurement instrument to evaluate EI initiatives and provide a guide for teachers.

2 Theoretical Framework

EI can be understood as an intentional and progressive process of transforming teaching practices to collaboratively drive the generation of solutions to educational problems. Its ultimate goal is to achieve higher quality learning and explore better ways of supporting and guiding students. (Phills et al, 2006; European Union, 2009; Jerez, 2017; Serdyukov, 2017).

Some Colombian universities have established teaching centers seeking to foster EI (Khouri and Manotas, 2023). In addition, educational policies have been implemented for its development (MEN, 2022).

However, there are still needs in the management of EI processes that allow their transfer to other contexts (Sein-Echaluce et al., 2019). Therefore, there is a need for tools that measure and improve such processes (Santaolalla et al., 2020).

A framework of factors for the evaluation of innovation processes was identified in the literature (Table 1).

Table 1. Factors associated with the development of EI processes

Factors	Definition	Sub-factors (instrument items)
Adaptation Cook, Lyon, Locke, 2019	Measurement of the feasibility of the process, of making changes and/or adjustments to a method, <u>program</u> or practice, for subsequent use in a particular student population or in the organizational context of the educational institution.	3
Effectiveness Rincón-Flores, Muñoz-Carril, Rodríguez-Machado, Domínguez-Acuña, 2018.	Measurement of the positive or negative consequences within of the teaching methods employed or resources implemented and their relationship to the expected learning outcomes (knowledge, <u>skills</u> and attitudes) of the students.	6
Follow-up Jutasompakom, Atmosukarto, Kurbanhusen, Lishan, 2021	Presence of a measurement strategy on the progress of the implementation of the educational innovation proposal, compliance with the established process and its scope.	4
Disclosure Teresa, Gil, Montero, Manuel, Ballester, 2018	Socialization of the methods or findings of innovation in the field of education within the institution or among colleagues.	6
Involvement Peña, Cañoto, Angelucci, 2017.	Active engagement of the student, becoming a participant and generating motivation and satisfaction when carrying out the action involved in the innovation.	4
Membership Marisa, Krut, 2019	The learning process is congruent with the conditions, needs and the educational innovation proposal.	5
Novelty Koldestam, Broström, Petterson, Knutsson, 2021	Opportunity to renew or transform an idea within an educational model to be used in different learning environments.	3
Diversity Diez-Villoria, Sánchez-Fuentes, 2015; Escarbajal-Frutos, Mirete-Ruiz, Maquillón-Sánchez, Izquierdo-Ruis, López-Hidalgo, Orcajada Sánchez, Sánchez-Martin, 2012.	Recognition of students with different characteristics and capabilities when performing the action involved in the innovation.	4
Feasibility Alvarez, 2002	The methodology is likely to be realized due to its circumstances or characteristics.	2

3 Method

Next, an exploratory quantitative study was designed in two phases: design and validation of a measurement instrument and elaboration of recommendations on the development of EI processes. The design of the instrument assessed the percentage of compliance with each factor in relation to the number of items that the teacher had in his or her innovation process. In the validation of the instrument, correlation tests were performed between one factor variables (Table 2).

Table 2. Significant correlations between variables by factor

SIGNIFICANT CORRELATIONS BETWEEN VARIABLES BY FACTOR			
FACTOR/SEGMENT	Nº Total correlations	Nº Significant correlations	Relative % of significances
Relevance	10	5	50.00%
Involvement	3	3	100.00%
Diversity	6	1	16.67%
Existence of instruments for monitoring	6	5	83.33%
Effectiveness	15	9	60.00%
Disclosure	6	3	50.00%
Feasibility	1	1	100.00%
Novelty	3	1	33.33%
Adaptation	6	6	100.00%

The validation showed that all factors, except for *Diversity* and *Novelty*, show high percentages of relationship between items, suggesting a future review of these factors in comparison with the others.

Subsequently, the instrument was sent to 40 teachers, who had an active EI process during the year 2022. Twenty-nine responses were received. Table 3 presents a summary of the characteristics of the group surveyed.

Table 3. Characteristics of the study group

SUMMARY CHARACTERISTICS STUDY GROUP			
Sex		Faculty	
Woman	15	Architecture and Design	5
Man	14	Science	4
Age		Economic and Administrative Sciences	3
18-35	1	Communication and Language	6
36-49	11	Environmental and rural studies	1
50-64	14	Engineering	6
Over 65	2	Medicine	3
N/R	1	Dentistry	1
Type of relationship		Step Level	
Chair	8	Holder	1
Plant	21	Associate	7
Temporary	0	Assistant	13

4 Results

Relationships between factors were found. The factors that individually represent the most significant relationships are: adaptation, effectiveness, novelty, follow-up and

involvement (Table 4).

Table 4. Significant correlations by factor

SIGNIFICANT CORRELATIONS BY FACTOR	
FACTOR / SEGMENT	I. Correlations
Adaptation	39
Effectiveness	36
Novelty	30
Existence of monitoring instruments	24
Involvement	21
Diversity	14
Relevance	2
Feasibility	10
Student Option	6
Disclosure	3
Basic Participant Information	2

Table 5 presents the factors that, in a paired manner, have the highest correlations (in particular, the relationships in blue represent 80% of the significant correlations).

Table 5. Frequencies of significant correlations between factors.

Frequency Table - Significant correlations between factors				
No.	Factors	n	% Relative	Accumulated
1	Effectiveness / Adaptation	16	0,16	0,16
2	Involvement / Diversity	8	0,08	0,24
3	Existence of instruments for monitoring / Effectiveness	8	0,08	0,32
4	Existence of instruments for monitoring / Adaptation	7	0,07	0,39
5	Involvement / Novelty	6	0,06	0,45
6	New / Adaptation	6	0,06	0,51
7	Relevance / Novelty	5	0,05	0,56
8	Effectiveness / Novelty	5	0,05	0,61
9	Relevance / Existence of monitoring instruments	4	0,04	0,65
10	Existence of instruments for monitoring / Novelty	4	0,04	0,69
11	Involvement / Feasibility	3	0,03	0,72
12	Involvement / Adaptation	3	0,03	0,75
13	Diversity / Adaptation	3	0,03	0,78
14	Relevance / Feasibility	2	0,02	0,80
15	Effectiveness / Student Choice	2	0,02	0,82
16	Disclosure / Novelty	2	0,02	0,84
17	Adaptation / Student Option	2	0,02	0,86
18	Basic Participant Information / Feasibility	1	0,01	0,87
19	Basic Participant Information / Student Option	1	0,01	0,88
20	Relevance / Effectiveness	1	0,01	0,89
21	Relevance / Adaptation	1	0,01	0,90

The main factors that act interdependently in innovation are: adaptation and effectiveness; in addition, student participation and consideration of their learning needs. These findings imply that when a university professor wishes to implement an innovation in the classroom, he/she should have a clear purpose, along with a strategy for monitoring and measuring it, considering the needs of the students and flexibility in the design of such innovation to adapt.

The novelty of the innovation is related to student involvement and adaptation. Novelty is also related to the relevance of the initiative and its effectiveness. In general, adaptation should be considered aligned to the possibility of student participation in the innovation process, to the flexibility of the innovation to meet the needs of students according to their characteristics and the generation of novel ideas.

In addition, the existence of innovation follow-up instruments at each stage of the process and the possibility of adaptation also show a positive relationship. In this sense, it was observed that teachers who have mechanisms for measuring student progress can

propose follow-up strategies and, in turn, adapt to different contexts.

Finally, considering the sociodemographic characteristics, it stands out that: 1) teachers between 36 and 49 years of age show a greater interest in obtaining feedback from their students on an innovation process; 2) teachers with tenure are more inclined to consider the innovation viable, because they have more experience and know better the available resources; and, 3) teachers who consult research to situate their EI proposal can contextualize their innovation in a pedagogical context, and thus, clearly state the problem and the need to be solved.

5 Discussion

The literature reports multiple domains associated with the development of innovation projects (Yi et al., 2021). Methodologies have emerged on how to carry out these processes (QS Reimagine Education Awards, 2020). However, this study presents empirical data on how certain factors constitute a roadmap that allows teachers who propose innovations to self-assess their progress and follow up to determine their achievements. Consequently, the often "confusing" routes to EI for university professors are made possible and concrete by the instrument designed and the meaningful relationships found among the relevant factors. The findings reveal how these factors manifest themselves in a permanent and interrelated way, in an innovative idea and in the stages for its development, as well as contribute to "mold" an EI exercise. From the self-diagnosis, each teacher will be able to identify what decisions to make when implementing his/her initiative, considering, mainly, the need to place his/her EI within a clear and measurable purpose (effectiveness), the identification of the student's needs (involvement), the follow-up of the implementation (existence of instruments for follow-up), the flexibility of the proposal (adaptation), among others.

6 Conclusions

This article is an exploratory study, based on the literature, to find nine factors that affect EI processes and the design of a 37-item measurement instrument, validated in a sample of 29 teachers. The results allow the identification of relevant aspects in EI project management. In particular, the recognition that EI is a multifactorial process with interdependencies among the factors, where the characteristics of the teacher and the student are key to its design. In addition, the list of factors and its corresponding instrument become a roadmap for university professors to manage their EI processes from its design, through its implementation, monitoring and evaluation.

7 Limitations and Future Research

Determining the reliability of the instrument and its contributions to the EI dialogue involves replicating it in other contexts to confirm its validation and broaden the reflections based on the results, including the voice of students in the process. These

studies should be integrated into a mixed research framework that, in addition to quantitative findings, reveals the discourses underlying teachers' innovation decisions.

References

- Jerez, O. and Silva C. (Eds). 2017. *Innovando en Educación Superior: Experiencias clave en Latinoamérica y el Caribe 2016-2017 (Volume 1: Curriculum management and teaching development)*. 1st Ed. Santiago, Chile: Faculty of Economics and Business, University of Chile. Laspau Affiliated with Harvard University. License: Creative Commons Attribution-ShareAlike International CC BY-SA 4.0.
- Khouri, F., & Manotas, E. (2023). Inspiration, action transformation: how do pedagogical development centers work in Colombia? *Educación superior*.
- Ministry of National Education [MEN] (2022). Educational innovation and digital transformation in higher education: a bet for the future of the sector: technical note. Available at: <https://colab.colombiaaprende.edu.co/wp-content/uploads/2022/08/Innovacion-y-transformacion-digital.pdf>
- Phills, J. A., Deiglmeier, K., & Miller, D. T. (2020). Nicholls, A., Simon, J., & Gabriel, M. (2015). *New Frontiers in social Innovation research*. United Kingdom: Palgrave Macmillan. Organisation for Economic Co-operation and Development [OECD]. (2006). *Oslo manual. Guide for the collection and interpretation of data on innovation*, OECD. Innovation in the Caribbean Region of Colombia: theoretical contributions and good practices, 1(2), 147.
- Santaolalla, E., Urosa, B., Martín, O., Verde, A., & Díaz, T. (2020). Interdisciplinarity in Teacher Education: Evaluation of the Effectiveness of an Educational Innovation Project. *Sustainability*, 12(17), 6748. MDPI AG. Retrieved from <http://dx.doi.org/10.3390/su12176748>
- Sein-Echaluze, M. L., Fidalgo-Blanco, Á., & García-Peñalvo, F. J. (2019). Design of a teaching educational innovation project based on transferable indicators between different contexts.
- Serdyukov, P. (2017). Innovation in education: what works, what doesn't, and what to do about it? *Journal of Research in Innovative Teaching & Learning*, 10(1), 4-33.
- QS Reimagine Education Awards (2021). *The Future Of Higher Education*. Reimagine Education. Conference & Awards. <https://www.reimagine-education.com/>
- Yi, S., Yun, R., Duan, X., & Lu, Y. (2021). Similar or Different? A Comparison of Traditional Classroom and Smart Classroom's Teaching Behavior in China. *Journal of Educational Technology Systems*, 49(4), 461-486.