Management framework for quality assurance and continuous improvement in online university programs integrating ISO 21001 and EFQM model

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Abstract

This study addresses the need to improve academic quality in virtual higher education programs. Faced with the challenges of ensuring relevant and effective training, the research focused on the design and validation of an academic quality management model for virtual education. The model integrates the principles of ISO 21001:2018, the EFQM Model, and Colombia's national education regulations. The methodology was developed in three phases: an initial diagnosis to identify the strengths and weaknesses of the Business and Financial Administration program, the development of the management model articulated with the selected reference frameworks, and its subsequent validation to confirm its suitability for continuous improvement. The results demonstrate the viability of a comprehensive management model that addresses the particularities of virtual education. The validation of the model confirms that it is an effective tool for improving academic quality, responding to the needs of stakeholders and regulatory requirements. In conclusion, this work provides a practical and theoretical tool that contributes to the continuous improvement of quality in virtual higher education, demonstrating how the integration of international standards and local regulations can strengthen training processes and meet the demands of the sector.

Keywords: Quality management, online education, Higher education, Management systems, Continuous improvement.

1. Introduction

In recent decades, higher education in Colombia has undergone a profound transformation, driven by technological advances and the need to expand educational coverage in a country characterized by its geographical diversity. In this context, virtual education has emerged as a strategic alternative, facilitating access to academic training for a growing number of students who, for various reasons, cannot access face-to-face education. However, this rapid growth has highlighted the challenge of ensuring and strengthening the academic quality of virtual programs, guaranteeing relevant and effective educational experiences that meet both regulatory requirements and the expectations of students, teachers, and the productive sector.

Although quality management models exist in the field of education, the literature shows a gap in the application of these frameworks to the particularities of virtual education. Most models focus on face-to-face environments, without considering the specific elements of technology-mediated teaching, such as interactivity, instructional design, and platform management. Therefore, it is essential to develop a model that integrates international quality standards, such as those of ISO 21001:2018 (Management Systems for Educational Organizations) and the EFQM (European Foundation for Quality Management)

model, with Colombian national education regulations, in order to systematically address the challenges specific to virtual education.

This study contributes to filling this gap by proposing and validating an Academic Quality Management Model designed specifically for virtual education. The relevance of this research lies in its ability to provide an applicable reference framework that not only addresses the problems of low academic quality identified in the Business and Financial Administration program of a particular institution, but also serves as a guide for other educational organizations seeking to strengthen their processes in the virtual modality. The model developed is based on a holistic approach that promotes continuous improvement, stakeholder satisfaction, and alignment with the institution's strategic objectives.

2. Literature Review

Historical evolution and paradigms of quality management in higher education

The works of (Cabero, 2016), (Marciniak and Sallán, 2017) and (Niku, 2023) define virtual education as a teaching-learning process mediated by Information and Communication Technologies (ICT), which allows greater access to higher education for populations geographically distant from urban centers, as well as for people who, for work, personal, or time reasons, cannot attend face-to-face programs. This modality offers the possibility of training in environments other than physical classrooms, promoting flexibility, autonomy, and educational inclusion.

From a theoretical perspective, virtual education has its roots in various pedagogies and learning models, such as connectivism, constructivism, and autonomous learning. These affirm that education is an active process, since it requires the active participation of the student to understand and apply the knowledge provided through educational platforms. It is also socially constructed, since students, with the support of the teacher-tutor, construct meaning through contact with digital learning resources, other students, and virtual learning environments (VLEs).

Collado Vadillo, R., Fernández Carriedo, A., & García Fernández, M. C. (2016), analyzed student satisfaction with the quality of virtual education at the UNED. The research designed a survey applied to a representative sample of students. The results of the study show that students are satisfied with the quality of virtual education but are dissatisfied with tutorial support, learning assessment, and the flexibility of the model.

Reference frameworks for quality management: ISO 21001 and EFQM

To create the proposed management model, the thesis draws on two of the most internationally recognized reference frameworks: ISO 21001:2018 and the EFQM Model. These models were chosen because they complement each other and offer a structured yet flexible approach.

- ISO 21001:2018 (Management Systems for Educational Organizations): The master document emphasizes that ISO 21001 provides a formal framework for establishing a quality management system in educational organizations. Based on sources such as TÜV Nord, this standard is described as a tool that helps institutions standardize and optimize their key processes. The principles of the standard, such as the beneficiary-focused approach, leadership, people commitment, and evidence-based decision-making, are aligned with the modern view of quality. The thesis emphasizes that adopting ISO 21001 not only contributes to quality improvement but also facilitates transparency and accountability, which are crucial elements in today's world for building trust among stakeholders.

- EFQM (European Foundation for Quality Management) model: The literature review benefits from the inclusion of the EFQM 2020 model. Through citations to Vitzilaiou, Dima, and Glykas (2022) and Zhang et al. (2021), the paper highlights the value of EFQM as a non-

prescriptive framework for excellence. Unlike ISO 21001, which focuses on minimum requirements, EFQM focuses on organizational excellence through self-assessment and the pursuit of continuous improvement. The model, with its criteria for leadership, strategy, people, partnerships, products, and results, provides a comprehensive guide for organizations to assess their maturity and design their own paths to excellence. The thesis integrates EFQM to go beyond simple standardization, promoting a culture of excellence and a strategic vision that adapts to the dynamics of virtual education. The combination of the ISO structure and the flexibility of EFQM provides the ideal framework for the proposed model, allowing it to be robust and adaptable at the same time.

Quality and specificities of virtual education

An essential component of the literature review is the analysis of quality in virtual education. The document recognizes that simply transposing quality models from face-to-face education to virtual education is a mistake. Distance or virtual education has unique characteristics that require a specific approach. The thesis cites Varas-Meza, Suárez-Amaya, López-Valenzuela, and Valdés-Montecino (2020) to recognize the rise of this modality in Latin America and the challenges associated with its quality.

The critical elements of quality in virtual education are explored, such as instructional design, interactivity between students and tutors, technological support, content relevance, and learning assessment in digital environments. The thesis refers to authors such to support the argument that the quality of a virtual program cannot be measured solely by student outcomes, but must include the quality of the learning experience, platform management, training of virtual tutors, and ongoing support.

In summary, the literature review establishes a solid theoretical foundation for the development of

the quality management model. It identifies a gap in the application of quality models in virtual education and justifies the need for a hybrid approach that combines the robustness of ISO 21001 and the pursuit of excellence of the EFQM Model, adapting them to the specificities of virtual programs and Colombian educational regulations. This synthesis demonstrates how the research builds on existing knowledge to offer an innovative and relevant solution to a current problem in the higher education sector.

Evolution of Quality in Higher Education

The studies analyzed agree on the importance of implementing quality management systems in virtual educational contexts. Niku (2023) highlights the need for distance education to have a specific quality management system capable of responding to the particularities of this modality.

Some studies propose quality from a systematic approach. Yanovskaya (2023) analyzes the importance of a systemic approach to educational management, while Niku (2023) mentions essential components for the design of online learning and quality assurance systems specific to this modality.

For their part, Sütőová, Teplická & Straka (2022) explore the potential of the 2020 model of the European Foundation for Quality Management (EFQM; 2020) to improve processes in technical vocational institutions, while Yanovskaya (2023) studies the formation of the concept of educational management and administration from a historical perspective.

A common element identified relates to the use of the EFQM: 2020 model. Murthy, Sangwan & Narahari (2021) examined how the sub-criteria of the EFQM model are structurally connected and mutually influence quality through the management of so-called Approaches (E), and categorize them into: enablers, enablers, enablers, or enablers according to their impact. Curpănaru (2021) highlights that the EFQM: 2020 model allows for an integrative approach that includes key aspects such as results achieved, external customer

focus, information management, and internal customer satisfaction.

Common areas for improvement in the implementation of quality systems were identified. Sütőová, Teplická & Straka (2022) point to weaknesses in organizational culture, performance drive, transformation, and the perceptions of key actors. Gupta et al. (2022) propose innovative mechanisms for managing the quality of education in technical specialties, with an emphasis on technological strategies.

The context of the COVID-19 pandemic was a catalyst for the development of virtual quality training programs. Gupta et al. (2022) and Miranda-Schaeubinger et al. (2022) documented the effectiveness of virtual quality improvement programs. Both studies report positive results, demonstrating that quality virtual training can be as effective as face-to-face training.

Rahmad & Cep (2022) draw a parallel between the concepts of quality in the industrial world and their adoption in education, pointing out that the purposes of quality include customer satisfaction and continuous improvement in both business and educational environments.

In terms of methodologies, several studies use qualitative approaches. Munive-Obando & Tobar-Gómez (2023) conducted a study using a diagnostic survey of 552 teachers and educational administrators that revealed a low level of knowledge on educational quality issues. They subsequently implemented a virtual training program that significantly improved this knowledge and its application in the institutions to which they belong. Which leads to the conclusion that, in terms of quality, training dynamics must be generated for the teaching community and others involved in education.

Models of excellence and international benchmark management standards

The document is based on the complementarity of two of the most globally recognized management models. The use of the ISO 21001:2018 standard is justified by the contributions of TÜV Nord, Pérez (2022). These works demonstrate that the standard provides a formal and standardized framework for educational organizations to establish a management system focused on students and continuous improvement. It is emphasized that ISO 21001 goes beyond quality assurance, promoting transparency and accountability. The inclusion of the EFQM Model is supported by the analyses of Vitzilaiou, Dima, and Glykas (2022) and Zhang et al. (2021), who describe this model as a non-prescriptive framework for excellence. Its ability to foster a culture of self-assessment and improvement that complements the structure of the ISO standard is highlighted. The EFQM, with its focus on leadership, strategy, and results, is used to go beyond standardization and achieve sustainable excellence.

According to Laurett, R., & Mendes, L. (2019), the EFQM model applied to education is defined as "a holistic framework that allows institutions to evaluate their performance in terms of leadership, strategy, processes, and results, adapted to the particularities of virtual learning environments" (p. 112). The authors emphasize that this model provides an orderly structure for self-assessment and continuous quality improvement.

For their part, Saiz-Álvarez and Olalla-Caballero (2017) define this model as "an integrative approach to quality management that allows virtual higher education institutions to identify strengths and areas for improvement, establishing a continuous cycle of planning, implementation, evaluation, and improvement" (p. 67). These researchers highlight that the EFQM model promotes the integration of comprehensive skills and values in education.

Santos and Abreu (2019) define the EFQM model as "a quality management system that provides a common language and conceptual tools for virtual educational institutions to assess their progress toward excellence, identifying critical aspects such as leadership, strategy, people, partnerships, resources, and processes" (p. 89).

Challenges and particularities of quality in virtual education

The literature review specifically addresses the unique characteristics of virtual education and the challenges it poses for quality management. The works of Varas-Meza, Suárez-Amaya, López-Valenzuela, and Valdés-Montecino (2020) are cited, which analyze the factors that have driven the expansion of distance learning in Latin America. The thesis identifies a significant gap, as most existing quality models were designed for face-to-face education and do not address the specificities of virtual education, such as instructional design, interactivity, technological support, and platform management.

For their part, Gonzalez Fernández, M. I., López Pérez, M. D., & Rodríguez Gómez, M. C. (2015) define the quality of virtual education as "a set of intrinsic and extrinsic characteristics of a virtual educational program that meet the needs of students and society, and that enable the achievement of the intended learning objectives."

Collado Vadillo, R., Fernández Carriedo, A., & García Fernández, M. C. (2016): They define it as "the extent to which virtual education programs meet students' expectations, satisfy their needs, and enable them to achieve the intended learning objectives."

Cabero Algarra, J. (2016): Focuses on the quality of virtual education from the perspective of educator training, emphasizing the need to train teaching staff to develop the skills required of a virtual tutor.

According to Marciniak and Sallán (2017), quality management in virtual education is defined as "a systematic set of processes and practices designed to ensure that virtual programs meet predetermined standards, satisfying the needs and expectations of students, institutions, and society" (p. 214). These authors argue that quality in online education cannot focus on the simple application of technologies, which is why they highlight aspects such as instructional design, teacher training, and assessment systems adapted to the virtual environment.

For their part, Masoumi and Lindström (2012) conceptualize quality management in virtual education as "a comprehensive framework that goes beyond technical aspects to evaluate the effectiveness of the pedagogical methods used and the level of interaction between students and teachers in virtual environments" (p. 28). It is important to consider sociocultural factors such as collaboration and community learning to ensure inclusive and accessible virtual education.

Complementing these approaches, Niku (2023) defines educational quality as "a management system that ensures the continuous quality control of graduates to meet nationally accepted standards of competence, enabling higher education institutions to respond adaptively to changes in the educational environment" (p. 43). Their approaches speak to adaptability as an essential component of quality in virtual environments.

3. Material and methods

The research adopts a mixed approach, with a quantitative bias. This choice is justified by the complexity of the subject matter, as it allows for a comprehensive understanding of the phenomenon by combining the strengths of quantitative and qualitative methods. The quantitative approach was used to measure and diagnose quality indicators and establish relationships between variables, while the qualitative approach facilitated understanding of the perceptions and experiences of the actors involved.

The methodological design is sequential explanatory (Quan a Qual). This means that, in a first phase, quantitative instruments (surveys) were applied for a broad diagnosis of the state of academic quality. Subsequently, the results of this phase were further explored and explained in a second qualitative phase through interviews and document review. This design allows for "data triangulation" that validates the findings and enriches the analysis, providing a solid basis for the formulation of the proposed model.

In terms of the type of research, it is classified as applied and empirical. It is applied because it seeks

to solve a specific problem within the institutional context of the program, generating a concrete product: the design of a quality management model. It is empirical because it is based on the collection and analysis of data in real environments to diagnose the magnitude of the problem and substantiate the model.

Methods and instruments for data collection, Data collection was carried out through a combination of methods, techniques, and instruments.

- **Quantitative method:** Structured surveys with closed questions and rating scales (Likert type) were used to collect data on perceptions of academic quality, satisfaction, and process effectiveness. These surveys were administered to a sample of students, teachers, and all management personnel.
- **Qualitative method:** Semi-structured interviews were conducted with students, teachers, and administrators to explore their perceptions and experiences in depth. This method, together with observation and thematic analysis of the narratives, provided insight into the "why" behind the quantitative results.
- **Document Review:** A systematic analysis of institutional and regulatory documents of the program was conducted, such as curricula, self-assessment reports, and internal regulations. This method helped to contextualize the study and contrast theory with actual practices.

Population, Sample, and Procedures The study population included students, teachers, and administrators of the Commercial and Financial Administration program.

- Teachers: 100% of the population (56 teachers) was surveyed.
- Students: 336 students responded, exceeding the minimum sample size of 309, corresponding to 20% of the total number of students.

- Administrators: All administrative staff were included in the surveys.

Information processing. Initially, surveys were administered to students, teachers, and all administrative staff. These closed-ended questionnaires, with rating scales, allowed us to quantify perceptions of strengths, weaknesses, and areas for improvement in the academic quality of the program. The quantification of this data into usable information began with a descriptive statistical analysis, showing patterns and deviations that revealed academic quality.

To go beyond the numbers and understand the reasons behind these results, we proceeded to the qualitative phase. Structured interviews were conducted with teachers, students, and administrators. The objective was to explore their experiences and understand the reasons behind the quantified perceptions. The qualitative information, once transcribed and organized, was subjected to a thematic analysis, identifying categories and meanings that explained and contextualized the previously quantified weaknesses and opportunities.

The integration of both data sets was crucial for the diagnosis. The numerical patterns from the surveys (e.g., low satisfaction in a specific area) were enriched and explained by the narratives from the interviews (reasons and concrete examples). This fusion allowed us to build a systemic understanding of the weaknesses and opportunities for improvement in the academic quality of the program.

Consolidated analysis by category. The following is a structured analysis of the diagnosis developed by applying instruments to the sample population of teachers and students. It was carried out by applying online instruments through Google forms. The instruments cover eight dimensions, each with a set of indicators that seek to measure teachers' perception of satisfaction (a total of 56 teachers responded, corresponding to 100% of the population group) from a population of students (336 students responded, corresponding to 20% of the total number of students; the minimum sample size was 309).

Results

The table 1 presents the consolidated comparative triangulation of the average and satisfaction (responses 4 or 5) in the dimensions of the instruments applied to students and teachers. In general terms, the average for students is 3.21 and for teachers is 3.26, very similar values that allow us to conclude that perceptions of satisfaction related to quality are similar, but they are just above 3.0, indicating that there is a need for improvement in the quality of academic processes in the program.

Analyzing satisfaction, there is a difference of 0.4 percentage points between teachers and students, with teachers scoring lower. A critical finding in both population groups surveyed is that the level of satisfaction in both groups is below 50% in all eight dimensions, indicating that there is 57% dissatisfaction, which requires specific and critical actions and interventions in each aspect to change this perception in the future.

Table 1 General comparison by category of results of instruments applied to students vs. teachers

Dimension	Teachers		Students		Diferences	
	Δ Average	Satisfacción (4-5)	Δ Average	Satisfacción (4-5)	Δ Average	Δ Satisfaction
I. Technological tools and teaching materials	3.23	42.5%	3.10	39.9%	0,10	2,6%
II. Quality of interaction and feedback	3.30	43.0%	3.20	43.0%	0,10	0,0
III. Development of professional skills.	3.38	48.7%	3.25	41.6%	0,13	7,1%
IV. Pedagogical models and flexibility	3.30	44.4%	3.16	48,7%	0.14	-4,3%
V. Systematization and evaluation of academic processes	3,00	38,3%	3,14	37,6%	-0,14	0,7%

VI. Digital skills	3,76	55,4%	3,24	42,1%	0,52	13,3%
VII. Academic performance and retention	3.04	30,8%	3,45	53,0	-0,41	-22,2%
VIII. Participation in continuous improvement processes and perception of the model for improving quality	3.12	37,5%	3,17	40,6	-0.05	-3,10%
OVERALL AVERAGE	3,26	42,6%	3,21	43,3%	0,00	-0,4%

When reviewing the results, the most critical dimension among teachers according to the results is VII. Academic performance and retention, with 30.8% satisfaction, followed by dimension VIII. Participation in continuous improvement processes and perception of the model for improving quality, with 37.5%; in third place is dimension V. Systematization and evaluation of academic processes, with 38.3%; and in fourth place is dimension I. Technological tools and teaching materials, with 42.5%.

In the student population group, the dimensions with the lowest averages are V. Systematization and evaluation of academic processes with 37.6%, followed by I. Technological tools and teaching materials with 39.9%, and in third place is VIII. Participation in continuous improvement processes and perception of the model for improving quality with 40.6%, and in fourth place, category III. Development of professional skills with 41.6%.

In this classification by lowest level of satisfaction, both teachers and students agree on dimension VIII. Participation in continuous improvement processes and perception of the model for improving quality, V. Systematization and evaluation of academic processes, and dimension I. Technological tools and teaching materials, respectively, all three of which are directly related to the quality of virtual education in academic terms.

Convergences (Opportunities for consensus)
The critical convergences identified are:
- Quality of interaction and feedback. (0.0%): Shared neutrality.
- Systematization and evaluation of academic processes. (0.7%): Shared neutrality.
- Continuous improvement processes. (-3.10%): Consensus crisis.
- Technological tools and digital materials. (2.6%): Obvious deficiencies.

In terms of evaluative convergences, we have:
- Importance of skills development
- Value of the quality of interaction and feedback
- Recognition of the advantages of virtual flexibility

Divergences (Urgent Action Required)
After analyzing the data, an extreme disconnect can be seen in the following aspects:
- Academic performance and retention (-22.2%): Massive underestimation.
- There is a widespread problem related to digital skills (13.3%).
- Analysis of the data reveals a certain overestimation by teachers in the following areas:

- Digital skills. (13.3%) Optimism about the impact of digital skills.
- Development of professional skills. (+7.1%): There is confidence in the quality of training for students; this category ranks fourth with the highest average satisfaction rating.
- There is a false sense of effectiveness in processes. Some perceptual paradoxes are evident:
- Academic workload. Protective teachers vs. adapted students.
- Participation-Results. High participation, low results.

Triangulation of results from diagnostic tools applied to teachers and students.

The triangulated and comparative analysis between teacher and student perspectives provides the most robust justification for the implementation of the quality model for virtual education proposed in this thesis, revealing problematic convergences that confirm systematic deficiencies and divergences that evidence the absence of unified quality criteria. The convergences identified demonstrate that both teachers and students recognize the inadequacy of student support, confirming the existence of a structural deficiency that requires systematic intervention through a management model that establishes standards, procedures, and evaluation mechanisms for effective virtual support.

The consensus on the limitations of specialized educational resources highlights the lack of institutional criteria for the evaluation, selection, and updating of virtual educational resources, justifying the need for a model that establishes specific standards of quality, relevance, and pedagogical effectiveness for virtual educational materials.

The shared assessment of feedback as a central process of virtual learning, combined with the deficiencies identified in its implementation, demonstrates the absence of standardized protocols that guarantee the quality, timeliness, and effectiveness of feedback processes in virtual modalities.

Finally, these divergences do not constitute irreconcilable conflicts but rather evidence of fragmentation in quality criteria, justifying the implementation of a model that establishes standards capable of articulating different perspectives into a coherent quality management strategy. The absence of a unified framework that integrates these diverse perspectives compromises institutional coherence and the effectiveness of the virtual education system, demonstrating the urgent need for MECAVI as an integrative model that guarantees quality from multiple user perspectives while maintaining consistent and systematic institutional standards.

Systematic perceptual misalignment.

An analysis of the results reveals a systematic perceptual misalignment:

- 22.2% maximum difference between groups in terms of performance and commitment.
- Predictable patterns according to proximity to teacher control.
- Communication crisis that compromises educational effectiveness in a virtual modality, which may be one of the causes of dropout from the program.

Agreed structural problems

There are agreed structural problems, the most significant of which are:

- Critical convergence in processes and continuous improvement; both teachers and students have low satisfaction ratings in these categories.
- There are technological deficiencies recognized by both groups, particularly evident in the results of category I. Technological Tools and Teaching Materials, in dimension P3: Teaching Materials at the teacher level, satisfaction was 18.9% and among students, 23.8%. Dimension P4: Technical Support also reflects low values, with 39.6% for teachers and 23.5% for students.
- Consensus-based foundation for institutional intervention.

Existing operational paradoxes

The diagnosis identified several operational paradoxes, the most relevant being:

- High participation, low results in continuous improvement.
- Pedagogical overprotection vs. actual student abilities.
- Perceptual investments that compromise decision-making.

Based on this analysis, some essential components of the management model to be proposed are presented below:

Perceptual calibration system:

- Objective metrics to validate subjective perceptions.
- Systematic two-way feedback.
- External performance and satisfaction indicators.

Agreed procedural standards:

- Standardized procedures based on identified convergences.
- Verifiable academic quality criteria.
- Continuous and transparent monitoring systems.

Effective continuous improvement cycles:

- Verifiable and communicable impact indicators.
- Structured participation with visible results.
- Feedback on the effectiveness of contributions

An analysis of the diagnosis in general terms clearly shows the need for a comprehensive quality management model that addresses systematic perceptual misalignments, capitalizes on agreed convergences, corrects critical divergences, and establishes verifiable objective standards for virtual education. Without this model, the institution operates with inaccurate diagnoses, misaligned strategies, and wasted potential, fundamentally compromising the quality and effectiveness of its virtual programs.

Proposed academic quality management model

The model is called the Academic Evaluation and Quality Model in Virtual Education (MECAVI) and synthesizes various methodologies to address the prevailing challenges facing online higher education in Colombia. It is an innovative model. Its innovation lies in the synergies between the ISO 21001:2018 standard and the EFQM Model, as these frameworks have been merged and adapted to form a specific quality management framework for virtual academic programs. Its framework is based on the strategic alignment of fundamental international benchmarks with national standards, such as the ISO standard and the EFQM Model, thereby providing it with conceptual rigor, relevance to the local environment, and institutional endorsement.

Initially, it integrates ISO 21001:2018, a globally recognized standard that outlines guidelines for the governance of educational institutions, with an emphasis on enhancing teaching-learning dynamics and safeguarding student satisfaction as the main stakeholders.

Subsequently, it incorporates the EFQM European Excellence Model, valued for its systemic orientation and ability to holistically assess institutional performance, thus promoting continuous improvement, transformative leadership, and long-term sustainable results. Complementing these frameworks is the relevant national regulatory context: Agreement 021 of 2020 of the Colombian Ministry of National Education, which outlines quality parameters for virtual academic programs and establishes strict evaluation criteria and mechanisms for quality assurance.

Consequently, the MECAVI Model is anchored in both globally recognized frameworks and fully complies with national regulatory mandates. This integration aims to facilitate consistent, results-oriented academic administration that focuses on continuous quality improvement in virtual training programs.

The bibliometric analysis, which covered more than forty publications from 2019 to 2024, revealed that 64.5% of these studies converge in identifying

significant deficiencies in the quality management of virtual programs, a convergence further corroborated by diagnostic findings that indicated a 57% overall dissatisfaction rate and a systematic perceptual difference of 22.2% between educators and learners regarding critical dimensions of educational quality within the program studied.

This theoretical-empirical alignment affirms Niku (2023) assertion that "the implementation of virtual learning requires a dedicated quality management system for higher education," echoing Yanovskaya (2023) on the imperative of "establishing a systematic approach to the governance of educational institutions." MECAVI directly addresses this imperative by integrating ISO 21001:2018, the EFQM model, and Colombian regulations into a customized framework that addresses the challenge of managing the quality of academic and administrative processes in virtual programs through contextualized and scientifically grounded strategies.

To provide a general context for the model, Figure 1 below shows the circular PDCA (Plan, Do, Check, Act) logic that structures the MECAVI Model as a dynamic system of continuous improvement. This logic has been integrated with international educational quality benchmarks, such as ISO 21001:2018, the EFQM 2020 Model, and Agreement 02 of 2020 of the National Accreditation Council (CNA), which ensures its regulatory consistency, applicability to institutional contexts, and relevance within the framework of virtual education. Figure 3 summarizes the key components of the model— Management System, Performance Evaluation, Continuous Improvement, Planning, Operation and Support, Stakeholders, and Quality Principles—as interconnected axes that guide academic management with a systemic, participatory, and evidence-based approach.

Figure 1 Components of the MECAVI Model
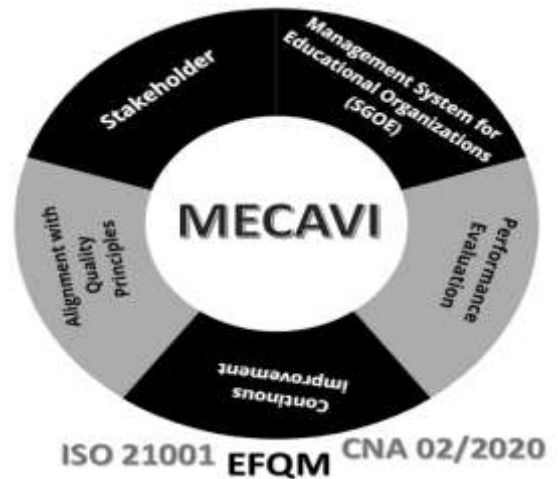
Below is a brief explanation of its components:

- Management System for Educational Organizations (SGOE). This is the structural core of the MECAVI model and corresponds to the application of the requirements established in the ISO 21001:2018 standard, designed specifically for educational institutions. It ensures the planning, implementation, evaluation, and improvement of educational processes.
- Performance Evaluation. This component measures the effectiveness of the program's processes and the model itself. It uses indicators such as academic management, stakeholder satisfaction, quality of digital resources, and competencies achieved, among others. It is based on CNA Agreement 02 of 2020.
- Continuous Improvement. A permanent cycle of adjustment, institutional learning, and model evolution. It responds to the "continuous learning" principle of the EFQM model and the PDCA cycle proposed by ISO 21001.
- Planning, Operation, and Support. A grouping of strategic, operational, and support processes that sustain the program's functioning.

- Stakeholders. Students, teachers, managers, employers, and other interest groups. They are identified and characterized to integrate their needs and expectations into each SGOE process.
- Alignment with Quality Principles. Ethical and strategic framework that gives coherence to the model, based on the values of EFQM, ISO, and the national assurance policy.
- Visual logic PDCA cycle. This cycle continuously organizes quality management through four phases: Plan, Do, Check, Act. Within the context analysis, implementation of training processes, performance evaluation, corrective actions, innovations, and continuous improvement.

The figure 2 shows the inputs, implicit processes, and outputs.

Figure 2 MECAVI model process

Limitations of the MECAVI Model.
It is necessary to bear in mind that MECAVI has limitations inherent to any model in order to maintain scientific rigor and establish realistic expectations regarding its scope and use. Although the MECAVI Model has been designed to be relevant for quality management in virtual programs, the following limitations should be noted:
- Dependence on institutional capacity and senior management commitment.

- Requirement for technological infrastructure and digital skills.
- Requirement for reliable data and relevant information.
- Scope of application and generalization (focus on virtual academic quality): Although MECAVI is scalable to different virtual programs, its design is specifically focused on academic quality management and factors inherent to the virtual modality. This means that:
- It does not comprehensively address other aspects of institutional quality not directly related to the core academic function.
- Its adaptation to face-to-face or hybrid modalities would require significant adjustments that go beyond the scope of the original proposal, as the particularities of interaction and technological mediation are different.
- Resistance to change and cultural factors. The implementation of any management model involves cultural and organizational transformation. There may be resistance to change from members of the academic community who are not accustomed to self-assessment processes, the measurement of indicators, or the constant adaptation of teaching methodologies. MECAVI does not directly incorporate an organizational change management strategy, so its success will also depend on the institution's ability to manage these transitions.

Practical contribution of the MECAVI model.
The practical contribution of the MECAVI Model lies in its ability to transform a complex challenge (quality management in virtual education) into a structured, measurable, and guiding process that provides higher education institutions, in this particular case the Commercial and Financial Administration program, with the necessary tools to diagnose, improve, and ensure academic quality, directly impacting the experience and success of

their virtual students.   The table 2 details the
practical contributions of the new Model.

Table 48 Practical contribution of the MECAVI model

Practical Contribution	Description	Impact on line Education
Comprehensive, tailored tool	Provides a specific quality management framework for virtual environments, integrating ISO 21001, EFQM, and Agreement 02 of 2020 into a single system.	Closes gaps in generic face-to-face models; addresses technological and pedagogical complexities.
Accurate self-assessment and diagnosis.	Includes master tables for collecting qualitative/quantitative data on key criteria (digital mediation, interaction, support).	Enables accurate diagnoses of strengths, weaknesses, and critical areas.
Guide for improvement plans	Transforms findings into concrete actions; provides step-by-step guidance from diagnosis to improvement monitoring.	Optimizes academic, pedagogical, and technological processes based on evidence.

Conclusions and discussions

The initial diagnosis of the research revealed a significant gap between the theoretical principles of quality management and their practical application in the context of virtual education. The low perception of satisfaction among the academic community, with an average of less than 43%, and the rejection of continuous improvement processes (39.1%) demonstrated a clear disconnect between theory and operational reality. This finding validates the premise of the study and the need for a specific model for virtual education, a gap already identified in the literature.

The research showed that academic quality cannot be addressed in a fragmented manner. The diagnosis revealed that the areas with the lowest satisfaction were precisely those elements that define the virtual experience, such as teaching materials (21.5%) and technical support (31.6%), as well as the quality of interaction (46.8%). These findings demonstrate the importance of a holistic and comprehensive approach. In response, the proposed model, which integrates the focus on the beneficiary of the ISO 21001 standard with the EFQM Model's focus on excellence, offers a

solution that addresses the multiple dimensions of quality in an interconnected manner.

In addition to perception, the study established a direct correlation between deficiencies in the current management model and academic performance indicators. A clear example is the course cancellation rate, which is 14.4% higher than the institutional average, and below-average performance on the Saber Pro tests. This empirical evidence supports the theory that an effective management system is a key predictor of academic outcomes. In this regard, the high dropout rate from the program (2.1% higher than the institutional average) is directly associated with dissatisfaction with the quality of the educational service, and not only with performance factors.

The proposed management model responds to these challenges by combining the standardization of the ISO 21001 standard with the flexibility of the EFQM Model. This combination not only creates a systematic and robust framework for process improvement, but also allows for adaptation to the changing dynamics of virtual education and encourages innovation. The integration of these international benchmarks with local educational regulations demonstrates how global tools can be

applied in a practical way to solve specific problems in national contexts.

Finally, the work contributes significantly to the literature on quality management in online education by providing a model that fills an identified gap. The validation of the model by experts confirms its viability and relevance, demonstrating that this solution is not a theoretical import, but a contextualized instrument capable of generating a real and positive impact on educational institutions.

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