

Quality assurance and evaluation of e-learning programs and courses

Aseguramiento de la calidad y evaluación de programas y cursos en línea

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ABSTRACT

Keywords

E-learning; instructional design; quality assessment; quality assurance; higher education

The objective of this work is to explore the categories, criteria and indicators necessary to evaluate the quality of the educational programs and the instructional design of their courses on e-learning. This is, with the intention of generating indicators and/or instruments for quality assurance and its evaluation that serve intrinsic purposes to the instructional design, to the operation of the courses object of the design and the educational programs in this modality, as well as to administrative purposes in higher education institutions. For this, different models are examined, and the context of the official Mexican evaluation models is reviewed. Finally, recommendations are integrated according to the situation of Higher Education Institutions in Mexico.

RESUMEN

Palabras clave

Aprendizaje electrónico; diseño instruccional; evaluación de la calidad; aseguramiento de la calidad; educación superior

El objetivo de este trabajo fue explorar las categorías, criterios e indicadores necesarios para evaluar la calidad de los programas educativos y el diseño instruccional de los cursos en modalidad en línea. Esto con la intención de generar indicadores o instrumentos para el aseguramiento de la calidad y su evaluación, que sirvan a fines intrínsecos al diseño instruccional, a la operación de los cursos objeto del diseño y a los programas educativos en esta modalidad, así como a fines administrativos en instituciones de educación superior. Para lo anterior, se examinaron distintos modelos y se revisó el contexto de los modelos oficiales de evaluación mexicanos. Por último, se integraron recomendaciones acordes a la situación de las instituciones de educación superior en México.

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INTRODUCTION

This work attempts to approach the considerations that will be taken into account when implementing courses or programs online mode (non-face-to-face, but distance learning, virtual, etc.) so that the appropriate quality criteria are met. It is examined from the definition and characterization of the modality, the identification of the value that the instructional design fulfills in the development and implementation of this type of offers, to the review of some models that can be used to evaluate the quality of the online modality, regarding the educational program and instructional design, at the course level. This review allows us to observe recurring elements to ensure quality in the design of an online course, both in its implementation and delivery, as well as in the learning experience and development of skills or objectives in students.

It is proposed that higher education institutions (HEIs) could be at a favorable time to consider the development of an offer of educational programs in mixed modalities (hybrid, distance or online). This takes into account the learning generated over more than two decades of constant growth of higher education in non-school modalities, but above all the experience generated in remote teaching caused by covid-19 and the subsequent scenario. During the health crisis, an important challenge of migrating educational experiences towards virtuality was faced, where academic continuity plans were launched (Ponce and Espinosa, 2022), while seeking to resolve the technological access problems that students faced (INEGI, 2020; MX Internet Association, AIMX, 2021; National Association of Universities and Higher Education Institutions, ANUIES, 2022).

These experiences allowed teachers to expand their digital skills and experiment, at least incipiently, with the delivery of online programs. In addition to classes, the different administrative and management procedures and processes necessary for the operation of educational programs could be resolved remotely. Thus, studies on the demand for online programs indicate a significant increase, especially in the age group of 25 to 39 years old. The schedules' flexibility stands out as the main reason for choosing this type of study (AIMX, 2022).

When considering the commitment of public HEIs to provide quality educational services, it will be important that they take into account the different aspects necessary to ensure and evaluate the quality of educational services in online mode and define how to implement them. Darojat (2013) shares a concern about the possible implementation of quality assessment mechanisms, mentioning that they may in themselves involve additional work that is too demanding for participants. Especially if they already participate in other similar procedures, such as the accreditations of schooled educational programs or institutional

accreditations¹ –in the understanding that these may contain some criteria and indicators regarding the online modality, but not enough.

The different state public universities in the country respond to their own characteristics. Varela-Petito (2011), citing Gedriaga Kuri *et al.* (2003) highlights that it is difficult to homogenize this type of institution due to different traditions, legislation, specializations, geographical locations, political and financing contexts. Therefore, the development of a model for a specific institution is encouraged in an environment where it can respond to particular needs but must coexist with those official models with which institutions evaluate themselves.

FROM DISTANCE EDUCATION TO E-LEARNING

It is important to understand e-learning as part of a wide range of modalities within the general model of distance education. E-learning began with correspondence education, assisted by radio and television, support of printed materials and later videos and audios in different formats. As a model, it has had an important development in recent decades regarding the use of technologies that allow providing possibilities of synchronous and two-way communication (audio and videoconferences), and distribution and access to educational resources in digital format (through internet and educational platforms). The latter is the component characteristic of e-learning, its distribution and access electronically through the internet, as well as the integration of the management of videoconferences, synchronous and asynchronous interaction spaces, etc.

García Aretio (2020) defines distance education based on the following characteristics: separation between participants (teacher and students), independent study self-managed by the student, communication mediated by technological resources and the support of an institution. The above agrees with the definition of Stracke *et al.* (2023), who understand online education as any type of learning that 1) takes place online, 2) is designed with learning objectives and intentions, that is, like formal education, and 3) is limited to a certain time, has a specific duration or a start and end time.

¹ By institutions such as: the Council for the Accreditation of Higher Education (known in Spanish as COPAES), the Inter-American Center for Social Security Studies (known in Spanish as CIESS) or the National Council of Humanities, Sciences and Technologies (known in Spanish as Conahcyt).

CONCEPTUALIZATION OF INSTRUCTIONAL DESIGN

The development of courses that are part of the online offering is usually based on instructional design models that involve the participation of different actors (for example, content, pedagogical and technological experts). Chiappe (2008) indicates that the most representative instructional design models limited to the framework of educational technology are: ADDIE, ASSURE, Dick and Carey, among others that take up the same proposals.

Chiappe (2008) points out that: “all these models have a characteristic in common: they focus on the organization of an instruction process composed of phases, within those activities or sets of activities are developed and make up more specific processes, focused on the achievement of a particular objective” (p. 230). For this and other authors it has been important to distinguish instructional design as a field where definitions coexist around professionals (trade), their moments (phase) and implementation (process). An understanding of the references that underlie these definitions allows a broader vision of instructional design and its scope.

For Reiser (2012), the field of instructional design encompasses the analysis of learning and performance, as well as the design, development, implementation and administration of instructional and non-instructional processes and resources, with the intention of improving learning and performance in a variety of contexts, particularly in educational institutions and workplace. The distinction of these contexts generates differentiated products and processes: school institutions use instructional design above all for the development of courses or subjects, while in the workplace they seek to develop micro-courses or educational resources that can be reviewed or consumed in a short time.

Martínez (2009) emphasizes that instructional design “is necessary in any modality, to organize in a systematic way, not only teaching but also learning.” Thus, the instructional design of courses is useful in contexts where the teacher or facilitator did not necessarily develop the course he or she teaches, when a previously prepared design is used to homogenize the learning experience, its delivery and conduct, and ideally its results.

By observing instructional design as a necessary activity in the development of educational e-learning projects, it becomes important to know which models are used by educational institutions and the characteristics of their implementation, as well as the mechanisms from which best practices are established and the evaluation of the courses produced is carried out. “In distance education, the different instructional design models aim to clarify, for those who receive the instruction, the ways to achieve learning; and that distance is not an impediment to achieving it” (Martínez, 2009, p. 116). When considering the latter, it is

interesting to know which instructional design models, pre-existing or self-developed, are used by higher education institutions in the country.

Various educational institutions face the challenge of designing e-learning courses in various ways, as McGahan *et al.* (2015) point out. The strategies they employ include:

- 1) Provide support to teachers to develop their courses.
- 2) Use predefined templates or courses.
- 3) Establish instructional design support programs to train teachers.
- 4) Make efforts at an institutional level.
- 5) Focus on course design from an institutional level to reduce barriers such as compensation, time, organizational change, experience, support, and technical infrastructure.
- 6) Create an institutional infrastructure where online courses are an essential component of the mission during the transition to distance programs.

The first scenarios where support is offered to teachers in the development of their courses may require the establishment of more transparent mechanisms to guide and evaluate the sufficiency and quality of the designed e-learning courses.

E-LEARNING QUALITY ASSURANCE AND EVALUATION

E-learning evaluation, as with any distance education offer, occurs in a context where there are negative perceptions (doubts about its quality, seriousness, etc.) on the part of the public, employers, and even teachers and students within the same educational institutions, compared to the view of education in conventional formats (e.g., face-to-face or on campuses). Some of the mechanisms to promote loyalty between HEIs that offer online education, their applicants or students and the market fall on aspects of customer satisfaction, perceived quality, commitment, trust and perceived value (Curth *et al.*, 2019).

In this regard, Gaskell and Mills (2014) identify four major challenges that undermine the credibility and effectiveness of online education and revolve around the deficiency in: 1) the quality of teaching, learning and quality assurance processes; 2) training results; 3) access; 4) perception of students, teachers, administrators and employers. While the first three

challenges are commonly addressed by training institutions to ensure compliance with certain levels or standards, the fourth challenge is more complex to address, especially with employers. In these, Gaskell and Mills (2014) indicate that it will be the support and renown of the training institution (and degree issuance) that will provide greater recognition to the training obtained online.

In the context of students' perception of online education, several factors that influence their perspective are identified; some of these, while not necessarily negative, can affect students' overall perception. For example, a study conducted in New Jersey, United States, found that students find that online courses require greater self-discipline and willingness to learn independently. Lack of communication or contact with teachers and peers was also identified as a major concern; however, accessibility to basic courses and tools does not appear to be a significant problem for students, regardless of race or ethnicity.

In this regard, it is important to highlight that the need for greater self-discipline can be a negative aspect when students do not have the necessary skills or experience to participate in online education programs. Therefore, these degree programs may attract older people or people with different circumstances, rather than 18- to 20-year-olds.

In line with the above, Orozco (2014) cites several authors (Hoosen and Butcher, 2012; Daniel, 2010; Jung and Latchem, 2012) to point out that “ensuring the quality of training services counteracts the detractors who put into question doubts the effectiveness of services, organization, results and effectiveness of the studies offered in the institutions through e-learning” (p. 39). At the same time, it indicates that the emergence of educational institutions that provide low-quality services in these modalities damages the image that students and the public may have regarding the quality, impact or other relevant factors for the assessment of an educational service.

Understanding quality assurance, and its subsequent evaluation, involves approaching definitions of what “educational quality” means. Moreno and Sánchez (2011) consider that this is not an isolated concept, “but as a value judgment it must include pertinence, relevance, equity, and the analysis of the resources used both in meeting the goals and objectives (effectiveness), as well as in their rational and effective use (efficiency)” (p. 4). For this reason, the evaluation of online education must be considered, as in conventional modalities, a mechanism that allows verifying the quality of the offer in its different variables.

To achieve this, it is important to have a concept that allows us to understand what we define as quality in online education. For the American Society for Training and Development and the National Governors Association (2001), cited by Li (2009), quality in online

education comes with an experience that “provides the right content at the right time, helps students to master knowledge and skills, in a way that keeps them motivated to learn and apply what they learn to improve individual and organizational performance” (p. 39).

For his part, Colás *et al.* (2005) point out that:

E-learning evaluation, from a pedagogical perspective, models from face-to-face training have been applied, reproducing to a greater or lesser extent models, approaches, research methods and data collection techniques, applied in formal education. The evaluation models of classic educational programs have been recurrent, therefore, when proposing pedagogical proposals for e-learning evaluation, hence models such as those of Stufflebeam, Kirkpatrick, Van Slyke and others are frequently used (p. 3).

Regarding the latter, the systemic evaluation model of Van Slyke *et al.* (1998) considers, to predict the success of training access to online education, the variables: 1) institutional characteristics, 2) characteristics of training recipients, 3) course characteristics and 4) distance training characteristics. For its part, Kirkpatrick's four-level model (1999) seeks to evaluate the impact of the training action considering four levels: participants reaction, learning achieved, level of transfer achieved and, finally, the resulting impact.

Table 1 compares the proposals of several authors regarding general evaluation models of the online training offer. Different dimensions and approaches are observed in these, from administrative points to those focused on the student's experience.

Table 1. Comparison of online offer evaluation models

Phipps and Merisotis (2000)	Zhang y Cheng (2012)	Ossiannilsson (2012)	Ortiz-Lopez et al. (2021)
1) Institutional support: involves having a solid technology plan, a reliable technology system and centralized support for the e-learning infrastructure	1) Planning: market demand, feasibility, target students, course objectives and finances	1) Administration: a) Strategic planning and development	1) Dimension: Institution quality <ul style="list-style-type: none"> • Institutional policy (5 indicators) • Institutional context (4 indicators) • Institutional response and help (5 indicators)
2) Course development: includes guidelines and standards for online course design and	2) Development: instructional design, course materials design, course web design, flexibility,	2) Products: a) Curriculum design b) Course design	2) Dimension: Teaching Quality: <ul style="list-style-type: none"> • Teaching function (11 indicators)

development, as well as review of materials and student participation in analysis and evaluation	student-student interaction, teacher/tutor support, technical support and evaluation	c) Distribution or delivery of the course	<ul style="list-style-type: none"> • Teaching strategies (7 indicators) • Teaching materials and resources (7 indicators) • Mentoring (5 indicators)
3) Teaching/learning: Evaluates teacher-student interaction, feedback, and quality of online resources			
4) Course structure: includes student preparation, additional information, and assignment submission and grading processes			
5) Student Support: offers access to information, resources and technical support for students	3) Process: technical support, website use, learning interaction, learning evaluation, learning support and flexibility	3) Services: a) Support for teachers b) Support for students	3) Dimension: Quality of the learning system or platform <ul style="list-style-type: none"> • Operation (9 indicators) • Accessibility (6 indicators)
6) Teaching support: Includes technical support, training, and written resources to help teachers teach online			
7) Evaluation and assessment: measures e-learning effectiveness through data related to costs, enrollment and the technology used in the course	4) Product: student satisfaction, teaching and learning effectiveness, and sustainability		4) Dimension: Quality of program evaluation: <ul style="list-style-type: none"> • Evaluation of prior program preparation (3 indicators) • Process evaluation (4 indicators) • Final evaluation (8 indicators)

Of the authors reviewed in table 1, Ortiz-López *et al.* (2021) proposed a quality evaluation model in e-learning for higher education based on the analysis of other existing models. The model, a product of their work,

consists of four main dimensions, 14 sub-dimensions and a total of 80 indicators that try to evaluate each quality factor relevant to e-learning; with this, they seek to make it useful both for evaluations carried out at the institutional level, and for self-evaluation that teachers can apply to their own teaching practice in the modality.

In the national context, various mechanisms for evaluating the quality of educational services can be considered. Some are specifically designed for mixed or non-face-to-face modalities, which include online education. Others have minor adaptations to observe what has already been done in programs or subjects in the e-learning modality.

Orozco (2014) carried out a detailed review in this regard, organizing these evaluation models according to their origin:

- a) Official quality assessment e-learning models in Mexico (National Council of Science and Technology, Conacyt;² Council for the Accreditation of Higher Education, Copaes; Interinstitutional Committees for the Evaluation of Higher Education, A. C., CIEES; Common Space for Distance Higher Education, Ecoesad).
- b) Private e-learning quality assessment models in Mexico.
- c) International models with presence in Mexico (Latin American and Caribbean Institute for Quality in Distance Higher Education, CALED; ISO/IEC 19796; Epprobate; Southern Association of Colleges and Schools Commission on Colleges; Procert Labs).

The first models are focused on the accreditation and monitoring of those educational programs that voluntarily, as institutional requirements or as mechanisms for access to federal financing, seek to demonstrate compliance with sufficient quality criteria in an environment dependent on the federal government. In the case of official models, they usually have criteria and indicators that evaluate broad aspects of educational programs and contain a section where indicators associated with the use of information and communications technologies (ICT) are established to support the program or, directly, the offer of subjects or stages in online mode.

It is important to analyze this aspect to understand how the recognition of non-traditional modalities has been performed in official evaluation and accreditation schemes. In most cases the strategy has been to establish and observe complementary elements rather than developing new or specific instruments. Some institutions, such as CIEES and Conacyt, have carried

² Now National Council of Humanities, Sciences and Technologies (Conahcyt).

out more exhaustive evaluations, although these are still located between traditional criteria and indicators, and those specifically aimed at the non-face-to-face or online modality.

At the same time, it is important to clarify that Conacyt has not published calls or reference frameworks for the evaluation of non-school programs since, at least, 2018. For its part, CIEES has had a reference framework to evaluate higher education programs in distance modality since 2018. This includes specific categories and indicators for online programs, such as instructional design and course administration, staff in charge of instructional design and management of distance programs, infrastructure to manage courses, digital library and data bank, among others (CIEES, 2018).

Other levels of quality evaluation would be the monitoring or compliance with standards or norms, understood as those characteristics that a system, product or service must meet, based on the voluntary agreement between manufacturers, consumers, users and the administration on the elements that must be met in each one (Spanish Association for Quality, AEC, 2023). These standards or norms are studied but little applied in Mexico to evaluate complete educational programs. Instead, official and other complementary models are more used, since these, as guidelines and good practices, can be adapted and accommodated depending on the characteristics of the institution or interest one has in them, although in the end they may be fully attended to if participating in an evaluation by an external entity, as the CIEES do.

On the other hand, an additional concept is benchmarking as a mechanism to obtain reference points (such as good practices among reference institutions) that become ideals to achieve by those that are starting or are in a situation of relatively low quality or compliance. Sam (2015) indicates that the use of benchmarking “focuses on best practices through self-assessment, including systematically collecting data and information from predefined benchmarks and subsequently formulating roadmaps to achieve these benchmarks” (p. 2); however, it is also pointed out that benchmarks development reference for e-learning is at a very young stage compared to exercises for other modalities, although exercises already exist in Europe, United States and Australia.

The above allows us to see that, as Ossiannilsson (2012) indicates, most quality models or standards are based on three or six main dimensions, the first three subdivided into the following six, leaving:

- d) Services: 1) support for teachers and 2) support for students
- e) Products: 1) curriculum design, 2) course design, and 3) course distribution or delivery

f) Administration: 1) strategic planning and development

The above does not mean that models are repetitive or have necessarily reached a state of consolidation, but rather it reflects what Ossiannilsson *et al.* (2015) indicated: “there is no single quality model that is suitable for all contexts. It is obvious that there will be needs for cultural and contextual adaptations, but there is already a set of principles for quality in online education, which will allow flexibility and dynamism to integrate changes with new technologies and pedagogies” (p. 40).

EVALUATION OF INSTRUCTIONAL DESIGN

If instructional design is understood as a specific element or process within the implementation of broad distance education projects, particularly associated with courses development and resources that are part of a training program (continuing education, bachelor's degree or postgraduate), it is proposed that there must be theoretical references to evaluate the instructional design based on the fulfillment of its objectives, procedures or products, although the use of models such as those referred to above is not ruled out.

It is useful to examine the instruments proposed to evaluate the quality of courses internally (see table 2). Each model highlights specific areas, reflecting diverse approaches in evaluating the quality of educational environments and methodologies. Although they share general criteria with those in table 1, they focus above all on the quality of resources, content, interactions and multimedia elements, regardless of the institutional context or educational program as a whole (although it could be assumed that all courses must have the same level of quality when evaluating their instructional design).

Table 2. Comparison of instructional design evaluation models

Santoveña (2010)	Mengual-Andrés <i>et al.</i> (2015), based on an instrument from Arias (2007)	Quality Matters (QM) rubric (McGahan <i>et al.</i>, 2015)
a) General quality of the environment and teaching methodology	1) Teaching guide 2) Methodology	1) Course summary and introduction 2) Learning objectives (or competencies) 3) Evaluation and measurement

c) Technical quality: multimedia resources	3) Content organization 4) Content quality 5) Teaching resources 6) Motivational capacity	4) Instructional materials 5) Interaction and attractiveness
b) Technical quality: navigation and design	7) Multimedia elements 8) Language style 9) Discrimination and values 10) User uniqueness	6) Course technology 7) Student support 8) Accessibility

Another way to evaluate online courses quality is through mechanisms suggested by the same instructional design models used. Almost all instructional design models already mentioned (ADDIE, ASSURE, among others) include within their stages some feedback or process evaluation. It is essential to identify criteria and indicators that guide and provide feedback on online courses design, especially when considering that not all participants in the design process need to be familiar with the complete model or have extensive experience in instructional design, nor that all educational institutions have access to experts who supervise processes on a massive scale. Therefore, predefined criteria and indicators help instructional designer teams to simultaneously advise the design of multiple online courses.

On the other hand, it is important to consider when the quality evaluation of an online course is conducted. When a design project has not been accompanied by experts from its beginning, it is possible that the evaluation takes place after its implementation. Although, traditionally, quality assessment focused on final products, such as courses and content, more recent approaches are oriented towards process, that is, from its implementation (Bremer, 2012). All of the above is summarized by Bremer (2012) when he emphasizes that “quality assurance does not take place in the final step but is applied from the beginning and continuously integrated into the process” (p. 25).

CONCLUSION

Online programs and courses quality evaluation can be carried out from different approaches and levels, by using or adapting those models where not only the course and its design are evaluated, but also the rest of the institutional conditions or the impact of the course-program.

In the national environment, a starting point for evaluating the quality of online courses, as part of complete educational programs, should be the use of official evaluation models (CIEES, Conacyt, Copaes, among others), understanding that, although these are not exhaustive in verifying the online component of the courses, they are concerned with the minimum conditions of this modality. These will have to be used as part of the evaluation-accreditation mechanisms by third parties, but it is suggested that institutions and those responsible for educational programs worry about using broader and more detailed models in the evaluation of these course-programs in their different stages, from creation to implementation, as well as compliance with more specific standards at some point.

The development of an online education quality assurance and evaluation model for a specific institution can become a useful instrument when relatively new projects are developed in the institution, while allowing guidance towards best practices (such as quality assurance) and ideal verification mechanisms (such as quality assessment), at the educational program and course level.

As an initial step for its validation and recognition, the accreditation process of educational programs in these modalities by the relevant organizations (CIEES or CALED) will be essential; however, it will be necessary to verify that the evaluation models of these organizations are sufficient to establish quality assurance mechanisms in cases such as the online modality for each institution, since the transition to online programs involves transformations or adjustments in organizational, regulatory, technological and pedagogical levels within the institutions.

The period of remote teaching due to covid-19 and post-pandemic caused in many institutions a greater integration of face-to-face modalities with the support of ICT, in addition to exploring or expanding their online offering, as well as the combination of face-to-face subjects, hybrid and online within the students' workload, therefore diversification in teaching modality requires specific adjustments in terms of evaluation, not only in its documentation, but also in the establishment of intermediate quality parameters.

For example, programs that offer a significant combination of in-person, hybrid, and online modalities must design evaluation criteria that consider the particularities of both in-person (synchronous) and non-in-person (synchronous or asynchronous) experiences. This implies assessing the quality of teaching in the classroom and work in laboratories and workshops, along with the effectiveness in conducting and monitoring in digital environments, the quality of teaching resources and relevance of the combination of modalities at the programmatic level, as well as in specific courses within the educational program.

The absence of mechanisms like this, through online education quality assurance and evaluation models, can put the success of modality diversification initiatives at risk, slow them down, or compromise the quality of the educational program in key areas such as learning and development of skills, retention and graduation, relevance and efficiency, among other aspects.

Given the variety of approaches to the phenomenon to be observed, the most appropriate thing is to develop your own model that can identify:

- a) The broad institutional context (administration and coordination). Both in the conditions of infrastructure, regulations and organizational preparation, as well as the policies that are institutionally promoted towards the diversification of modalities.
- b) The context of each academic unit (school, faculty or institute) where an educational program or set of subjects operates online. This, observing technological, educational and organizational dimensions, as proposed by Gaona *et al.* (2014).
- c) The context of the educational program or set of subjects that operates in online mode, in relation to the official evaluation models in which the educational program accredits itself (CIEES, Copaes, etc.).
- d) The context of each subject that operates in the e-learning modality. Here you can create your own version from one of the existing models: Quality Matters (QM) Rubric (McGahan *et al.*, 2015), the one presented by Mengual-Andrés *et al.* (2015), that of Phipps and Merisotis (2000), among others.

Finally, this model should establish the necessary reference points to guide the implementation of a course or educational program and the institutional strategy in this type of modality, to orient the start-up of these initiatives and to indicate minimum quality indicators and those that are also the ideal ones to be achieved. In other words, it should become a mechanism for quality assurance and not only for evaluating quality in the presentation of internal or external reports. The latter points of reference are, perhaps, appropriate for a later analysis.

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