

TECHNO-PEDAGOGICAL DESIGN MODEL FOR BLENDED LEARNING COURSES IN FACE-TO-FACE UNIVERSITIES FOR THE POST COVID

MODELO DE DISEÑO TECNOPEDAGÓGICO PARA CURSOS BLENDED LEARNING EN UNIVERSIDADES PRESENCIALES PARA EL POST COVID

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Abstract: This article aims to describe the techno-pedagogical design model for planning courses in face-to-face universities that relied on technological mediations to give continuity to the academic offer and now must adjust their techno-pedagogical design models to a blended learning modality in post-pandemic times. Specifically, the phases that structure a model of techno-pedagogical design of academic programs in a blended learning modality are described in order to guarantee the process of academic continuity in Colombian public universities. In a first phase, the essential characteristics of the techno-pedagogical design in higher education academic programs are identified, seen as the phases to be taken into account in the planning process of the training action. In a second phase, the common structural elements in the techno-pedagogical design models are identified. Finally, the elements identified in the previous phases are integrated with the characterization of public universities to design the techno-pedagogical design model of courses in blended learning mode. The central result of this research is a techno-pedagogical design model that integrates the good teaching practices used in the development of higher education courses in times of emergency with the curricular design of academic programs to be implemented in blended learning mode in the later period. to the current pandemic. The use of techno-pedagogical design models naturally integrate technology into the teaching-learning processes, which allows the redesign of face-to-face university courses in blended learning mode in a disciplined and formal way.

Keywords: techno-pedagogical design, blended learning, higher education

Resumen: Este artículo tiene como objetivo describir el modelo de diseño tecnopedagógico para la planificación de cursos en universidades presenciales que se apoyaron en mediaciones tecnológicas para dar continuidad a la oferta académica y ahora deben ajustar sus modelos de diseño tecnopedagógico a una modalidad de aprendizaje mixto en tiempos de pospandemia. Específicamente, se describen las fases que estructuran un modelo de diseño tecnopedagógico de programas académicos en una modalidad de aprendizaje mixto con el fin de garantizar el proceso de continuidad

académica en las universidades públicas colombianas. En una primera fase, se identifican las características esenciales del diseño tecnopedagógico en los programas académicos de educación superior, entendidas como las fases a tener en cuenta en el proceso de planificación de la acción formativa. En una segunda fase, se identifican los elementos estructurales comunes en los modelos de diseño tecnopedagógico. Finalmente, los elementos identificados en las fases anteriores se integran con la caracterización de las universidades públicas para diseñar el modelo de diseño tecnopedagógico de cursos en modalidad semipresencial. El resultado central de esta investigación es un modelo de diseño tecnopedagógico que integra las buenas prácticas docentes utilizadas en el desarrollo de cursos de educación superior en tiempos de emergencia con el diseño curricular de programas académicos para ser implementados en modo blended learning en el período posterior a la pandemia actual. El uso de modelos de diseño tecnopedagógico integra naturalmente la tecnología en los procesos de enseñanza-aprendizaje, lo que permite rediseñar los cursos universitarios presenciales en modalidad blended learning de manera disciplinada y formal.

Palabras clave: Diseño tecnopedagógico, blended learning, educación superior

1. INTRODUCTION

The current scenario of development of the teaching-learning process in a non-face-to-face mode and the need for better pedagogical use of technology recovers the concept of instructional design and integrates it into a more real and current concept, the techno-pedagogical design, which has a dimension integral of the process. According to Berger et. al. [1] Instructional design is the science of creating detailed specifications for the development, implementation, evaluation, and maintenance of situations that facilitate the learning of small and large content units, at different levels of complexity. In a complementary way, the analysis of different definitions of instructional design allows us to identify common characteristics such as that it is a detailed systematic planning process, which aims to find the best practices that allow the student to optimally develop their learning process and that the evaluation allows to identify weaknesses that are found once the instructional design has been applied.

On the other hand, the influence of technology on instructional design systems has made it possible to evolve towards the concept of techno-pedagogical design, which in practical terms is a contemporary approach to the principles of instructional design [2]. The techno-pedagogical design is characterized as the integrated set of: "a proposal of contents, objectives and teaching and learning activities, as well as guidelines and suggestions on how to approach and develop them", "an offer of technological tools" and "a series of suggestions and guidelines on how to use these tools in the development of the proposed teaching and learning activities" [3]. The different definitions of techno-pedagogical design are integrated and applied in the conception and specification of techno-

pedagogical design models, which allow to implement the practices of this type of design in the teaching and learning processes. The models specify phases or methodologies that allow the design or redesign of courses and activities of educational processes. Among the most representative techno-pedagogical design models, one can start with the generic ADDIE model, which is characterized by being systemic, having a high level of usability and ease of application in any context [4]. Regarding its specification, the ADDIE model is structured in 5 phases: Analysis, Design, Development, Implementation and Evaluation.

The TPACK model raises the need to integrate three axes of knowledge: pedagogical, disciplinary and technological; which offers a holistic and deep understanding of how digital technologies can offer added value to teaching-learning processes, from the process of designing activities to the execution of teaching practice.

Another techno-pedagogical design model is the 7C Learning Design [5], which is based on the components of learning design, its design motivation is focused on the design of digital activities and focuses on activities as the axis that articulates the entire design process. Among the structural activities of this method are conceptualize, create, communicate, collaborate, reflect, integrate, consolidation.

The 4C / ID [4] model is based on practical and applied learning tasks as the axis. The scope of the model is the development of reflective expert knowledge. The central motivation of the model is how to support the practical activity, the specification of this model is structured in two main activities: analysis and design and in a complementary way these are divided into 4 components: decomposition of skills in principles, analysis of constitutive activities and related knowledge, selection of teaching resources, composition of the training strategy.

On the other hand, regarding the central scope of this research, it seeks to identify and describe what are the phases and procedures of a techno-pedagogical model to redesign academic programs in face-to-face universities in the post-COVID era, taking as the main requirement the integration of technological mediations and good teaching practices mediated with technology used in the teaching-learning processes in the current emergency situation.

2. BACKGROUND

Through the review of the literature and the diachronic analysis, multiple definitions of Instructional Design have been found. The concept of instructional design is presented below from the perspective of different authors.

Regarding the phases of the process, instructional design deals with the planning, preparation and design of the resources and environments necessary for learning to take place [6].

Subsequently, instructional design was defined as the discipline interested in prescribing optimal instructional methods, creating desired changes in students' knowledge and skills [7].

Otherwise, instructional design is the science of creating detailed specifications for the development, implementation, evaluation, and maintenance of situations that facilitate the learning of small and large content units, at different levels of complexity [8].

Regarding the capacities of the students, the instructional design is the art and applied science of creating an instructional environment and the materials, clear and effective, that will help the student to develop the capacity to achieve certain tasks [9].

In the same year, instructional design is said to involve systematic instructional planning that includes needs assessment, development, evaluation, implementation, and maintenance of materials and programs [10].

Similarly, instructional design is the systematic and reflective process of translating teaching-learning processes into plans for didactic routes, materials, activities, information resources and evaluation [11].

With a more modern perspective, instructional design is defined from two views, the pedagogical instructional design and the instructional design process, in the first view, emphasis is placed on the principles, pedagogical strategies and learning theories in which the teaching must be supported. design, in the second view focuses on the process followed to make decisions and develop educational resources [12].

In the last decade, it has been affirmed with respect to instructional design that it is the

science and art that allows creating detailed specifications for the development, evaluation and maintenance of actions that facilitate learning and performance [13].

It is observed that the definitions of instructional design presented by different authors are markedly influenced by the learning theories of the time, as can be seen in the most recent ones, which are inferred to be supported by constructivism and connectivism.

However, according to the current needs of a society markedly influenced by the technological paradigm and in which information and communication technologies are integrated into educational processes in a natural way, the approaches of instructional design should be redirected towards the techno-pedagogical design, which is also influenced by the systemic approach in its conception.

In a complementary way, techno-pedagogical design is a concept that integrates instructional design and the use of technology in the teaching-learning process [14]; additionally, this type of design generates a high added value in current scenarios because it is not only applied to the design of online courses, but to any training action that incorporates the use of information and communication technologies [15].

On the other hand, over time different models have been used for the planning and development of the teaching-learning process at different levels of education. However, a flexible generic model has been established and matured that adapts to the needs and characteristics of educational levels. This model is structured in five phases that correspond to Analysis, design, development, implementation and evaluation; the name of the model in question is ADDIE for the phases that comprise it.

3. RESEARCH METODOLOGY

Descriptive research studies a phenomenon under natural conditions without considering a hypothesis [16], for this reason, in this research it has been decided to use this type of research in order to specify the phases that structure a techno-pedagogical design model for blended learning courses in face-to-face Universities that allows the redesign of academic programs in the post-COVID era. For the conception and design of the model, methodological foundations related to software engineering are used, specifically, foundations related to specification, use of methodologies and agile development are used.

In particular, systems specification fundamentals related to the characterization of a specification using criteria such as correctness, sufficiency, consistency, clarity and realism are used. Similarly, elements related to the use of methodologies in the development of a process

are taken, which avoids defects in the models of a system [17]. In a complementary way, the fundamentals of agile development methodologies are used, which are more oriented to development processes of a few weeks and with low levels of formalization in the documentation [18].

Specifically, regarding the procedure used for the conception and design of the model, initially the requirements to which the techno-pedagogical design model should respond were identified; Subsequently, the typology of existing techno-pedagogical models was analyzed to structure the central core of the model's phases, which had the impact of identifying the stages of analysis, planning, design, implementation and integration, execution, monitoring and control. Finally, in a descriptive way and through a decomposition process, the internal structure of each of the phases was specified.

4. RESULTS

The use of software engineering methodologies and the foundation in bodies of knowledge of project management in the process of design and construction of a model generates added value by improving indicators of productivity, discipline and maturity in the construction of the techno-pedagogical model [19-20].

Figure 1 shows the domain model of the objects that structure the techno-pedagogical model for blended learning courses in face-to-face universities.

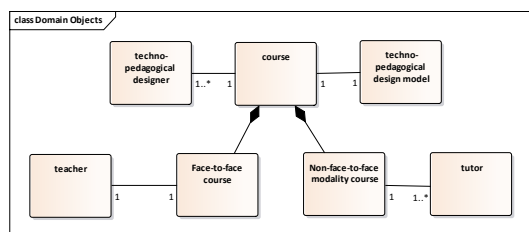


Figure 1. Domain model of techno-pedagogical design objects

Figure 2 visualizes the phases that structure the techno-pedagogical model for blended learning courses through an activity diagram.

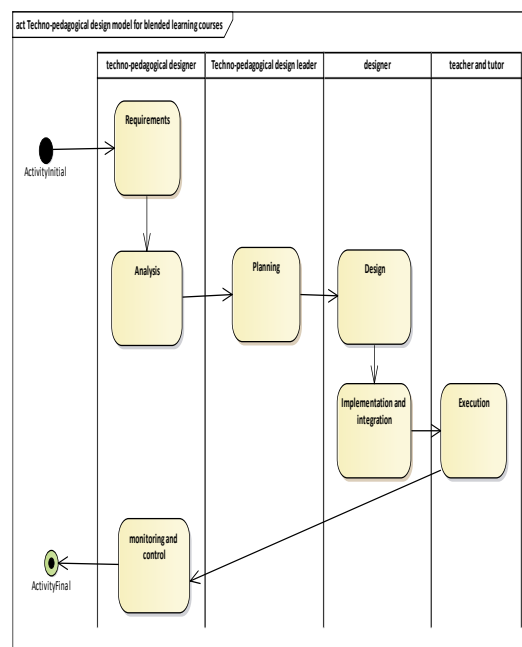


Figure 2. Techno-pedagogical design model

As for the phases that structure the model, which should be used by higher education teachers in the planning and execution scenario of the teaching-learning process of a higher education course, the phases of the techno-pedagogical model are described below.

The first phase is that of requirements, a requirement is a characteristic that the model must have or a restriction that the model must have in order for it to be accepted by the academic community [15]. Specifically, the requirements established by the regulatory standards of the education sector, by the institutional educational project, by the institutional pedagogical thinking, by the educational project of the program, by the learning outcomes of the program and the specification of the results must be identified of learning to develop in the subject.

The second phase of Analysis, in this phase an analysis is made of the student, the educational context of the teaching-learning process developed in face-to-face mode, the educational context of the process developed in a non-face-to-face modality and the learning results expected for the course.

The third planning phase, in this phase the activities to be developed in the course are identified, the pre-knowledge necessary to develop each activity, the resources to be used in each activity, additionally the resources that are going to be implemented and which can be identified must be identified. re-use. Finally, an estimate of times is made for each activity. In the same way, it must be identified which activities will be developed in the face-to-face mode and which, in the non-face mode, particularly for the

latter, the communication strategies with the students, the activities and resources to be used of the technological platform must be established. Of high relevance, in this phase monitoring and control strategies must be planned to avoid overlapping and redundancy between the activities and content to be developed in the face-to-face and non-face-to-face modes.

The fourth design phase has the scope of thinking and proposing an outline of the activities and resources to be used in each course, particularly the objectives and learning results of the activity, the instructional activities and their associated resources, of high relevance, must be specified. Due to the requirements, the technologies in which the activities will be presented and in which the resources will be implemented must be identified. Finally, evaluation strategies and instruments must be created for each activity.

The fifth phase of implementation and integration is aimed at creating the activities and resources designed in the previous phase and integrating the selected resources to be reused into the technological platform. Similarly, evaluation instruments, rubrics, and evaluation monitoring and control strategies must be implemented with the expected learning outcomes.

The sixth phase of execution, has as its central scope to develop the teaching and learning activities planned for the face-to-face modality and to guide the learning activities to be developed by the students in the non-face-to-face modality. In a complementary way, the evaluation strategies are executed, the instruments are applied and the feedback supported in the rubrics is made.

The seventh phase of monitoring and control, seeks to evaluate the redesign process of the course in blended learning mode, additionally it seeks to formalize the process of foundation of the application of the model in a particular context; finally, good practices should be formalized and improvement actions and adjustments should be formulated for the application of the model in other scenarios.

In previous qualitative studies, oriented to the description of techno-pedagogical models, the generic nature is evidenced in that they can be adjusted and used at any level of education and in any modality [4]. In a complementary way, regarding the literature review, techno-pedagogical design models oriented to the design of online courses have been identified; However, no techno-pedagogical models have been identified that respond to the requirements of blended learning courses that respond to the

redesign of courses that naturally incorporate technology in the teaching-learning processes.

5. CONCLUSIONS

The integration of techno-pedagogical design models has become a necessity in the planning processes of higher education institutions; particularly, in the scenario that universities are currently experiencing, with regard to social isolation, these institutions have had to develop courses in a remote manner to attend the teaching-learning processes. The courses developed make use of a high technological component, which has an impact on the identification of good practices in the integration of technologies to higher education courses. In prospective scenarios, these good practices cannot be set aside and, on the contrary, must be formally incorporated into the curricular redesign of academic programs in the post-COVID 19 era. The propitious strategy to carry out this type of redesign is the use of techno-pedagogical design models which incorporate technology in a natural way.

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