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*Scientific Articles*

## **Desarrollo y experiencia de curso a distancia, estudio de caso**

*Distance learning course development and experience, case study*

*Desenvolvimento e experiência de um curso de ensino a distância: estudo de caso*

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### **Resumen**

La diversificación de la educación superior permite atender las necesidades del sector educativo de nivel superior, para lograrlo se deben definir estrategias como implantar de manera paulatina cursos a distancia. El objetivo de la investigación fue diseñar y poner en práctica un curso a distancia de nivel superior para contribuir a la ampliación de la oferta educativa. La investigación fue cualitativa y exploratoria basado en estudio de caso, se utilizaron las metodologías Scrum y ADDIE para el desarrollo del curso. La valoración de la experiencia educativa se realizó durante tres semestres consecutivos, con una muestra integrada tres grupos, con un total de 120 estudiantes. Los resultados, con una media de 3.4 evidenciaron que los estudiantes están de acuerdo con el diseño del curso y



con la modalidad no escolarizada, lo que evidencia que, la estructura del curso fomenta el aprendizaje autorregulado y los entornos virtuales requieren de la guía y seguimiento del docente. Conclusiones se observó que el diseño instruccional del curso es fundamental para el seguimiento y adquisición de competencias establecidas en el curso. El acompañamiento del docente es prioritario por lo que se debe incidir en el rol como guía para monitorear la trayectoria del estudiante durante el curso. Por consiguiente, el buen diseño de cursos a distancia y la implementación de este en el LMS son una buena opción para iniciar con nuevos espacios de aprendizaje en instituciones con modalidad presencial.

**Palabras clave:** curso a distancia, diseño de curso, experiencia de aprendizaje, LMS, no escolarizada.

### **Abstract**

Diversification of higher education allows satisfying the needs of the educational sector at that level. To achieve this, some strategies should be implemented such as the gradual implementation of distance-learning courses. The objective of the research was to design and put into practice a Higher Education distance-learning course to contribute to increase the academic offer. The research was qualitative and exploratory; Scrum and ADDIE methodologies were used in the development of the course. The evaluation was carried out through the educational experience with a focus group of 120 students. The results, with an average of 3.4, proved that students agree with the design of the course and with distance learning modality showing that the design of the course promotes self-regulated learning and that virtual environments require guidance and follow-up by the teachers. To sum up, it is shown that instructional design is essential for the follow-up and acquisition of the competencies set in the course. The follow-up by the teacher is essential, therefore one must stress the teacher's role as a guide for the monitoring of the student academic journey throughout the course. Consequently, it is concluded that a good distance learning course design and the implementation of it in an LMS is a good option to begin with the implementation of new learning environments in institutions with face-to-face modalities.

**Keywords:** distance learning course, course design, learning experience, LMS, distance learning.

## Resumo

A diversificação do ensino superior permite atender às necessidades do setor. Para isso, estratégias como a implementação gradual de cursos a distância devem ser definidas. O objetivo desta pesquisa foi projetar e implementar um curso de ensino superior a distância para contribuir com a expansão da oferta educacional. A pesquisa foi qualitativa e exploratória, baseada em um estudo de caso. As metodologias Scrum e ADDIE foram utilizadas para o desenvolvimento do curso. A avaliação da experiência educacional foi realizada ao longo de três semestres consecutivos, com uma amostra composta por três grupos, totalizando 120 alunos. Os resultados, com uma média de 3,4, mostraram que os alunos concordaram com o projeto do curso e com a modalidade não presencial. Isso demonstra que a estrutura do curso promove a aprendizagem autorregulada, enquanto os ambientes virtuais exigem orientação e acompanhamento do instrutor. Em conclusão, o projeto instrucional do curso mostrou-se fundamental para o acompanhamento e a aquisição das competências estabelecidas. O apoio do professor é primordial; portanto, deve-se enfatizar seu papel como guia para monitorar o progresso do aluno ao longo do curso. Consequentemente, cursos de ensino a distância bem estruturados e sua implementação em um Sistema de Gestão de Aprendizagem (LMS) representam uma boa opção para a criação de novos espaços de aprendizagem em instituições com um modelo tradicional presencial.

**Palavras-chave:** curso de ensino a distância, estrutura curricular, experiência de aprendizagem, LMS, educação não tradicional.

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## Introduction

Public higher education institutions in Mexico must have the vision to offer new and innovative educational modalities that allow for flexibility in the academic paths of university students. The United Nations Educational, Scientific and Cultural Organization (UNESCO, 2016) indicates that educational strategies supported by Information and Communication Technologies (ICTs) should be implemented to strengthen learning processes and generate new forms of access to education. The use of ICTs has allowed for greater flexibility in higher education by implementing academic programs in hybrid, online, and distance learning modalities. Rabia et al. (2023) point out that implementing any of these educational formats requires the design and development of the content that integrates the resources available to students through a Learning Management System (LMS).



Another factor to consider in implementation is the role of the professor in distance learning, who becomes an advisor. The tutor plays a fundamental role in distance learning. The guidance they provide to students through the LMS communication channels contributes significantly to the continuity and completion of the course. Riofrío et al. (2025) found in their research that the distance learning advisor must guide the student, taking into account their needs, so that they do not lose interest. This leads to considering student-centered learning, which fosters autonomy in the process of acquiring new knowledge based on prior experiences (Cordero & Ramón, 2021).

Regarding the student's role, it should be active and oriented towards self-regulated learning, which allows them to plan, set objectives, and achieve goals. Similarly, self-assessment enables students to monitor their learning to achieve educational objectives and, consequently, acquire new knowledge. For this, it is necessary to establish strategies that support students in their self-regulated learning (Pinto & Palacios, 2022). Demuner et al. (2023) mention It is important to define strategies to promote self-regulated learning; in this sense, experience in the production of distance courses has shown that this approach should be considered in the design and development of distance courses.

The didactic structure of distance learning courses should be based on instructional design, which provides the educational approach. It also facilitates the design of learning experiences, the monitoring of student activities and academic needs, and the establishment of self-assessment and learning assessment opportunities. The Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model (Morales et al., 2014) was used because it has a systemic approach that allows these actions to be carried out through a cycle. The model provides guidelines for designing and developing flexible courses that consider the needs of students and teachers, making them more aware of the change in role involved in both developing and delivering a distance learning course.

It is important to recognize that virtual environments at higher education have gradually been gaining ground thanks to their flexibility; however, it is necessary to strengthen their adoption because it involves an interaction between learning systems, didactics, technologies and LMS, as well as between the student and advisor actors (Cassio et al. 2024).

Käms et al. (2021) mention that student dropout in distance learning programs is due to a lack of interactivity and follow-up, as well as the absence of an intuitive interface in the LMS. To prevent dropout in these types of courses, courses should be designed with these characteristics. Achhab (2022) agrees that non-formal education requires creating courses and learning environments that consider the technological and pedagogical

approach, fostering student ownership of their learning. The teacher guides this learning, and the environment contains the resources and instructional design necessary for the educational intention to achieve its purpose.

Based on the above, it is considered that higher education institutions should establish strategies for the implementation of distance learning courses in accordance with the educational purpose.

The research team has been working on developing educational technology to support in-person learning. Considering the educational institution's vision of providing new learning spaces for the student community, the research aimed to design and implement a distance learning course at a university that offers in-person education. Furthermore, it sought to evaluate the relevance of the course design and the acceptance of the modality, in order to contribute to the vision of generating new ways to access education.

This article presents the development of the "Software Best Practices" distance learning course and its implementation through a non-formal learning experience. The results obtained from the evaluation of the course and the non-formal learning experience are presented. The discussion contrasts these findings with existing studies on the topic, and the conclusions and future lines of research are outlined.

## Methodology

The research design was descriptive, with a mixed-methods, exploratory approach focused on analyzing student perceptions. A case study strategy was adopted, and a sample of 120 students was selected for data collection and analysis. The course was developed using the Scrum agile methodology and the ADDIE model.

## Materials and case study

The case study corresponds to the learning unit (LU) of "Good software practices", the participation of the expert professor in the LU and the development team of the area of the Educational Technology Unit and Virtual Campus (UTEyCV) of the Interdisciplinary Professional Unit of Engineering and Social and Administrative Sciences (UPIICSA) and of the Directorate of Virtual Education (DEV, 2023) of the National Polytechnic Institute (IPN).

The sample consisted of 120 students who took the UA course in the non-school-based learning experience.



## **Methodologies for the development of the distance learning course**

The development of distance learning courses requires established deadlines and resources that must be properly managed to ensure timely and effective delivery . To achieve this, the Scrum methodology (Sutherland, 2016) was used, which enables the agile management and development of IT projects, and the development of this distance learning course is comparable to this type of project. Management was carried out through partial deliveries called Sprints. who supported the development management by assigning roles, responsibilities and activity delivery times, fostering collaborative work within the development team .

The course was structured using the ADDIE model, which guides the pedagogical and didactic design aimed at creating a valuable learning experience for the student. Significant aspects of planning and monitoring self-regulated learning (Pintrich, 2002) were considered to promote student engagement, participation, and progress.

The sprints, in conjunction with the analysis, design, development, implementation, and evaluation stages of the ADDIE model, enabled the development of content, digital and multimedia learning resources, and the instructional design of the course. The deliverables were reviewed, and relevant comments and suggestions were made and submitted to the course author for approval. This management approach allowed for parallel activities and continuous verification that the work plan and educational requirements were being met.

## **Development of the distance learning course**

The development of distance learning courses is considered an educational technology service that relies on ICTs, making it advisable to adopt best practices for service delivery. This service should be provided by the relevant department; in this study, it falls under the purview of UTEyCV, which currently lacks a defined process adhering to best practices such as Scrum and ADDIE. To support this department within the higher education institution, a procedure for developing distance learning courses was proposed and presented, focusing on the value chain for service management. The institution's capacity and demand were taken into account, and in this regard, the academic unit has the mission of implementing distance learning courses to gradually diversify its educational offerings.

## Analysis

It began with the determination of requirements and the development plan for the distance learning course was prepared.

*Service:* Development of distance learning courses for higher education

*Users Those who are attended to:* The course author and the students.

*Service to be delivered:* course available on the LMS.

*Team Formation that provides the service:* Composed of the service manager and the service professionals, the service manager is the head of the area and the professionals are the graphic and instructional designers, the web developers and the style editors.

*Development management:* The means of communication and delivery of the development sprints were established, the institutional Outlook Drive communication and collaborative work platform was used, email, videoconference by Teams and a group was created on WhatsApp.

*Work Plan Development :* The work plan was developed in collaboration with the course author and the development team. It comprises a series of sprints, each a set of activities encompassing the development of: curriculum content, instructional design, multimedia resources, user interface, and pedagogical design or implementation in the LMS. The sprints were developed concurrently, with partial deliveries of activities serving as input for the next activity. Table 1 presents an example of the work plan. Column one lists the sprints, column two the person responsible for each activity, and column three lists the activities.

**Table 1. Work plan for course development**

Sprints	Responsible	Activity
Content development	Professor author	Content development, instructional design, teaching resources, interface design proposal
Sprint	Responsible	Activity
Review, feedback, and contact with the author professor	Instructional Designer Style editor	Review the content, instructional design, resources, and proposed interface design. Provide feedback to the instructor.
Receive feedback	Professor author	He receives feedback and observations, accepts them, adjusts them and gives the go-ahead; if he does not accept them, he indicates it to the instructional designer and they reach an agreement.
Development of multimedia teaching resources and the user interface for the course	Graphic designer	Receives the content and resources, creates the graphic design, and develops the multimedia resources. Submits the completed work to the professor, who reviews it and provides feedback, requesting adjustments as needed and giving approval once the work is finished and meets the requirements.
The pedagogical design or setup in the LMS	Webmaster	Based on the instructional design, spaces are created in the LMS and the content, resources, and instructional design are placed there.
Review of the pedagogical design or setup in the LMS	Professor author Instructional Designer	They check that the LMS contains the instructional design and the developed resources; in case of incidents, they report them and the webmaster makes the corrections; they are reviewed again and if they are correct, they give the go-ahead.

*Note:* This is my own work, based on the research conducted during the investigation.

## Design

The course design was defined considering that, as a non-classroom-based course, it must have a structure that guides the student and fosters self-regulated learning. Therefore, the course design comprises: the framework, the thematic units, and communication channels. The overall structure is modular, and the modules include Welcome, Good to Know, Agenda and Communication, as well as the thematic units. The course includes a lesson plan or course agenda, which serves as a guide for students to

follow in order to achieve the desired learning outcomes. Self-regulation of learning , which is composed of: 1) The content to be studied, 2) Learning session and activities to be carried out, 3) Evidence of learning to be delivered, the score that each activity has, the time of completion and delivery date.

In a distance learning course, the advisor must pay attention to the activities carried out by the students, verifying that they are being carried out on time and in the correct manner, for which purpose the design in the delivery of the activities contains a space for feedback on the learning evidence submitted.

was included so that students could ask questions and have them answered by the course advisor. This forum also allows the advisor to provide specific and personalized feedback, thus enabling the monitoring of learning progress. An example of the design of a thematic unit is presented in Table 2, outlining each of the modules that comprise it.

**Table 2.** Example of the content design of a thematic unit of the course

Modules	Instructional design of the unit	
Thematic Unit I “Good practices and frameworks”	Introduction	Write an essay on the topic to be studied in the unit, describing the learning process that will take place.
	Purpose	State the educational purpose to be achieved upon completion of the unit study
	Learning experience	Describe the topic and include the resources to consult, as well as the activities to be carried out, the evaluation criteria and score
	Sessions	Include the session number and name, the purpose, a description of the study content, and multimedia resources.
	Activities	It consists of the activity number and name. Instructions for completing the activity are given, along with details of the required evidence and submission method, as well as the evaluation method, including the rubric.
	Conclusions	It presents the closing of the unit study, highlighting the purpose that is fulfilled during its study.
	Glossary	It provides definitions of key concepts to support a better understanding
	Literature	It includes a list of sources that can be consulted during the study of the content.

*Note:* This is my own work, based on the research conducted during the investigation.

## Development

In the development stage, the graphic designer produced the multimedia resources indicated by the author professor. The resources integrated text, image, and audio, resulting in the development of videos, images, animations, interactive elements, and infographics, as well as downloadable PDF files, which support different types of learning.

## Implementation

The implementation phase aims to make the course available to the end user. The operational course should be free of incidents and problems, and it must be guaranteed that it meets the established requirements. To achieve this, the sprint corresponding to the course's pedagogical design is resumed, and the packages are imported into the LMS, performing functional tests. Table 3 presents the actions taken by the webmaster, who was responsible for setting up the course in the LMS, conducting the tests, and delivering the course to production. At the end of the sprint, the course author gave their approval, and the course is ready to be delivered.

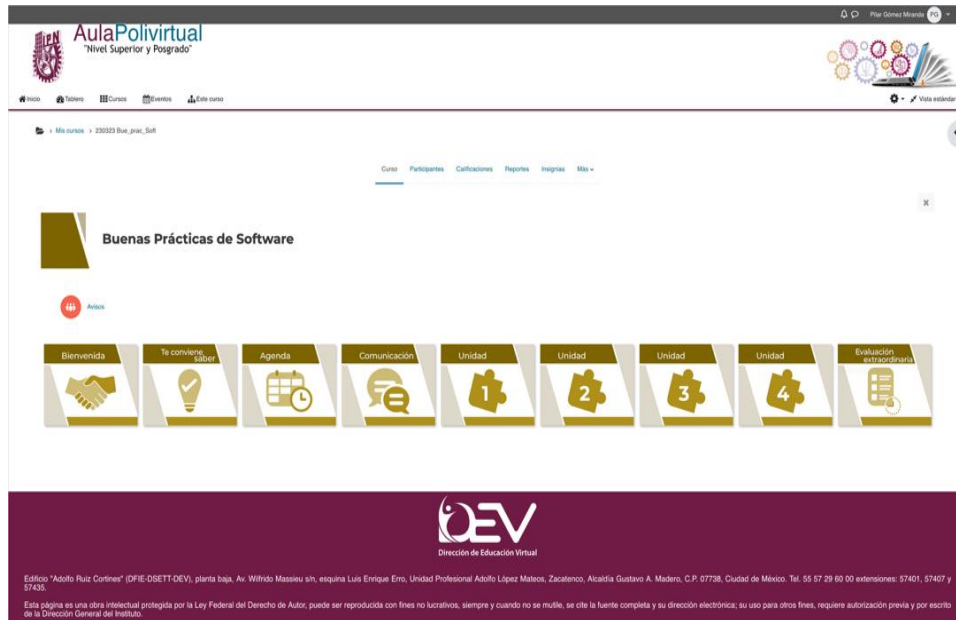
**Table 3.** Transition of the course development to distance learning

Action	Sprints
Course development in the LMS	Installation on the platform, for which the files found in the drive containing the content, instructional design, teaching resources and graphic design of the course were used
Course review in the LMS	Review of the course, which must comply with the instructional design, content, and teaching resources, reporting any incidents found.
Incident handling in the LMS	The issues found were addressed, the corrections were made, and the document was returned to the author professor.
Course approval in the LMS	Review by the author of the final version of the course and approval
Incident control	When the course is in use, any incidents that occur are recorded on the incident control form and addressed to ensure the continuity of the course.

*Note:* This is my own work, based on the research conducted during the investigation.

Figure 1 shows the main interface of the distance learning course, which was set up in the LMS by the DEV area of the IPN and is available on the AulaPolivirtual site where the course is currently taught.

**Fig. 1.** Main interface of the software best practices course



*Note.* Taken from the main interface of the course developed and available on the official website of the Directorate of Virtual Education. AulaPolivirtual Good Software Practices, 2024.

## Results

The final stage of the ADDIE model, evaluation, was conducted by assessing the course implementation with a sample of 120 students. The learning experience took place over three consecutive semesters, from January 2024 to June 2025. The advising professor worked with one group per academic period. The number of students enrolled per semester was 50 for the first semester, 30 for the second, and 40 for the third. Students completed this unit remotely and supplemented their coursework in person.

To determine if the course achieved its educational purpose, the following research questions were established: Did the course design favor the students' academic performance? Was the course format accepted by the students?

The data used to answer the research questions were obtained from a semi-structured survey designed to assess participants' evaluation of their non-formal learning experiences. The survey consisted of 10 questions with responses on a 5-point Likert scale, where 1 = disagree, 2 = somewhat agree, 3 = neutral, 4 = agree, and 5 = strongly

agree. The survey sections are: 1) Opinion on the learning experience (5 questions), and 2) Opinion on the non-traditional learning modality . The survey was initially administered as a pilot test to 20 students. The instrument's reliability was assessed using Cronbach's alpha coefficient with IBM SPSS Statistics (version 30), yielding a reliability level of 0.82, indicating consistency. Subsequently, the final version of the instrument was administered to a sample of 120 students. Table 4 shows the mean for each response, which was calculated using Microsoft Excel's descriptive statistics tool.

**Table 4.** Results of the educational experience using the distance learning course

<i>Variables</i>	<i>Questions</i>	<i>Average</i>
Opinion on the learning experience using the distance learning course	Did the design enable self-regulated learning?	4.00
	Do the multimedia resources cover the course topics?	4.00
	Are the knowledge acquired in the study of resources applied in the learning activities?	4.00
	Was the evaluation carried out based on the rubrics?	3.00
	Was the feedback from the supervising professor provided in a timely and appropriate manner?	2.00
MY opinion on the distance learning course	Is a distance learning course a good option for completing a learning unit?	5.00
	Is the distance learning course flexible and adaptable to learning needs?	3.00
	Does the distance learning course encourage self-study and responsibility for your learning?	3.00
	Is a tutor required during the distance learning course?	4.00
	The distance learning modality should be implemented in your academic program	2.00

*Note:* Prepared by the author, based on the survey results.

## Discussion

Currently, higher education is required to be flexible to strengthen learning processes (UNESCO, 2016). The instructional and technological design of courses collaborates and facilitates the development of intuitive and functional courses to track the learning trajectory through interaction with the environment (Guerra, 2020; Simón et al., 2025). This is evidenced in student opinions, with the average of 4 indicating agreement, denoting that the design facilitated self-regulated learning.

The results indicate that the learning resources and activities, with an average of 4 (agree), demonstrate the importance of a distance learning course being composed of a diversity of resources that allow for autonomous learning, which coincides with Véliz and Gutiérrez (2021). (Simón et al. 2025; Galvis and Carvajal, 2022) point out that instructional design is fundamental and that it should integrate clear and logical learning activities to promote meaningful learning.

A distance learning course will not fulfill its educational purpose without teacher guidance. This guidance is manifested through instructional design and direct interaction with the student using forums. In this sense, we agree with Barráez (2020), who points out that a key factor for student monitoring is the appropriate use of the communication tools integrated into the LMS. The result for the question of whether the instructor provided feedback corresponds to The average of 2 = partially agree , which indicates that emphasis needs to be placed on this area so that the advisor assumes the appropriate role according to the modality.

The students' opinion on the question, whether a faculty advisor is required during the course, presented an average of 4=agree, which shows that the advisor's role is necessary for monitoring students' progress, which is consistent with Riofrío et al. (2025).

According to Vazhaevna and Ivanovna (2021) Attention should be paid to the role that the student plays during a distance learning course, as it requires dedication, organization, and discipline ; therefore, students must be aware of these characteristics and adopt them to achieve educational goals.

Assessment in a distance learning course is relevant for students in order to identify the achievements attained during their learning process. The average opinion was recorded as 3 = neutral, which means that students express uncertainty regarding the assessment carried out by the advisor. We share the view of Realyvázquez et al. (2020), who point out that assessment should transcend the grading system, valuing the performance and educational goals achieved by students . Therefore, the design of the assessment should be reviewed so that, in its implementation, students have clarity

regarding the continuous assessment that will demonstrate their academic performance, which is reflected in a numerical grade.

The opinions on the questions of the distance learning course with an average of 5=totally agree to take distance learning units and an average of 3=partially agree that their curriculum can be distance learning, indicate that they would be in favor of a blended learning approach, which agrees with (Rabia et al. 2023) since he considers that higher education institutions should focus their efforts on the diversification of education.

We agree with Cea and de Vicente (2021) that the non-school-based modality of higher education is increasing, therefore it is recommended to develop distance courses to give flexibility to the academic offer in order to expand it in the short term.

## Conclusions

Research shows that distance learning courses available in an LMS and that have the pedagogical and instructional design are a good option to diversify higher education, since they encourage self-regulation of learning in students.

The success of the course depends on the selection and development of learning resources and activities, as well as the form of assessment that the teacher uses. The author defines these as the guide for student performance. Greater emphasis should be placed on continuous assessment, avoiding purely quantitative evaluation. This goes hand in hand with the teacher's role and performance, who, through the communication channels specified in the instructional design, must provide follow-up and feedback to the student. It is observed that the teacher's guidance must be timely and concise, as students require answers and clarifications regarding the activities and evidence they submit to ensure their learning.

Finally, it is concluded that online programs can be gradually implemented in higher education institutions, developing distance learning courses through the management of best practices such as Scrum and ADDIE, which enable the creation of robust educational products aligned with educational objectives. It is suggested that learning experiences be conducted to raise awareness among the student community of the advantages of this modality, and thus progressively incorporate a face-to-face academic program until it is fully integrated into the distance learning modality.

## Future lines of research

Future lines of research include developing distance learning courses using the presented production process. Promoting the implementation of distance learning courses in higher education programs. Providing flexibility to education by proposing a blended learning model in public sector undergraduate programs, thereby supporting educational diversification.

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